UNIVERSITY OF WYOMING

MEETING OF THE TRUSTEES OF THE UNIVERSITY OF WYOMING

March 26-28, 2025

PUBLIC SESSION REPORT

University of Wyoming

Vision

Use our unique strengths to make Wyoming and the world a better place.

Mission

As Wyoming's university, we unlock the extraordinary in every person through education, research, innovation, engagement, and service.

Values

- Access to an affordable, high-quality education.
- Real-world education where students learn by doing.
- A welcoming and supportive learning community fostered by integrity, inclusivity, freedom of expression, and respect.
- The growth, health, and leadership capacity of all members of the university community.
- Wyoming's wild and working lands as an asset to be utilized, understood, stewarded, and treasured.
- Our partnership and engagement with Wyoming communities in the creation and exchange of knowledge and resources.
- Our role as a catalyst for innovation and economic vitality.

(Accepted January 2023)

UNIVERSITY OF WYOMING

TRUSTEES OF THE UNIVERSITY OF WYOMING
BOARD MEETING AGENDA
Wednesday, March 26 -Friday, March 28, 2025
UW Conference Center
Laramie, Wyoming

UNOFFICIAL MEETING SCHEDULE – COMMITTEE MEETINGS

Wednesday, March 26, 2025
Meeting Location: UW Conference Center
Lunch will be provided to Trustees at the meeting location.

8:00 – 10:00 a.m. – Facilities Contracting Committee
Committee Members: Carol Linton (Chairman)/Mike Greear/Brad LaCroix/Jim Mathis/John McKinley

10:00 a.m. – Noon – Fiscal and Legal Affairs Committee
Committee Members: Brad Bonner (Chairman)/David Fall/ Michelle Sullivan/Mike Greear

11:00 a.m. – 1:00 p.m. – Biennium Budget Committee
Committee Members: Laura Schmid-Pizzato (Chairman)/ Carol Linton/John McKinley/Paul Ulrich/ Tom Walters

1:00 – 3:00 p.m. – Research and Economic Development Committee
Committee Members: David Fall (Chairman)/ Brad Bonner/Brad LaCroix/Paul Ulrich

3:00 – 5:00 p.m. – Academic and Student Affairs Committee
Committee Members: Michelle Sullivan (Chairman)/Brad Bonner/Jim Mathis/Laura Schmid-Pizzato/ Tom Walters

5:00 – 6:00 p.m. – Legislative Relations Committee
Committee Members: John McKinley (Chairman)/Carol Linton/Laura Schmid-Pizzato/Mike Greear/ Tom Walters

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OFFICIAL MEETING SCHEDULE

Thursday, March 27, 2025
Meeting Location: UW Conference Center

7:00-7:45 a.m.	**Informal breakfast at the Holiday Inn**
7:45 a.m.	**Travel to the UW Conference Center for the regular Board meeting**
8:00 – 9:30 a.m.	***Executive Session [Session I]*** **Meeting Location**: **UW Conference Center**
9:30 a.m.	***Break***
9:45 a.m.	***Pledge of Allegiance*** *[Marty Martinez, UW Marna M. Kuehne Foundation Veterans Services Center]*
10:00 a.m.	Introduction: New Trustees (Greear, Ulrich, Walters) – Brown
10:15 a.m.	*Legislative Relations Committee* **–** McKinley (Chairman) o Legislative Recap – Smith
10:30 a.m.	*Facilities Contracting Committee* – Linton (Chairman) o Modifications to UW Regulation 6-4 (Use of University Buildings, Grounds and Services) – Mai/Holland/Evans 8/18
11:00 a.m.	***Public Testimony***
11:15 a.m.	Research Excellence Presentation: Rare Earth Elements and Opportunities for Wyoming – Chitnis/Quillinan/T. Brown 10/36
11:45 a.m.	Update on UW Regulation 2-13 (School of Computing) – Turpen/Mai/Kean ..... 11/77 *[also see Facilities Contracting, and Biennium Budget Committee packets]*
12:00 p.m.	***Lunch with Staff Senate Leadership, UW Conference Center***
1:00 p.m.	Update from University President Ed Seidel

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1:15 p.m. UW Foundation Fundraising Priorities – Seidel/Stark 13/91

1:45: p.m. *Biennium Budget Committee* – Schmid-Pizzato (Chairman)
- Update on Physician Assistant Program – Hardigan/Smith *[see committee packet for information]*

2:00 p.m. Spring Enrollment Census Information – K. Moore…….....14/102

2:15 p.m. Tier I Engineering Progress Report – Wright……15/104

2:45 p.m. ***Break***

3:00 p.m. Roll Call

3:00 – 5:00 p.m. **Trustee Committee Reports** *[see committee packets for information]*

Academic and Student Affairs Committee; Michelle Sullivan (Chairman)

Biennium Budget Committee; Laura Schmid-Pizzato (Chairman)
- UW Business Enterprise Fee Book Proposal for FY26 (per UW Regulation 7-11)

Facilities Contracting Committee; Carol Linton (Chairman)

Fiscal and Legal Affairs Committee; Brad Bonner (Chairman)

Legislative Relations Committee; John McKinley (Chairman)

Research and Economic Development Committee; David Fall (Chairman)

Special Event
Thursday, March 27, 2025

5:30 p.m. Trustee Reception at UW President's Residence [invitation only]

Friday, March 28, 2025

8:00 – 9:30 a.m. ***Executive Session [Session II]***
Meeting Location: UW Conference Center

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9:30 a.m. ***Break***

9:45 a.m. **Business Meeting**
Meeting Location: UW Conference Center

Roll Call

Approval of Board of Trustees Meeting Minutes *(Public Session & Executive Session)*
- February19, 2025, UW Board of Trustees Meetings

Annual Election of Board Officers (effective May 1, 2025) – Brown/McKinley/Linton

Discussion: Trustee Committee Appointments – Brown
- Trustees ad hoc Committee on Private Support sunset
- Trustee Education Initiative Board Appointment

Update: UW President's Comprehensive Evaluation and Timeline – Brown

Trustee Open Discussion on Any Topic

Reports
ASUW – President Kameron Murfitt
Staff Senate – President Adam Comeau
Faculty Senate – Chairman Ray Fertig
Wyoming Community College Commission – Executive Director Ben Moritz

Public Testimony *[Scheduled for Thursday, March 27, 2025, 11:00 a.m.]*

Committee of the Whole
Regular Business
Board Committee Reports *[Scheduled for Thursday, March 27, 2025, at 3:00 p.m.]*

Trustee Committees - *[Note: Committees of the Board will provide reports during the regular work sessions and will not have a formal report to provide during the Business Meeting.]*

Liaison to Other Boards –
- UW Alumni Association Board – Laura Schmid-Pizzato & Jack Tennant
- Foundation Board – Brad Bonner & David Fall
- Haub School of Environment & Natural Resources – Michelle Sullivan

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- Energy Resources Council – Paul Ulrich
- Cowboy Joe – John McKinley

Proposed Items for Action:

I. Contracts, agreements, procurements over $2 million or 10 years in length – Evans
II. Academic Personnel Report – Bagley
III. Non Academic Personnel *[placeholder]*

Information Only Items: *[no action, discussion, or work session]*

- Contracts and Procurement Report (per UW Regulation 7-2) – Evans..... 16/462
- Capital Construction Report – Brown/Mai *[see Facilities Contracting Committee packet]*
- Foundation Monthly Giving Report – Stark *[provided as supplemental]*

New Business

- July 2025 meeting details -- Brown

Date of Next Meeting: April 16, 2025 (video conference)

Adjourn Meeting

AGENDA ITEM TITLE: Discussion of Campus Carry and Approval of Modifications to UW Regulation 6-4 (Use of university Buildings, Grounds, and Services) – Mai/Holland/Evans

SESSION TYPE:
☐ Work Session
☐ Information Session
☐ Other
☒ [Committee of the Whole – Items for Approval]

APPLIES TO STRATEGIC GOALS:
☒ Yes (select below):
- ☐ Institutional Excellence
- ☐ Student Success
- ☒ Service to the State
- ☐ Financial Growth and Stability

☐ No [Regular Business]

☒ *Attachments are provided with the narrative.*

EXECUTIVE SUMMARY:
During the 2024 Wyoming legislative session, the Repeal Gun Free Zones and Preemption Amendments, HB 0125, House Enrolled Act No. 49 (HB 0125), was passed by both houses but vetoed by Governor Gordon on March 22, 2024. The Bill would have specifically permitted that anyone lawfully carrying a concealed weapon to do so at "[a]ny public school, public college or university athletic event taking place on public property that does not sell alcoholic beverages" and "[a]ny public college or university facility." The Bill would have given the legislature preemption of state entities, including the University, to regulate the storage, use, and possession of firearms.

Although the Governor vetoed the bill, his veto memo reinforced his support for the Second Amendment and advocated for "firearm freedom." His veto was not based on an opposition to repealing gun-free zones, but rather that he viewed the legislation as the erosion of local control norms, and "giving sole authority to the legislature to micromanage a constitutionally protected right." He also stated that were the bill enacted, it "would augment the Legislature's reach into local firearms regulation" and extend the separation of powers of the Wyoming Constitution. The Governor called on "school districts, community colleges, and the University [of Wyoming] to take up these difficult conversations again and establish policies that allow for the safe carry of concealed weapons within their facilities."

To comply with the Governor's directive, the University's Board of Trustees reviewed a proposed rule at its November 2024 meeting that would have allowed for concealed carry in University facilities, with certain exclusions. After hearing extensive open comments from the public and University community through a survey, town halls, Q&A sessions, and presentations, the Board voted (6-5) to not modify the total ban of firearms on campus.

However, with the new Campus Carry law passed in February 2025, the University is required to update its policies to come into compliance by July 1, 2025. Attached are proposed modifications to UW Regulation 6-4 (Use of University, Buildings, Grounds, and Services) to address the following:

1) Continue to prohibit open carry of firearms in University facilities;
2) Add reference to carrying a concealed firearm pursuant to Wyo. Stat. §6-8-105;
3) Clarify that the prohibition against dangerous weapons does not apply to the University apartments; and

4) Require the use of a concealed biometric firearms storage container or lock box when the concealed firearm is not being carried and concealed on a person.

Also attached are draft Campus Carry FAQs (information only) that will be provided to campus via the University of Wyoming Police Department website to provide background, context, and education for the University community.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
This topic was last discussed during the November 2024 Board of Trustees Meeting.

WHY THIS ITEM IS BEFORE THE BOARD:
UW Regulation 1-101 requires that the Board approve modifications to UW Regulations.

ACTION REQUIRED AT THIS BOARD MEETING:
Board approval, modification, or disapproval of the recommended modifications to the Regulations.

PROPOSED MOTION:
I move to authorize modifications to UW Regulation 6-4 to comply with the concealed carry of firearms pursuant to Wyo. Stat. §6-8-105, effective July 1, 2025.

PRESIDENT'S RECOMMENDATION:

AGENDA ITEM TITLE: **Rare Earth Elements and Opportunities for Wyoming**, Chitnis, Quillinan, Brown

SESSION TYPE:
☐ Work Session
☒ Information Session
☐ Other
☐ [Committee of the Whole – Items for Approval]

APPLIES TO STRATEGIC GOALS:
☒ Yes (select below):
- ☒ Institutional Excellence
- ☐ Student Success
- ☐ Service to the State
- ☐ Financial Growth and Stability

☐ No [Regular Business]

☒ *Attachments are provided with the narrative.*

EXECUTIVE SUMMARY:
Research Excellence Presentation on Rare Earth Elements and Opportunities for Wyoming by the School of Energy of Resources.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
N/A

WHY THIS ITEM IS BEFORE THE BOARD:
Research Excellence Presentation was requested.

ACTION REQUIRED AT THIS BOARD MEETING:
N/A

PROPOSED MOTION:
N/A

PRESIDENT'S RECOMMENDATION:
N/A

AGENDA ITEM TITLE: **Update on UW Regulation 2-13 Academic Program Reorganization Process (School of Computing)**, Turpen/Mai/Kean

SESSION TYPE:
☐ Work Session
☒ Information Session
☐ Other
☐ [Committee of the Whole – Items for Approval]

APPLIES TO STRATEGIC GOALS:
☒ Yes (select below):
- ☒ Institutional Excellence
- ☒ Student Success
- ☒ Service to the State
- ☐ Financial Growth and Stability

☐ No [Regular Business]

☒ *Attachments are provided with the narrative.*

EXECUTIVE SUMMARY:
In alignment with the Board of Trustees' directive from the January 2025 meeting, the Provost's Office has been actively engaged in the UW Regulation 2-13 process to reorganize the School of Computing (SoC) as an independent academic unit. The Interim Provost will provide an update on the progress, stakeholder engagement, and next steps in the reorganization process.

The School of Computing was established in January 2022 as part of UW's strategic initiative to enhance interdisciplinary computing education and research. It has been an incubated entity within the College of Engineering and Physical Sciences (CEPS) with the long-term plan to become an independent academic unit. Following the Board's directive, the Office of the Provost initiated the UW Regulation 2-13 process to formally evaluate the reorganization of SoC through a memo to Dean Cameron Wright on February 3, 2025.

Following the memo from the Interim Provost, a formal reorganization recommendation was submitted on February 28, 2025, by CEPS Dean Cameron Wright with support from SoC Director Gabrielle Allen. The proposal outlines SoC's administrative, academic, and financial readiness to operate independently. The recommendation ensures that SoC's transition will not negatively impact CEPS operations, as SoC has been financially and administratively independent within CEPS. The Faculty Senate received the proposal for review and feedback on February 28, and a stakeholder survey was launched on March 4 inviting faculty, staff, and stakeholders from CEPS and SoC to assess potential impacts and provide input. This process has involved collaboration with faculty, staff, and administrative leadership within SoC and CEPS, as well as engagement with the Faculty Senate, Budget and Finance Office, and UW Operations.

The Faculty Senate is expected to provide formal feedback by March 26, 2025. The Board's Biennium Budget and Facilities Contracting Committees will review the transition plan in March 2025. A final Board of Trustees decision is expected during the April 2025 conference call with a recommendation from the Interim Provost (the President will not provide a recommendation per his conflict-of-interest management plan). If approved, it will be recommended that the SoC officially transition to an independent unit by July 2025.

The reorganization of the School of Computing as an independent academic unit represents a strategic advancement for UW, positioning the university at the forefront of interdisciplinary computing education and research. The transition is expected to enhance computing initiatives across the university while maintaining strong collaborations with CEPS and other UW entities.

The University of Wyoming is committed to maintaining a fair, transparent, and effective governance system that supports academic and institutional excellence. As part of this commitment, UW Regulation 2-13 establishes a structured process for reviewing academic programs, reorganizing departments, and making data-driven decisions about low-producing programs. This regulation ensures that these decisions are based on well-defined criteria, including enrollment trends, financial sustainability, and contributions to the university's strategic goals. Recent reviews under UW Regulation have included annual low-producing program reviews that result in the discontinuation or consolidation of programs and the reorganization of the Biodiversity Institute to the Haub School of Environment of Natural Resources. UW Regulation 2-13 provides clear guidelines that ensure program reviews and reorganizations are conducted based on established metrics and that academic programs are aligned with the university's long-term goals.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
In January 2025, the Board of Trustees directed the Provost's Office to initiate UW Regulation 2-13 to recommend the reorganization of the College of Engineering and Physical Sciences to establish the School of Computing as an independent unit in the organizational structure of the University of Wyoming.

WHY THIS ITEM IS BEFORE THE BOARD:
Requested update on the progress of CEPS/SoC reorganization.

ACTION REQUIRED AT THIS BOARD MEETING: N/A. Information only.

PROPOSED MOTION: N/A. Information only.

PRESIDENT'S RECOMMENDATION:

AGENDA ITEM TITLE: <u>Annual UW Foundation Fundraising Priorities</u>, Seidel/Stark

SESSION TYPE:
☐ Work Session
☒ Information Session
☐ Other
☐ [Committee of the Whole – Items for Approval]

APPLIES TO STRATEGIC GOALS:
☒ Yes (select below):
- ☒ Institutional Excellence
- ☒ Student Success
- ☒ Service to the State
- ☒ Financial Growth and Stability

☐ No [Regular Business]

☒ *Attachments are provided with the narrative.*

EXECUTIVE SUMMARY:
As part of the regular reporting process to the UW Board of Trustees on philanthropy, the university and the UW Foundation will present a review of FY 25 fundraising priorities and major accomplishments to date. Anticipating that President Seidel and the UW Foundation will seek the Board's approval to enter a comprehensive campaign in July 2025, this presentation demonstrates how UW and the UW Foundation have built momentum for existing priorities and how planning is progressing for a potential comprehensive campaign. The proposed FY 26 fundraising priorities will be presented in July 2025 along with the request to enter into a comprehensive campaign.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
This topic was last addressed during the July 2024 Board of Trustees Meeting.

WHY THIS ITEM IS BEFORE THE BOARD:
This reporting is part of the Trustees' Annual Schedule of Items to Approve, Discuss or Report and the MOA between UW and the UW Foundation.

ACTION REQUIRED AT THIS BOARD MEETING:
N/A

PROPOSED MOTION:
N/A

PRESIDENT'S RECOMMENDATION:
N/A

AGENDA ITEM TITLE: 2025 Spring Census Enrollment Update, Moore K.

SESSION TYPE:
☐ Work Session
☐ Education Session
☒ Information Item
☐ Other:
[Committee of the Whole – Items for Approval]

APPLIES TO STRATEGIC PLAN:
☒ Yes (select below):
- ☐ Driving Excellence
- ☒ Inspiring Students
- ☐ Impacting Communities
- ☐ High-Performing University

☐ No [Regular Business]

☒ *Attachments are provided with the narrative.*

EXECUTIVE SUMMARY:
Enrollment numbers are considered final as of the 15th class day of each Fall and Spring semester. The 15th class day of the Fall and Spring semesters, known as the "Census" date, is used to report final enrollments to federal and state agencies and is regarded as the official enrollment figures for the term.

Spring 2025 numbers reflect the census date of February 5th, 2025. Numbers reported include:

- First Year Students
  - Resident/Non-Resident
- Transfer Students
  - Resident/Non-Resident
- Graduate/Professional
- Student Credit Hours (SCHs)
  - Resident/Non-Resident
- Total Enrollment

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
This information is reported each semester.

WHY THIS ITEM IS BEFORE THE BOARD:
To keep the UW Board of Trustees up to date on enrollment figures.

ACTION REQUIRED AT THIS BOARD MEETING:
N/A

PROPOSED MOTION:
N/A

PRESIDENT'S RECOMMENDATION:
N/A

AGENDA ITEM TITLE: **Tier-1 Engineering Initiative Goals Status Report**, Wright

SESSION TYPE:
☐ Work Session
☐ Information Session
☒ Other
☐ [Committee of the Whole – Items for Approval]

APPLIES TO STRATEGIC GOALS:
☒ Yes (select below):
- ☒ Institutional Excellence
- ☒ Student Success
- ☒ Service to the State
- ☒ Financial Growth and Stability

☐ No [Regular Business]

☒ *Attachments are provided with the narrative.*

EXECUTIVE SUMMARY:
The Tier-1 Engineering Initiative (EI), a joint effort between UW, the Wyoming Legislature, Governor's Office and other critical stakeholders, seeks to advance UW's capacity and status in engineering and related fields, including attaining Carnegie R1 status. Original Tier-1 EI documents from 2013 and 2014 described a set of goals to which the college should aspire. Funding for the Tier-1 EI was first provided by the legislature in 2015. This report provides a status on the Tier-1 EI goals as of March 2025. The report's main text provides background and a short discussion for each goal. Multiple appendices are provided to back up and extend the discussion in the main text. Considerable progress has been made in nearly all the original goals, spanning academic programs, student success, research activity, fund raising, outreach, and facilities.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
An update on the Tier 1 Engineering Initiative was last presented to the Board in November 2024.

WHY THIS ITEM IS BEFORE THE BOARD:
This item was requested at the January 2025 meeting to be provided at the March 2025 meeting.

ACTION REQUIRED AT THIS BOARD MEETING:
None.

PROPOSED MOTION:
None.

PRESIDENT'S RECOMMENDATION:
NA.

AGENDA ITEM TITLE: **Service Contract and Procurement Reports**, Evans

SESSION TYPE:
☐ Work Session
☐ Information Session
☒ Other
☐ [Committee of the Whole – Items for Approval]

APPLIES TO STRATEGIC GOALS:
☐ Yes (select below):
- ☐ Institutional Excellence
- ☐ Student Success
- ☐ Service to the State
- ☐ Financial Growth and Stability

☒ No [Regular Business]

☐ *Attachments are provided with the narrative.*

EXECUTIVE SUMMARY:
Per UW Regulation 7-2 (Signature Authority), unless otherwise limited by UW Regulation or reserved by the Board of Trustees, the President shall have authority to approve and/or sign University contracts, federal contracts, agreements, memorandums of understanding, and procurements that involve an external party, require consideration (paid or received) valued less than $2,000,000 (one-time or in aggregate), and for which the term is less than ten years. The President may delegate this authority to University Officers for such contracts, federal contracts, agreements, memorandums of understanding, and procurements that require consideration (paid or received) valued less than $1,000,000 (one-time or in aggregate) and for which the term is less than five years.

As required by the Regulation, attached are the following reports:

1) Service Contracts (including contracts, federal contracts, agreements, and memorandums of understanding) valued at $50,000 or above (one-time or in aggregate) from December 16, 2024 – February 15, 2025

2) Procurements valued at $50,000 or above (one-time or in aggregate) from December 16, 2024 - February 15, 2025

Service contract workflow
Per the University's Standard Policy and Procedure (Signature Authority), the President can delegate signature authority to University officers for service contracts valued less than $1,000,000 (one-time or in aggregate) and for which the term is less than five years.

Procurement workflow
Cost Center Managers (business manager level or designee) approve all purchases, and are the final approvers for purchases of $99,999 or less. Deans/Associate Vice Presidents are the final approvers for purchases between $100,000 and $499,999. Vice Presidents are the final approvers for purchases between $500,000 and $999,999. The President is the final approver for purchases between $1,000,000 and $1,999,999. The Board of Trustees approves purchases of $2,000,000 and above.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
Standing information item at each in-person Board of Trustees meeting.

WHY THIS ITEM IS BEFORE THE BOARD:
Per UW Regulation 7-2 (Signature Authority), at each regular meeting of the Board of Trustees (excluding conference calls), the President shall provide a written report to the Board of Trustees identifying each contract, federal contract, agreement, memorandum of understanding, or procurement valued at $50,000 or above (one-time or in aggregate) signed by the President or designee under this provision.

ACTION REQUIRED AT THIS BOARD MEETING:
N/A. Information Only.

PROPOSED MOTION:
N/A. Information Only.

PRESIDENT'S RECOMMENDATION:
N/A. Information Only.

AGENDA ITEM TITLE: **Discussion of Campus Carry and Approval of Modifications to UW Regulation 6-4 (Use of university Buildings, Grounds, and Services)** – Mai/Holland/Evans

Modifications effective July 1, 2025

UNIVERSITY OF WYOMING REGULATIONS

Subject: Use of University Buildings, Grounds and Services
Number: UW Regulation 6-4

I. POLICY

It is the policy of the University of Wyoming to permit the use of University buildings and grounds and equipment by internal and external users, as defined within this policy, if such use is consistent with the University's primary purposes, i.e. instruction, research and public service. The University retains the right to determine which activities are consistent with its primary purposes.

II. TYPES OF USE

A. Internal vs. External Users. The types of uses permitted may depend on whether the person seeking to use the space is considered an "internal" user or an "external" user. Categorization of whether one is an "internal" or "external" user under this Regulation is solely determined by the University.

1. "Internal users" include: Academic or administrative departments or units of the University; Student organizations recognized by the University pursuant to UW Regulation 11-4; Faculty and staff of the University, active or retired; Organizations formally affiliated with the University, such as the University of Wyoming Foundation and University of Wyoming Alumni Association.

2. "External users" include persons, entities or organizations other than those defined as "internal users," whose activities are consistent with the University's primary purposes.

B. Use of Assigned Space for UW Colleges and Departments. University buildings and space assigned or reassigned to deans of individual colleges or to administrative officers of other individual units shall be used exclusively for University instructional, research and service functions, or for purposes authorized in this Regulation. UW Regulation 6-7 sets forth the process for reallocation or change in assigned spaces.

C. Use by Internal Users for non-University Purposes. University buildings and grounds and equipment shall not be used by an internal user for personal or private purposes unrelated to University purposes. Internal users who are using University buildings or grounds or equipment as a private citizen may have use of said

buildings, grounds or equipment as an external user but only in accordance with the procedures set forth in this Regulation. Use of University buildings and equipment by internal users for outside consulting is permitted only in accordance with Presidential Directive 2-1996-1 and the applicable policies set forth by Academic Affairs.

D. **Emergencies.** University buildings and grounds may be used during a natural disaster or state or local emergency when authorized by the President or President's designee, as specified in any applicable Memorandums of Understanding or contracts with other entities, or as set forth in Wyoming or Federal law.

E. **Signs, Posters, Banners and Fliers.** The time, place, and manner of free expression activities may be regulated to prevent unreasonable interference or conflict with the educational, research, housing, or other legitimate functions of the University, including the normal use by others of public areas. Similarly, the University must preserve the visual integrity of campus by providing a framework for planning and displaying temporary posters, signs and banners to ensure their usefulness and effectiveness, while minimizing visual clutter, litter, potential damage to property, disruption of campus operations, and unnecessary costs.

External users who seek to publicize activities or advertise events as described in this section may only use specifically designated University spaces or locations, and must seek advanced written approval by the Vice President of Administration in consultation with the applicable departmental office. Solicitation or the posting of handbills without University approval is strictly prohibited.

F. **Prohibited Uses By External Users.** The University shall not, except by written authorization of the President of the University, or designee, make University buildings and grounds available to external users for the following uses or activities:

1. Any interests operated primarily for profit, such as but not limited to private, personal or commercial interests;

2. Political campaigning by, or for, candidates who have filed for public office; and

3. Political campaigning for ballot measures.

G. **Filming and Photography.** Use of University buildings and grounds for filming and photography is permitted in accordance with the UW Filming and Photography Policy as posted on the University of Wyoming Division of Administration website.

Modifications effective July 1, 2025

III. SCHEDULING

A. The following process and rules apply to use of University buildings and grounds, as applicable, by internal users:

1. Use of University buildings and grounds, as applicable, must be scheduled in accordance with all applicable University Regulations and policies, including but not limited to the process and procedures set forth in the Central Scheduling Policy posted on the University Central Scheduling website.

2. Normal operating hours of administrative and academic department offices are 8:00 a.m. to 5:00 p.m., Monday through Friday. Summer operating hours of administrative and academic department offices are 7:30 a.m. to 4:30 p.m., Monday through Friday. Individual departments and units may also set their individual normal operating hours outside of those listed above as defined by that department or unit.

IV. FEES

A. Users may be assessed fees, charges and/or deposits for use of University buildings and/or grounds, as set forth in the University Fee Book or applicable Presidential Directives.

B. Any request for a reduction or waiver of any portion, or all, of a fee, charge or deposit shall be submitted to the Vice President for Administration, who shall make the final determination.

V. ALTERATIONS OR IMPROVEMENTS

Internal and external users are expressly prohibited from making any alterations or improvements or performing maintenance to University buildings or grounds. All construction, alterations, improvements or maintenance to University buildings or grounds shall be performed exclusively by, or through, UW Operations. All alterations or improvements or maintenance shall be requested through UW Operations in the process set forth on the UW Operations website. University departments, employees or offices authorizing or permitting any alterations or improvements to University facilities in violation of this directive shall be responsible for all subsequent costs resulting from such unauthorized alterations or improvements.

VI. CONDITIONS OF USE

All persons or groups, whether internal or external, using University buildings, grounds or equipment shall follow all University Regulations and applicable city, county, state or

federal ordinances and statutes. In addition, the following conditions apply to all use of University buildings and grounds and equipment:

A. **Access to Public versus non-public areas of the University**. University faculty, administrative and staff personnel, and students are permitted access to public areas of the University and, when engaged in a University-authorized or assigned activity, to non-public areas of the University. Members of the general public who are not University employees or students are permitted access to the public areas of the University, provided such access is consistent this Regulation. Members of the general public who are not University faculty or administrative or staff personnel or students are prohibited from use of non-public areas of the University, except upon authorization of the person-in-charge.

B. **Animals.** University employees, students, and members of the general public are prohibited from bringing any animal, including but not limited to, dogs, cats and birds, into University buildings. However, animals are permitted in University buildings as follows:

1. Individuals with disabilities who are accompanied by a service animal as defined by the Americans with Disabilities Act; or

2. Individuals with disabilities who have been approved by the University to have an emotional support or assistance animal while they are in their University-owned or leased housing facility as provided by the Fair Housing Act; or

3. Individuals who are engaged in an authorized University instructional, research, public service or athletic activity requiring the presence of animals; or

4. Individuals who reside in University housing facilities that have been specifically designated by the University as pet friendly. The Vice President for Students Affairs, or designee, is responsible for establishing and administering policies and procedures governing the Pet Friendly Housing Policy.

The University reserves the right to remove or require the removal of any animal that poses a direct threat to the health or safety of others, is not housebroken, is in violation of any University policy, or otherwise disrupts the use of campus grounds or facilities.

C. **Bicycles, motorcycles, mopeds, scooters, skateboards, and roller skates.** University employees, students, and members of the general public are prohibited from operating, using, or storing any bicycles, motorcycles, mopeds, scooters, skateboards, roller skates or other similar devices in a University building, except when expressly permitted by the Vice President for Administration or designee.

Modifications effective July 1, 2025

Use of bicycles and non-motorized vehicles is subject to the parameters set forth in UW Regulation 6-5.

D. **Dangerous weapons.** No dangerous weapon may be stored or carried in or upon University facilities. Any person carrying a dangerous weapon in a University facility is required to relinquish the weapon to the UW Police Department voluntarily or upon request. The weapon will be returned when the person leaves the University facility, unless the UW Police Department determines that the weapon should be retained in an investigation. If a person carrying a dangerous weapon refuses to relinquish the weapon, the person shall be denied access to University facilities. Nothing in this paragraph prevents the carrying or storing of weapons for the following reasons: (1) by authorized Peace Officers as defined and authorized by Wyoming Statutes; (2) by individuals directly transporting weapons to and from the weapons storage facility; (3) by individuals carrying a concealed firearm pursuant to Wyo. Stat. §6-8-105; (4) by individuals in a University apartment; or (~~3~~5) ~~pursuant to~~by individuals engaged in official University business ~~and~~ or University-approved activities~~, including activities conducted by ROTC cadets under the direct and immediate supervision of ROTC faculty members, activities conducted by registered student organizations with the written permission of the Vice President for Student Affairs; and other University activities~~ with the written permission of the responsible vice president and the UW Chief of Police.

If a concealed firearm is not being carried and concealed on a person, the firearm must be stored in a concealed biometric firearm storage container or a lock box within the individual's direct control at all times. Firearms storage container or lock box is defined as a locked, hard-sided safe, gun case, or similar secure device designed specifically for storing firearms when not in use. For the purpose of this Regulation, direct control of a firearm storage container or a lock box refers to the authority and ability to access it, even if it is not in the individual's immediate physical possession at all times. This means the individual must retain control over the key, combination, or other access mechanisms to ensure that only authorized individuals can open or use the lock box. Additionally, the firearm storage container or a lock box must be securely placed and protected to prevent unauthorized access, theft, or misuse, allowing the individual to maintain control and oversight.

University students, faculty, and staff may be subject to disciplinary action for violation of this ~~paragraph~~section, up to and including termination. All persons violating this ~~paragraph~~ section may also be subject to criminal sanctions in accordance with Wyoming law.

E. **Equipment and Services.** Internal and external users authorized to use University buildings are required, except as otherwise authorized by the Vice President for Administration or designee, to utilize University services and equipment when using University buildings. The University may impose reasonable restrictions on

the use of such services and equipment when such restrictions are necessary to avoid interruption of the University's primary functions.

F. **Right to reassign or substitute Buildings or Grounds.** The University reserves the right to impose such requirements on the use of University buildings and grounds as it may deem necessary and reasonable and reserves the right to reassign or substitute buildings or grounds as available and in the best interests of the University.

G. **Sound amplification.** Sound amplification is permitted at all times in University buildings and on University grounds during the hours of 11:45 a.m. to 1:00 p.m. and 5:00 p.m. to 6:00 p.m., provided that the written authorization for the event, indoors or outdoors, includes approval for an internal or external user to use sound amplification. The University may grant exceptions to this directive through the Vice President for Administration or designee.

VII. SANCTIONS

Failure of an internal or external user to comply with the provisions of this Regulation may, at the University's sole discretion, result in a cancellation of authorization to use University buildings, grounds or equipment, in a loss of scheduling privileges, or in disciplinary sanctions pursuant to UW Regulations and policies.

VIII. ADMINISTRATION

The Vice President for Administration, or designee, is the University administrative officer responsible for the implementation of this Regulation.

Modifications effective July 1, 2025

Responsible Division/Unit: Division of Finance & Administration, Division of Governmental Relations & Operations

Source: Repeal Gun Free Zones and Preemption Amendments, HB 0172, House Enrolled Act No. 24 (2025)~~None~~

Links: http://www.uwyo.edu/regs-policies

Associated Regulations, Policies, and Forms: Appendix to UW Regulation 6-4 (Definitions); Service and Assistance Animals for Individuals with Disabilities at the University of Wyoming

History:
University Regulation 178, Revision 2; adopted 7/17/2008 Board of Trustees meeting
Revisions adopted 9/12/2014 Board of Trustees meeting
Revisions adopted 6/15/2016 Board of Trustees meeting
Revisions adopted 11/18/2016 Board of Trustees meeting
Reformatted 7/1/2018: previously UW Regulation 2-178, now UW Regulation 6-4
Revisions adopted 6/16/2021 Board of Trustees meeting

University of Wyoming Campus Carry FAQs

Constitutional Concealed Carry

Can anyone in Wyoming carry a concealed handgun?
Generally, yes. Wyo. Stat. § 6-8-104(a)(iv) allows for "permit-less carry" or "constitutional carry," meaning a person without a valid permit may still carry a concealed firearm in Wyoming as long as they would otherwise qualify for a permit or they possess a concealed carry permit issued by a state with reciprocity for concealed carry permits. However, pursuant to Wyo. Stat. § 6-8-105, in most instances you must have a permit to concealed carry a handgun in University facilities.

Does "Constitutional Carry" affect the carrying of a handgun at the University of Wyoming?
No. The law allows only Wyoming-issued permit holders to carry a concealed handgun in University facilities, and only on some parts of campus (see below for exclusions).

Open Carry

Can anyone carry a handgun openly in Wyoming?
Yes, but not in University facilities. Wyo. Stat. § 6-8-401 states that "the right to keep and bear arms is a fundamental right. The Wyoming legislature affirms this right as a constitutionally protected right in every part of Wyoming." Additionally, the statute clarifies that only the "state legislature" can regulate the "sale, transfer, purchase, delivery, taxation, manufacture, ownership, transportation, storage, use and possession of firearms, weapons, and ammunition."

Does Wyoming's "Open Carry" law allow the open carry of a firearm in University facilities?
No. During the 2025 Wyoming legislative session, the Repeal Gun Free Zones and Preemption Amendments, HB 0172, House Enrolled Act No. 24, was passed by both houses. This new law allows concealed carry on the University campus but authorizes the University to prohibit the open carry of firearms in its facilities or on its campus. See Wyo. Stat. § 6-8-105(d)(iii) effective July 1, 2025. UW Regulation 6-4 prohibits the open carry of firearms specifically in its facilities.

Concealed "Campus Carry"

General/About the Law

Which states have similar campus carry laws as Wyoming?
Nine other states have statutes that require over 300 public colleges and universities to allow campus carry, including Arkansas, Georgia, Idaho, Kansas, Mississippi, Texas, Utah, West Virgina, and Wisconsin. [*South Dakota has passed a bill, waiting on Governor's signature (would add 13 schools). Arizona has a bill being debated in the current session (would add 25 schools).]*

What is Wyoming's "Campus Carry" law?
"Campus Carry" is the common name for the law that authorizes a permit holder to carry a concealed handgun at institutions of higher education in Wyoming. Campus carry was authorized by the Repeal Gun Free Zones and Preemption Amendments, HB 0172, House Enrolled Act No. 24 (2025), which is codified as Wyo. Stat. §6-8-105.

Does the Campus Carry law allow everyone to carry a concealed weapon at the University?
No. The law does not grant a universal right to carry a concealed weapon on campus. The law allows only Wyoming-issued permit holders to carry a concealed handgun, and only on some parts of campus (see below for exclusions).

What is required for a person to be eligible for a concealed carry permit in Wyoming?
Generally, an applicant must meet nine distinct standards to receive a concealed carry permit in Wyoming: (1) has been a legal resident of Wyoming for six months prior to application; (2) is at least 21 years of age; (3) does not suffer from a physical infirmity which prevents the safe handling of a firearm; (4) is not ineligible to possess a firearm pursuant to 18 U.S.C. section 922(g) (prohibits the possession of a firearm by convicted felons, fugitives, users of controlled substances, those adjudicated mentally defective, illegal aliens, dishonorably discharged veterans, those who have renounced their U.S. citizenship, and those under a court order relating to, or having been convicted of domestic violence) or Wyo. Stat. 6-8-102 (criminalizes the use or possession of a firearm by convicted felons in Wyoming); (5) has not been committed to a state of federal facility for the abuse of a controlled substance within one year prior to application, or has not have been convicted of certain felonies or misdemeanors under the Wyoming Controlled Substances act or similar laws or other states or the United States; (6) does not chronically or habitually use alcoholic liquor and malt beverages to the extent that normal faculties are impaired; (7) demonstrates familiarity with a firearm; (8) is not currently adjudicated to be legally incompetent; and (9) has not been committed to a mental institution.

Applicants for a concealed carry permit in Wyoming must demonstrate familiarity with a handgun by taking and satisfactorily completing a handgun use and safety course taught by a qualified instructor. (Exemptions from parts of this requirement exist for certain applicants, such as those with applicable military service.)

Please refer to Wyo. Stat. §6-8-104 for exact eligibility requirements.

What does it mean to have a concealed carry permit?
Wyoming state law permits eligible persons to apply for and receive a permit to carry a concealed handgun on their person.

What weapons are covered under the concealed carry permit?
The statute covers only handguns. A handgun is any pistol, revolver or derringer, designed to be fired by the use of a single hand. Other weapons — rifles or shotguns — are not permitted in University facilities but can be stored at the University of Wyoming Police Department (UWPD).

If Wyoming has reciprocity with another state and that state allows concealed carry at age 18, can a concealed carry holder from the other state who is younger than 21 carry a handgun in Wyoming?
Yes. Under Wyoming's current law, if you are a permit holder from another state, your permit is valid statewide, and your state recognizes (or honors) Wyoming permits, you can generally carry a concealed firearm in Wyoming. However, for purposes of Campus Carry, this would not permit that individual to carry in University facilities since it is not a Wyoming-issued permit.

Implementation

What process did the University use to establish institution-specific policies for the carry of concealed handguns on campus?
During the 2024 Wyoming legislative session, the Repeal Gun Free Zones and Preemption Amendments, HB 0125, House Enrolled Act No. 49 (HB 0125), was passed by both houses but vetoed by Governor Gordon on March 22, 2024. The Bill would have specifically permitted that anyone lawfully carrying a concealed weapon to do so at "[a]ny public school, public college or university athletic event taking place on public property that does not sell alcoholic beverages" and "[a]ny public college or university facility." The Bill would have given the legislature preemption of state entities, including the University, to regulate the storage, use, and possession of firearms.

Although the Governor vetoed the bill, his veto memo reinforced his support for the Second Amendment and advocated for "firearm freedom." His veto was not based on an opposition to repealing gun-free zones, but rather that he viewed the legislation as the erosion of local control norms, and "giving sole authority to the legislature to micromanage a constitutionally protected right." He also stated that were the bill enacted, it "would augment the Legislature's reach into local firearms regulation" and extend the separation of powers of the Wyoming Constitution. The Governor called on "school districts, community colleges, and the University [of Wyoming] to take up these difficult conversations again and establish policies that allow for the safe carry of concealed weapons within their facilities."

To comply with the Governor's directive, the University's Board of Trustees reviewed a proposed rule at its November 2024 meeting that would have allowed for concealed carry in University facilities, with certain exclusions. After hearing extensive open comments from the public and University community through a survey, town halls, Q&A sessions, and presentations, the Board voted (6-5) to not modify the total ban of firearms on campus.

However, with the new Campus Carry law passed in February 2025, the University is required to update its policies to come into compliance by July 1, 2025.

Will the University continue to monitor the implementation of the Campus Carry law?
Yes, the University will monitor its impact on faculty, staff, students, and visitors.

Can the University establish a policy that prevents Wyoming concealed carry permit holders from bringing their handguns in University facilities?
No. The University may only adopt policies consistent with the law.

Exclusion Zones

Are there any places where a concealed carry permit holder cannot carry a concealed handgun?
Yes. Wyoming state law prohibits handguns and other weapons in certain places, including the following:

- Any facility used primarily for law enforcement operations or administration without consent of the chief administrator;
- Any detention facility, prison, or jail;
- Any courtroom, except that nothing shall preclude a judge from carrying a concealed weapon or determining who will carry a concealed weapon in the courtroom;
- Any portion of an establishment licensed to dispense alcoholic liquor and malt beverages for consumption on the premises, which portion of the establishment is primarily devoted to that purpose;
- Within state agency operated health and human services settings, health and human services facilities that are exempt from licensure or licensed by the department of family services, or department of corrections or health and human services facilities that are certified by the behavioral health division of the department of health to provide residential services; and
- Within any facility where explosive or volatile materials are present. This does not include materials that are either an insufficient amount or in a form such that the material could not reasonably cause bodily injury due to the material's explosive or volatile nature.

See below for the list of University facilities and premises where a concealed carry permit holder cannot carry a concealed handgun.

Are concealed handguns permitted in health service settings?
No. The concealed carry of handguns is prohibited in health service settings, including those areas in which professional mental health services are provided. See below for the list of University facilities where a concealed carry permit holder cannot carry a concealed handgun. It is advised that you check in advance regarding the status of the area you will be visiting to make sure that handguns are not excluded from the location.

In an emergency, health service staff may call UWPD to hold the handgun for safekeeping.

Are concealed handguns permitted in residence halls?
Yes, if you are at least 21 years of age (or 18 with consent from the appropriate sheriff) and have a Wyoming-issued concealed carry permit; however, the handgun must be secured in a biometric firearms storage container or a lock box within your direct control if it cannot be secured on your person (for example, while you are sleeping, changing, taking a shower, etc.). Firearms storage

container or lock box is defined as a locked, hard-sided safe, gun case, or similar secure device designed specifically for storing firearms when not in use. Direct control of a firearm storage container or a lock box refers to the authority and ability to access it, even if it is not in the individual's immediate physical possession at all times. This means the individual must retain control over the key, combination, or other access mechanisms to ensure that only authorized individuals can open or use the lock box. Additionally, the firearm storage container or a lock box must be securely placed and protected to prevent unauthorized access, theft, or misuse, allowing the individual to maintain control and oversight. Firearm storage containers may be bought locally at sporting goods stores or through online retailers.

Are concealed handguns permitted in University apartments?
Yes. The University does not regulate the lawful carrying or storage of firearms in University apartments.

Are concealed handguns permitted in Half Acre?
Yes, but only in certain areas. The concealed carry of handguns is prohibited in athletic training service areas and the Wellness Center at Half Acre. Concealed handguns are allowed in the remaining areas (with a Wyoming-issued permit) but must be secured in a biometric firearms storage container or a lock box within your direct control if it cannot be secured on your person (for example, while you are climbing, swimming, dancing, working out, changing, taking a shower, etc.). Firearms storage container or lock box is defined as a locked, hard-sided safe, gun case, or similar secure device designed specifically for storing firearms when not in use. Direct control of a firearm storage container or a lock box refers to the authority and ability to access it, even if it is not in the individual's immediate physical possession at all times. This means the individual must retain control over the key, combination, or other access mechanisms to ensure that only authorized individuals can open or use the lock box. Additionally, the firearm storage container or a lock box must be securely placed and protected to prevent unauthorized access, theft, or misuse, allowing the individual to maintain control and oversight. Firearm storage containers may be bought locally at sporting goods stores or through online retailers.

Are concealed handguns permitted at University-sponsored events, on University Outdoor Program trips, on class field trips, and in undergraduate or graduate fieldwork?
Likely, yes. The Campus Carry law only applies to University-owned facilities, not University grounds or activities. If the event, trip, or fieldwork is not in a University-facility or is off campus, then Wyo. Stat. § 6-8-104 allows any person with a valid permit or without a valid permit to carry a concealed firearm in Wyoming as long as they would otherwise qualify for a permit or they possess a concealed carry permit issued by a state with reciprocity for concealed carry permits. It is the responsibility of the concealed carry permit holder to know and understand the concealed carry laws of the location or facility where the event, trip, or fieldwork is taking place.

Are concealed handguns permitted in University vehicles?
Likely, yes. The Campus Carry law only applies to University-owned facilities, not University vehicles. Wyo. Stat. § 6-8-104 allows any person with a valid permit or without a valid permit to carry a concealed firearm in Wyoming as long as they would otherwise qualify for a permit or they possess a concealed carry permit issued by a state with reciprocity for concealed carry permits.

It is the responsibility of the concealed carry permit holder to know and understand the concealed carry laws of the location where a University vehicle is parked, travelling, or positioned.

Are concealed handguns permitted at UW Casper?
Likely, yes. The University leases space from Casper College to provide opportunities for students to earn University baccalaureate and master's degrees, certificates, and professional development credit. The new Campus Carry law applies broadly to any public college or University facility. It is the responsibility of the concealed carry permit holder to know and understand the concealed carry rules of any Casper College facility.

Are concealed handguns permitted at University Extension offices or Research and Extension Centers throughout the state of Wyoming?
Maybe. If the University owns the facility, then the Campus Carry law applies and Wyoming-issued permit holders may carry a concealed handgun (see below for exclusions). If the University does not own the facility, then the facility's concealed carry rules shall apply. It is the responsibility of the concealed carry permit holder to know and understand the concealed carry rules of the facility.

For employees who carry, what should they do if they work in a facility where concealed carry is permitted, but have meetings in excluded areas?
It is advised that you check in advance regarding the status of the area you will be visiting to make sure that handguns are not excluded from the location. You may use your normal work breaks, including lunch, if necessary, to store your gun at the UW Police Department (UWPD), in your car, at a location off campus, or within a concealed biometric firearms storage container or a lock box within your direct control. Firearms storage container or lock box is defined as a locked, hard-sided safe, gun case, or similar secure device designed specifically for storing firearms when not in use. Direct control of a firearm storage container or a lock box refers to the authority and ability to access it, even if it is not in the individual's immediate physical possession at all times. This means the individual must retain control over the key, combination, or other access mechanisms to ensure that only authorized individuals can open or use the lock box. Additionally, the firearm storage container or a lock box must be securely placed and protected to prevent unauthorized access, theft, or misuse, allowing the individual to maintain control and oversight. Firearm storage containers may be bought locally at sporting goods stores or through online retailers.

Safety

What should I do if I see a handgun or any other type of weapon on campus?
Call the UW Police Department (UWPD) (307-766-5179) or 911. A concealed carry permit holder is required to keep the handgun out of sight. While brief, inadvertent exposure of a concealed handgun, including transfer of a handgun from a permit holder's person to a firearm storage container and the imprint of a handgun under a permit holder's clothes, may not rise to a violation of the law or University policy, if you see a person on campus with a weapon, you can help with campus safety by alerting police about suspicious activity.

Can I carry a concealed handgun in my backpack or purse?
Yes, as long as it is properly concealed.

Is there any safety training for what I should do in an active shooter situation?
The UW Police Department (UWPD) encourages all faculty, staff, and students to view the "Run, Hide, Fight" active shooter training video. UWPD will provide additional training specific to the University of Wyoming and a module in HCM/WyoLearn for new employee onboarding, annual refresher, and on-demand training.

Faculty FAQs

General Information

What do I do if I see a handgun in my classroom or on campus?
If you see a gun, call the UW Police Department (UWPD) (307-766-5179) or 911.

Campus carry requires that handguns remain concealed at all times with no exceptions. While brief, inadvertent exposure of a concealed handgun, including transfer of a handgun from a permit holder's person to a firearm storage container and the imprint of a handgun under a permit holder's clothes, may not rise to a violation of the law or University policy, if you see a person on campus with a weapon, you can help with campus safety by alerting police about suspicious activity.

Notify law enforcement via 911 or UWPD (307-766-517), and UWPD will arrive and assess the situation. Persons who violate these laws and policies are subject to penalties and fines in addition to disciplinary action imposed by the University.

If your class is in a location where your cell phone does not get reception, identify the nearest location you can make a call at the beginning of the semester so you know where to go, if needed. If you have a teaching assistant, have them leave and find the best place to call UWPD (307-766-5179) or 911.

Do faculty have a right to know if students are carrying a gun in class?
No. Even if a faculty member were to ask, the concealed carry permit holder is not required to respond. Under Wyoming law, only law enforcement can verify whether a person is carrying and has a concealed carry permit.

What areas of campus are excluded?
The concealed carry of handguns is prohibited in the following University facilities and premises:

- Any athletic event where alcohol is currently being served, including but not limited to:
  - Arena Auditorium
  - Hansen Arena
  - War Memorial Stadium

Event includes competition, contest, game, practice, or pre-event activities. For the avoidance of doubt, this exclusion does not include athletic areas at times when alcohol is not being served (e.g., if there is no event or activity taking place where alcohol is being served, then handguns are allowed if the holder has a Wyoming-issued concealed carry permit).

- Any portion of an establishment licensed to dispense alcoholic liquor and malt beverages for consumption on the premises, which portion of the establishment is primarily devoted to that purpose, including but not limited to:
    - Within the designated area of Pokes Pub in the Wyoming Union
    - University events where alcohol is being served (and only in that portion of the building)

- Within state agency operated health and human services settings, including but not limited to:
    - Athletic Department Sports Medicine and Student-Athlete Well-Being Facilities
    - Athletic Training Services and Wellness Center at Half Acre
    - Education Health Center of Wyoming: Family Medicine Residency Centers in Casper and Cheyenne and the Albany Community Health Clinic in Laramie
    - Mountain View Medical Plaza
    - Psychology Center
    - Speech, Hearing, and Telepractice Clinic
    - Student Health Service and the Campus Pharmacy
    - University Counseling Center
    - Wellspring Counseling Clinic

- Within state agency health and human services facilities that are exempt from licensure or licensed by the department of family services, including but not limited to:
    - Early Care and Education Center (ECEC)

- Within any facility where explosive or volatile materials are present:
    - Chemical stock rooms
    - Regulated Materials Management Center (RMMC)
    - Portions of the Wyoming State Veterinary Laboratory where explosive or volatile materials are present
    - Areas where other explosive or volatile materials are present as designated by the UW Safety Office

This exclusion does not include materials that are either an insufficient amount or in a form such that the material could not reasonably cause bodily injury due to the material's explosive or volatile nature. In general, any laboratory, room, or storage area that contains chemical(s) with a National Fire Protection Association (NFPA) 704 label that lists a particular chemical(s) as a 3 or higher in any category of flammability, instability, or health hazard or is listed as radioactive, water reactive, oxidizer, or simple asphyxiant in the special hazard or has biohazardous agents or toxins will likely meet this exception. Please

contact the University Safety Office to determine if your laboratory, room, or storage area meets the exclusion.

Explosives are defined as any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat.

Volatile substances are characterized by their high vapor pressure and low boiling points, allowing them to exist as gases or vapors at room temperature. Examples include but not limited to:

Alcohols: Ethanol, methanol, and isopropanol.
Explosive Precursors: Nitroglycerin and triacetone triperoxide (TATP).
Hydrocarbons: Benzene, toluene, and xylene.
Ketones: Acetone and methyl ethyl ketone.
Organic Solvents: Chloroform, ether, and trichloroethylene.
Toxins: Carbon monoxide, hydrogen cyanide, and volatile organophosphates.

- Any facility used primarily for law enforcement operations or administration without consent of the UW Chief of Police, including but not limited to:
  - UW Police Department operations and administrative offices

- Any detention facility, prison, or jail and any courtroom, when being used as a courtroom by official judges of the United States or the State of Wyoming to hear or adjudicate or deliberate over actual cases at law or in equity, including but not limited to:
  - UW College of Law Moot Courtroom and holding cell (for the avoidance of doubt, this section does not apply when a courtroom is being used as a classroom to instruct students in the ordinary course of the College of Law's business)

Can Campus areas that are in an exclusion zone have signs on the area to notify individuals that no handguns are permitted within the area or location?
Yes, but any signs must be approved by the applicable Vice President, Dean, or Director and be approved and installed through UW Operations. The cost of these signs will be covered centrally by UW Operations.

What happens to concealed carry holders who violate the law?
Criminal penalties for those who violate the law and University polices can vary depending on the violation. Those punishments can include loss of license by the permit holder, significant fines and penalties, or even time in jail. UWPD will investigate all reported cases and make the appropriate decision based on the facts provided. The University will also investigate the violation and may impose a sanction, up to and including termination for employees and expulsion for students.

Classroom

Can I ban the carry of concealed handguns in my classroom?
No. Academic personnel cannot ban the concealed carry of handguns in their classrooms. Language in Wyo. Stat. §6-8-105(e) specifically forbids the prohibition of lawfully carrying of a concealed weapon into a place authorized by statute.

What if the inherent nature or requirements of the class (swimming, dancing, etc.) make concealment difficult or impossible?
If the inherent nature or requirements of the class would make the concealed carry of a handgun difficult, clearly communicate to your students the requirements of the class. For example, some active dance classes require the free movement and physical interaction that could inadvertently reveal someone who is trying to carry a concealed handgun. Encourage your students who are licensed to carry and choose to carry a handgun to think through their day and plan accordingly, which may mean leaving their handgun at home, secured in a private vehicle, or secured in a biometric lock box within the person's direct control. It is the responsibility of the concealed carry permit holder to know and understand the University polices regarding campus carry.

Office

Can I ban firearms in my office?
Yes, but only the open carry of firearms. Concealed carry permit holders with a valid Wyoming permit may conceal carry in offices.

Can I put a sign on my office door requesting individuals not enter the office if they are carrying a firearm?
Yes, but only the open carry of firearms. You are not allowed to prohibit concealed carry holders with valid Wyoming permits from entering your office with a concealed handgun. If an individual comes to your office visibly displaying a firearm, please call UWPD (307-766-5179) or 911.

May I include information about campus carry in my syllabus?
You may. However, please remember that you may not restrict the rights of an individual with a valid Wyoming concealed carry permit to conceal carry within the classroom. Any language used on syllabi must have prior written approval by the Provost's Office.

May I conduct meetings in a gun-free exclusion zone?
Yes, but only if your class requires a health services setting, is in the ECEC, or is in an area where explosive or volatile materials are present as designated by the UW Safety Office. Any classrooms that request to be excluded for the above reasons must receive prior written approval from the Provost's Office.

AGENDA ITEM TITLE: **Rare Earth Elements and Opportunities for Wyoming**, Chitnis, Quillinan, Brown

Rare Earth Element Opportunities for Wyoming

Tyler Brown, Scott Quillinan, and Parag Chitnis

Prepared for the University of Wyoming Board of Trustees

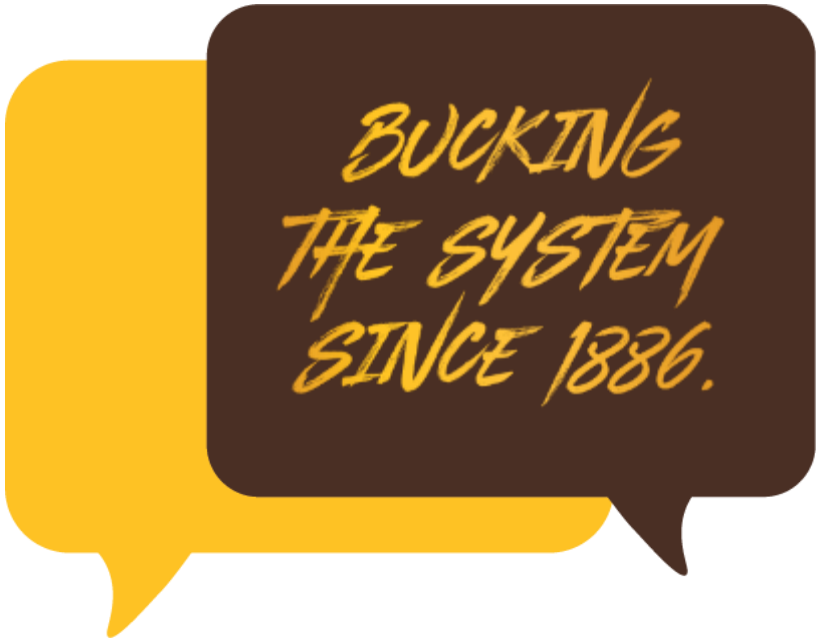
March 27th, 2025

UNIVERSITY OF WYOMING | School of Energy Resources

THE WORLD NEEDS MORE COWBOYS.

SER's Mission:

To advance energy-driven economic development for Wyoming



SER Research Structure

Staffed Centers of Excellence

- Center for Economic Geology Research
- Center for Carbon Capture and Conversion
- Hydrogen Energy Research Center
- 3D Visualization Center
- Center for Energy Regulation and Policy Analysis

Faculty-Led Centers of Excellence

- Center for Air Quality
- Center for Produced Water Management
- Wind Energy Research Center
- Nuclear Energy Research Center
- Subsurface Energy and Digital Innovation Center
- Center for Biogenic Gas Research

Research Programs/Groups

- Energy Engagement, Leadership, and Careers Program
- Jurisprudence of Underground Law and Energy Research Group

Partner Organizations

- Enhanced Oil Recovery Institute
- Wyoming Integrated Test Center

Select Research Topics

- Carbon capture, use and storage
- Carbon engineering (coal to products)
- Oil and gas production
- Produced water management
- Visualization
- Methane detection
- **Rare earth elements and critical minerals**
- Coal markets and sales
- Combustion
- Energy policy and economics
- Hydrogen
- Nuclear
- Applied geologic research
- Wind

Critical Minerals Program Overview

History and Development of the Program

- Initial seed funding WY Legislature in 2016
- Grown into large and successful multidisciplinary research program (>$10)

Expertise

- Geosciences, engineering, data analytics, economics, social science, law, policy, and more.

Campus, state, national, and international collaboration

- Several departments and colleges
- Wyoming cities and counties
- National labs, industry, academia

Events

Wyoming Rare Earths: opportunities for a Domestic Critical Mineral Supply Chain

- **Focus:** Convening experts from industry, government and academia to address critical mineral supply chains.
- **Location and Date:** Ucross Foundation June 16th-17th, 2025

Dr. Jacob Hochard, Haub

Critical Minerals Leadership Academy (CMLA) – <u>funded by the Department of Energy</u>

- **Focus:** Training for graduate students and early career professionals invested in critical minerals R&D across the supply chain.
- **Location and Date:** Laramie, August 3rd-10th, 2025

Dr. Erin Phillips, SER

Nearly everyday, “critical minerals” & “rare earth elements” in the news…

WORLD

Why the U.S. Keeps Losing to China in the Battle Over Critical Minerals

Syrah Resources thought its graphite mine in Mozambique would challenge China’s dominance in the global market, but then things started going off the rails.

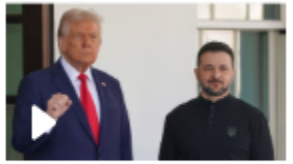
By Jon Emont | Photographs by Annie Flanagan for WSJ March 10, 2025 11:00 pm ET

VIDEO

Inside Trump’s Mineral-Rights Deal With Ukraine

President Volodymyr Zelensky has agreed to the framework of a deal that would allow the U.S. access to Ukraine’s critical minerals. WSJ’s Ian Lovett reports from Kyiv on what’s at stake. Photo: Nathan Howard/Reuters

By Wall Street Journal February 28, 2025 11:50 am ET



Is Trump mulling a minerals deal with conflict-hit DR Congo?

Endowed with minerals but losing ground to rebels, the Congolese government wants to boost security.

2 days ago | World

Putin offers Russian and Ukrainian rare minerals to US

The proposal to give the US access to minerals would also include those from territories taken from Ukraine.

25 Feb 2025 | World

Inside the race for Greenland's mineral wealth

The territory's untapped mineral wealth has caught the eye of both mining firms and Donald Trump.

26 Jan 2025 | Business

Nearly everyday, “critical minerals” & “rare earth elements” in the news…

American Rare Earths launches development of Cowboy State Mine in Wyoming

Rachel Finch Laramie Boomerang Updated 17 hrs ago

In a significant stride toward boosting domestic rare earth resources, American Rare Earths and its subsidiary Wyoming Rare (USA) Inc have beg...

OCT 21

By Jon Emont | Photogr

VIDEO

Inside Trump’s Mineral-Rights Deal With Ukraine

President Volodymyr Zelensky has agreed to the framework of a deal that woul critical minerals. WSJ’s Ian Lovett reports from Kyiv on what’s at stake. Photo: N

By Wall Street Journal February 28, 2025 11:50 am ET

ENERGY | MINING

Wyoming Rare Earths Producer Close To Completing $53 Million Processing Plant

Rare Element Resources needs one more thumbs-up from a federal agency to complete its $53 million rare earth demonstration plant in Upton. The rare earth refinery is billed as a game-changer not

AUG 06

ENERGY | MINING

Ramaco Hires Heavy Hitter To Push Production Plant For Wyoming Rare Earths

Ramaco Resources is closer to being able to start mining rare earth minerals in Wyoming. The company announced Tuesday that it’s hired a global engineering firm to push efforts to bu plant outside of Sheridan.

to rebels, the Congolese government wants to boost security.

AUG 12

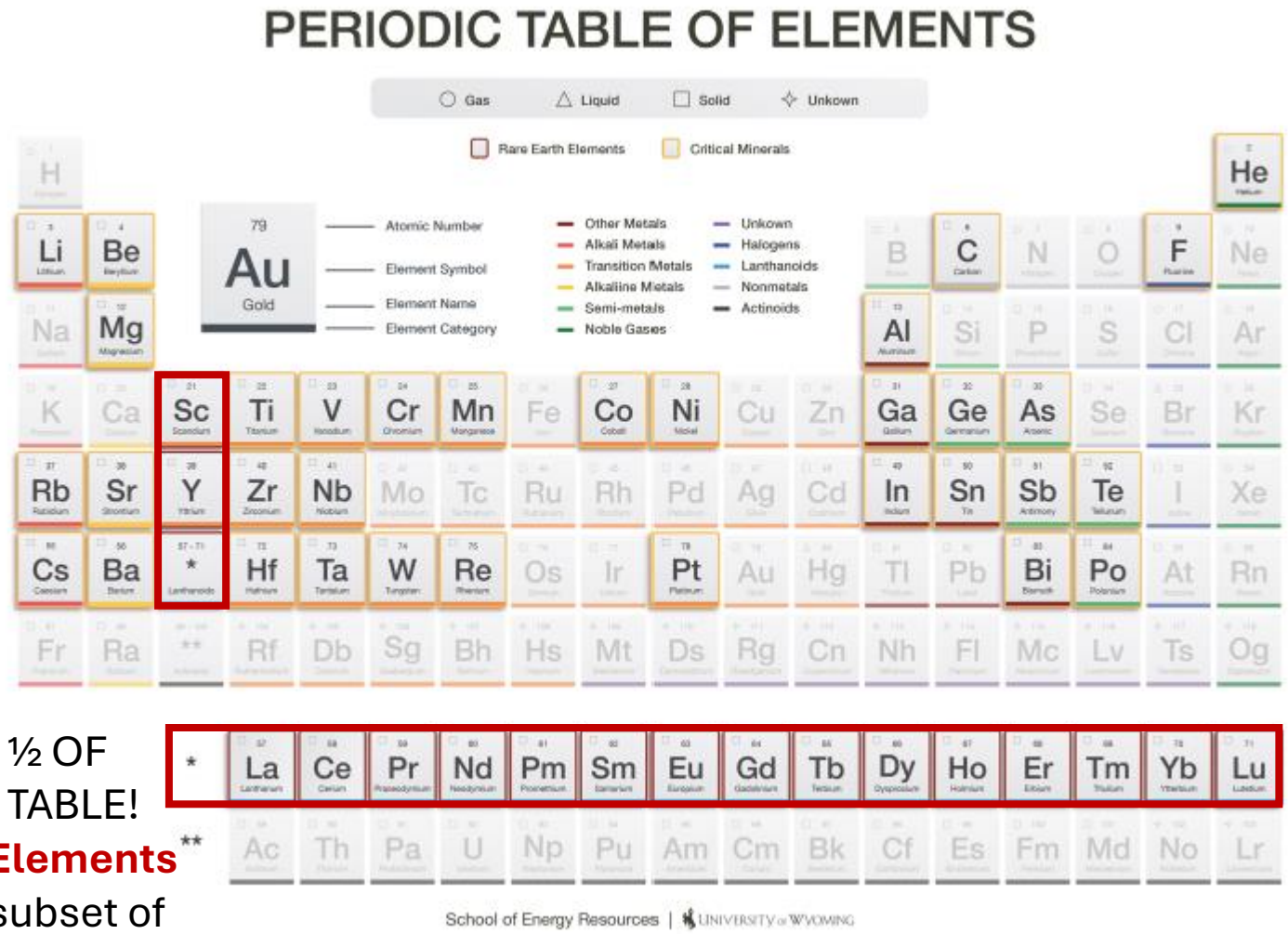
ENERGY | MINING

Wyoming Rare Earths Companies In Race To Start Producing

The Australian-based American Rare Earths Ltd. has restructured its Wyoming project to attract investment. With Wyoming becoming ground zero for U.S. rare earths, companies are in a race to be the first to start producing.

But what is meant by "Critical Minerals" and "Rare Earth Elements"?...

- ✓ A **non-fuel** mineral or mineral material essential to the **economic and national security** of the United States
- ✓ Serves an **essential function** in the manufacturing of a product, the absence of which would have significant consequences for the economy or national security of the United States (Energy Act of 2020).
- ✓ Has a **supply chain** that is **vulnerable to disruption**



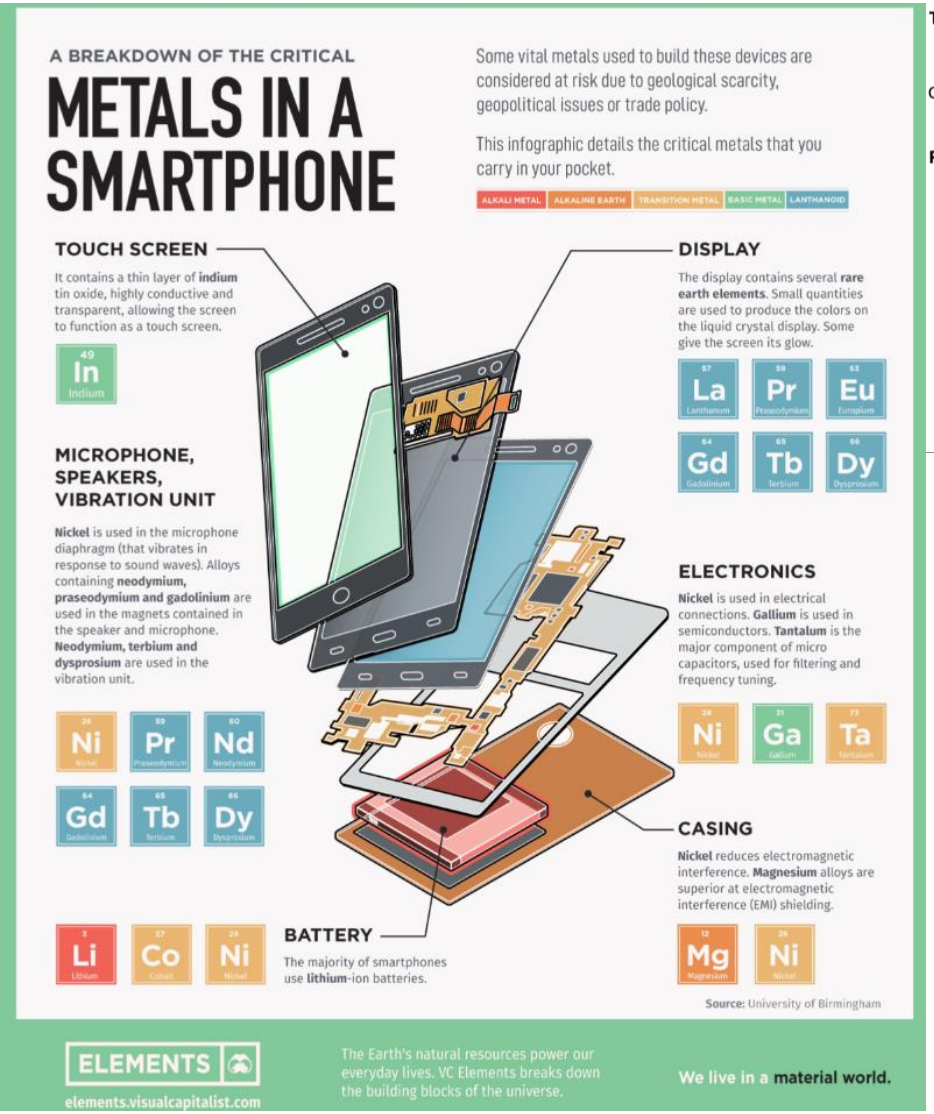
ALMOST ½ OF PERIODIC TABLE!

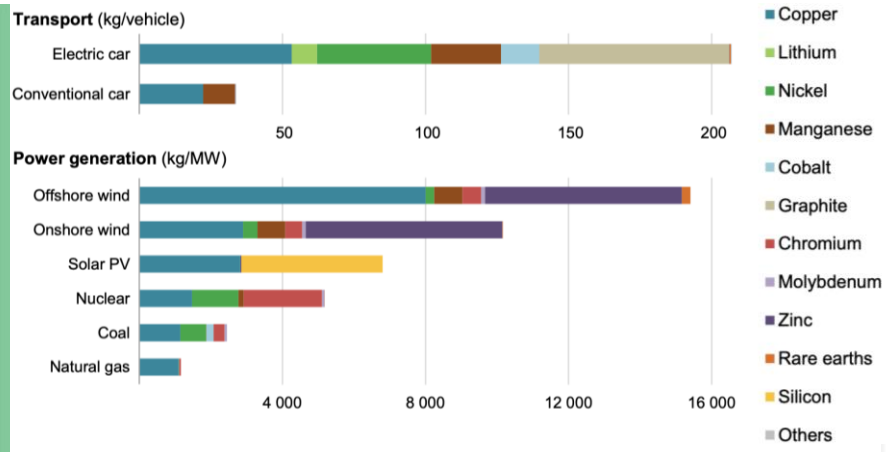
Rare Earth Elements (REEs) are subset of **Critical Minerals (CMs)**

Initial list (2018) was revised in 2022, and there are planned **updates every 3 years.**

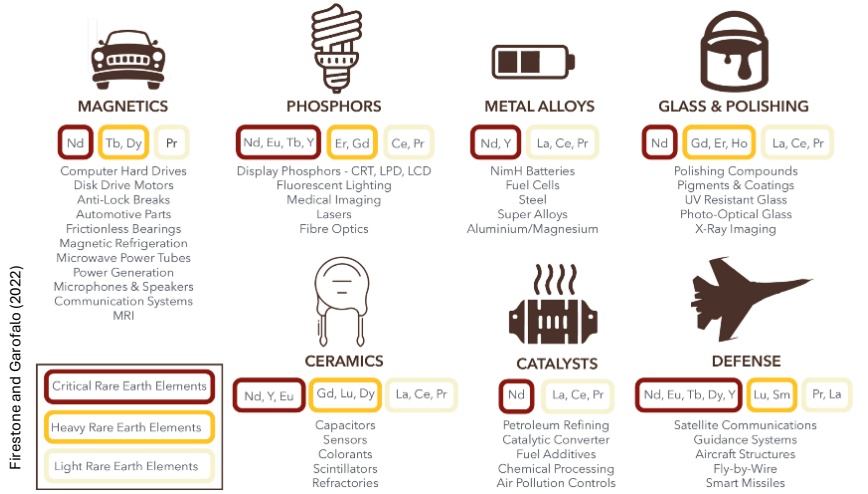
UW School of Energy Resources

"Critical" because of essential function

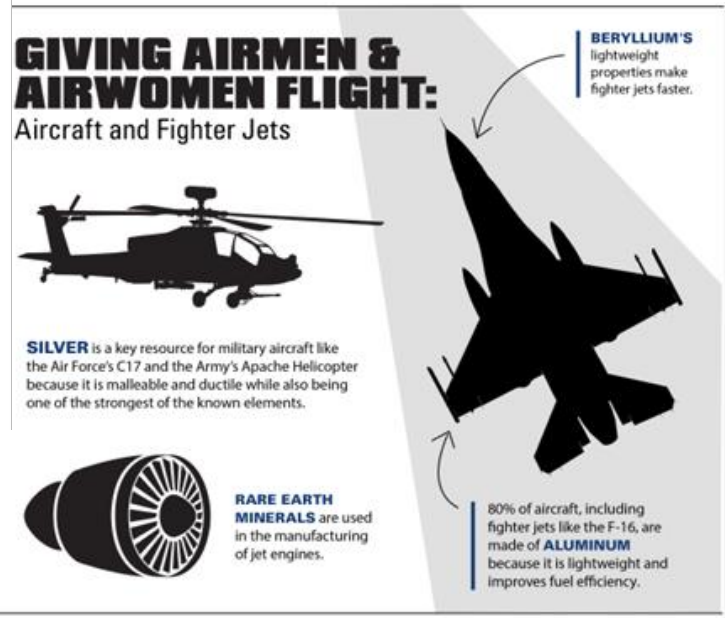


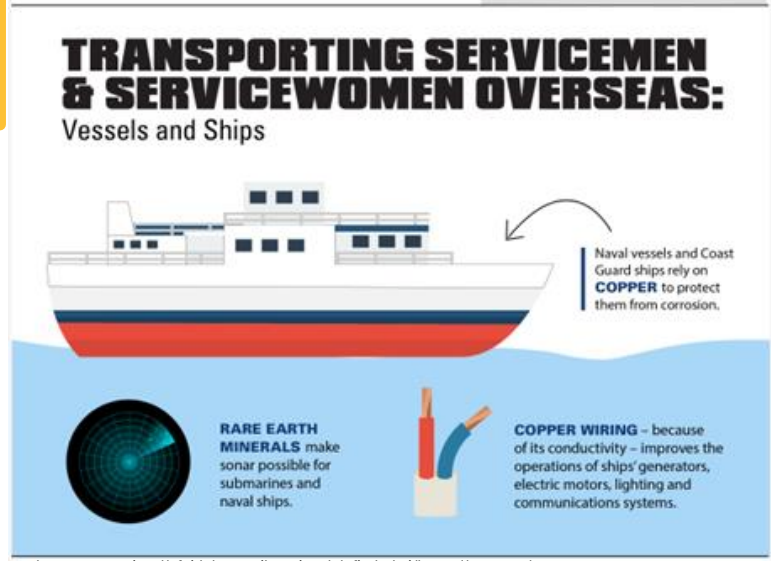


long list of manufacturing processes & manufactured products the use minerals



Firestone and Garofalo (2022)





chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://nma.org/wp-content/uploads/2017/10/infographic_defense-01.pdf

UW School of Energy Resources

"Critical" because of potential supply chain disruptions

Resource Development and Supply Chains dominated by other countries

Supply Chain

UPSTREAM MIDSTREAM DOWNSTREAM

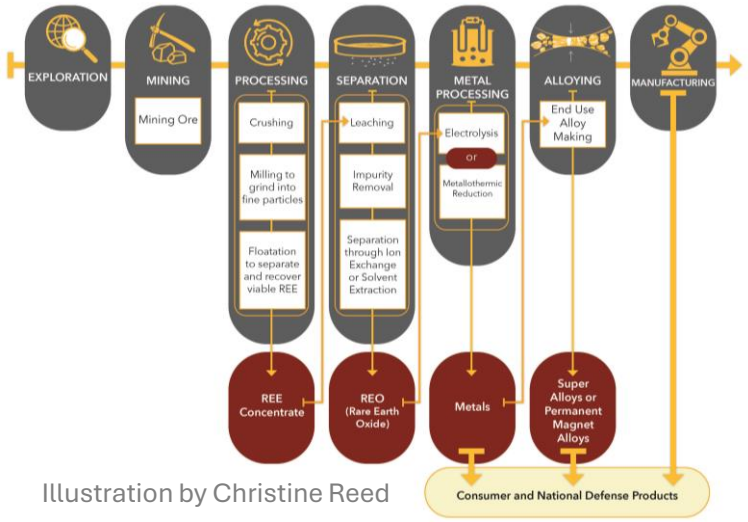
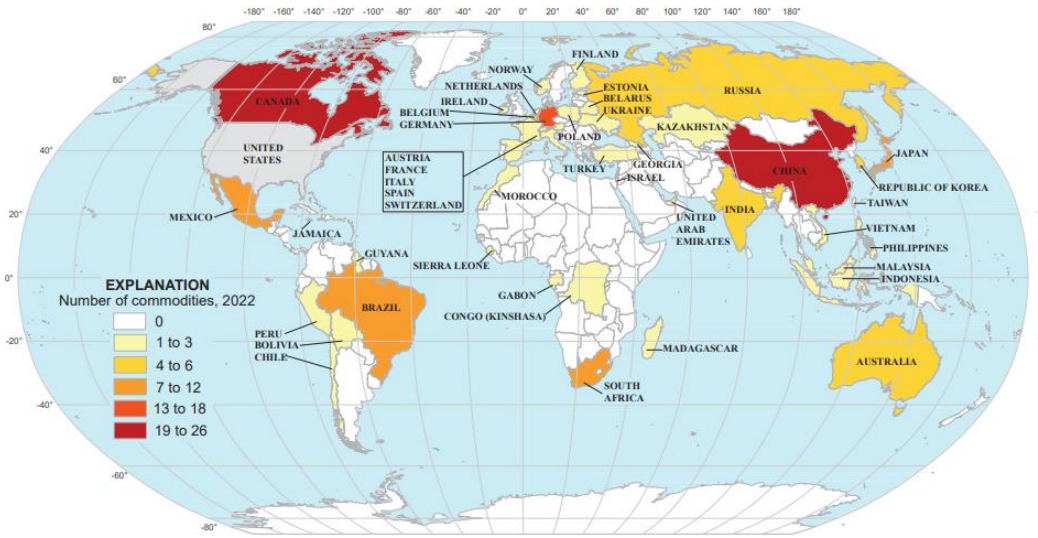
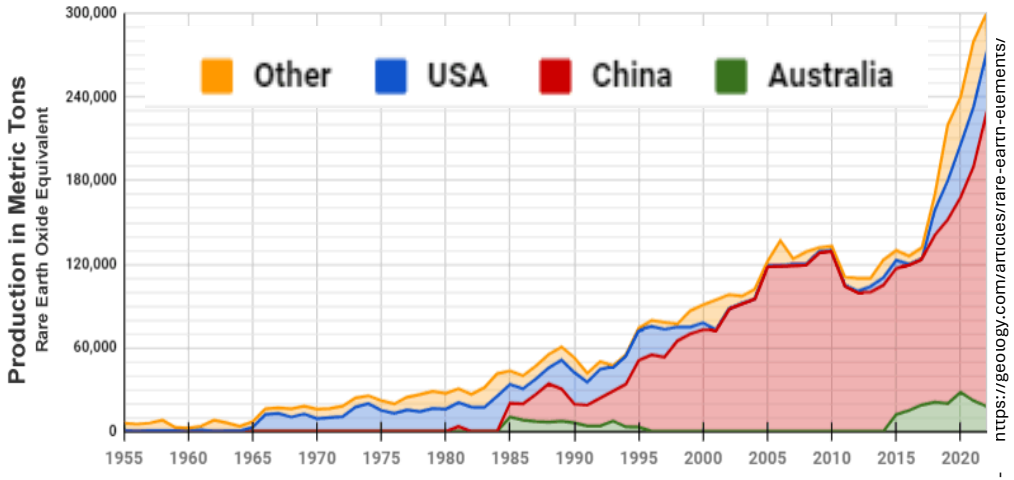


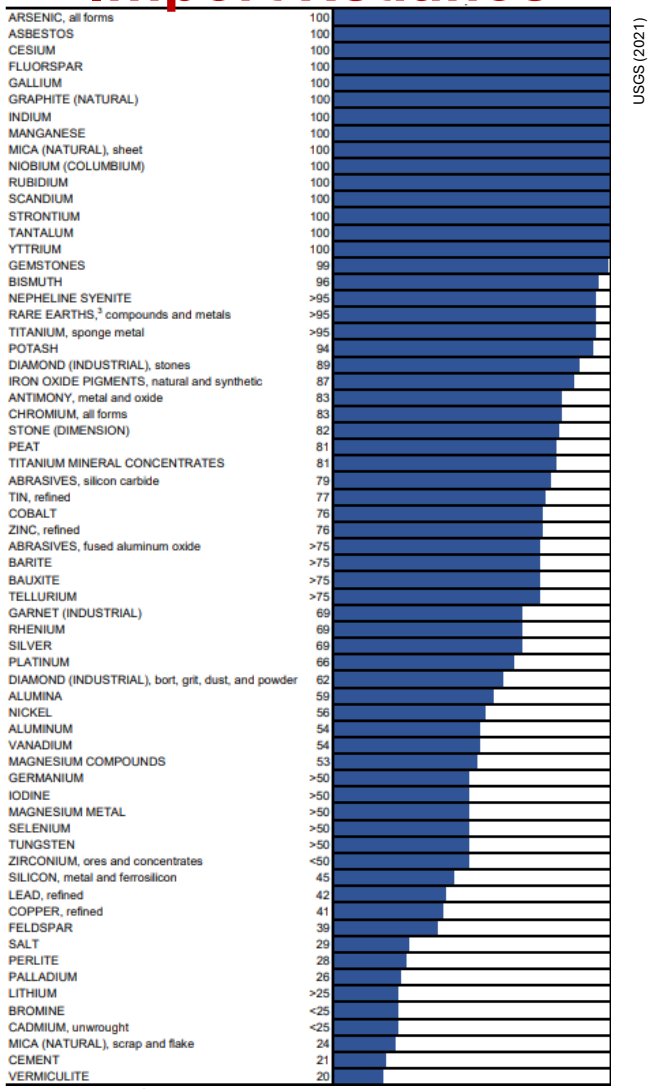
Illustration by Christine Reed



Locations of Developed Resources



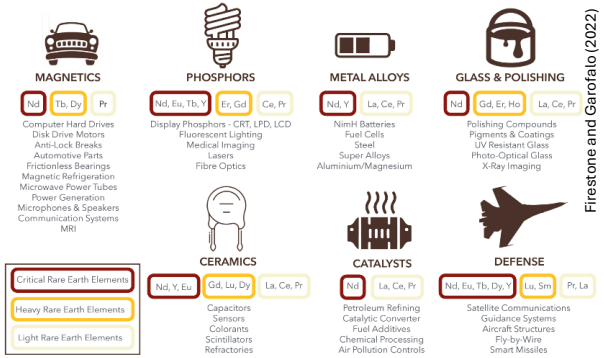
Import Reliance



USGS (2021)

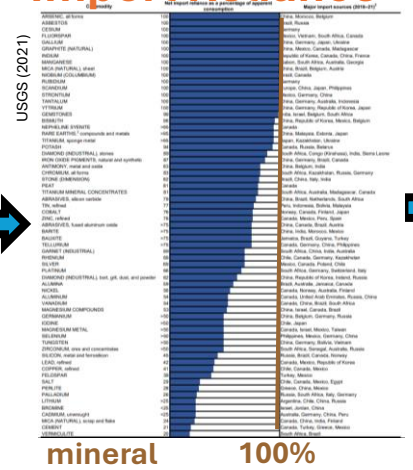
Led to the U.S. Critical Minerals Initiative

Products use minerals



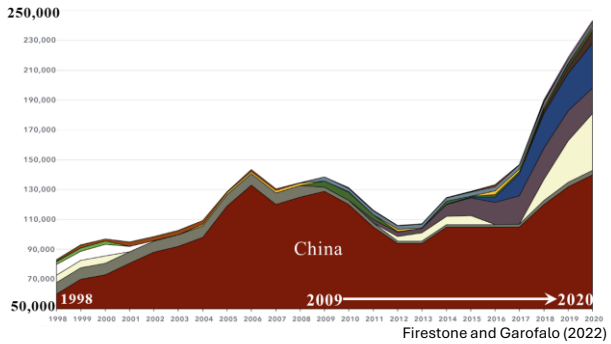
Firestone and Garofalo (2022)

Import Reliance



USGS (2021)

Supply Chains dominated by China

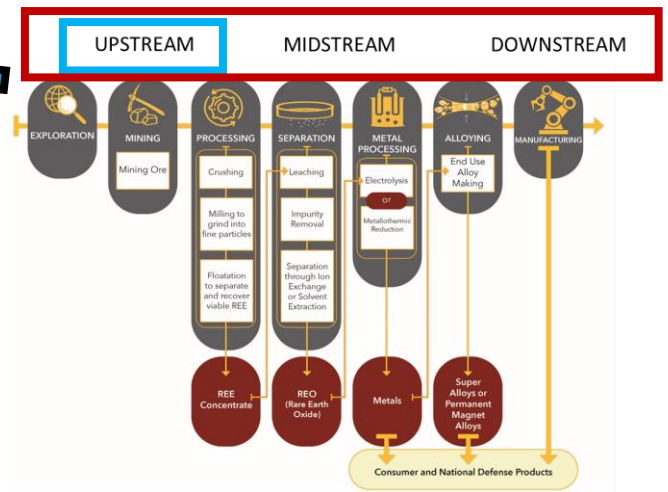


Firestone and Garofalo (2022)

Critical Elements

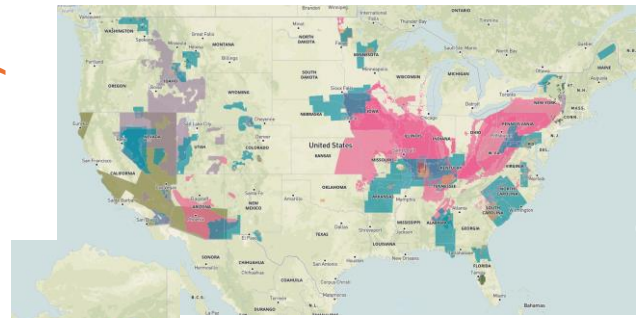
School of Energy Resources | University of Wyoming

Bipartisan Infrastructure Law: $1,200,000,000,000.
Hundreds of billions funding energy and mineral materials industries.



Domestic Supply Chains Needed

EARTH MRI (conventional)



https://www.usgs.gov/special-topics/earth-mri/maps

CORE-CM (unconventional)

https://netl.doe.gov/resource-sustainability/critical-minerals-and-materials/core-cm

SER Research emphasizes UNCONVENTIONAL & SECONDARY resources

Anderson **COAL** Seam at Dry Fork Mine Powder River Basin, Wyoming

Photo: Christine Reed

Cliff Mine **TAILINGS PILE**, Centennial Ridge, Wyoming

https://loc.getarchive.net/media/cliff-mine-mine-tailings-pile-centennial-ridge-medicine-bow-national-forest

CBM **PRODUCED WATER** discharge facility, Powder River Basin, Wyoming

https://coyotegulch.blog/2022/02/[illegible]-wyoming-state-[illegible]-coal-study-estimates-the-coal-bed-methane-[illegible]-drew-down-some-powder-river-basin-[illegible]-by-more-than-100-feet-wyofile/

Powerplant **ASH** Capped Landfill. Powder River Basin, Wyoming

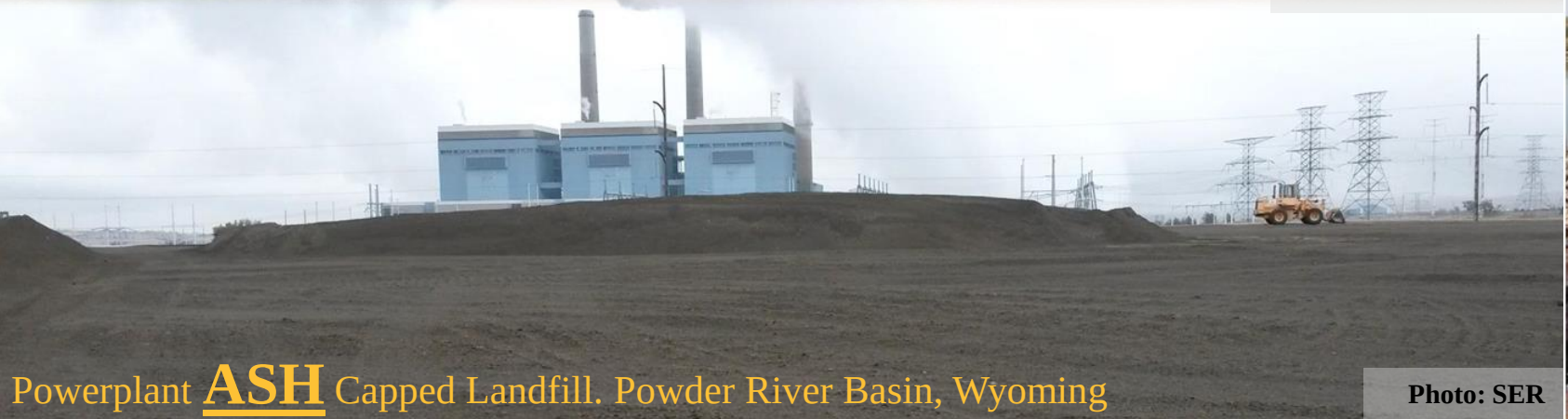


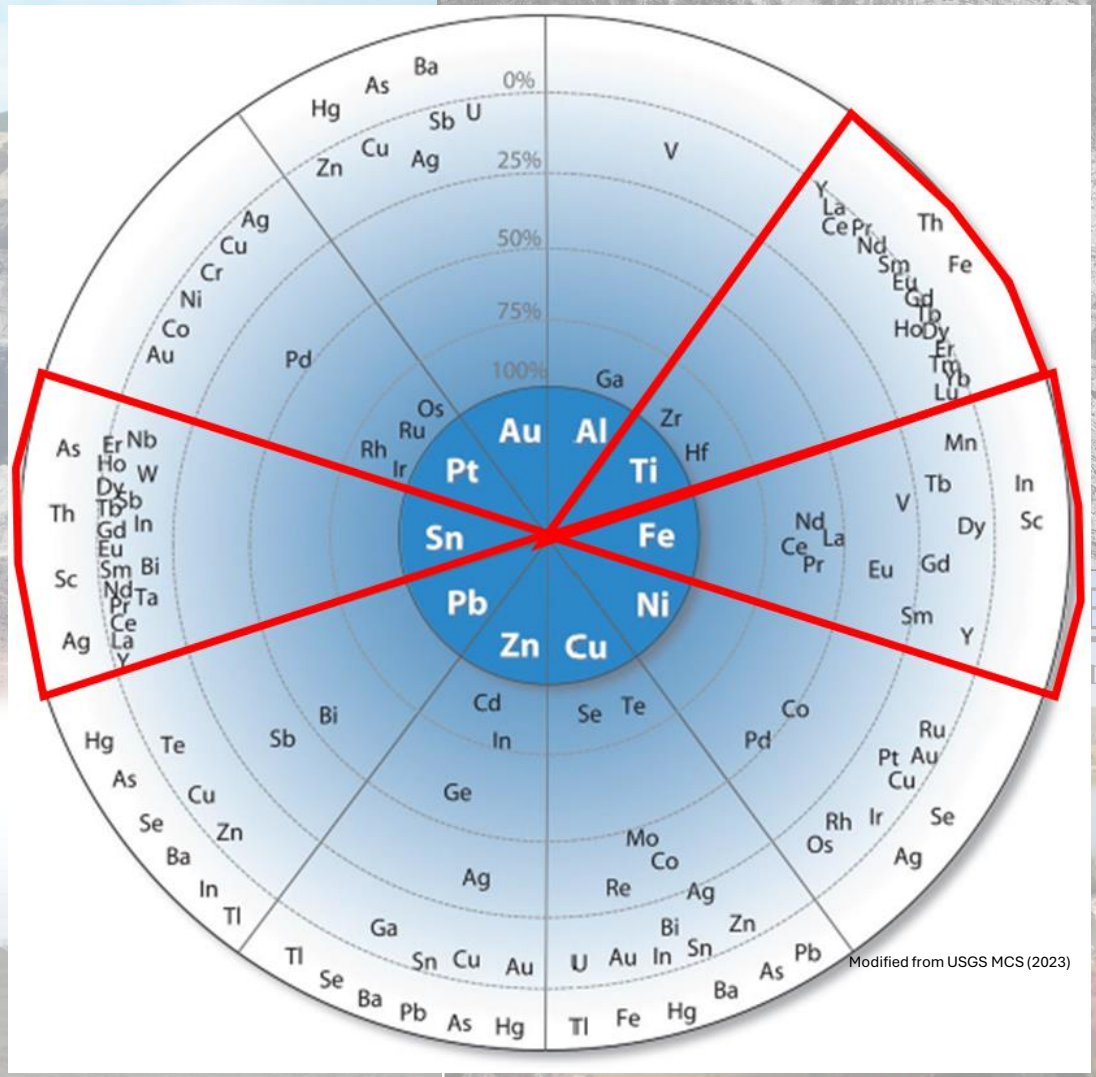
Photo: SER

Research emphasizes UNCONVENTIONAL & SECONDARY resources

Anderson **COAL** Seam at Dry Fork Mine Powder River Basin, Wyoming

Cliff Mine **TAILINGS PILE**, Centennial Ridge, Wyoming

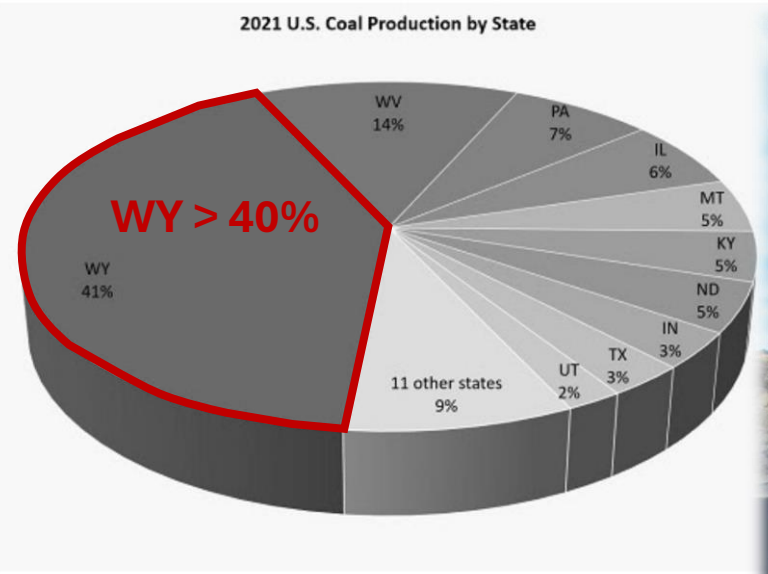
Goal of co-production and maximization of usable material



Powerplant **ASH** Capped Landfill. Powder River Basin, Wyoming

Photo: SER

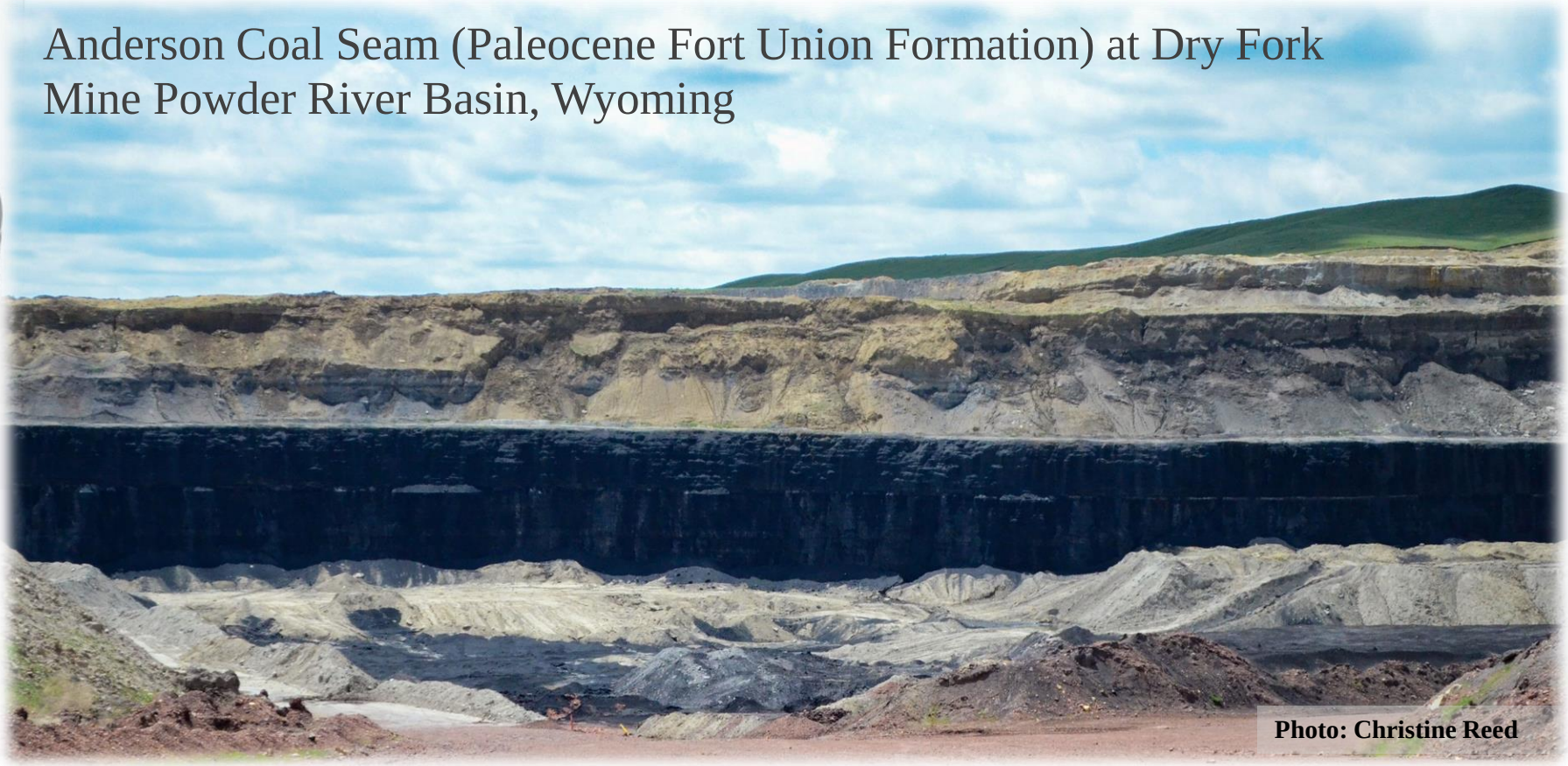
For Wyoming, REEs in Coal present a tremendous opportunity



Coal production by state, data from DOE-EIA. [Credit: WSGS]

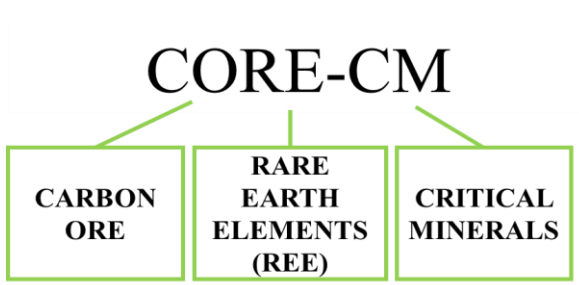
- 1/3 of all minable coal in the US
- > 40% of coal mined in U.S. sourced from Wyoming
- More than 5,500 jobs and almost $700M to state and local governments (https://wyoenergy.org/portfolio/)

10% increase in Coal production would provide >900 jobs and > $75M in tax revenue TO WYOMING



- **14 operating coal mines in Wyoming (+ 2 Greenfield)**
- **10 operating coal power plants in Wyoming**
- **Wyoming coal shipped to power plants in >25 US states**

CORE-CM Phase I: Program and Objectives



U.S. DEPARTMENT OF ENERGY

NATIONAL ENERGY TECHNOLOGY LABORATORY

https://netl.doe.gov/resource-sustainability/critical-minerals-and-materials/core-cm

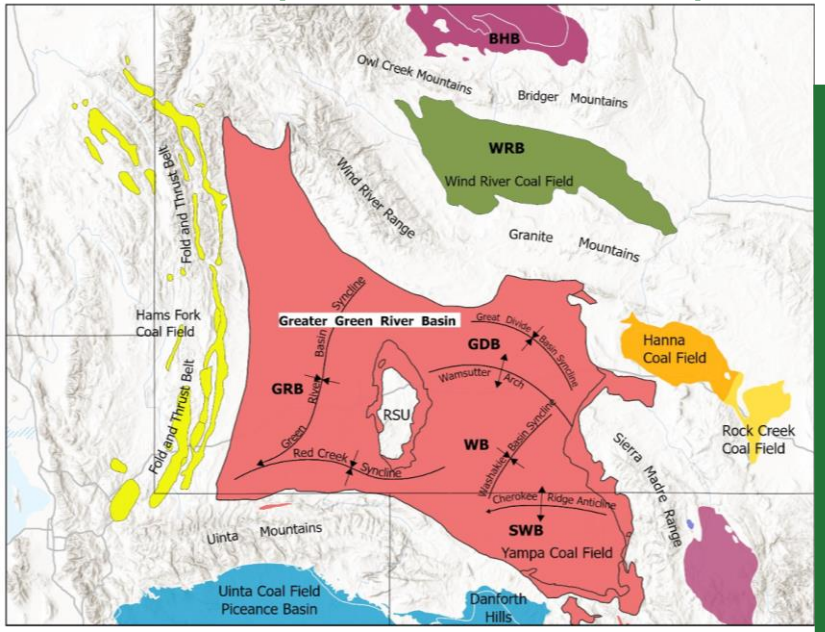
https://netl.doe.gov/resource-sustainability/critical-minerals-and-materials/core-cm

Major Project Objectives

- **Develop a coalition team** to achieve project objectives
- **Complete detailed assessments**, that meaningfully contributes to DOE's CORE-CM goals nationally.
- **Strategic planning for regional economic growth and job creation**, associated technology innovation around coal and other materials.
- **Define regional economic growth potential around existing strengths, energy infrastructure, business and industry**, including planning for the leveraging of **highly trained workforces**, existing and novel coal technologies, and energy infrastructure in development of CORE-CM supply chains.
- **Develop a preliminary strategic plan** for increasing the supply of CORE-CM materials to manufacturers nationally
- **Assemble a committed network of stakeholders and communities**

CORE-CM Phase I: Two (2) SER-led CORE-CM Projects

Greater Green River Basin & Wind River Basin (GGRB-WRB; Area 9)



University of Wyoming

School of Energy Resources Center for Economic Geology Research | School of Energy Resources Center for Energy Regulation & Policy Analysis | School of Energy Resources Center for Carbon Capture and Conversion | College of Business Center for Business and Economic Analysis

Colorado School of Mines Earth • Energy • Environment | Colorado Geological Survey | Los Alamos National Laboratory | Wyoming Energy Authority

Coalgeo, LLC | Colorado Northwestern Community College | Western Wyoming Community College | Boston Strategies International Global growth. Guaranteed.

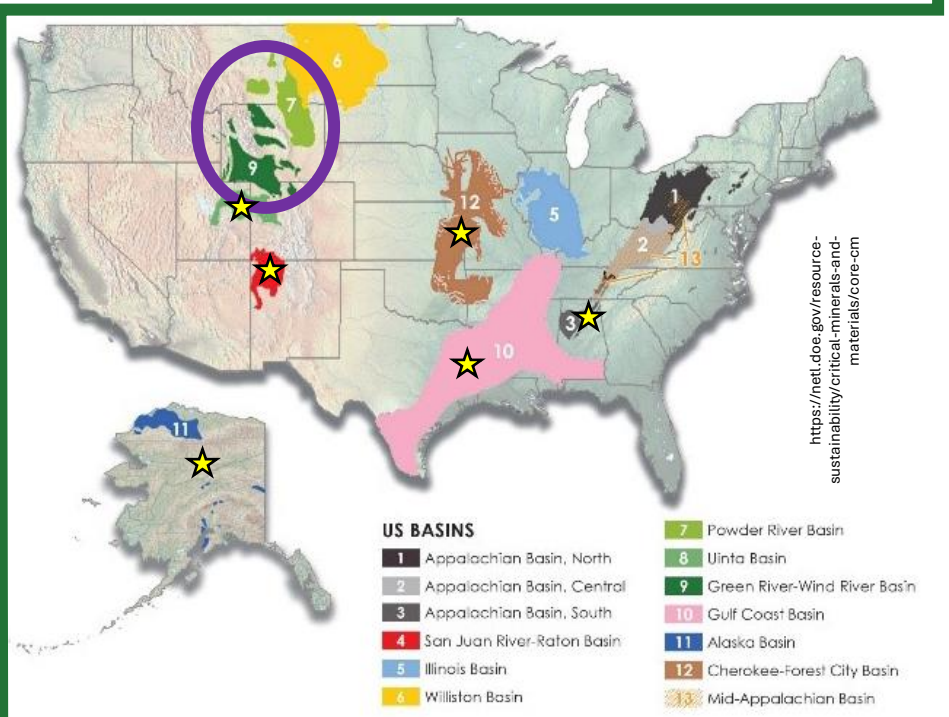
Period of Performance:

3 years (September 2021 to August 2024)

Project Funding:

Total Project $2,584,625

WEA Provided Cost Share $225,000



Period of Performance:

3 years (September 2021 to November 2024)

Project Funding:

Total Project $2,605,720

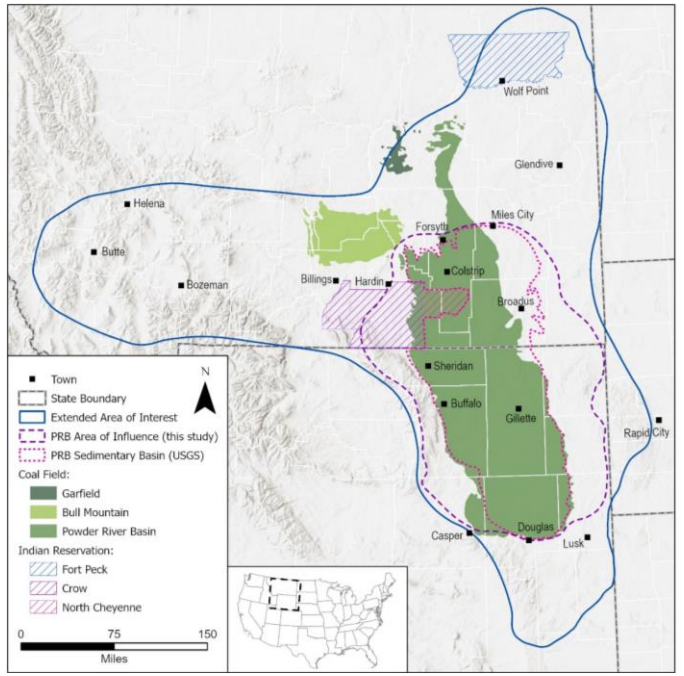
WEA Provided Cost Share $225,000

UW School of Energy Resources | School of Energy Resources Center for Economic Geology Research | School of Energy Resources Center for Energy Regulation & Policy Analysis | School of Energy Resources Center for Carbon Capture and Conversion | School of Energy Resources Shell 3D Visualization Center | College of Arts and Sciences Geology and Geophysics | College of Engineering and Applied Science Chemical Engineering

Wyoming Energy Authority | Battelle | GilletteCollege | Energy Capital Economic Development | Center of Wyoming Geological Survey | Southeastern Montana Development Corporation | BSI Energy Analytics | Los Alamos National Laboratory | MBMG Montana Bureau of Mines and Geology

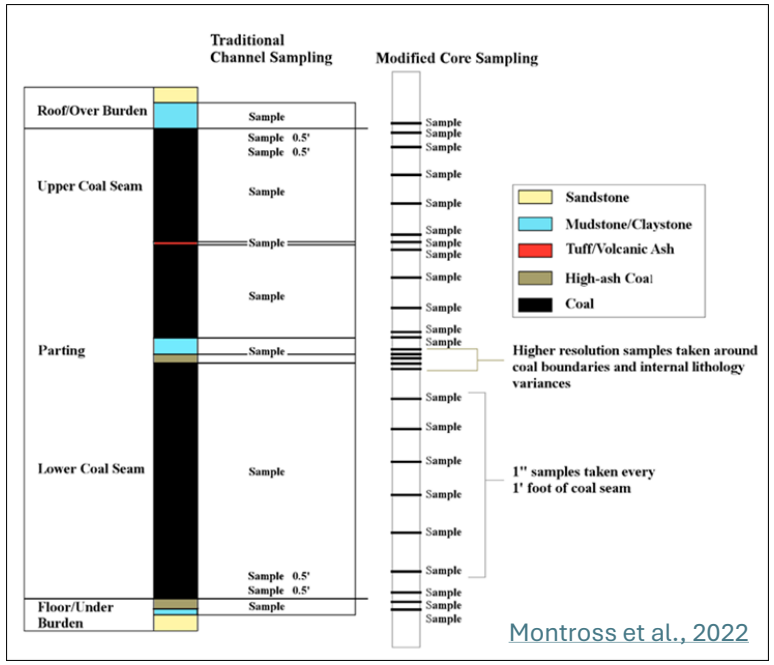
Dry Fork Mine Western Fuels-Wyoming, Inc. | Navajo Transitional Energy Company | Peabody | Black Hills Corporation

Powder River Basin (PRB; Area 7)



CORE-CM Phase I: Methods Development and Growing Database

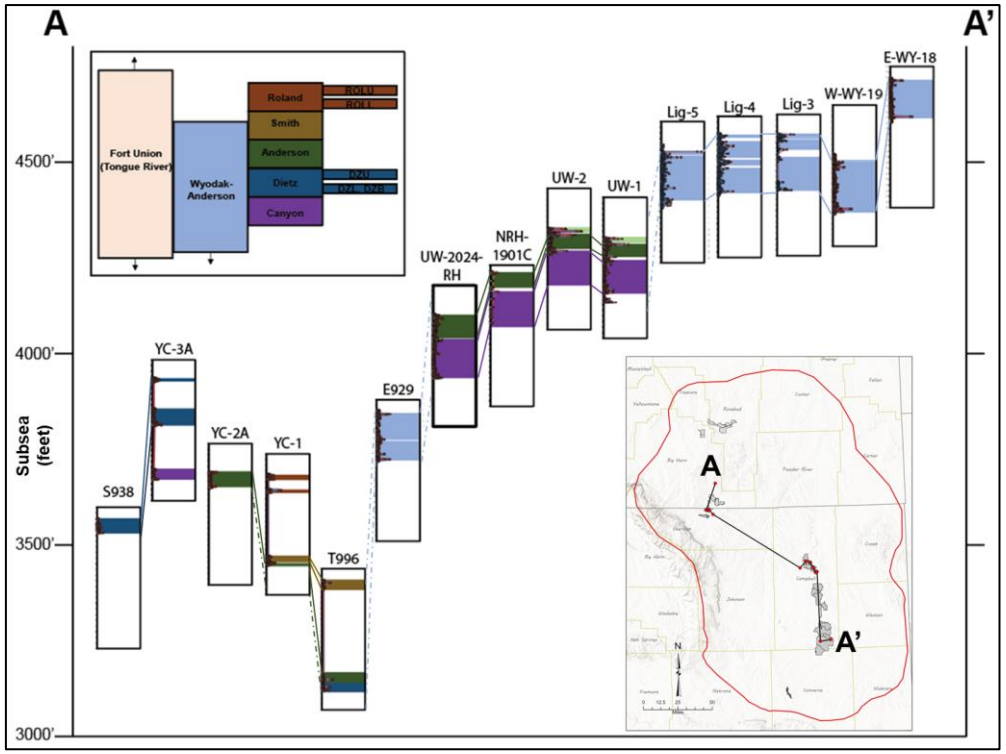
Greater Green River Basin & Wind River Basin (GGRB-WRB; Area 9)



Montross et al., 2022

- **Collaborations with SER, led to technical standards used in other projects**
- **Addition of >2000 samples & >100,000 geochemical datapoints**

Powder River Basin (PRB; Area 7)



806 new samples and **130** previously unreported data are currently utilized within the GGRB-WRB CORE-CM coal assessment strategy

36,450 new geochemical data points and **4090** previously unreported data points are produced that include concise location information

690 new samples and **658** samples from previous related SER-studies are currently in the PRB CORE-CM assessment strategy

34,762 new geochemical data points and **30,954** data points from previous related SER-studies that include concise location information

A Machine Learning Screening Tool for Rare Earth Elements and Critical Minerals at the Mine Scale

2.5 year project: March 2023 – August 2025

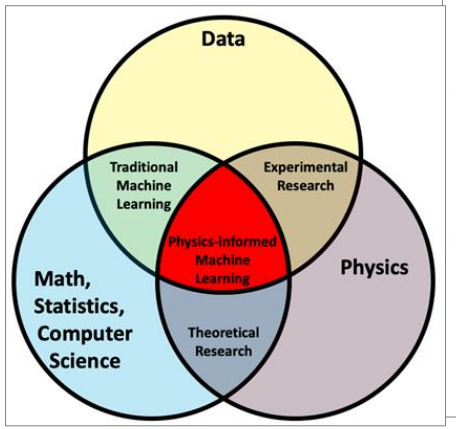
Los Alamos NATIONAL LABORATORY | U.S. DEPARTMENT OF ENERGY | Black Hills Corporation | University of Wyoming School of Energy Resources

Task 1.0 – Characterization

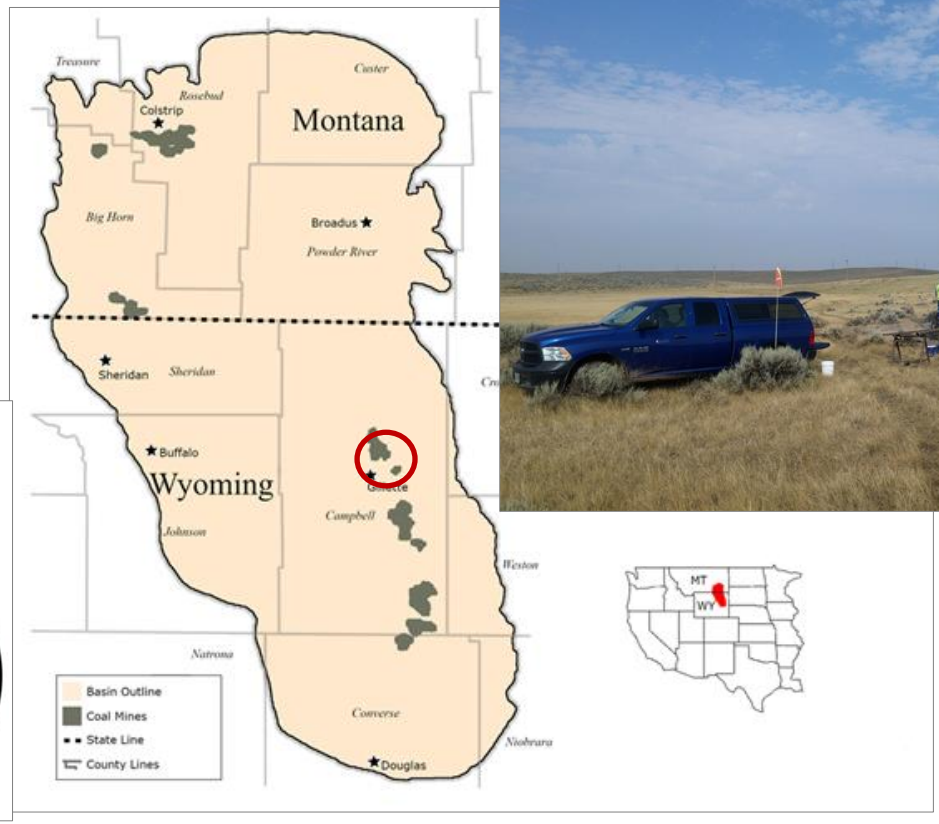
- catalog the existing data from core and well-logs
- add new samples from outcrop and core
- add new chemical and mineralogical data
- utilize advanced analytical techniques
  - ICP-MS, microprobe, elemental mapping (XRF), Raman spectroscopy, XRD, etc…

Task 2.0 – ML model development

- training of unsupervised ML model to extract REE/CM signatures
- construct high-resolution 3D geological framework model using Task 1 outputs and signatures learned with ML model



Wyodak Coal Mine



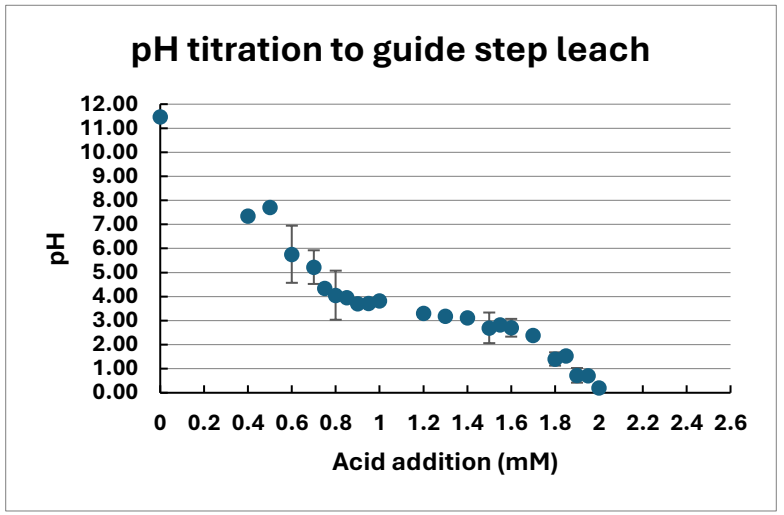
REE Extraction from Powder River Basin Coal Byproducts and Mining Waste, in response to DOE's Technology Commercialization Fund (TCF)

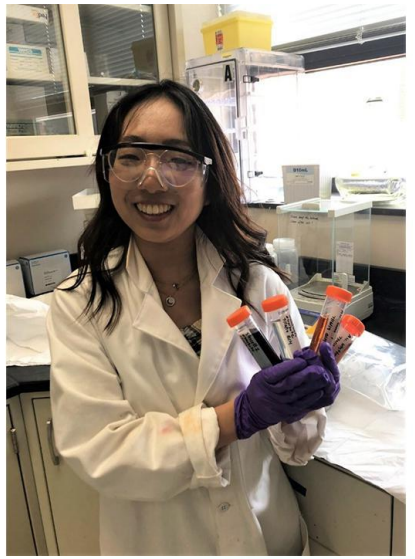
~4 year project: December 2020 – February 2025

Year 1
Assessment of PRB feedstocks and REE extraction technology testing/optimization per each feedstock tested.

Year 2
Feedstock(s) down select paired with optimized technology selection for that feedstock(s) demonstration.

Year 3
Technology upscaling to achieve pilot-scale REE extraction on site. Pilot-scale facility to be located in the PRB by project end date.





https://netl.doe.gov/node/9840

REE Extraction from Powder River Basin Coal Byproducts and Mining Waste, in response to DOE's Technology Commercialization Fund (TCF)

~4 year project: December 2020 – February 2025

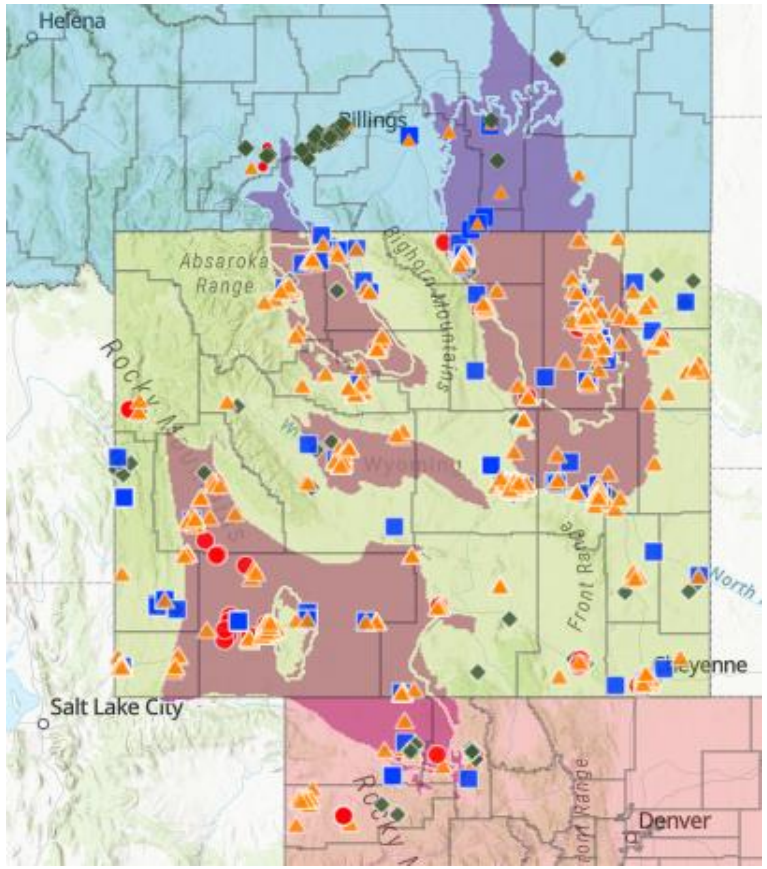
Year 1
Assessme
extraction
per each f

Year 2
Feedstock
optimized
feedstock

Year 3
Technolog
scale REE
facility to
end date.

https://netl.doe.gov/node/9840

CORE-CM Phase I: Economic Assessment of Infrastructure, Industries, & Businesses



Inventory of CORE-CM Supply Chain Relevant Businesses

Contacts: Angela Ture (ature@uwyo.edu)
Daniel Cooley (dcooley3@uwyo.edu)

Economic assessments necessary for planning of Technology Innovation Centers (TICs)

Next step: Preliminary Economic Impact Study
Sum of Direct, Indirect, and Induced Effects

Direct Effect
Economic impact directly through employment and operations

Indirect Effect
Economic impact through supply chain

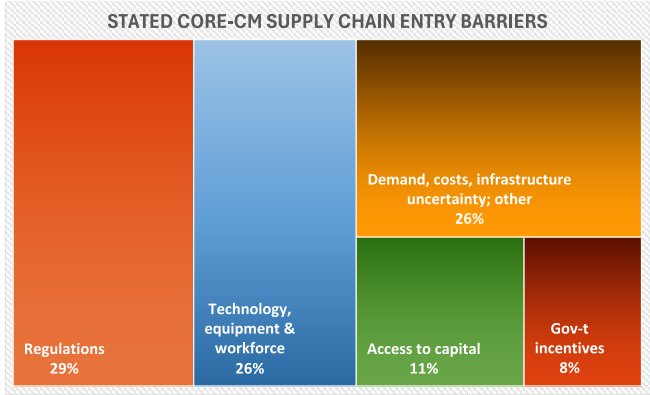
Induced Effect
Economic impact through local spending of income

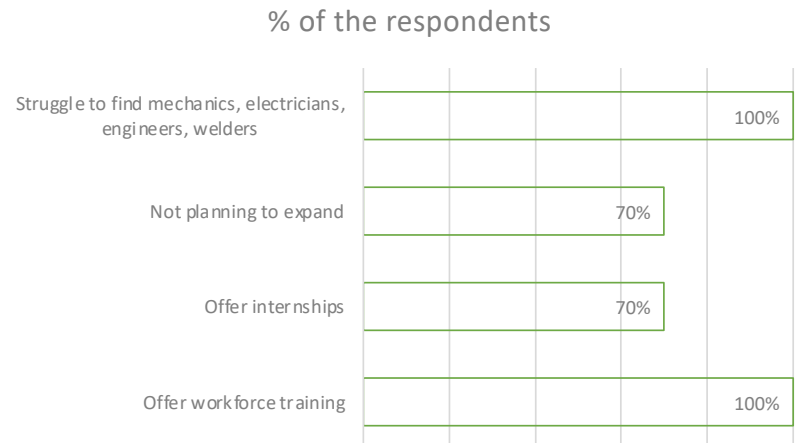
Measured Through:
Employment Labor Income Value Added Output

Exploratory Business Survey Responses (n=11)

Benefits
- additional revenue
- trade independence

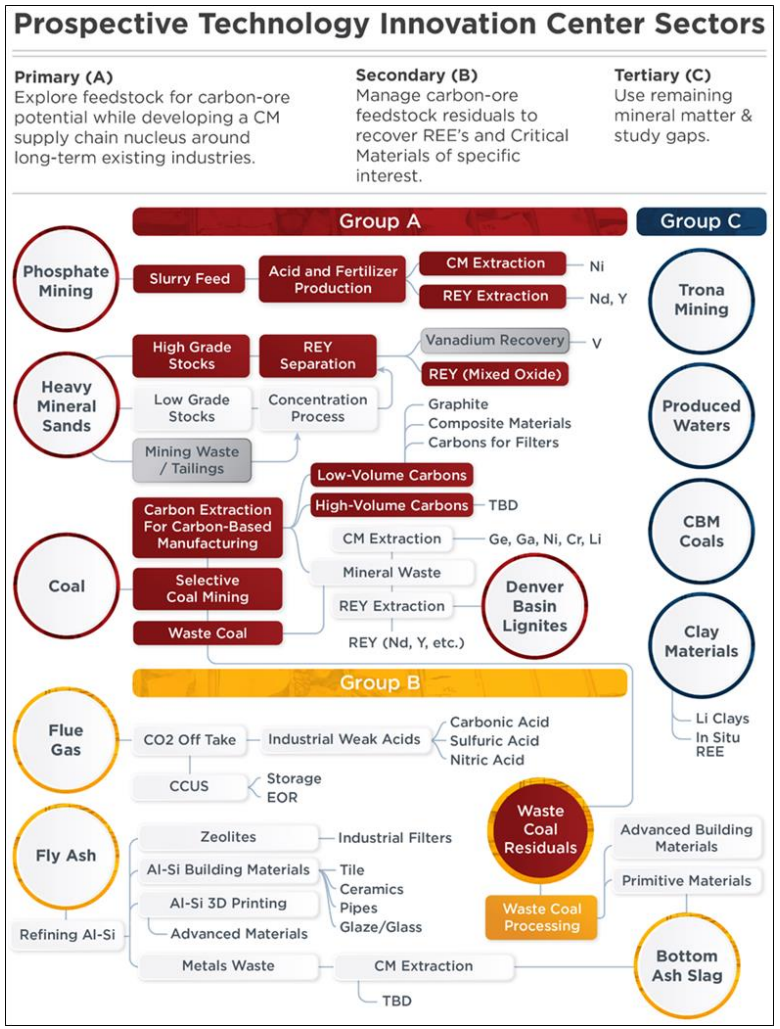
Risks & Uncertainty
- regulations
- market demand
- technology and production process





CORE-CM Phase I: Basin-specific Feedstocks Categorized & Ranked

Greater Green River Basin & Wind River Basin (GGRB-WRB; Area 9)

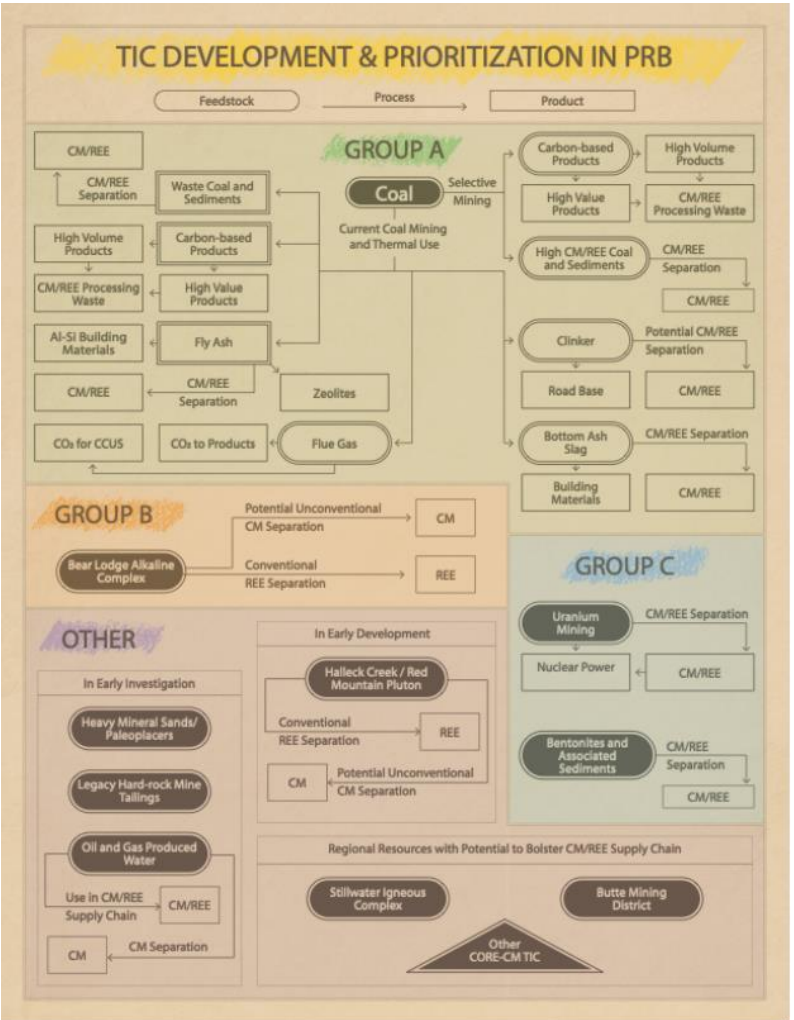


Technology Innovation Centers (TICs) development dependent on:

- **specific feedstocks**
- **technology readiness**
- **existing industry and workforce**

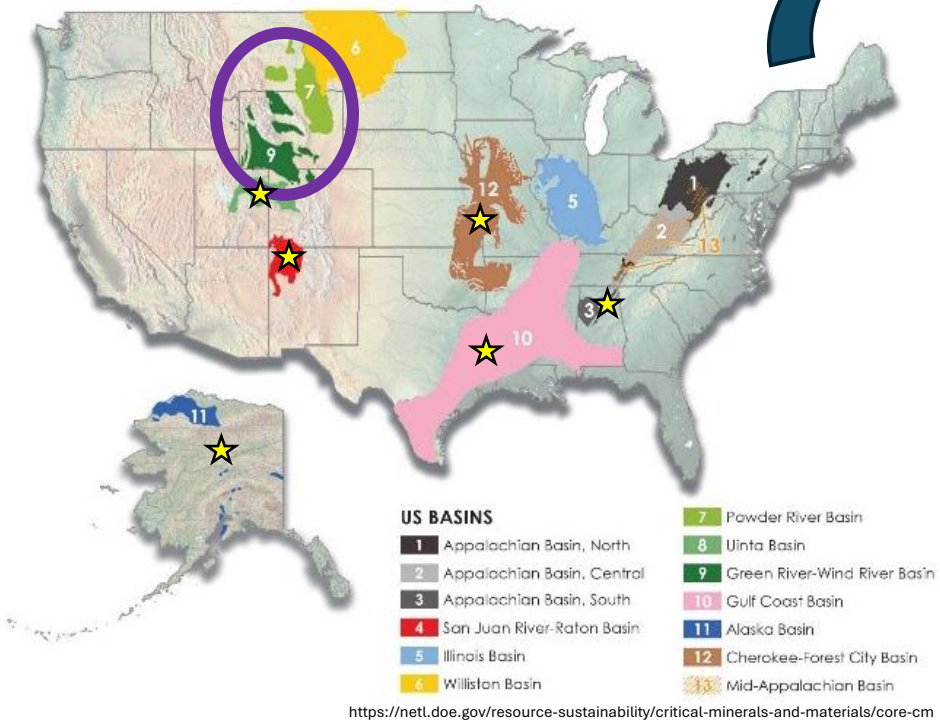
The goal for CORE-CM projects are TICs

Powder River Basin (PRB; Area 7)



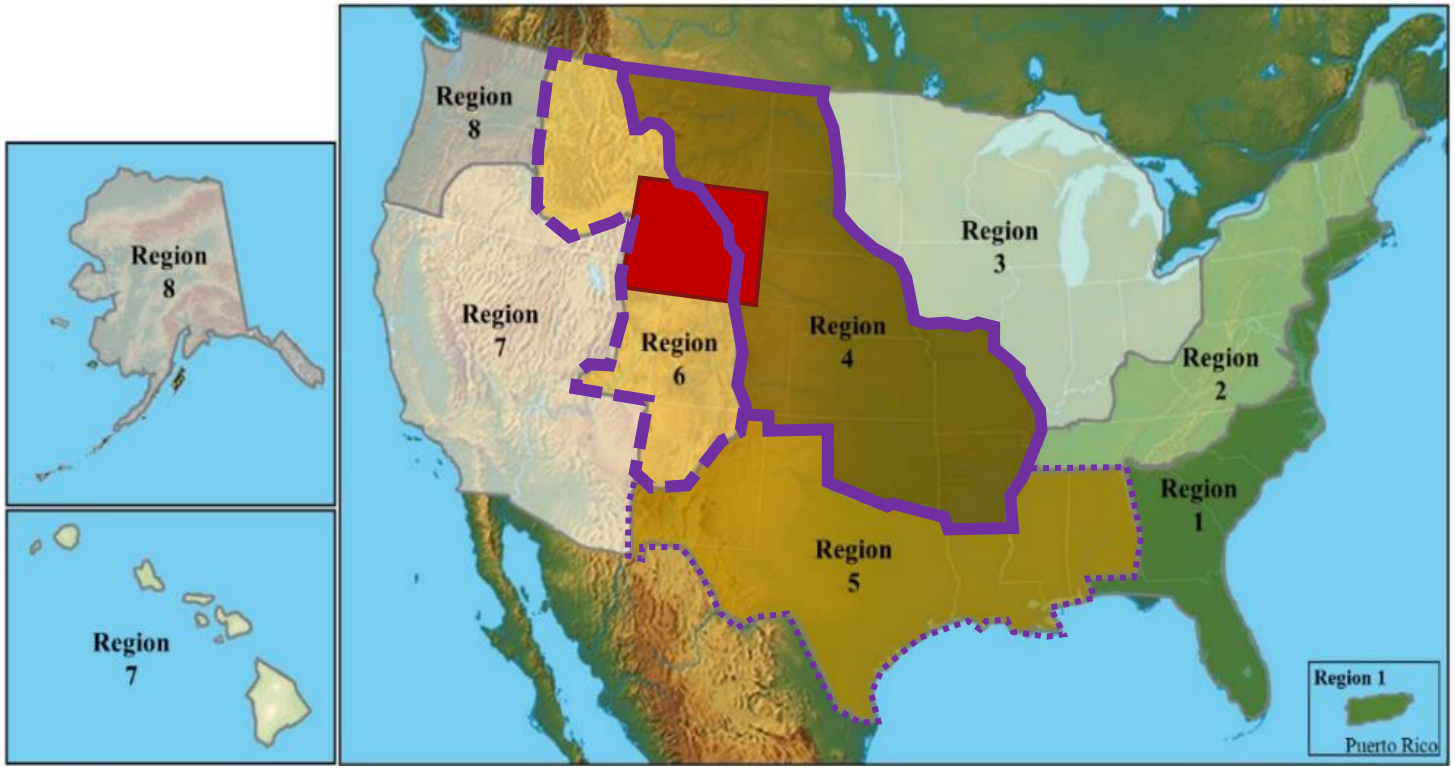
CORE-CM Phase II: CORE-CM Regional Framework

Basin-Specific Framework



https://netl.doe.gov/resource-sustainability/critical-minerals-and-materials/core-cm

Regional Framework



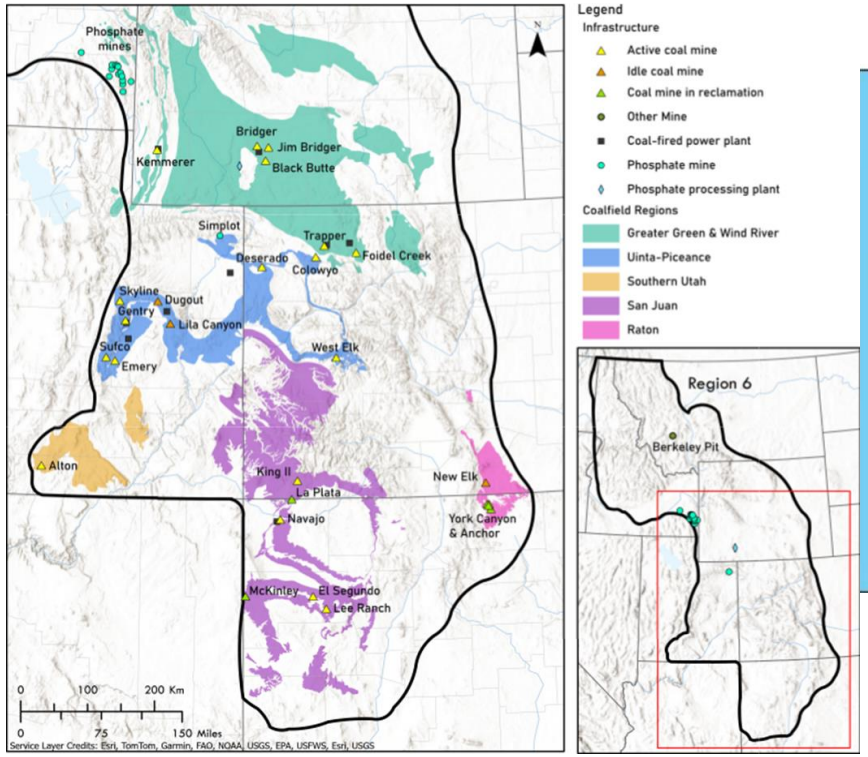
https://netl.doe.gov/resource-sustainability/critical-minerals-and-materials/core-cm

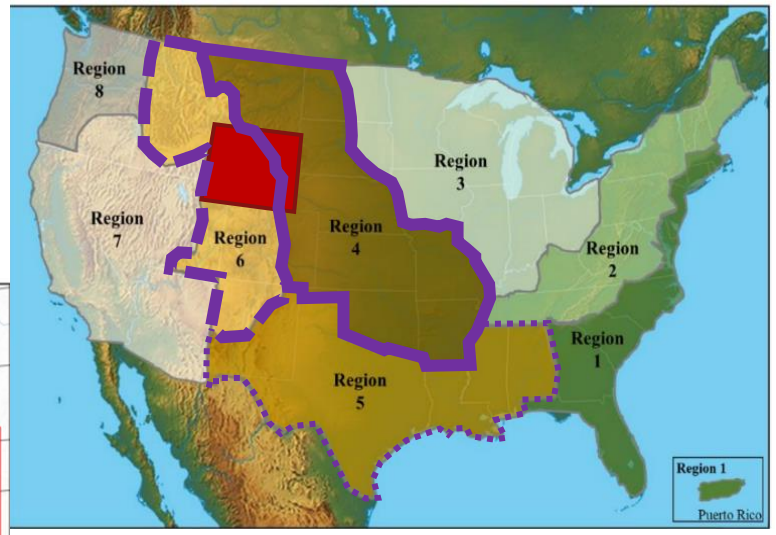
UW School of Energy Resources

Similar focus to Phase I CORE-CM but on a Regional Scale

CORE-CM Phase II: Regions & Budgets

Rocky Mountain (RM; Region 6)



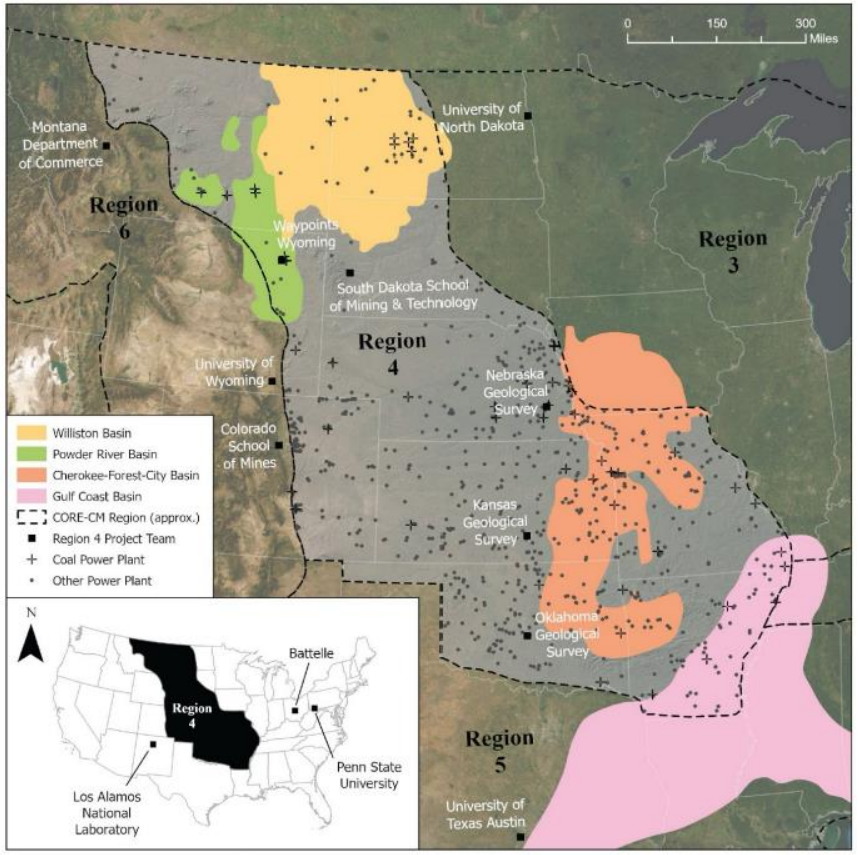


https://netl.doe.gov/resource-sustainability/critical-minerals-and-materials/core-cm

Period of Performance: 3 years
Project Funding:

Total Project $2,574,095

Great Plains & Interior Highlands (GPIH; Region 4)



Period of Performance: 3 years
Project Funding:

Total Project $10,181,914

Phase II: Leadership and Coalitions

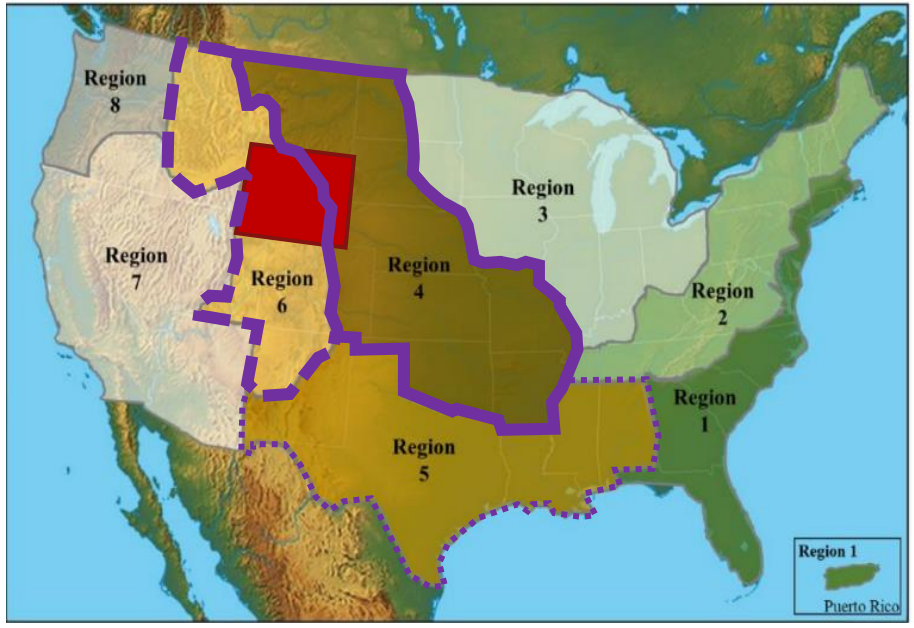
Rocky Mountain (RM; Region 6)

Phase II Leadership

- University of Wyoming
- University of Utah
- New Mexico Institute of Mining & Technology
- Colorado School of Mines

Phase II Coalition Team

- Idaho National Laboratory
- Sandia National Laboratory
- Los Alamos National Laboratory
- Colorado Geological Survey
- Utah Geological Survey
- Wyoming Geological Survey
- Lamar University
- Western Wyoming Community College
- Montana Technological University
- Western Colorado University
- Utah State University Eastern
- Utah Advanced Materials and Manufacturing Initiative
- Associated Governments of Northwest Colorado



https://netl.doe.gov/resource-sustainability/critical-minerals-and-materials/core-cm

Huge coalition teams with many partners, stakeholders, and supporters

Great Plains & Interior Highlands (GPIH; Region 4)

Phase II: Region 4 Leadership

- University of Wyoming

Phase II: Region 4 Coalition Team

- University of North Dakota/ Energy and Environmental Research Center
- Kansas Geological Survey
- Colorado School of Mines
- Pennsylvania State University
- Oklahoma Geological Survey
- South Dakota School of Mines & Technology
- University of Texas at Austin
- Los Alamos National Laboratory
- Battelle
- Western Fuels – Wyoming
- Navajo Transitional Energy Company
- Peabody Energy
- Black Hills Corporations
- Waypoints Wyoming
- Montana Department of Commerce
- Nebraska Geological Survey

Example of ecosystem development in Wyoming leveraging TICs

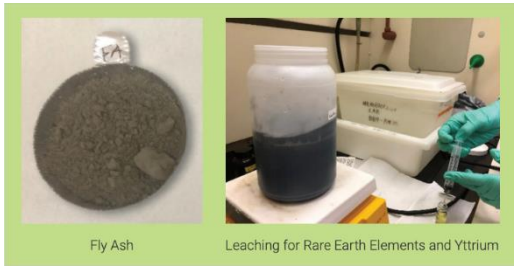
Wyoming Innovation Center Gillette Wyoming

Research-to-commercialization facility

UND-CEMRI Demo Plant

REE/CM from Lignite. Part of FEED study.

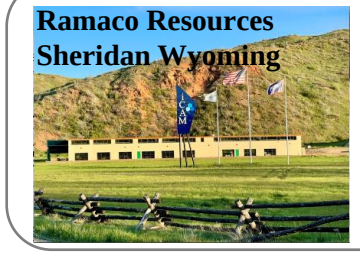
NETL REE Extraction from Coal Ash



Pilot-scale testing at the WY Innovation Center

Rare Element Resources DOE-funded demonstration plant to process rare earths from Bear Lodge Deposit, Upton Wyoming

Ramaco Resources Sheridan Wyoming



Coal-to-products, rare earth element, and critical mineral research and development

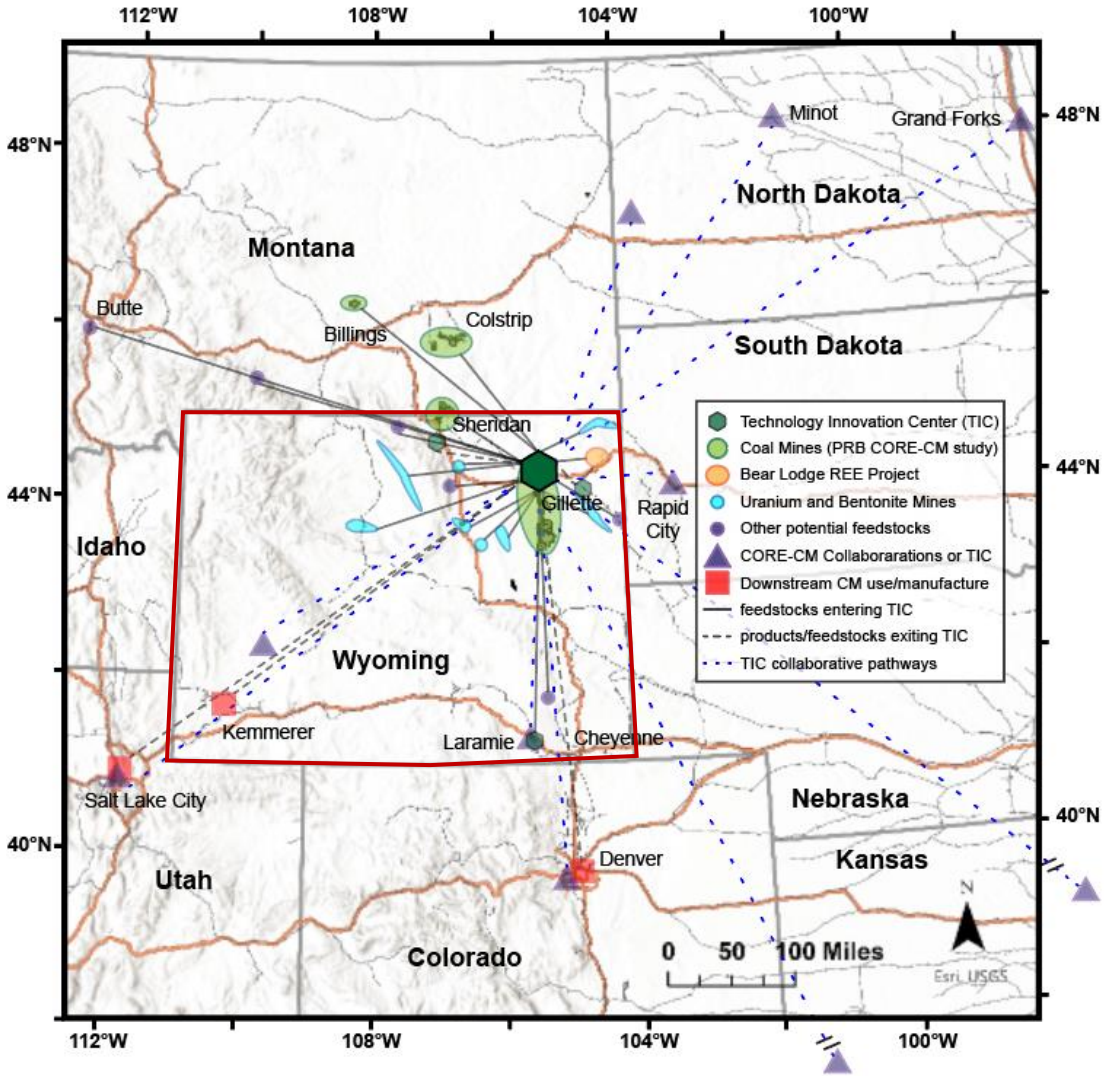
UW SER Center for Carbon Capture and Conversion

Two forthcoming field demonstrations for high volume uses for PRB coal in Gillette Wyoming

ITC WYOMING INTEGRATED TEST CENTER

Carbon capture and carbon utilization test center in Gillette Wyoming

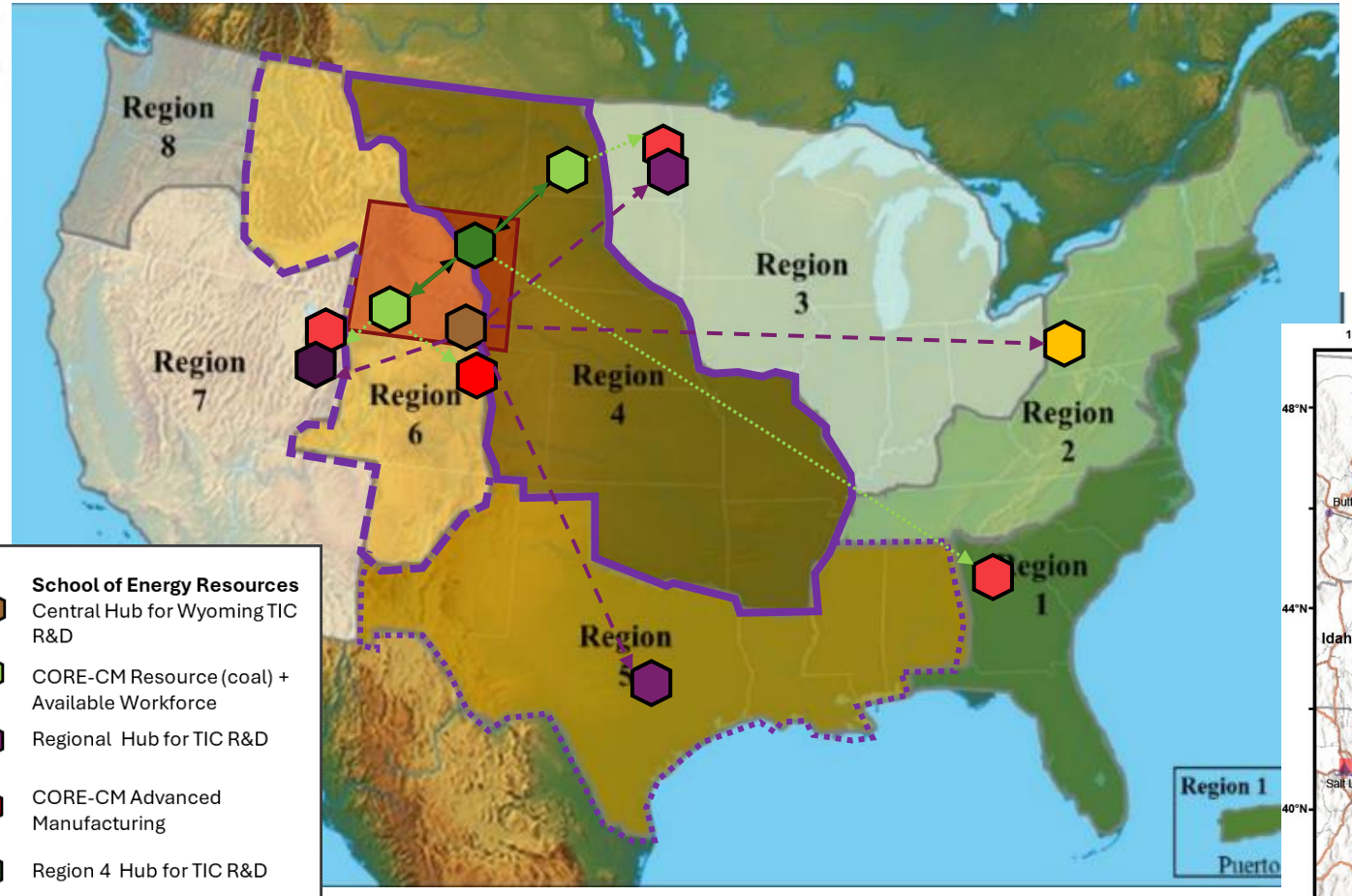
Connected Technology Innovation Centers



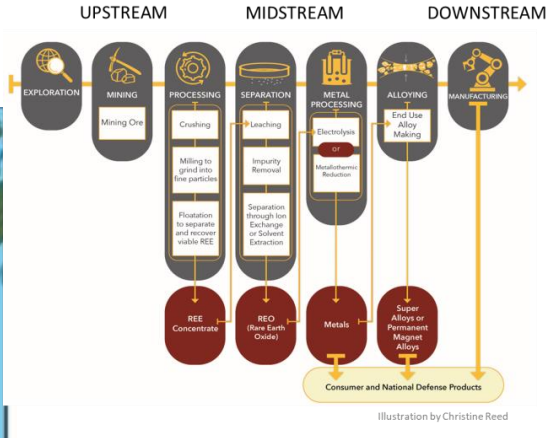
Wyoming has opportunity to be a NEXUS in the CORE-CM Supply Chain

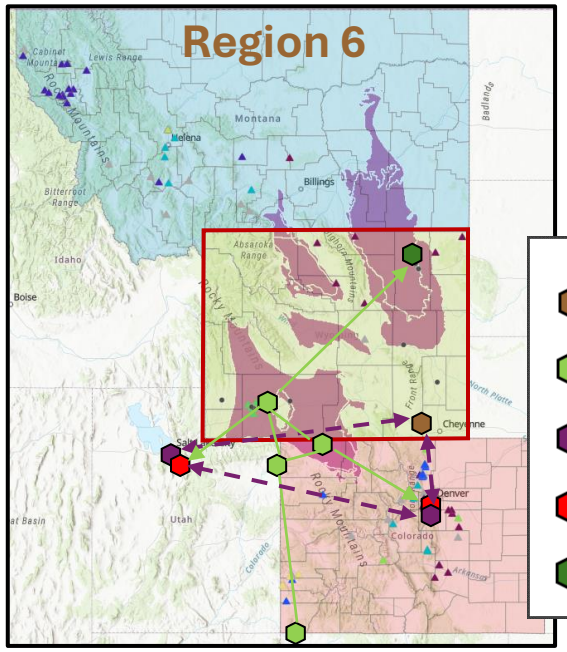
Transportation Infrastructure

Wyoming as a CORE-CM NEXUS



Supply Chain





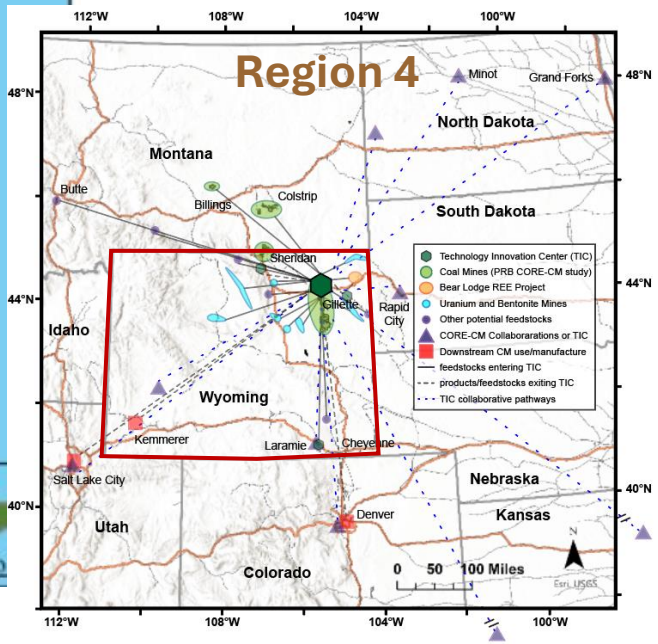
School of Energy Resources
Central Hub for Wyoming TIC R&D

CORE-CM Resource (coal) + Available Workforce

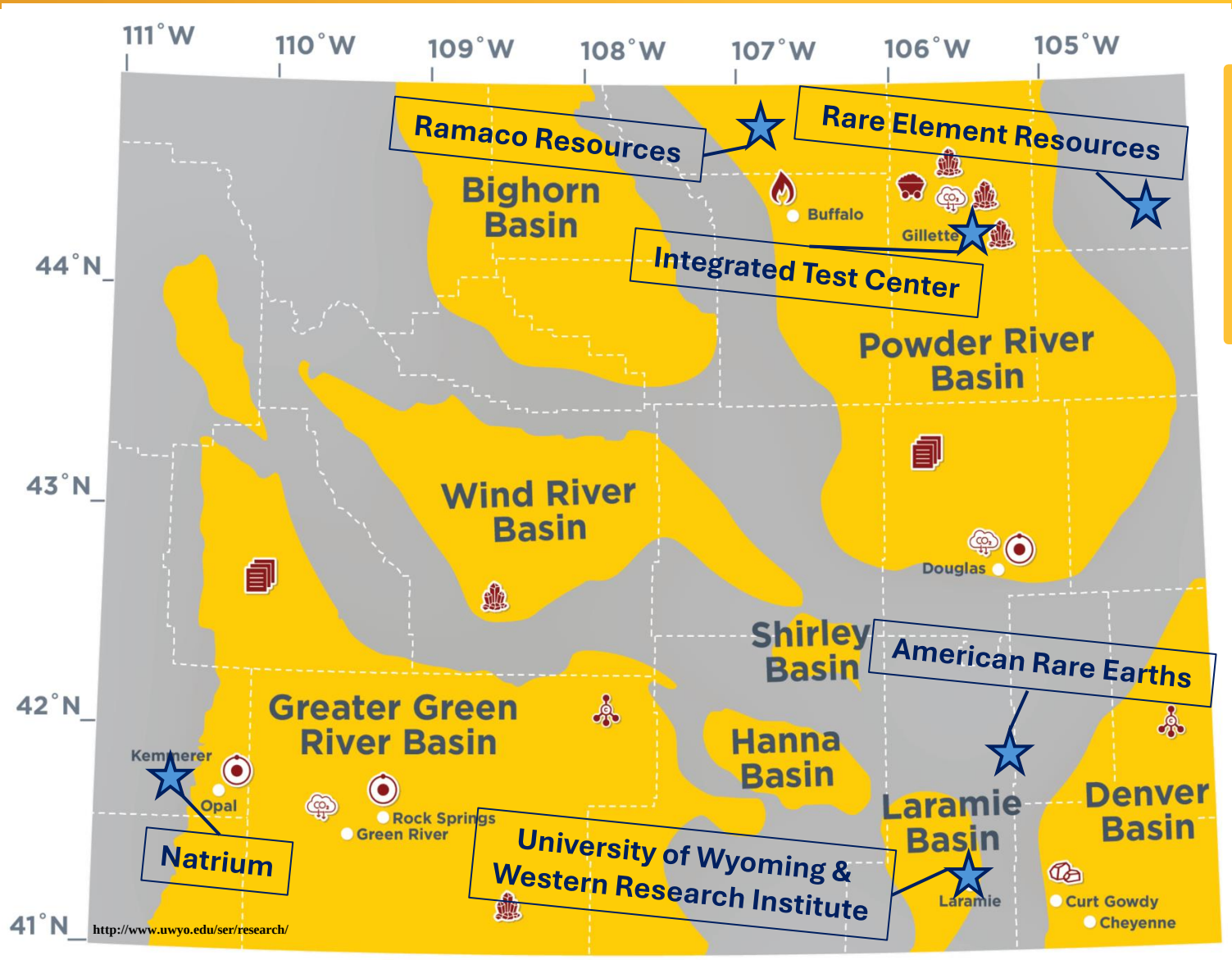
Regional Hub for TIC R&D

CORE-CM Advanced Manufacturing

Region 4 Hub for TIC R&D



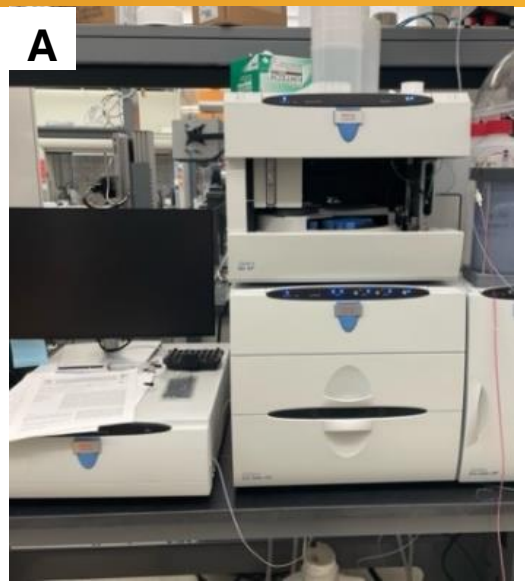
REE+CM related Activities in Wyoming

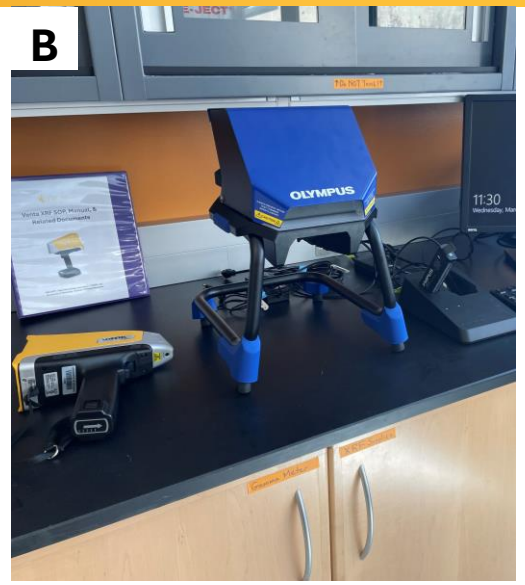


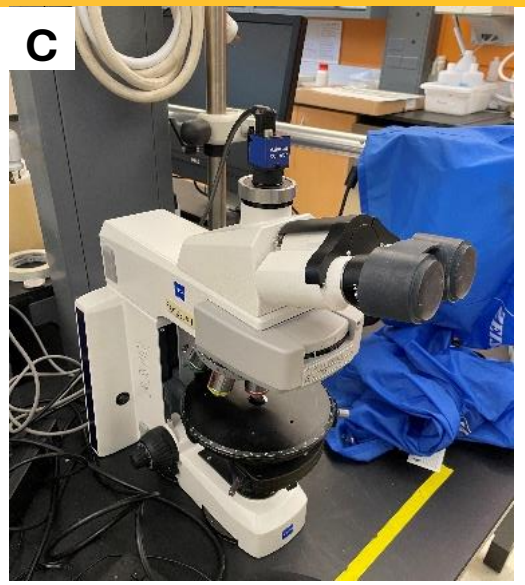
Wide-range of other REE+CM related actives in Wyoming. SER is, or has been, active in most all of them.

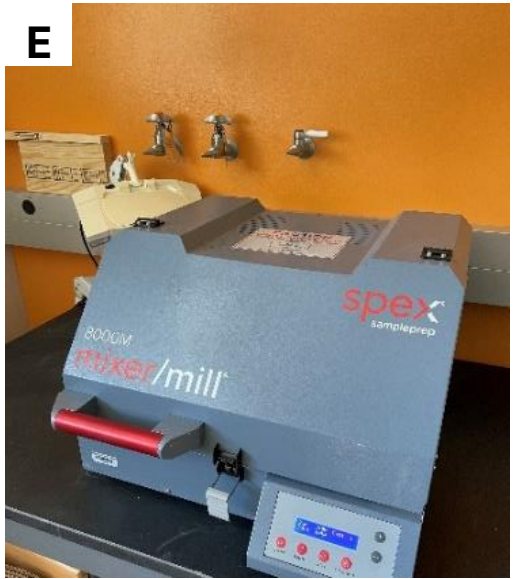
- Carbon Storage Project
- Nuclear
- Pipeline
- Hydrogen
- Methane Mitigation
- Carbon Engineering
- Mining
- Oil & Gas
- Class VI Database
- Critical Mineral and Rare Earth Element

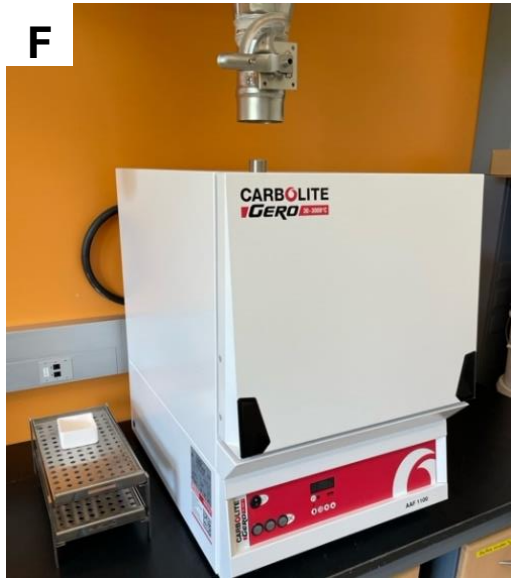
SER & University of Wyoming : Science Facilities (Center for Economic Geology)











- **A)** Ion Chromatograph: Can detect REEs in fluid samples such as oil and gas brines
- **B)** pXRF Analyzer: Can detect elemental concentrations in solid and liquid samples
- **C-D)** Petrographic/stereo microscopes for examining rock samples and thin sections
- **E-F)** Sample Prep Station: Drying, grinding, and ashing samples in preparation for measuring elemental concentrations

SER & University of Wyoming : Science Facilities (Other UW Laboratories)

CCCC Laboratory (SER)

Facility dedicated to research supporting the future of Wyoming coal and creating economic development and diversification opportunities

Raman Microscope

GC-MS

Geochemistry Analytical Laboratory (G&G)

Facility which conducts chemical analyses of aqueous and solid materials using high-precision analytical instructments (e.g., moisture, volatiles, and ash in coals, REEs, PGEs, and more)

ICP-MS

TGA

ICP-OES

Materials Characterization Laboratory (G&G)

Facility which specializes in characterization of chemical composition, crystalline structure, morphology, and fabric of natural and man-made solid materials

XRD

SEM

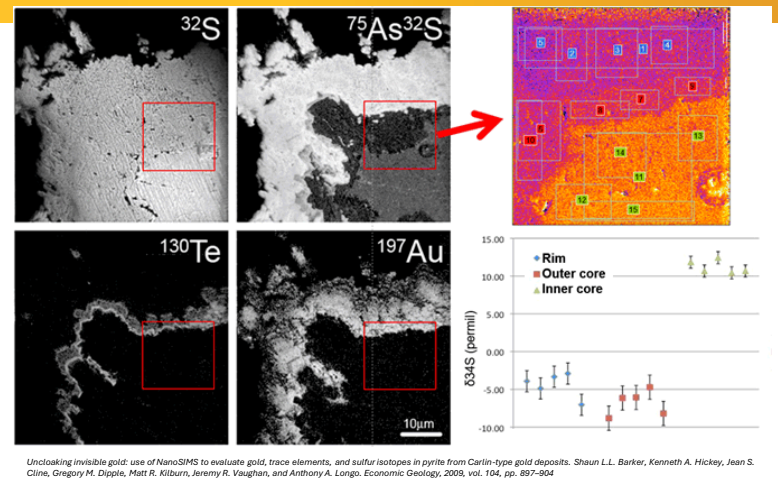
EPMA

SER & University of Wyoming : Science Facilities (potential future instrumentation)

Future Instrumentation & Research: ***NanoSIMS-HR***

- Ion microprobe capable of generating elemental and isotopic maps of geological and biological samples at nanometer resolution
- Applications:
  - Detecting rare earth element enrichment on small scales
  - Fingerprinting the source of critical minerals in Wyoming ore deposits
  - Discovering previously unknown concentrations of economically valuable minerals (e.g., “Invisible Gold” example to right)

https://www.cameca.com/products/sims/nanosims-hr



Uncloaking invisible gold: use of NanoSIMS to evaluate gold, trace elements, and sulfur isotopes in pyrite from Carlin-type gold deposits. Shaun L.L. Barker, Kenneth A. Hickey, Jean S. Cline, Gregory M. Dipple, Matt R. Kilburn, Jeremy R. Vaughan, and Anthony A. Longo. Economic Geology, 2009, vol. 104, pp. 897–904

SER & University of Wyoming: REE-related Teaching & Outreach

Participation in conferences and workshops

- Geological Society of America Connects 2023, including **Pardee Keynote Symposium** on Critical Minerals Policy
- **DOE Tribal Clean Energy Summit**, 2022 and 2024
- Annual Resource Sustainability Meeting, 2022-2024
- International Pittsburgh Coal Conference, 2023
- Battelle Innovations in Climate Science, 2023
- National Environmental Justice Conference and Training Program, 2023
- National Academies of Science and Engineering Workshop on Mineral Resources Workforce, 2024
- Joint University of Wyoming-University of Utah virtual town hall focused on critical minerals research
- Hosted a presentation on Tribal Sovereignty for University of Wyoming leadership

THE GEOLOGICAL SOCIETY OF AMERICA®

Rare Element Resources – Bear Lodge Project

https://www.rareelementresources.com/home

2024 Bull Hill Total Rare Earth Mineral Resource Summary

Resource Class	Metric Tonnes (millions)	%TREO	Contained TREO Metric Tonnes (1000's)	Recovered Nd/Pr Metric Tonnes (1000's)
Measured	2.04	4.53	92.4	18.4
Indicated	3.98	3.85	153.1	31.3
Measured & Indicated (M&I)	**6.02**	**4.08**	**245.5**	**49.7**
Inferred	1.90	3.61	68.5	14.4

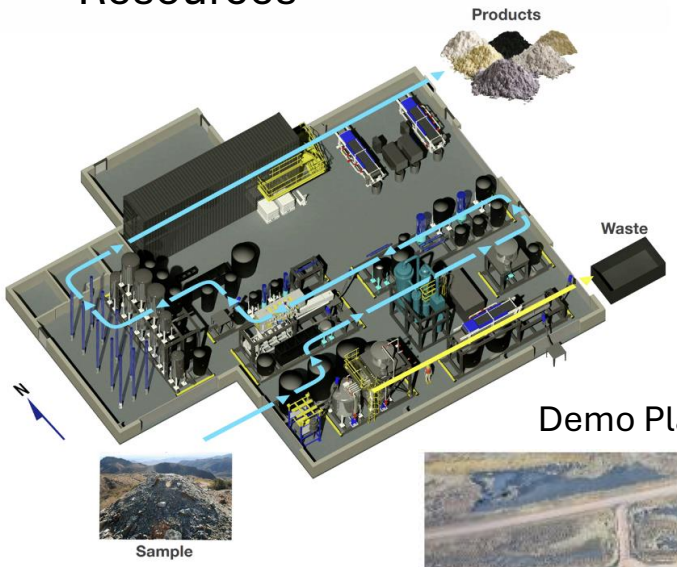
Artist Rendering of a Potential PUG Plant

Physical Upgrade Plant

Artist Rendering of a Potential Hydromet Plant

Hydromet Plant (Upton, WY)

- 245,000 tons of TREOs (Measured and Indicated)
  - Most ready technologically
- Existing relationship with the School of Energy Resources



Demo Plant

American Rare Earths – Halleck Creek Project

- 1.5B tons of TREOs (Measured and Indicated)
- SER and Department of Geology assistance investigating REE mineralization

Table 10-4: Estimated Rare Earth Resources at Halleck Creek (1,000 ppm TREO Cut-off)

Classification	Tonnage	Grade				Contained Material			
		TREO	LREO	HREO	MREO	TREO	LREO	HREO	MREO
	t	ppm	ppm	ppm	ppm	t	t	t	t
Measured	206,716,068	3,720	3,352	370	904	769,018	692,935	76,550	186,836
Indicated	1,272,604,372	3,271	2,900	360	852	4,162,386	3,689,999	458,140	1,084,256
Meas + Ind	1,479,320,439	3,334	2,963	361	859	4,931,405	4,382,934	534,691	1,271,092
Inferred	1,147,180,795	3,239	2,878	361	837	3,715,661	3,302,005	413,651	960,355
Grand Total	2,626,501,234	3,292	2,926	361	850	8,647,066	7,684,939	948,341	2,231,447
Rounded	2,627,000,000	3,292	2,926	361	850	8,647,000	7,685,000	948,000	2,231,000

‘UW in Your Community’ Event April 17 in Wheatland

Published April 02, 2024

Phoebe Futcher
Geology Ph.D. Student

Rare earth minerals explained

Dr. Lily Jackson (SER Research Professional) speaking at UW in Your Community event

Ramaco Resources – Brook Mine Project

Table 1.0-1 Current Brook Mine In-Place REO Exploration Target Tonnage and Grade Estimates (Ash-Basis)

	Total Model Volume	Total Model Mass	Primary Magnetics		Secondary Magnetics		Heavy		Light		Total		Ga and Ge	
			Tons	Grade	Tons	Grade	Tons	Grade	Tons	Grade	Tons	Grade	Tons	Grade
Range	(M CY)	(M Tons)	(000)	(ppm)	(000)	(ppm)	(000)	(ppm)	(000)	(ppm)	(000)	(ppm)	(000)	(ppm)
Low	2,025	3,922	260	93	72	26	39	14	853	301	1,105	392	114	47
High	2,025	3,922	325	116	90	32	49	17	1066	377	1,382	490	143	59

- 1-1.5M tons of (*estimated) REEs, Ga & Ge
- SER presence & participation at the Ramaco Resources Rodeo
- Existing SER collaboration with NETL scientists

Dr. Holly Krutka (SER Director)speaking at 2024 Ramaco Research Rodeo

RAMACO

NATIONAL ENERGY TECHNOLOGY LABORATORY

School of Energy Resources

- Minerals Team (Center for Economic Geology Research) collaborates with:
  - Other SER Centers of Excellence
  - UW faculty and researchers from multiple colleges & departments
  - Universities, State Governments and Geological Surveys, US Geological Survey, National Labs, Department of Energy, and many Industry Partners

Many at SER have strong connections to the University of Wyoming education system

UW | School of Energy Resources

AGENDA ITEM TITLE: **Update on UW Regulation 2-13 Academic Program Reorganization Process (School of Computing)**, Turpen/Mai/Kean

Office of Academic Affairs
Dept. 3302 • 1000 E. University Avenue
Laramie, WY 82071
(307) 766-4286 • (307) 766-6476 • fax (307) 766-2606
www.uwyo.edu/acadaffairs

February 3, 2025

To: Cameron Wright, Dean, College of Engineering and Physical Sciences
CC: Gabrielle Allen, Director, School of Computing
Re: UW Regulation 2-13: College of Engineering and Physical Sciences/School of Computing

The University of Wyoming's School of Computing (SoC) was established in January 2022 when the Board of Trustees approved the Request for Authorization (RFA). In the original RFA, it was proposed that the SoC initially be "incubated" in the College of Engineering and Applied Sciences (CEPS). This incubation period aided in the coordinated development of the SoC and further strengthening of the Electrical Engineering and Computer Science department. The long-term vision for a highly inclusive SoC remains a central tenant to the proposed plan.

The original RFA also articulated that the SoC will:

- be a cross-university school with joint appointments possible with any UW department,
- have robust, multiple-pathway degree programs at both the graduate and undergraduate level,
- leverage partnerships with corporations, national labs, and UW entities including the ARCC, WyGISC, Data Science Center, WIP and UW colleges, and Wyoming's community colleges, and
- ultimately be a separate unit led by a dean (to be recruited internationally).

In the January 2025 Board of Trustees meeting, the Board directed the Provost to initiate UW Regulation 2-13 for the proposed reorganization of the School of Computing as an independent school in the UW organizational structure and budget. Per UW Regulation 2-13, the Provost, in collaboration with the Faculty Senate will review the recommendation to reorganize and will discuss the recommendation with and solicit feedback from the Academic Personnel and staff in SoC and CEPS. Per the Standard Administrative Policy and Procedure on "Academic Programs Discontinuance, Reorganization, Consolidation, and/or Reduction per UW Regulation 2-13," prior to initiating a reorganization, consultations will be held with relevant faculty, staff, and other appropriate stakeholders to gather input and assess the potential impact of the reorganization.

I am asking you to work with Dr. Allen on preparing a proposal to reorganize and submit it to me by February 28, 2025. This proposal does not need to include specific details about how the reorganization will be implemented, but instead it should provide a rationale and justification for the reorganization. The college and school should work together, and with other entities like the Budget and Finance office and Academic Affairs in developing the proposal. You may choose to attach documents that have already been developed to support your recommendation (e.g., 2022 SOC Management Plan and the WyGisc/Soc implementation plan). This proposal will be provided to the Faculty Senate; Academic Personnel, administrators, and staff in SoC; and Academic Personnel, administrators and staff in CEPS for review and feedback. I will review the reorganization proposal, the recommendation from Faculty Senate, and feedback from SoC and CEPS in formulating my recommendation to the Board at its April 2025 conference call.

The transition of the School of Computing as its own unit under the Academic Affairs Division has the support of the Office of the Provost, and I encourage a strategic and thoughtful process that outlines plans for the transition of staff and budget to ensure the long-term viability and growth of SoC.

As directed by the Board, the draft reorganization plan will also be presented to the Trustee Committees of Biennium Budget and Facilities Contracting at their March 2025 committee meetings. Please consult with Vice President Kean to review your reorganization proposal and to verify the content of the proposal adequately addresses budgetary and facilities matters of interest to these committees prior to submitting to me on February 28.

If the Board approves the recommendation to reorganize, then per the SAP, the Dean of CEPS will consult with me to establish a reorganization committee comprised of representative faculty, staff, and students from CEPS and SoC to develop a detailed implementation plan.

Regards,

J. Scott Turpen
Interim Provost

Copies to:
Gabrielle Allen, Director, School of Computing
Ray Fertig, Chair, Faculty Senate

UNIVERSITY OF WYOMING
College of Engineering and Physical Sciences

WORKING FOR WYOMING & THE WORLD

Cameron H. G. Wright, Ph.D., P.E. | **Dean**
Dept. 3295 | 1000 E. University Ave. | Laramie, WY 82071-2000
Tel. 307.766.4992 | Fax 307.766.4444 | www.uwyo.edu/ceps

February 28, 2025

TO: Interim Provost Scott Turpen

SUBJ: CEPS/SoC 2-13 Recommendation Report

Sir,

I am sending to you, attached to this cover memo, my Recommendation for the Reorganization of the College of Engineering and Physical Sciences (CEPS) and the School of Computing (SoC), in accordance with the UW Reg 2-13 process. I have worked closely with SoC Director Gabrielle Allen to produce this document.

Since the SoC was first created and began incubation in CEPS, it was always planned that the SoC would eventually move out to become its own organization, and decisions related to SoC always reflected this plan. The attached document confirms that I see no issues or impediments to the SoC moving out of CEPS and standing up as a separate entity. Note that a preliminary canvas of all the departments in CEPS also shows no issues.

Respectfully,

Cameron H. G. Wright
Carrell Family Dean
Professor of Electrical and Computer Engineering

xc: Dr. Gabrielle Allen
Mandy Gifford

Atch: Recommendation for the Reorganization of the College of Engineering and Physical Sciences and the School of Computing, 28 Feb 2025.

Recommendation for the Reorganization of the College of Engineering and Physical Sciences and the School of Computing

To: Scott Turpen, Interim Provost
From: Cameron Wright, Dean, College of Engineering and Physical Sciences
Date: February 28th, 2025

The University of Wyoming's School of Computing (SoC) was established by the Board of Trustees (BoT) in January 2022 (Appendices 1 & 2) with the directive that it would be initially incubated within the College of Engineering and Physical Sciences (CEPS) before transitioning to an independent academic unit reporting directly to the Provost, similar to the Haub School and School of Energy Resources. In January 2025, the BoT formally directed the Provost to initiate UW Regulation 2-13 to reorganize the SoC out of CEPS. This directive aligns with the original Request for Authorization (RFA, Appendix 3), which envisioned the SoC becoming a standalone unit within approximately four years.

This memo outlines my recommendation and justification for implementing the 2-13 process to restructure CEPS, allowing the SoC to transition out of the College potentially in Summer 2025. This transition would include the SoC's faculty, staff, students, academic programs, research centers, funded projects and budget, establishing it as an independent unit. ***From its inception, all stakeholders have understood the SoC's temporary placement in CEPS as an incubation phase*.** The SoC has operated within CEPS with that understanding, ensuring that there will be minimal administrative issues for this reorganization. I recently solicited questions or concerns from CEPS department heads in relation to this proposed reorganization and have also discussed it at a CEPS Leadership meeting, and I received no comments.

1. State of the School of Computing

The motivation and concept plan for the SoC was developed as part of the President's Digital Pillar working group in 2021 (Appendices 4 & 5). The SoC is following the plan outlined in the Request for Authorization (Appendix 3 & 6) and remains on track with established metrics (Appendix 7). In particular, the SoC is set to enroll students in a new concurrent BS in Applied Computing and BS in Data Science programs (Appendix 8) starting Fall 2025.

To support these programs and advance research in computing applications and applied computing, the SoC has recruited 11 new faculty jointly with six departments across five colleges (Appendix 9). Additionally, it added seven faculty from a merger with the Wyoming Geospatial Information Science Center (WyGISC) in summer 2023 (Appendix 10). With efforts to align WyGISC academic programs with SoC new offerings, the SoC had a total enrollment of 108 students in academic programs in Fall 2024 (Appendix 11) and 343 students enrolled in SoC classes including 36 in new COMP classes (Appendix 12). This number does not include students enrolled in other computing classes taught by SoC joint faculty in their second unit.

The unrestricted operating funds allocated to the SoC (Appendix 13) have been consistent with the budget outlined in the original Request for Authorization (Appendix 3, Page 33). These funds have always been provided in addition to the standard CEPS budget and have

been managed under a separate SoC budget code to allow for financial autonomy and support the School's transition to independence. When the already independent WyGISC moved into the SoC in 2023, its unrestricted operating funds were also temporarily administered through CEPS. ***When the SoC moves outside of CEPS, no funds will be taken from CEPS in the process***.

2. Proposal for Reorganization

As part of the proposed reorganization, the SoC will relocate entirely as a complete self-contained unit, shifting from a unit within CEPS to an independent academic entity. This transition includes the following key aspects:

- *Staffing Changes*: No staffing changes are planned, except for the removal of the CEPS Dean from the staff/faculty reporting (dotted) line. The Provost is anticipated to recruit a SoC Dean to replace the current Director role.[1] No other reporting line changes are needed; the SoC Director already reports (solid line) to the Provost. (Appendix 14). The three joint faculty positions between the SoC and other CEPS units will not have any changes.
- *Academic Programs*: No changes to student academic programs (Appendices 8 & 11). All curricula committees (Appendix 15), including those in partnership with CEPS units, will continue functioning as they do currently. There are no changes for students - advising will remain with SoC and ACES. Course fees associated with SoC will move with it.
- *Budget Stability:* No significant budget changes (Appendix 13). The SoC (including WyGISC) unrestricted operating budget is additional to the CEPS budget. ***No original CEPS funds will leave the college when the SoC moves out.*** In coordination with the VP for Budget and Finance and the Provost, the SoC will continue ramping up to its planned target of $3M/yr in unrestricted operating funds. Additional funding to support a Computational Science and Engineering program, previously from Tier 1 funds, will be provided by UW administration from alternative sources. The BoT budget committee will review the SoC budget and sustainability at the March 2025 BoT meeting.
- *Research Funding:* All research funding (Appendix 16) currently routed through CEPS will move with SoC, including future Indirect Costs associated with SoC external funding.
- *Transition of SoC Centers*: The Wyoming Geospatial Information Science Center (Appendix 10) and the Data Science Center (Appendix 17), including any staff (Appendix 18) and resources will move with the SoC. WyGISC will vacate their current space in the AG building and move to Crane Hall. The Data Science Center will continue to use Room 4030 in the Science Initiative Building.
- *Endowed funds & Gifts*: Funds and gifts designated for the SoC will move with it. No CEPS endowments or gifts will transfer.
- *Operations:* All equipment, office supplies, computers purchased by the SoC, will move with the SoC. SoC will vacate space in the EN and AG buildings and relocate to the Crane/IT buildings, estimated to occur in Winter 2025. This will free up space, some newly remodeled, for CEPS and CALSNR use. The BoT facilities committee will review the SoC facility plans at the March 2025 BoT meeting.

[1] The current SoC Director, Dr. Gabrielle Allen, has confirmed to the BoT in the January 2025 meeting that she will not apply for the SoC Dean position.

3. Rationale for CEPS/SoC Reorganization

3.1 Interdisciplinary Mission Alignment: *SoC will best support its interdisciplinary, UW-wide mission as an independent unit.* The SoC serves a university-wide mission, collaborating with multiple colleges, including Agriculture, Arts & Sciences, Life Sciences, Business, Education, and Health Sciences in addition to Engineering and Physical Sciences. Its core faculty are generally in joint appointments across UW (Appendix 9). To accelerate the establishment of the school as a hub for computing at UW, the SoC initiated a broad range of engagement programs, strategically designed and managed to build bridges (Appendix 34). To date, these programs and other engagement activities have resulted in 174 student impacts in 36 colleges, and over 160 faculty engagements with 98 unique faculty in 34 departments. The School has also worked to advance computing related infrastructure available to UW researchers and educators, including broadening the use of the NCAR Wyoming Supercomputing Center and collaboratively building new visualization solutions (Appendix 25). The SoC has prioritized support through different mechanisms, of UW strategic initiatives including Tier 1 Engineering, K-12 education and outreach, Science Initiative, Center for Controlled Environment Agriculture, Center for Rural Communities Resilience and Innovation, WlydTech Center, AMK Ranch, Quantum Information Science and Engineering Center, and the AI Initiative.

Implementing the planned independence will better position the school to provide and grow an academic and research hub for computing and support the whole university in interdisciplinary education and research. UW will benefit from the SoC mission to bring computing to students across the entire university, and to bring computing expertise and external funding throughout UW through joint appointments and affiliate faculty appointments.

> **Impact on CEPS:** *Positive*. Continuing to work with SoC as a hub of computing will further enable collaboration of CEPS faculty across UW around interdisciplinary computing and data programs and provide CEPS students with more options through SoC classes and programs. The continued collaboration of SoC with CEPS around CDSE (Computational and Data-enabled Science and Engineering) will ensure a continuing close connection. The move to an interdisciplinary independent unit will also help differentiate between the SoC and EECS missions and directions.

3.2 Administrative Readiness: *The SoC has a robust and effective administrative support team and is ready to operate as an independent academic unit.* The incubation of SoC within CEPS has provided valuable administrative support, allowing the school to establish robust operations (Appendix 19). The transition was further strengthened by a merger with WyGISC, which was already independently managing academic programs. As a result, the SoC now has a fully developed administrative structure effectively serving its 19 core faculty, 6 administrative support staff, 6 postdoctoral researchers and visiting scholars, 10 WyGISC developers, and 108 students (Appendices 9, 18, 20 & 21).

The Director of the SoC already reports directly to the Provost, with a dotted-line report to the Dean of CEPS for day-to-day coordination (Appendix 14). The SoC Director meets regularly with both, ensuring open communication and collaboration. Over the past year, there have been no outstanding administrative or strategic concerns raised by the Dean, demonstrating the school's ability to effectively grow and function independently.

> **Impact on CEPS:** *Negligible*. CEPS will have one less unit to oversee for financial, personnel, etc., activities.

3.3 Academic Readiness: *The SoC is academically prepared to transition into an independent unit while maintaining and growing its strong interdisciplinary focus.* The school has successfully developed and launched new academic programs which leverage and integrate with the adopted GIST programs from WyGISC. (Appendices 8, 11, 12 & 15). These include the upcoming BS in Applied Computing and BS in Data Science, set to enroll students in Fall 2025. The SoC has faculty in place to support its programs (Appendix 9), and has well-functioning faculty governance, curricula committees (Appendix 15), and has developed and ratified key policies, including SoC by-laws and RTP expectations which will require only minor modifications for the reorganization (Appendix 23). The SoC also has key student advising and student success mechanisms.

As an independent unit, the SoC will be better positioned to expand its interdisciplinary teaching and research initiatives, foster innovative curriculum development, and serve as a university-wide leader in computing education. The transition will enhance its ability to support faculty collaborations across multiple colleges and strengthen its role as a central hub for computing-related academic programs.

> **Impact on CEPS:** *Positive*. The continued partnership between CEPS and the SoC will sustain joint efforts in Computational and Data-enabled Science and Engineering (CDSE), ensuring strong interdisciplinary connections. The transition will also help further distinguish the SoC's computing application-focused and flexible student-pathway mission from that of Electrical Engineering and Computer Science (EECS), allowing both units to develop in complementary directions.

3.4 Budgetary Readiness: *The SoC is budgetarily secure and ready to operate with its own budget.* The SoC has operated within CEPS with a separate budget, and all SoC expenses are included in that budget (Appendix 13). Under the initial guidance of the CEPS Director of Business Operations, the SoC has prepared its own budget and made its own budget presentation to the BOT each year. In 2023 the provost made available to SoC an additional, ongoing $500K, from the new Tier 1 Engineering appropriation (out of $5.5M in new Tier 1 funding) to support building a program in Computational Science and Engineering. In FY24 and FY25 these funds have supported Tier 1 goals for computational science and engineering including joint SoC-CEPS faculty, research scientists, faculty fellows and graduate research scientists (Appendices 24 & 25). Once SoC becomes independent the $500K Tier 1 funds will remain in CEPS, and alternative (non-CEPS) funds will be provided to SoC to continue the computational science and engineering efforts.

> **Impact on CEPS:** *Positive*. CEPS will have the $500K of Tier 1 funds that were allocated to SoC in FY24 and FY25 available for other uses.

3.5 Facilities Readiness: *The SoC has secured appropriate facilities to accommodate its current operations and potentially support future growth.* The SoC will move all its faculty and staff, including WyGISC, to Crane Hall and the IT building. These spaces were chosen because they have the space to support SoC growth and locate SoC in the same space as the interdisciplinary Haub School and the staff and services of the UW IT Division including the Advanced Research Computing Center. The funds for the renovation of Crane Hall were approved in the January 2025 BOT meeting. Renovation work is expected to be complete in September 2025. SoC plans to relinquish all existing space in the Engineering Building and Agriculture buildings in Winter 2025 (assuming renovations are complete).

> **Impact on CEPS:** *Positive*: The relinquished space in the Engineering Building will be used for growth in the EECS department. CEPS will be able to take advantage of SoC office renovations. *Negative*: SoC will be further from CEPS faculty and students. But SoC has developed and maintained strong collaborations with other colleges, so it should be possible to continue strong connection to CEPS from its new location.

3.6 Communication Readiness: *The SoC has prioritized and developed communication to stakeholders, within the SoC, within CEPS, and across the University of Wyoming and the State of Wyoming.* In the CEPS incubation phase the SoC has also been able to leverage the Colleges communication mechanisms. While communication can always be improved, the School has a solid basis to expand from. The School has an Internal Advisory Board, established in 2022, that represents all-but-one UW Colleges (Appendix 26). The School has also coordinated with the Department of Electrical Engineering and Computer Science, including establishing a joint working group, to communicate and market all UW computing-related programs and opportunities. The SoC established its web presence in 2022 (Appendix 27), now has additional active social media pages (LinkedIn, Instagram, Facebook, Appendices 28-30), has invested in a marketing coordinator, has organized SoC Retreats in 2024 and 2025, has developed an internal SoC handbook. The SoC has an openly subscribable weekly newsletter, published since November 2023, that now has 229 subscribers (Appendix 31).

3.7 Board of Trustees (BoT) and University Leadership Support: *The BoT has received multiple presentations on the SoC's trajectory (Appendices 32 & 33) and supported its future independence from the beginning.* The current proposal aligns with prior BoT decisions.

3.8 Alignment with National Trends: The SoC move to an independent unit is synergistic with current trends in computing and AI education and positions the school to fully engage in the national, and international, conversations on how to organize universities to prepare students for future careers. Universities are restructuring computing education to better integrate AI, data science, and computational thinking across disciplines, ensuring students are prepared for rapidly evolving workforce demands. The SoC is already one of 140 members of the Computing Research Association (CRA, Appendix 35). The CRA has a Dean's

Council of 31 North American independent academic computing colleges/schools, which does not include new, independent Colleges/Schools of Computing in development stages (Appendix 36). The SoC already actively engages in national conversations on computing education, e.g. through the CRA, the Computing Community Council, and the National Artificial Intelligence Research Resource Pilot. Through being at the table to participate in these discussions alongside peer institutions, industry leaders, and policymakers, the SoC will ensure that its curriculum, research initiatives, and industry partnerships remain at the forefront of national efforts to shape the future of AI and computing.

4. Conclusion

The School of Computing is fully prepared to operate as an independent academic unit. This reorganization aligns with prior BoT decisions and UW's strategic vision. I recommend proceeding with the formal transition process under UW Regulation 2-13 to establish the SoC as an independent entity.

Cameron Wright, Dean, College of Engineering and Physical Sciences

Date: February 28th, 2025

Appendices and Online Materials

1. University of Wyoming Institutional Communications "UW Trustees Approve Launch of School of Computing", (January 11th, 2021). Internal news story describing the launch, rational and mission of the new School of Computing
2. UW Announcement of Notice of Intent for a School of Computing, July 15th, 2021
3. Request for Authorization for the School of Computing, Board of Trustees Meeting, January 22nd, 2022. Pages 22-89
4. University of Wyoming Digital Pillar Report, Draft Report from May 21st, 2021, which included the School of Computing as a center piece, authored by 28 faculty, staff and students across the university
5. Preliminary Plan for School of Computing, May 2021, authored by a subgroup of the Digital Pillar
6. Timeline, from request for authorization plan, normalized to first faculty cohort.
7. School of Computing Metrics
8. Academic Programs: Computing Minor (Catalog, Proposal), Applied Software Development (Catalog, Feasibility Study & NOI), GIST Programs (Feasibility Studies, NOIs), MS GIST – Thesis (Catalog), MS GIST – Professional (Catalog), BS Applied Computing (Feasibility Study & NOI), BS Data Science (Feasibility Study & NOI), MS AI (Feasibility Study & NOI), MS QISE Degree Programs (Feasibility Study & NOI)
9. Table of School of Computing Faculty, including WyGISC faculty, February 17th, 2025.
10. News story on the move of WyGISC to SoC, February 9th, 2025
11. Academic Programs and Enrollment
12. Academic Courses and Enrollment
13. Budget Information, SoC and WyGISC
14. Academic Affairs organization chart showing current reporting of SoC to Provost and CEPS
15. Curricula Committees
16. Spreadsheet of total External Funding where a SoC core faculty member is a PI or co-PI. **These numbers are the total funds coming to UW and do not include the amount of funds that are directed only to SoC.*
17. News story on the move of the Data Science Center to SoC, March 28th, 2025
18. WyGISC Development Team Staff
19. Initial Management Plan for School of Computing, October 26th, 2022
20. Table of School of Computing Administrative Team, February 17th, 2025.
21. Org Chart for School of Computing, February 17th, 2025
22. Curriculum Overview
23. SoC Policies
24. Report to Provost on SoC FY24 Tier 1 Spending, July 23rd, 2024
25. Report on SoC requested by Chair of CEPS National Advisory Board, November 25th, 2024.
26. Table of School of Computing Internal Advisory Board, February 17th, 2025.
27. School of Computing Web Page
28. School of Computing LinkedIn Page, 440 Followers

29. School of Computing Instagram Page, 311 Followers
30. School of Computing Facebook Page, 76 Followers
31. School of Computing "I/O Computing News" weekly newsletter, 229 email recipients, example from February 13th, 2025
32. Presentation to the Academic and Student Affairs Committee of the Board of Trustees, September 25th, 2024: Recording on YouTube, Meeting Materials.
33. Presentation to the Board of Trustees, January 23rd, 2025: Recording on YouTube, Meeting Materials.
34. Engagement Programs and Engagement Metrics
35. SoC Feature in 2024 Computing Research Association Member Book (Page 157)
36. North American Dean-led Colleges or Schools of Computing

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Date: February 28, 2025

To: Ray Fertig, Chair, UW Faculty Senate
From: J. Scott Turpen, Interim Provost
Subject: UW Regulation 2-13 Reorganization Recommendation – School of Computing

Dear Senate Chair Fertig and Members of Faculty Senate,

In accordance with UW Regulation 2-13, I am presenting for Faculty Senate review and feedback the proposed recommendation for the reorganization of the University of Wyoming's School of Computing (SoC) as submitted by the College of Engineering and Physical Sciences (CEPS). As directed by the Board of Trustees at their January 2025 meeting, this recommendation outlines the proposed transition of SoC into an independent unit within the University's academic structure.

The School of Computing was established in January 2022 under the College of Engineering and Physical Sciences as an incubated entity. The long-term vision, as outlined in the original Request for Authorization (RFA), has always been for the SoC to become a stand-alone academic unit, reinforcing its role as a cross-university hub for computing education, research, and industry collaboration. The recommendation for reorganization is driven by this vision and the need for an independent administrative structure to support the continued growth and impact of computing disciplines at UW.

This proposal developed by CEPS and SoC leadership includes these elements of the reorganization:

- Establishing the School of Computing as an independent academic unit reporting to Academic Affairs.
- Maintaining and expanding cross-disciplinary collaborations with colleges, research centers, and external partners.
- Ensuring sustainable financial and administrative structures to support the transition.

The Faculty Senate's review and recommendation will be integral to this process. Following the Standard Administrative Policy, faculty, staff, and other appropriate stakeholders within SoC and CEPS will have the opportunity to provide feedback. Additionally, this recommendation will be presented to the Trustee Committees on Biennium Budget and Facilities Contracting in March 2025 for further review.

I look forward to the Faculty Senate's input and recommendations regarding this reorganization. Your review will inform my final recommendation to the Board of Trustees, which will be discussed during their April 2025 conference call. I ask that you submit your recommendations to me by March 26, 2025. Please let me know if additional information is required to facilitate your review.

Sincerely,

J. Scott Turpen
Interim Provost

cc:
Cameron Wright, Dean, College of Engineering and Physical Sciences
Gabrielle Allen, Director, School of Computing

AGENDA ITEM TITLE: **Annual UW Foundation Fundraising Priorities**, Seidel/Stark

UNIVERSITY OF WYOMING
FOUNDATION

FY25 Fundraising Priorities

Approved by Board of Trustees

STUDENT SUCCESS

FACULTY EXCELLENCE

INSTITUTIONAL EXCELLENCE

- Complete Difference Makers Campaign (Stadium West Side and Aquatic Center)
- Range and Ranch Management
- Enhance corporate engagement and support through the Office of Industry and Strategic Partnerships
- Centers and Institutes, for example:
  - AMK Ranch
  - Neltje Center for Excellence in Creativity and the Arts
  - Nuclear Energy Research Center
- Continue donor-centric approach by connecting donor passions with university priorities

Building Alignment & Driving Momentum

UW Board of Trustees Investment - 2022

- **$15M** *for* **STUDENT SUCCESS & FACULTY EXCELLENCE & RESEARCH EXCELLENCE**

UW Foundation Board Investment - 2022

- **$5M** *for* **STUDENT SUCCESS & FACULTY EXCELLENCE** *matched to* **$10M**

State of Wyoming Match - 2024

- **$10M** *for* **STUDENT SUCCESS & FACULTY EXCELLENCE** *matched to* **$20M**

WHAT IS A CAMPAIGN?

INCLUSIVE: Donors at all levels have a place.
Cultivate a culture of philanthropy.

COMPREHENSIVE: Momentum and collaboration across UW.
Focused on a wide-range of priorities.

TRANSFORMATIONAL: Poised for future growth.
Makes new programs possible.
New baseline.

WHAT MAKES A CAMPAIGN DIFFERENT?

Providing the necessary confidence to launch a campaign

SETTING THE STRATEGIC DIRECTION

- Internal Readiness
- Philanthropic Priorities
- External Readiness
- Review & Report

bwf

BUILDING CAPACITY WHILE CHANGING THE WAY YOU ENGAGE YOUR DONORS.

INTERNAL READINESS

- Engagement Preparation
- Internal Leadership Interviews
- Giving Insight Analysis
- Program Reviews

DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY

EXTERNAL READINESS

- Prospective Donor Interviews
- Engage DX Constituent Survey
- External Planning Considerations

DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY

REPORT, ANALYSIS, AND DECISIONS

- Conclusions
- Recommendations
- Report Review and Delivery
- Presentations to UWF & UW

DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY

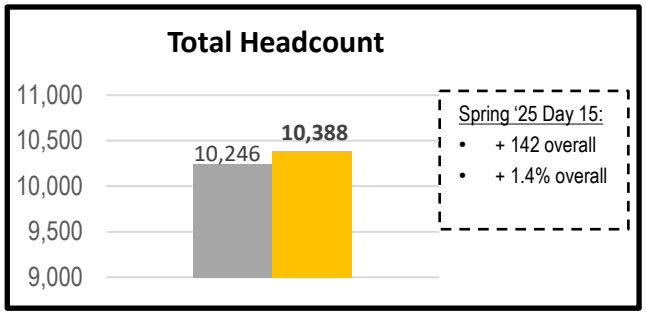
Possible Campaign Plan Timeline

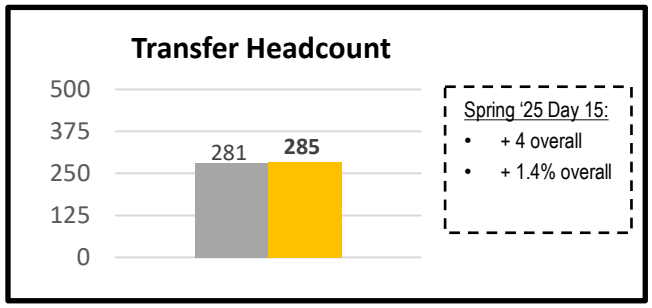
Timeline is standard but is dependent on readiness, priorities, internal and external assessment, campaign goals, and other university milestones.

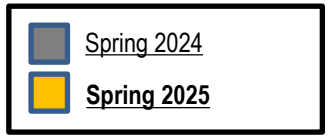
AGENDA ITEM TITLE: **2025 Spring Census Enrollment Update**, Moore K.

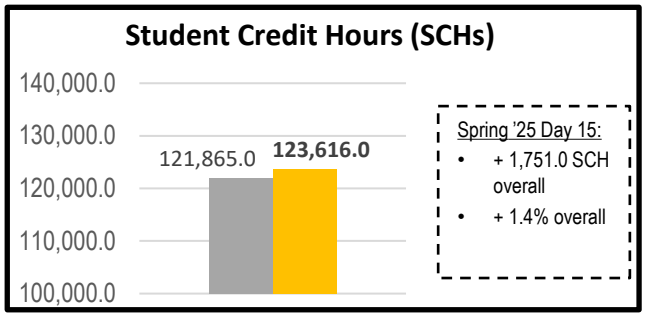
Spring 2025 Day 15 Enrollment as of February 10th, 2025

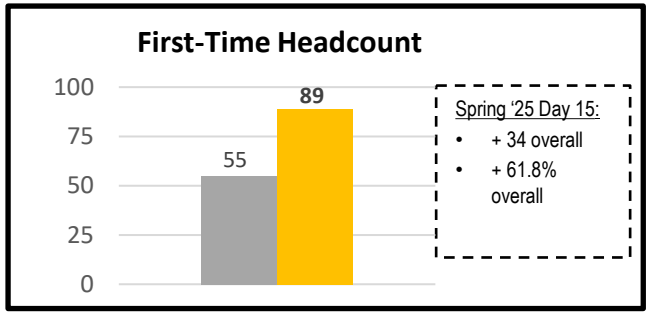
- The Spring 2024 enrollment numbers below reflect federal total numbers from February 5th, 2024. The Spring 2025 enrollment comparisons reflect federal total numbers from February 10th, 2025.

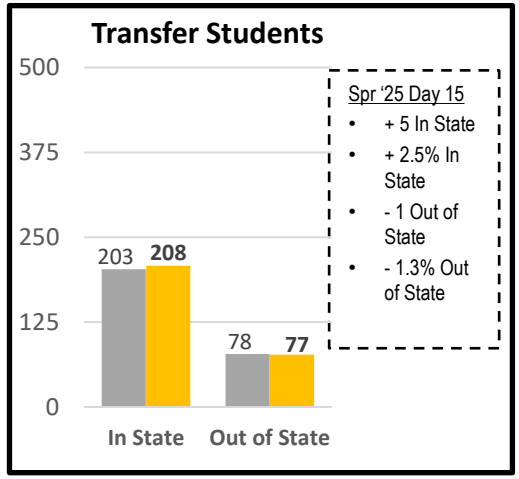


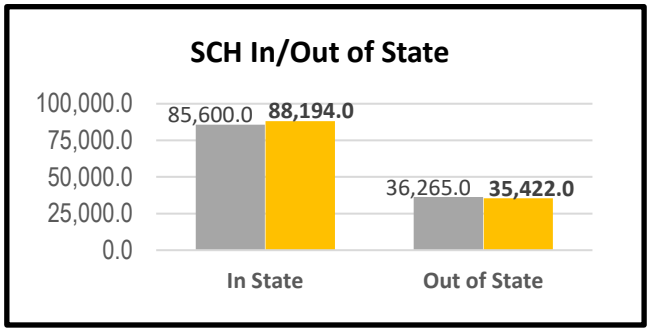


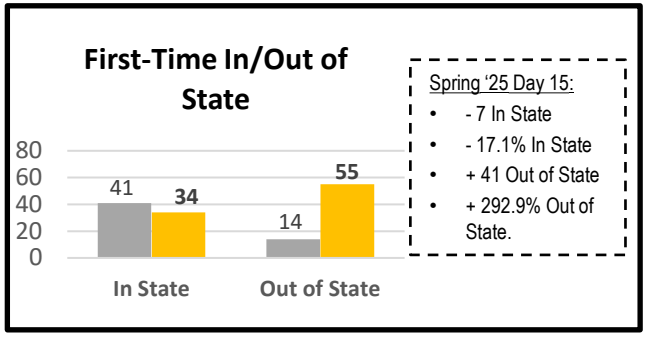


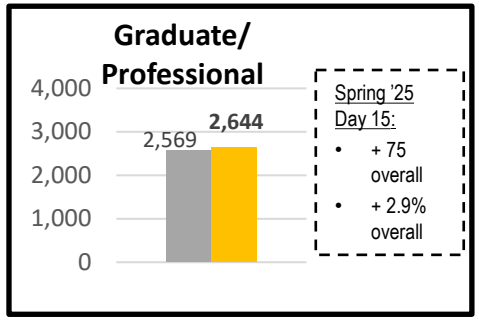












AGENDA ITEM TITLE: **Tier-1 Engineering Initiative Goals Status Report**, Wright

Report on the Status of Tier-1 Goals

Submitted by Cameron Wright, Ph.D., P.E.
Carrell Family Dean, College of Engineering and Physical Sciences

March 2025

Introduction. Goals for the Tier-1 Engineering Initiative (EI) were described in various documents submitted to the Governor's Office by the Governor's Tier-1 Task Force.[1] The Tier-1 Engineering Initiative was first proposed in 2012, and the Task Force was created. One of the early listings of the EI goals appeared in a document submitted in 2013 ("*Toward Tier 1 for Wyoming*"), which is provided here as Appendix 1. In 2014, those goals were refined and the 2013 document was superseded by the EI Implementation Plan of 2014; goals 17-19 (mainly regarding facilities) from the 2013 document were not listed as separate goals in 2014 but rather were incorporated into the Capital Program described in the 2014 Implementation Plan as part of goal 16. The last known version of this Implementation Plan, version 16, was provided to me by one of the original members of the Governor's Task Force when I first became Dean, and is provided here as Appendix 2. It is this version of the EI Goals that are discussed in the text that follows.

Background. The members of the Tier-1 Task Force were both thoughtful and ambitious in setting the EI goals. When assessing the progress toward those goals, it's prudent to recall the many factors and events, unforeseen by the Task Force members, that came into play in the ensuing 13 years. For example, few if any foresaw the revolutionary advances and growing importance to Wyoming of Artificial Intelligence, Controlled Environment Agriculture, Quantum Information Science and Engineering, Advanced Materials, Rare Earths and Critical Materials, Cybersecurity and Blockchain, and Nuclear Science and Engineering. Who foresaw that Wyoming would be the home of the country's first advanced nuclear power plant (TerraPower)? This reality was well stated in October 2022 by President Seidel, when he asked for a new planning document in light of all the changes (see Appendix 3). Referring to the original Tier-1 goals in that committee charge, he said,

> *"Since that original vision, science and engineering at a national level have changed dramatically (e.g., more interdisciplinary, more focus on place-based research and innovation, and more importance on partnerships). UW has faced many changes in administration, multiple budget cuts, loss of experienced personnel, and changes in unit organization, some of which have created challenges to the vision of Tier 1 Engineering and the Science Initiative."*
>
> *... [a list of examples was given] ...*
>
> *"With such new developments and programs, it is time to consider how EPS2030 should be developed going forward. Numerous new possibilities are opened with the above considerations in mind."*

[1] Note: The formal name of this group was the "*2012 Wyoming Governor's Energy, Engineering, STEM Integration Taskforce*," aka the WGEESIT, but it is commonly referred to as the "Tier-1 Task Force" or in this document as just the "Task Force."

President Seidel's assessment of how things "have changed dramatically" was absolutely correct, and as a result, the college (CEPS) worked for over one year (with an 8-person Executive Committee, and a 15-person Working Group, representing every CEPS department, SoC, and external industry representatives) to create a 110-page report, "CEPS 2030 FINAL REPORT Guidance Document," submitted in November 2023 and provided as Appendix 4. This document not only guides the college going forward, as President Seidel envisioned, but the extensive appendices of that document provide important institutional memory for each department. For a more succinct (4-page) document that captures the main points of the lengthy CEPS 2023 document, "CEPS_strategic_planning_Nov2024" is provided as Appendix 5.

President Seidel mentioned in his October 2022 memo the challenges represented by the "changes in administration." He was again quite correct. Since the Tier-1 EI was first started, this college and the university have experienced considerable leadership turnover, which often resulted in what is called "institutional priority whiplash." To be precise, since the Tier-1 EI began, we have had:

- 5 Deans (Ettema, Gasem, Rodi, Pishko, Wright);
- 6 Provosts (Allen, Jones, Miller, Alexander, Carman, Turpen); and
- 6 Presidents (Buchanan, Sternberg, McGinity, Nichols, Theobald, Seidel).

Maintaining continuous progress toward Tier-1 is rather difficult in such an environment, but we have persevered.

President Seidel also mentioned in his October 2022 memo the challenges represented by the "budget cuts" and "loss of experienced personnel." For example, in FY17 there was a budget cut from the state that resulted in a 9.14% cut to the Tier-1 budget, and a cut in FY21 that resulted in a 10% cut to the Tier-1 budget (see Appendix 6). Each time, there was also an even more significant budget cut to the unrestricted operating (UO) main budget of the college, and each time multiple faculty positions were lost. Faculty positions were also lost due to Central Personnel Management (CPM) decisions from Academic Affairs, even in years in which there was no budget cut from the state. For example, in AY22-23, CEPS lost 14 faculty members funded from UO due to retirements or resignations, but we were only authorized to hire 8 positions, for a net loss of 6 faculty positions. This steady dwindling of faculty numbers (documented in the appendices of the CEPS 2030 document provided at Appendix 4) is the opposite of what the Task Force envisioned and recommended, and certainly makes it more difficult to make progress toward Tier-1 goals. Only in AY23-24 and AY 25-26 have we seen a small, slow net gain in faculty numbers, but nowhere near the numbers recommended by the Task Force.

It is illuminating to examine the funding that was recommended by the Task Force, compared to the funding that was actually provided by the legislature. On pp. 22-23 of the 2013 Tier-1 document (Appendix 1) it says, "An annual budget increase of $14.77 M is required to fully fund the University of Wyoming Engineering Initiative."[2] It was noted that the UO budget of the college in 2013 (with employee benefits) was $16.6M. On p. 24 of Appendix 1, a staged funding approach was planned

[2] According to the U.S. Bureau of Labor Statistics, from 2014 to today, inflation has caused a cumulative price increase of approximately 33.32%. That is not factored in this discussion.

and described, intended to start in 2015. Comparing this staged funding approach to the actual Tier-1 budget (provided in Appendix 6) is shown below.

	Planned	**Actual**
Year 1 (2015)	$5 M	$2,571,750
Year 2 (2016)	$7.5 M	$5,113,164
Year 3 (2017)	$10 M	$3,797,686
Year 4 (2018)	$12.5 M	$3,797,686
Year 5 (2019)	$14.77 M	$4,184,718

The plan was that by Year 5, the $14.77 M increase would level off and stay steady. To show that, compared to actual, I have extrapolated to what is shown below.

	Planned	**Actual**
Year 6 (2020)	$14.77 M	$4,184,718
Year 7 (2021)	$14.77 M	$4,292,123
Year 8 (2022)	$14.77 M	$4,292,123
Year 9 (2023)	$14.77 M	$3,792,352
Year 10 (2024)	$14.77 M	$9,292,351
Year 11 (2025)	$14.77 M	$9,292,352
Year 12 (2026)	$14.77 M	$9,292,352

Note that late in FY23 the legislature, at the urging of President Seidel, increased the Tier-1 budget to almost $9.3M per year. That increase has been extremely helpful in making greater progress toward the Tier-1 goals.

If we total the amount planned versus the actual amount from 2015 to 2026, we see that $153.16M was planned from 2015 to 2026, versus $63.9M actually provided. That is, less than half the funding that the Task Force believed was necessary to achieve the Tier-1 goals as described in the 2013 document was actually provided by the legislature.

In the 2014 Tier-1 document (Appendix 2), even more aggressive initial funding was recommended. As shown on p. 5 of Appendix 2, the following was recommended.

Phase 1	**State Appropriation**	**UW Cost-Share, Including School of Energy Resources**	**Total Investment**
FY 2015	$2.7M (16%)	$9.2M (53%)	
FY 2016	$5.3M (31%)		$17.2M (100%)

Note in this revised plan, not only was more early funding planned, but significant UW cost-share was originally planned. While in the 2013 document, the amount recommended for 2015 and 2016 was a total of $12.5M, in the 2014 document, a total of $17.2M was recommended for those first two years.

How much cost-share from UW was actually provided? It's difficult to verify, because the central UW financial software conversion to Oracle's WyoCloud in July 2017 (for FY18 and going forward) did not carry all details over, and neither the UW Financial Affairs Division nor the CEPS Business Office has any way of going back in time to check. However, piecing together notes from the previous college Director of Business Affairs, the following is the best estimate. Notes from FY15 indicate that the matching funds provided by SER were $1,853,593. Notes from FY16 indicate that UW provided $1,400,000 and SER provided $1,254,000. If this is correct, then the total cost-share actually provided was $4,507,593, versus the $9.2M recommended by the Task Force. I found one document that indicated a request for the Research Office to also contribute cost-share to get closer to the $9.2M recommendation, but again due to the financial software conversion I have been unable to verify if that ever occurred. The cost-share from UW and SER was understandably unsustainable for future years, and at UW's request the legislation was modified such that going forward there was no more expectation by the legislature of any further cost-share by UW for Tier-1.

President Seidel also mentioned in his October 2022 memo the challenges represented by "changes in unit organization." He was quite correct. For example, the reorganization of colleges begun in 2021 that moved four academic departments from the College of Arts and Sciences to the College of Engineering and Physical Sciences diverted large amounts of time, energy, and attention in the college to making the reorganization proceed smoothly. This certainly took away from the ability to focus more on making progress toward the Tier-1 goals. Tier-1 efforts were by no means put on hold, but the reorganization certainly and unavoidably slowed progress. Only in 2025 is the reorganization (which has been highly successful) just now beginning to level out to a steady state and thus requiring less attention. It should be noted, however, that the reorganization has nearly doubled the day-to-day workload of the Dean and the Dean's Office staff.

This is the background and landscape upon which the college (under the leadership of 5 Deans) has been striving to make progress on the Tier-1 goals. As President Seidel very accurately stated in his October 2022 memo, these challenges include "*many changes in administration, multiple budget cuts, loss of experienced personnel, and changes in unit organization*." To that we should also add the COVID-19 pandemic (and the associated closure of labs, classrooms, and the temporary yet precipitous drop in enrollment), the pandemic-related budget crisis in Wyoming illustrated by the price of oil actually going negative in 2020 (a budget crisis which President Seidel faced as he first arrived on the UW campus), the national "demographic cliff" resulting in fewer college-age people to enroll in college, the national decrease in the belief that a college degree is "worth it" which further erodes enrollments… none of these challenges were foreseen by the Task Force in 2013 and 2014 when the goals listed in Appendix 1 and Appendix 2 were set.

How does all the background given above help understand the actual path to Tier-1 and the current status of the Tier-1 goals? The plans of the Task Force included ambitious goals to be aggressively

funded. However, budget realties required that funding to be scaled back considerably, yet the overall goals remained the same.

Despite a much lower Tier-1 budget than planned over the years (less than half), along with all the other challenges and setbacks listed by President Seidel in his October 2022 memo, as well as the COVID-19 pandemic and other obstacles, the College of Engineering and Physical Sciences (CEPS) has made considerable progress on the goals laid out by the Task Force. Since the inception of the Tier-1 Engineering Initiative, CEPS has:

- added faculty and staff positions in key areas that had been lacking or lost due to cuts
- added a new academic department for a world-class petroleum engineering program
    - academic home to Mohammad Piri and other stellar researchers
    - has the 4th largest PhD program at UW
- funded high-recognition, nationally funded research programs across many engineering departments
    - provided seed funding for research clusters in areas beneficial to Wyoming
    - provided one-time funding for equipment and laboratory upgrades to improve competitiveness for federal research funding
    - provided matching funds for new research projects
- funded the Undergraduate Research Scholars program for Tier-1 scholarships
- funded an additional 33 graduate assistantships (GAs) to the GAs provided by the UW Graduate School
- greatly increased Ph.D. production (for example, a 210% increase from 2014 to 2019)
- added in 2017: the High Bay Research Facility (97,683 square feet)
- added in 2019: the Engineering Education and Research Building (102,950 square feet)
- built a very strong Student Success Center, that includes
    - professional advising for all undergraduates
    - career placement/services for all students
    - internship coordination with WY and out-of-state companies
    - K-14 outreach and state-wide programs, reaching hundreds of teachers and students across WY (e.g., ESP4T has trained over 600 K-12 teachers)
    - recruiting, both in WY and beyond (e.g., undergraduate research scholars program)
    - marketing/communications, including active social media info feeds
    - alumni relations

This is only a partial list of accomplishments as we strive to achieve the Tier-1 goals, and new accomplishments occur regularly. For example, I learned that we just received a new gift of $100k from industry for the Process Control Laboratory in the college. This is the second sizable industry gift for this laboratory. Process Control, an interdisciplinary specialization involving chemical engineering and electrical engineering, is an area of very high interest for multiple industries in Wyoming such as the trona mining industry, the rare earths/critical minerals industry, and is essential for modern oil refineries and other processing sites. Graduating more engineers who are experts in modern, computer-based Process Control, incorporating the latest technology such as machine learning and artificial intelligence, is an excellent example of exactly what the Task Force

wanted to see from this college. For a snapshot of the college status, the update I recently provided to the Wyoming Engineering and Surveying Society is provided at Appendix 7.

Original EI Goals

As mentioned in the Introduction, the original EI Goals went through some variations as the Governor's Task Force evolved various topics in their discussions. The document from 2013 (Appendix 1) was refined and ultimately superseded by the EI Implementation Plan of 2014. The last version of this Implementation Plan, version 16, is provided here as Appendix 2. It is this version of the 16 EI Goals that are discussed in the text that follows.

Assessing the level of achievement of these goals is not a "yes or no" answer. Any useful answer is more complex and nuanced, and should be viewed in the context of the Background section previously provided.

Goal #1

UW aspires to drive the College of Engineering and Applied Science into the top quartile of engineering rankings for graduate education.

National and international ranking of universities, colleges, undergraduate programs, and graduate programs is a highly contentious issue, with considerable disagreement regarding the validity or fairness of the processes used to create such rankings. For example, it's been shown that the well-known U.S. News & World Report rankings are weighted to favor universities with highly selective admissions. UW admits any eligible Wyoming student, which is the opposite of selective admissions. Large universities also have an advantage over UW in faculty numbers and resources. These are only two of several factors that put UW at a perennial and significant disadvantage in such rankings.

However, various ranking systems of graduate engineering programs both in the U.S. and worldwide do tend to weigh some common metrics, such as total research expenditures, the number of PhD graduates per year, average research expenditures per tenure track faculty member (TTFM), publications per TTFM, citations per publication, PhD student to TTFM ratio, etc. CEPS constantly works to move our graduate engineering programs to higher and higher levels in each of these categories, which would improve our standing in any of the many ranking systems.

in the context of comparisons of UW to other universities, it's pertinent to note that UW is now classified as an R-1 university. In the UW News article, "*UW Ascends to Highest Level of Research Universities*" (see Appendix 8), it is stated that this "puts UW in the top tier of U.S. research universities," and it further states that we are now in the top 4.8% of all the nation's universities. R-1 status is determined only by 1) research expenditures and 2) the number of PhD graduates. Since the CEPS graduate programs contribute by far the most to UW in terms of research expenditures and the number of PhD graduates, compared to any other college at UW, it is fair to say that the CEPS graduate programs contribute the most to this high ranking of UW. Being in the top 4.8 percent greatly exceeds the top quartile of the Tier-1 goal.

Goal #2
UW will aggressively pursue outstanding students throughout Wyoming and the nation through a combination of marketing and scholarships.

As part of the Tier-1 activity, CEPS employs a full-time marketing professional, and a full-time recruiter. Extensive postings in various digital (and social) media sites, and targeted advertisements in select magazines, all "get the word out" to prospective students. In addition to our full-time recruiter, our Assistant Dean for Student Success, and her cadre of CEPS College Ambassadors (students in the college), engage in productive outreach activities across Wyoming. Furthermore, faculty and staff members also assist in recruiting and retention. At the request of the Interim Provost, we submitted to him on 28 Feb 2025 a spreadsheet listing "Faculty Advocates," who are faculty members who regularly participate in tours, student campus visits, outreach, etc. The spreadsheet listed 87 faculty members in the college who are considered "Faculty Advocates."

The generous Undergraduate Research Scholars (URS) program, funded by Tier-1, is the "Tier-1 scholarship" suggested by the Task Force. It began in 2014 (even before there was Tier-1 funding available), and attracts top students to CEPS programs. This provides both a scholarship and an undergraduate research experience for the selected students, and is targeted at students with very high GPAs and ACT scores. This was the goal of the Task Force.

The URS was first offered in 2014. It provides $6,000 per year, and we budget for 20 awards, or $120k per year group cohort. Since the URS award is renewable for 4 years (if the student maintains a GPA of 3.0 or higher, and continues in an engineering major), the total budget is $480k per year.[3] Below are the actual amounts spent by fiscal year. Only FY18 and later numbers are shown, as that's all that's available in the WyoCloud financial system. Our professional advising unit has maintained detailed spreadsheets of all pertinent student data (name, major, GPA, award amount, when graduated, etc.) from 2014 to present, and if necessary, we could manually sum the award amounts for the earlier years.[4]

FY2018	$431,800
FY2019	$471,932
FY2020	$375,440
FY2021	$246,000
FY2022	$141,000
FY2023	$148,854
FY2024	$195,000
FY2025	$374,056

[3] If a URS student's GPA drops below 3.0, we notify them, and they have two semesters to bring it back up; they don't get dropped from the URS immediately. If they don't get the GPA up after two semesters, they can appeal (which goes to the Dean). Since 2014, only one student has appealed (right after COVID, and it was approved). Since 2014, very few have dropped below 3.0, but some have changed majors.
[4] The URS spreadsheets contain individual student information including GPA. Since BoT materials are considered to be public records, federal FERPA regulations prohibit including the spreadsheets in an Appendix to this document.

Note the decrease that started in 2020. This was due to the Student Financial Aid (SFA) office notifying us that the URS was just a regular scholarship, and that we had to adhere to the new limitation on stacking scholarships. That effectively eliminated any new awards for the URS, and therefore we had no new incoming cohort for a couple of years. That had a very negative effect on our ability to recruit top students. After several meetings between SFA and CEPS, SFA agreed that because the URS was from Tier-1 funds and not from financial aid funds, we didn't fall under the same rules. After that, we revived the URS program and began awarding URS scholarships again. The slow recovery is shown for 2024 and 2025. It's hoped that we'll soon be able to get back to being able to fully award 20 students again.

Goal #3
UW will track the performance of Tier 1 scholarship students using metrics of GPA, freshmen to sophomore retention in engineering at UW, time to degree, job placement upon graduation, and employer/employee satisfaction after graduation.

As mentioned in the text for Goal #2 above, our professional advising unit has maintained detailed spreadsheets of all pertinent URS student data (name, major, GPA, award amount, when graduated, etc.) from 2014 to present, and will continue to do so. Our data also includes those who continued on to grad school at UW. The spreadsheets cannot be included here due to FERPA regulations, but we maintain a close watch on items such as GPA, freshmen to sophomore retention in engineering at UW, time to degree. Items such as job placement upon graduation, and employer/employee satisfaction after graduation are also obtained through surveys, and this is more fully discussed below and in the text for Goal #8 below. Note that the "time to degree" data we have for URS students has not been particularly insightful. While most URS students graduate in four years (with a temporary blip due to COVID), some of these top-performing students choose to pursue double majors and/or minors, which of course extends the time to degree.

Since we have been tracking the URS (i.e., the Tier-1 scholarship) students since 2014, it can be seen that the metrics show a very high percentage of initial awardees maintain a high GPA throughout their time at UW. A few lose eligibility due to GPA (see discussion for Goal #2), and a few lose eligibility due to changing to a non-engineering major, but by and large the students we recruit into a URS cohort perform extremely well and maintain their URS status for four years. We see no concerning negative trends. With over a decade of experience with the URS program, it has proven to be an excellent tool for recruiting and motivating outstanding students throughout Wyoming and the nation.

For after graduation, we get career outcome data from students through the First Destination Survey, and typically have a response rate of 60% - 70%. The ACES unit of UW takes the lead on that for the whole university, and CEPS supports the effort in various ways for CEPS students. The link for that is given below.

UW Career Outcomes Data - https://www.uwyo.edu/aces/career-services/career_outcomes.html

Obtaining reliable data on internships and other forms of experiential learning continues to be a challenge. We send out numerous surveys to students, and also ask faculty to encourage students to respond, but the response rate tends to be low. These days, students tell us they are "surveyed to death" both by UW and by outside entities, and many just tune out or delete such surveys.

Regarding employer and employee satisfaction after graduation, our CEPS Career Services unit sends out surveys to employer partners in the summer that ask various questions in which we are interested. This most recent one last summer focused on what students the employers hired for internships, their use of the Applicant Tracking Systems, opinions on AI for things such as resumes and cover letters, etc. We also included a couple of questions about their satisfaction with students and their understanding of concepts and software for use in professional roles. Looking at the survey responses and also anecdotal personal feedback from a variety of employers, we find that overall, they are very happy with the preparation our graduates bring to the workplace. Some suggestions for the future include more verbal and written communication experience for students prior to graduation; we are studying how we can best provide that.

Goal #4
UW will undertake major undergraduate [and graduate] curricular innovation to make use of all three pillars of engineering education (theory, experiment, computation) by infusing computational science into the core Engineering Science courses in the College of Engineering. [Note: Goal #4 appears in several places in Appendix 2. The variation "[and graduate]" was inserted into the final appearance of Goal #4 on page D-8 of Appendix 2.]

President Seidel interprets the Tier-1 Goal #4 more liberally than the exact wording, for good reason. If taken literally by the exact words written by the Task Force, the push to infuse computational science would be limited to only those courses in the Engineering Science (ES) program of the college. The ES program is primarily a group of only six courses (Statics, Dynamics, Electric Circuits, Materials, Thermodynamics, and Fluid Dynamics) that are part of the curriculum shared by multiple engineering degree programs.

President Seidel's interpretation, and we believe the actual intent of the Task Force, was not to single out the few actual ES courses, but rather to infuse computational science into the Engineering **and** Science courses in the College of Engineering [and Physical Sciences], which means all technical courses in all the curricula of all engineering [and physical science] degree programs where appropriate. And given that interpretation of the goal, we have definitely accomplished it and continue to do so as computational techniques and tools evolve. Advanced computational tools, modeling, simulation, classification, machine learning, artificial intelligence, and other appropriate applications and methods are continuously being incorporated into a wide variety of both graduate and undergraduate courses throughout the college. The most recent ABET accreditation evaluators remarked that they were impressed by the degree to which advanced computational tools were incorporated into so many courses.

A concrete example of the college incorporating the most advanced computational tools and techniques into coursework and providing new academic options for our students is the recent creation of new academic degree options, all of which are interdisciplinary across multiple departments.

- Undergraduate Minor in Quantum Information Science and Engineering
- M.S. in Quantum Information Science and Engineering
- M.S. in Artificial Intelligence
- Undergraduate and Graduate certificates in Nuclear Energy Science

President Seidel has also expanded the interpretation of the Tier-1 Goal #4 even further, to extend beyond the college and encompass all appropriate disciplines at UW. It is this interpretation of Goal #4 that has been one of the most frequently cited reasons by President Seidel for creating the School of Computing: to bring computational tools and techniques to the whole campus.

Goal #5
The college aspires to have a consistent pass-rate for the FE exam of at least 90%.

This goal has not been achieved, and in reality, it's unlikely to be achieved given the current state of the exam. It is, unfortunately, a very unrealistic goal today. NCEES is the national organization that creates and administers the Fundamentals of Engineering (FE) exams, as well as the Professional Engineer (PE) license exams. I have been a member of NCEES exam committees for over 24 years and am very familiar with target pass rates, exam statistics, and exam methodologies. If UW consistently achieved a 90% or better pass rate on the current format of the FE exam, there would likely be an investigation by NCEES due to suspicion of cheating. A much more realistic goal is for the college to achieve an FE pass rate that exceeds the national average. National pass rates differ quite a bit depending upon the engineering discipline, typically ranging from 40% to almost 80%, and also vary quite a bit from one semester to the next. A consistent 90% pass rate across all disciplines would be highly unusual, based on current exam design. For all engineering disciplines combined, the overall FE pass rate for UW in 2024 was within 1% of the national pass rate (approximately 70%). We strive to do even better, but there are factors beyond our control that tend to keep the FE pass rate at UW from rising much above the national average.

One contributing factor is that NCEES significantly changed the FE Exam on January 1, 2014. It went from being a pencil-and-paper exam only given twice each year to a computer-based testing format available any day during the year at an approved Pearson VUE Testing Center. There is one such testing center on the UW campus in the Coe Library, but students often choose a testing center elsewhere due to greater availability. Why is this pertinent? When the FE exam was on fixed dates only twice a year, CEPS had a well-organized and strategically timed FE Review program that helped increase our FE pass rates so that it regularly exceeded the national average by a significant margin. This is the old FE exam situation that the Task Force members recalled. Since 2014, it's become very difficult to get students to attend an FE review session, since they take the exam on all different days. However, CEPS is currently revamping its FE Review program and is pushing harder to get students to come to the new FE reviews.

Another factor not in UW's favor is student motivation. It's important to note that while UW requires all engineering students to *take* the FE exam, there is no requirement for them to *pass* the FE exam. Many students inherently wish to do well, but some (especially some international students or other students who don't intend to ever earn a U.S.-based PE license), just go through the motions on the FE exam, and that tends to drag down the pass rates. According to NCEES, at nearly all other universities, taking the FE exam is optional, so only those who are motivated to pass tend to take it. That results in a higher pass rate at those other universities. Yet we still do well overall.

Goal #6
UW's College of Engineering and Applied Science aspires to have 90% of its graduates complete at least one professional internship by the time of graduation. The college will actively partner with prospective employers to achieve this goal.

The college makes available to 100% of our students the *opportunity* to engage in a professional internship by the time of graduation. The college promotes this continuously, through the CEPS Career Services unit. Not all students choose to do so. Some students need to work on the family ranch over the summer, or work at some other type of summer job for financial reasons, prefer summer research opportunities, or aren't as able to go on an internship due to other family reasons. The broad scope of the CEPS Career Services unit, and all it does to help prepare students for successful careers, is truly impressive and in many ways exceeds what was envisioned by the Task Force. See Appendices 9 to 11 for an enlightening view of some of the many activities of the CEPS Career Services unit.

The CEPS Career Services unit maintains a close relationship with a very large number of employers, both in Wyoming and elsewhere, and coordinates an impressive number of internship placements (mostly summer internships but some are shorter "winterships" during the winter break). This is combined with large job fairs every semester (organized by the CEPS Career Services unit) that help with both post-graduation employment and internships.

CEPS, through its Career Services unit, proactively tries to obtain internship experience data from our students. For example:

- All CEPS students who have advising appointments in the Fall semester fill out a an experiential education survey to get an idea as to what they plan to do next summer and what we in CEPS can do to help. Unfortunately, this is mostly completed by freshman, sophomores, and some juniors, resulting in skewed data.
- We survey employers in an effort to determine who they are hiring. We don't typically get a high response rate, and students often intern with companies that we do not yet have in our database.
- The Dean sends out an email to faculty who are teaching senior-level classes to ask faculty to put up a QR code in class for just seniors that links to a very quick survey to see if they have ever had an experiential education experience during their time here at UW.

We record this data in Salesforce and our Career Servies unit also keeps a running spreadsheet of this data. Our latest data from the "CEPS Experiential Education Senior Survey" is: 102 responded (out of approximately 400 seniors) with the results being 64% of the students who responded

reported having some form of experiential learning during their time here. Of those, 58% reported having internships, 40% reported getting involved in research, and 17% reported having a relevant part time job. However, the low response rate means the statistical reliability of the data is low. We know that, for some reason, no Construction Management majors and almost no Civil Engineering majors completed the survey—yet we know anecdotally that a large percentage of these students have internships. We are working on strategies to obtain more complete data.

Goal #7
The college proposes to develop a unique relationship with its industry and agency partners by exploring opportunities to formally develop a required UW/industry/agency leadership program for all undergraduate engineering and computer science students.

The undergraduate engineering and computer science degree programs are highly constrained by a combination of the ABET accreditation requirements, a limit on the total number of semester hours for a particular BS degree program in the college, and the goal to keep down both the time-to-degree and the cost-of-a-degree. These constraints make it unrealistic to add a UW/industry/agency leadership program as a *required* component of any of our degree curricula. Efforts have been made over the years to create such a program on a voluntary or elective basis, with limited success, and efforts are still ongoing. We also encourage such leadership topics to be a part of any internship position for our students.

As the current Dean of CEPS, I am an ardent advocate of leadership training for all. I have been in leadership positions in military and civilian units of all sizes for the last 50+ years, graduated (as a distinguished graduate) from some of the country's top leadership programs, taught leadership at the U.S. Air Force Academy and at multiple U.S. military commands, and am an often-invited speaker on leadership at various events. The topic of leadership, and the benefits of leadership training to our students, is very important to me. Consistent with this, I initiated the hiring of a professional career & leadership coach (using Deanship funds) to present periodic workshops on various topics related to professional development and leadership to groups of students, staff, and faculty.

We wish to avoid duplication of effort or competition in this space, and note that leadership training is most effective when both technical and nontechnical people come together. With this in mind, and to extend beyond just one college for leadership training available to students, the College of Engineering and Physical Sciences collaborates with the College of Business (CoB) to help populate the UW Leadership Academy, which is coordinated by the UW Center for Principle-Based Leadership & Ethics, housed in the CoB. See the website and also Appendix 12 for more information.

The experiential UW Leadership Academy is an excellent program. Students explore six different industries and four communities across Wyoming while learning about the challenges that the next generation of leaders will need to address. Additionally, students have the opportunity to meet Wyoming's top leaders and expand their professional networks for future connections and job

opportunities. The student cohort spends two to three days at each location, visiting businesses, hearing from community leaders, and discussing key industries and pressing issues.

Goal #8
UW will develop a systematic approach to collect employment data of its engineering college graduates by initiating an aggressive survey in January of the preceding academic year's graduates.

As mentioned earlier in the text related to Goal #3, the ACES unit for UW takes the lead on soliciting that information for the whole university, and CEPS supports the effort in various ways that are specific to CEPS students. For after-graduation information in particular, we get career outcome data from students through the First Destination Survey, and typically have a response rate of 60% - 70%. The link for that is given below.

UW Career Outcomes Data - https://www.uwyo.edu/aces/career-services/career_outcomes.html

The First Destination Survey (FDS) and is a nationwide effort that is compiled by the National Association of Colleges and Employers (NACE). It aims to understand how many of our students are going into the workforce, continuing education, still looking, going into the military, etc. We ask about the location they are moving to, pay, and organizations they are going on to work with. See pages 15-16 of Appendix 7 for an example of this data. We also ask what their personal email addresses are for future connections. Since UW policy is to delete email accounts of students upon graduation, we lose the ability to contact them if they don't provide a personal email address.

The First Destination Survey typically has about a 65% response rate in CEPS and across the university. The results of this data may be seen here and can be displayed though Power BI, thanks to ACES. For any responses we do not get, ACES looks up LinkedIn profiles of grads and fills out surveys for them with the data thus obtained. This tedious manual process takes ACES months to complete.

ACES has also generated an internal Recent Grad Report Template in Handshake (a program students have access to find jobs and events) that CEPS Career Services uses for finding alumni and encouraging them to continue engaging with students.

ACES (and CEPS) continually make efforts to get a higher response rate for the FDS. For example:

- This survey is on the check list for graduating students across campus to complete as they plan to graduate. It is listed, but is NOT required. Making this survey required for students to complete before graduation has been suggested to upper administration, but has not yet been approved.
- Students who are graduating get an auto-generated email from the Handshake program.
- CEPS Career Services emails graduating seniors in CEPS with the link to the survey and also periodically reaches out to faculty to encourage their students to respond to the survey.
- CEPS Career Services verbally encourages students who they know are graduating to fill out the survey.

While the Tier-1 goal #8 as originally written mentioned January as the timing of the survey, CEPS Career Services has found that April is a better month for this. We make a push in early to mid-April in hopes of data being more accurate, as students may not have committed to a particular employer yet. Furthermore, waiting until January *after* they have graduated would have a much lower response rate. The survey is both in Handshake (a program students have access to in order to find jobs and events) and in Qualtrics.

Goal #9
The opportunities to engage engineering and science alumni are multifaceted and UW would be well served to survey the landscape of various forms of alumni involvement with engineering schools. Armed with this information, the college will make a concerted effort to engage our alumni in activities designed to enhance the undergraduate experience.

The college continuously works closely with the UW Alumni Association and the UW Foundation to engage UW engineering and science alumni, keep abreast of various forms of alumni involvement that work well at other engineering schools around the country, and incorporate those identified as best practices. The Dean, Associate Deans, Assistant Dean, and other faculty members in the college regularly meet with a wide variety of alumni and other supporters and stakeholders at various locations in and out of Wyoming.

As the Dean, I have traveled around Wyoming, as well as to Montana, to Texas, to Utah, to Arizona, to California, to Colorado, and to Canada multiple times to meet with alumni from the college.

The college also maintains a group of seats in the Wildcatter at War Memorial Stadium to which we invite alumni for home football games, and the college is a Silver Boot Sponsor of Cheyenne Frontier Days (CFD) to which we invite alumni to both rodeo and concert events. The Dean personally attends and hosts alumni at all home football games and at CFD events.

To leverage these relationships with alumni to promote activities designed to enhance the undergraduate experience, the college invites various alumni to visit classes, give presentations, serve as senior design judges, present at "career advice" meetings, and propose (and sometimes sponsor) student projects.

An outstanding example of this is the "Summer Internship with 9H" (see Appendix 13) in which the 9H Research Foundation (founded by Gene Humphrey, one of our engineering alums) and the college collaborate to make available funded student internships, in which the students work on a selected project. This activity provides progress not only with Goal #9 but also Goal #6.

Goal #10
UW should boldly develop the niche areas over the next decade, with the goal of achieving international prominence in each.

On page 15 of the 2014 document (Appendix 2), the Task Force originally suggested several potential niche areas. They suggested that we,

> "strive for national prominence in the following four niche areas:
> 1. Unconventional Reservoirs
> 2. Advanced Energy Technologies and Energy Conversion and Delivery
> 3. Computational Science and Engineering
> 4. Atmospheric Sciences"

They went on to say,

> "Further, we will develop the following focus areas and help bring them to full fruition:
> 1. Water Resources
> 2. Biological and Biomedical Engineering"

Through the advances of Dr. Mohammad Piri, and other prominent members of the Energy and Petroleum Engineering Department, the CEPS program is known throughout the country and the world for preeminence in Unconventional Reservoirs. It's pertinent to note that CEPS supports Dr. Piri with considerable Tier-1 funding; for the current year, CEPS provides his program with $728,528 in funding to support his work in Unconventional Reservoirs.

For Advanced Energy Technologies and Energy Conversion and Delivery, CEPS works very closely with the School of Energy Resources (SER) to make advances in these areas, and has developed a prominent national reputation. Our collaborations with SER have never been better.

Regarding Computational Science and Engineering, there are several aspects to that. For applications of high-performance computing and supercomputers, our partnership with the "NSF-Wyoming Supercomputer Center" (NWSC) in Cheyenne and our on-campus Advanced Research Computing Center (ARCC) high-performance computer cluster have earned us an enviable national reputation. For a further example beyond that, Dr. Suresh Muknahallipatna's research team in the Electrical Engineering and Computer Science (EECS) Department worked closely with Nvidia and IBM to create a highly parallelized method for weather modeling that is now the standard for the world-wide weather prediction results used by The Weather Channel (an IBM subsidiary). This new method not only sped up the calculations immensely, but also greatly increased the spatial resolution of the predictions. In some parts of the world, this advance alone will save many lives. For "hard-core" computing, we have had limited success hiring and retaining faculty members who specialize in advanced computer architectures. We are working with the School of Computing in an effort to push harder in this area.

Regarding Atmospheric Sciences, CEPS is known throughout the country as one of the top centers for this research area. The Atmospheric Sciences Department has an ongoing Continuing Agreement with the NSF for advanced work that in many cases can only be accomplished by UW. NSF and the state of Wyoming partnered to fund the purchase and required modifications of the new King Air aircraft. This aircraft has unique capabilities, and is considered by NSF to be a national resource. It is the *only* aircraft specially modified for atmospheric science research that is owned by a university. All other such research aircraft are owned by the U.S. government.

Regarding the suggested focus areas, CEPS has a nationally recognized program in Water Resources. We have multiple researchers making progress in this area, and for the particular area of "produced water" (that is, water produced as a byproduct of oil and gas development), the Center for Excellence in Produced Water Management, headed by Dr. Jonathon Brant, is considered by many to be the top group in this field. See https://cepwm.com/ for more info.

For Biological and Biomedical Engineering, progress has been slower, inhibited in part by the fact that UW has no medical school. Most highly active Biomedical Engineering programs around the country exist in collaboration with their own university's medical school. However, the EECS Department at UW has the oldest continually offered Bioengineering concentration for its electrical engineering degree, and we have recently added a Biomedical Engineering minor to our available degree options. The minor is administered by the CEPS Chemical and Biomedical Engineering Department, in collaboration with many other departments, such as EECS, Chemistry, Molecular Biology, etc.

New opportunities for other niche areas arise over time, and CEPS responds whenever it appears to be appropriate for Wyoming. For example, in the strategic planning document (Appendix 5), the following are new areas of emphasis into which CEPS is moving. The number in bold is the current number of faculty members working in that area.

- Artificial Intelligence: **13** Of the 13, 8 are in the EECS Department.
- Controlled Environment Agriculture: **2** (plus a new Center for Controlled Environment Agriculture)
- Quantum Information Science and Engineering (QISE): **9** (plus a new Center for QISE). Mainly in physics and electrical engineering. A $5M grant has already been obtained.
- Advanced Materials: **17** (includes carbon engineering, rare earths, critical materials)
- Cybersecurity/Blockchain: **2** (plus 3 in the Center for Blockchain and Digital Innovation)
- Nuclear: **9** (includes energy production, materials, and uranium). In response to needs expressed by TerraPower, BWXT, and others. In collaboration with the SER Nuclear Energy Research Center.

This ongoing activity of entering new areas of opportunity in which Wyoming can be competitive is in keeping with the original intent of the Task Force.

Goal #11

The college will strive to create an atmosphere that promotes industry collaboration on research and academic programs that are responsive to the most current technologies utilized today. We embrace the idea promoted by the Task Force of periodically conducting workshops with corporate CEO's and research vice presidents to keep the college connected to the most pressing challenges of the day.

The college has fostered and developed excellent relationships with various industry representatives at the VP and CEO level for both research and academic programs. The most extensive collaborations are with the oil and gas industries, but in recent years that has expanded

to many other areas. Prime examples are the collaboration with the CTO of Plenty (for controlled environment agriculture), with CEO of Safran Passenger Innovations (for aerospace-related user electronics and interfaces), with multiple trona mining companies (for the Process Control minor and laboratory), with leaders of multiple construction companies (for the Construction Management major), and with SVPs and COOs of various oil and gas companies.

An additional boost to this effort has been the recent establishment of the UW-wide Office of Industry and Strategic Partnerships (OISP), which spans the UW Foundation and the Research and Economic Development Division. The OISP organization has taken corporate engagement to a new level, and CEPS works closely with the OISP to regularly engage with top industry leaders. See https://www.uwyo.edu/oisp/ for more information.

Goal #12
We propose to ensure stability of graduate assistant researchers by adding 100 fellowships to the college.

Given the lower than anticipated levels of funding from the legislature, there was never sufficient Tier-1 funding available for the suggested 100 new graduate fellowships (more commonly called "graduate assistantships" or GAs), and still be able to make meaningful progress on other goals. In the early days of Tier-1, more than a dozen new GAs were initially funded across the college, and this number grew depending upon availability of funds. Made possible by the increase to the Tier-1 budget in 2023, we are currently funding 33 new graduate assistantships (GAs) across the college, in addition to the GAs provided by the UW School of Graduate Education. Many additional GA's are funded as part of extramural grants, typically NSF, DoE, DoD, NASA, NIH, etc.

Goal #13
The college of engineering can make significant advances toward Tier 1 status by recognizing entrepreneurial activity as a third leg of its mission combined with excellence in teaching and research.

The college constantly promotes and encourages entrepreneurial activity on the part of our faculty members. The college was one of the founding units of the Institute for Innovation and Entrepreneurship (IIE), and a partner in the follow-on unit, the Center of Innovation and Entrepreneurship (CEI). The Director of the CEI has an office in the EERB of CEPS. The central mission of both of these units is to advance entrepreneurial activity, and promote economic development for Wyoming. As Dean, I wrote the first draft of the white paper for Academic Affairs advocating the incorporation of innovation and entrepreneurial activity into the UW-wide criteria for Reappointment, Tenure, and Promotion (RTP) for faculty members.

The college actively encourages and advocates for commercial spinoffs/startups from the college, with successful example companies such as Resono, Wyonics, CellDrop, Cowboy Clean Fuels, Piri Tech, and more… see the "innovation" link on CEPS website https://www.uwyo.edu/ceas/innovation.html for more information.

Goal #14
UW will develop a professional marketing plan to promote the engineering initiative to prospective students, citizens in the state, and our peer institutions across the nation.

This was accomplished and the marketing plan is updated, regularly maintained, and periodically pushed out to various digital and other sites by the CEPS full-time marketing professional funded by Tier-1. While the prevalence and influence of social media sites was not specifically cited by the Task Force, our marketing professional works with UW Institutional Marketing and Communications unit to post frequently to all the pertinent social media sites with material promoting our STEM programs.

Goal #15
UW proposes to develop a one-semester engineering course for middle school students and a companion course for pre-service and in-service teachers involving college preparation and benefits of higher education, introduction to STEM fields, examples of "cool" engineering, the science and math behind engineering.

The college works extensively with not just middle school students, but the entire K-12 (or K-14 if you count community college students) population to introduce, advocate for, and promote the STEM fields, and to demonstrate examples of "cool" engineering, as well as the science and math behind engineering. It should be noted that we also work with and coordinate closely with the newer UW Science Initiative (SI) for activities such as the SI Road Show and the annual STEM Fair. The suggested one-semester engineering course for middle school students unfortunately does not fit into the current rather rigid middle-school schedule of required topics (they have rebuffed our attempts), but we have made extensive progress in reaching out to students all across the K-14 population.

One excellent example of reaching out to students to promote STEM is the Engineering Summer Program (ESP), which is organized and administered by the college for rising high school juniors. This is a highly successful program, conducted on the UW campus, providing 18-24 students every summer with a broad exposure to the various engineering disciplines. The "conversion rate" of ESP participants to UW-enrolled freshmen is impressive.

The overall K-14 outreach program has also continued to expand. The number of participants in each K-14 outreach program has increased significantly compared to previous years. From a report provided to the BoT last year, for example:

- Computer Science Education Week: Number of Wyoming student participants quadrupled from last year (increasing from 224 students in 8 classrooms to 908 students in 34 classrooms)
- Engineers Week saw a jump in participating students from 3,139 to 4,123 and a growth in participating classrooms from 132 to 222. (**this is 62% of all Wyoming 3rd grade classrooms!**)
- Other classroom visits grew from 38 to 92.
- Outreach activities grew to include 4-H Robotics Club from Cheyenne, Girl Scout Troup 1628, the Science Zone (Casper) summer camps, St. Anthony (Buffalo) summer STEM camps, and pre-kindergarten and kindergarten classes.

- We were granted two Governor's Proclamations (Engineers Week and Land Surveyors Education Week)
- Increased funding to and participation in outreach programs for K-12 teachers

Regarding outreach programs for pre-service and in-service K-12 teachers, CEPS funds and operates the "Engineering Summer Program for Teachers" (ESP4T) and the "Machine Learning for High School Teachers" (ML4HST). The former provides a broad exposure to STEM topics and examples of "cool" engineering, and the latter provides a framework for showing teachers how to introduce the concepts of Artificial Intelligence to their students. ESP4T, held every summer since 2016 (and temporarily shifted online during COVID), has trained 613 K-12 teachers. ML4HST, held every summer since 2021, has trained 56 high school teachers so far.

Goal #16
We will work with the UW Foundation to formalize plans for a fund raising effort devoted to an excellence endowment of $30-40M for engineering. This program may be a component of UW's next Capital Campaign.

The Capital Campaign, envisioned by the Task Force, to be headed up by the UW Foundation, has not yet materialized (although we seem to be getting closer). While there has been no one single "excellence endowment" fund implied in Goal #16, the past 5 Deans of Engineering, in close partnership with the UW Foundation team, have raised an impressive amount of endowment funding from a wide variety of alumni and other supporters, each with their own specific "donor intent," but all geared toward promoting excellence of our engineering programs.

As shown in the 2/24/2025 UW Foundation report (Appendix 14), from 2014 to present, philanthropic gifts raised for the College of Engineering and Physical Sciences total **$77,492,989**. That's **over twice** the goal amount listed by the Task Force.

Note that since becoming Dean, I have personally helped to raise (working closely with our UW Foundation team members) **$36,701,057** of that total – not counting the 2019 year, since I became Dean only in the Fall of that year, and to count funds for that year would be improper. I am personally most proud of obtaining, in partnership with my UW Foundation team, the $5 million Carrell Family Deanship for the college, only the second Deanship in the history of UW.

Added to the total listed above are gift funds raised for buildings ($33,390,509 for the High Bay Research Facility and $5,534,983 for the Engineering Education and Research Building).

The total funds raised since 2014 for CEPS and Tier-1 related gifts, including for buildings, is **$116,418,481**. This is a testament to the close working relationship of the Dean and the UW Foundation team.

There is another aspect to Goal #16. Closely related to the topic of fundraising is the topic of creating endowed professorships, chairs, headships, deanships, etc. Increasing the number of these positions has been a high priority of President Seidel since he arrived on campus. Such

endowed positions add to the prestige of a university, and help greatly with recruiting and retaining top-quality faculty members. They can also be used to motivate further donations and to generate momentum in fundraising. In this endeavor, CEPS has been highly successful, as enumerated below.

In 2013, the college had only 8 endowed Chairs/Professorships:

1. Castagne Endowed Professor in Petroleum Engineering
2. Templeton Endowed Professor
3. Castagne Endowed Professor in Mechanical Engineering
4. Cline Endowed Chair in Environment and Natural Resources
5. Harris Early Career Faculty Professor
6. Nicholson Chair in Electrical Engineering
7. H.T. Person Professorship
8. V.O. Smith Professorship

Since then, we've added 14 more:

1. Botts Chair in Unconventional Reservoirs
2. Alchemy Sciences Petroleum Engineering Chair
3. LeNorman Endowed Leadership Chair
4. Cline Endowed Professorship (the fund actually supports two: a chair and a professorship)
5. Lynch Professorship in Petroleum Engineering
6. General Samuel Phillips Professorship for Instructional Excellence
7. Carrell Family Deanship
8. Carrell Family Energy & Petroleum Professorship
9. Hoy Engineering Professorship
10. Botts Department Head in Civil Engineering
11. E.G. Meyer Family Chemical & Biomedical Engineering Department Head (will be officially awarded in July 2025)
12. Walrath Professorship in Mechanical Engineering (new gift, still in holding at Foundation for two years of endowment income)
13. Patrick Heasler Professorship in Mathematics and Statistics
14. Roy J. Shlemon Professorship in Applied Engineering and Environmental Geology

Note that for the newly endowed positions in the list above, numbers 4-14 above have been added since I became the Dean of CEPS. I am fortunate to have such an excellent team from the UW Foundation, who deserve the real credit for this.

Not shown above: the only Professorship that transferred from A&S as part of the UW reorganization is the Harry C. Vaughan Professorship, currently held by Danny Dale, in Physics & Astronomy. We have also added more endowed scholarships designated for CEPS.

Conclusion. Despite far less funding than the Task Force believed would be needed to accomplish their stated goals, and the many challenges that ensued (from budget cuts to faculty losses to

many changes of administrators to a COVID-19 pandemic), the college has made significant and meaningful progress on the EI Goals originally set out by the Tier-1 Task Force.

Perhaps realizing the high granularity of 16 goals, the Task Force combined the overall intent of all 16 of the Tier-1 Engineering Initiative goals into four broader "strategic goals" listed below. These are listed in the Executive Summary on page 4 of the 2014 document (Appendix 2), and also on page 12 of the same document. Note: the previous college name CEAS from the 2014 document was updated to CEPS below.

1. **Excellence in Undergraduate Education**: *The College of Engineering and Physical Sciences has solid educational programs that produce talented graduates, who are in demand by employers. The goal is to enhance these programs and expand our local recognition to a national reputation.*
2. **World-Class Research and Graduate Education**: *Research leading to discovery and innovation often happens at the interface of different disciplines, where ideas and talents intersect to solve pressing problems. CEPS seeks to build world-class interdisciplinary research capabilities in selected areas that will have significant impact on Wyoming and the nation.*
3. **Productive Economic Development through Partnerships:** *CEPS will promote discovery and innovation and seek productive partnerships with the state, national agencies, and industry to actualize research findings and catalyze economic development in Wyoming.*
4. **K-14 STEM Education.** *Strength in K-14 educational programs is conducive to larger numbers of engineering students and more high-impact careers for UW graduates. UW will introduce STEM concepts early in the K-12 educational experience, and it will also enrich the freshmen and sophomore skill sets in STEM to improve performance and retention.*

It's important to note that every decision regarding the expenditure of Tier-1 funds is checked to make sure it fits into one or more of the strategic goals listed above. And we don't lose sight of the fact that our primary mission is ***"to educate, motivate, and mentor the students who are entrusted to us."***

Ultimately, "Tier-1" is less of a destination than it is a journey—a journey to greater excellence, more opportunities for our students, and greater recognition of our programs and graduates. Despite the many unforeseen and uncontrollable challenges along the way, CEPS has made steady and significant progress on the Tier-1 Goals as described in this report.

For your navigation convenience, all the appendix documents listed below are contained in a separate file, named “Tier-1_goals_Appendices.pdf” and tied to bookmark links in that file.

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Note: Author(s) of documents shown in parentheses

1. 2013 Tier-1 Engineering Initiative document (Governor’s Task Force)
2. 2014 Tier-1 Engineering Initiative implementation plan (Governor’s Task Force)
3. EPS2030 Committee Charge (President Seidel)
4. CEPS 2030 FINAL REPORT Guidance Document for the College of Engineering and Physical Sciences (CEPS 2030 Committee)
5. CEPS_strategic_planning_Nov2024 (Dean Wright)
6. FY15-FY26 Tier-1 budget appropriations (Dean Wright and Megan Barber)
7. WES - CEPS Overview for 2024 (Dean Wright)
8. “UW Ascends to Highest Level of Research Universities” (UW News)
9. CEPS Career Services weekly email example (CEPS Career Services staff)
10. CEPS Career Services student trek to Argonne National Lab (CEPS Career Services staff)
11. CEPS Career Services resume, internship, etc. help by appointment (CEPS Career Services staff)
12. UW Leadership Academy – 2025 (Dr. Haller)
13. 9H Summer 2025 Internship (9H)
14. Gifts_to_CEPS_2014-2025 (UW Foundation)

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Appendix 1

2013 Tier-1 Engineering Initiative document (Governor's Task Force)

University of Wyoming Engineering Initiative:

Toward Tier 1 for Wyoming

April 2013

Introduction

This report presents a vision and accompanying plan to fundamentally transform the University of Wyoming's College of Engineering and Applied Science into an outstanding engineering school, providing a lasting legacy of value to the citizens of the state. The university aspires to move the college forward with academic excellence in every respect: recruiting outstanding students, infusing curricular innovation, generating deep industry connections, and developing a research enterprise aimed at fueling the state's economy.

The motivation for engineering excellence stems from many individuals, but was focused by the passion of a collection of Wyoming elected officials, whose desires are clearly articulated in Governor Matt Mead's charge letter to the 2012 Wyoming Governor's Energy, Engineering, STEM Integration Task Force:

> *"It is only through a well-articulated, understandable strategy that we will be able to fulfill the challenge of becoming a Tier-1 academic and research institution in areas of excellence for Wyoming."*

The Task Force is comprised of a collection of outstanding government and corporate individuals who share a passion and affinity for the university and the state. During the past year, they have worked with UW's leaders to forge a vision for the future of the college. The present report represents the outcome of that endeavor.

In what follows, we lay out the strategy to advance UW's engineering school to national prominence, the result of which will have a profoundly positive impact on the future of Wyoming. Specific topics addressed with recommended actions include:

- Identifying performance metrics and providing a path to drive the college toward national prominence
- Elevating the quality of engineering undergraduates while forging authentic partnerships with industry
- Undergraduate curricular innovation stressing computational aspects of engineering
- Continuing UW's "rock solid" undergraduate engineering program, while graduating outstanding, well-rounded engineering students possessing professional experience and leadership skills obtained beyond the traditional classroom experience

- Developing niche areas of research excellence that have a major influence on Wyoming's future and, further, actively promoting deep connections between faculty researchers and industry and government agency partners

- Advancing economic development in the state through licensing intellectual property and promoting technology transfer

- Capital facilities designed to meet the technological innovation and teaching needs of engineering today

- Marketing the college and the university across the state and the nation

- Developing effective programs in Wyoming middle schools to introduce engineering as an exciting and rewarding career

A Premier College of Engineering—What is Tier 1?

The notion of a Tier 1 engineering school has caused widespread discussion as to its precise meaning. Recognition of engineering excellence comes from multiple sources including prospective students, engineering alumni, private industry, and the peer institutions that make up such an elite group. It is not difficult to identify a collection of outstanding engineering schools. Our personal experience, coupled with accepted national rankings and quantifiable performance metrics, readily paint the landscape of engineering excellence. Our goal is to be elite, but not elitist.

We have chosen to define Tier 1 engineering education in the US today through a collection of data from 10 institutions that, by any definition, represent engineering excellence. Five of the ten schools reside in the *US News and World Report* ranking of top 10 graduate engineering programs in the United States. We excluded 4 private schools as well as Cal Tech, a school with a mission substantially different from UW. The remaining five programs were identified from public institutions with outstanding engineering credentials and a mission similar to UW. The schools chosen for benchmarking engineering excellence, along with their *US News* 2014 national ranking for graduate schools in engineering are shown below. In the end, however, excellence in engineering is not a function of a rating in one set of rankings or another, but rather of the quality, impact, and visibility of the program in our nation and in the world.

Benchmark Tier 1 Institutions (US News Graduate Eng. Rank: 2014)

School	Ranking	School	Ranking
California—Berkeley	3	Texas—Austin	11
Illinois—Champaign-Urbana	5	Texas A & M	11
Georgia Tech	5	UCLA	16
Purdue	8	Wisconsin—Madison	18
Michigan	9	Washington	25

With 199 ranked schools, the top quartile of engineering schools is defined by those with a ranking higher than 50, making the above list truly elite. However, far more important than the numerical ranking is the immediate name recognition—the visibility—of engineering excellence associated with every one of these schools. We refer to this collection of schools in the report as the Tier 1 set. Clearly, other great schools exist and one can swap schools in and out. However, the metrics of interest change little or not at all.

How does UW Compare?

Using our Tier 1 set of schools, we have introduced a collection of some of the most important benchmarks associated with developing a national reputation in engineering while also providing a measure of the quality of students attending these schools—see Figure 1. The figure provides statistical averages of the key metrics of interest. In addition, the same performance indicators are presented for the University of Wyoming along with an easily readable ratio that benchmarks UW against the statistical average of the Tier 1 set. Finally the same information and ratios provided for UW are also provided for the University of Utah and the University of Arizona. Both of these schools are located in the mountain west and rank right at the top quartile of *US News* 2014 graduate engineering programs, with Arizona at 48 and Utah at 51. The University of Utah's information is of particular interest as the state of Utah has had roughly a 13 year history of its own "engineering initiative," providing us a window into what is achievable for UW.

We believe two metrics, more than any others, serve to define a national reputation for engineering excellence at the graduate level. They are the production of high quality Ph.D. graduates and research funding. High levels of performance in these metrics naturally lead to other positive performance indicators including refereed research publications, patents, and licensing of intellectual property. Doctoral education and research funding also promote excellence in undergraduate education by providing students with opportunities to learn at the cutting edge of technology.

In 2011, the Tier 1 set of schools generated funded research awards averaging $645K per tenure track faculty member ($$/TT). Research funding for UW was $162K/TT, representing a ratio of 0.19 of the Tier 1 average. In contrast, Utah's research funding was $551K/TT—a very impressive ratio of 0.85 of the Tier 1 set.

In 2011, the average annual Ph.D. production per tenure-track faculty member of our Tier 1 set was 0.71. Again, referencing Figure 1, UW's Ph.D./TT production ratio is 0.20 of the Tier 1 set. By comparison, Utah's ratio of Ph.D./TT production is 0.66 relative to the Tier 1 set—an indicator of a strong research college of engineering.

The Tier 1 Ph.D. production of 0.71 graduates per tenure-track faculty member is quite high as the time to graduation for a Ph.D. might require 5-6 years. Achieving this level of productivity requires the *average* faculty member to support 3-4 Ph.D. students at all times. Supporting a single

Engineering Metrics							
	Research Funding $/TT[1]	Ph.D. grads/TT[1]	MS grads/TT[1]	BS grads/TT[1]	US News (Graduate Engr)[2]	25th and 75th Percentile ACT Scores[2]	Acceptance Rate %[2]
School							
Cal-Berkeley	861,226	1.06	1.54	3.87	3	28-34	22
Illinois Urbana-Champ.	572,606	0.71	1.41	3.59	5	26-31	68
Georgia Tech	534,098	0.71	2.49	4.33	5	28-33	51
Michigan	520,826	0.59	2.33	3.55	7	28-32	46
Texas at Austin	634,067	0.70	1.78	3.88	8	25-31	47
Purdue University	653,849	0.71	1.52	4.43	10	23-29	68
Texas A&M	843,966	0.61	2.09	3.79	12	24-29	64
UCLA	652,464	0.87	2.86	4.99	16	26-33	25
Wisconsin-Madison	684,203	0.70	2.67	3.66	17	26-30	51
Washington	495,711	0.48	1.79	3.51	26	23-30	58
Statistics							
Average	645,301	0.71	2.05	3.96		26-31`	50
Max	861,226	1.06	2.86	4.99			
Min	495,711	0.48	1.41	3.51	199		
University of Wyoming	162,200	0.14	0.74	2.43	132		
Wyoming Ratio	0.19	0.20	0.36	0.61	34%	22-27	96
University of Utah	551,417	0.47	1.47	2.62	51		
Utah Ratio	0.85	0.66	0.72	0.66	74%	21-27	83
University of Arizona	349,955	0.53	1.23	2.85	48		
Arizona Ratio	0.54	0.74	0.60	0.72	76%	21-27	74
1. Source: ASEE 2011 Database							
2. Source: US News and World Report (2014)							

Figure 1. Engineering metrics of excellence showing (a) the averages from a set of premier engineering schools, (b) the metrics for the University of Wyoming and the ratio to the Tier 1 averages, (c) the metrics for the University of Utah and the ratio to the Tier 1 averages, and (d) the metrics for the University of Arizona and the ratio to the Tier 1 averages.

student may cost $40K annually, providing some insight into the funds needed to support the enterprise. It should come as no surprise then, that research funding and Ph.D. production are inextricably linked.

While Ph.D. production may be a key metric for the national reputation of an engineering school, production of masters graduates is a critical service to industry. If we examine masters graduates per tenure track faculty for UW and the Tier 1 set, we find that UW's ratio is 0.36. While well below the marquee programs, the number is nearly double UW's ratio for Ph.D. production which was 0.20. The University of Utah's ratio for this metric resides at a very respectable value of 0.72 of the Tier 1 set.

An examination of the University of Arizona's (UA) performance indicators shows their research funding ratio at 0.54 of the Tier 1 set. While significantly above UW's ratio of 0.2, UA falls well below Utah's funding ratio of 0.85. UA's Ph.D. production and MS production per tenure-track faculty member are much more in line with Utah's and, again, significantly higher than UW's.

What is Achievable?

As mentioned previously, the University of Utah is a valuable case study as it has been part of an engineering initiative for over a decade. In September of 2000, Governor Mike Leavitt announced ambitious plans to double the number of engineering and computer science graduates in the state in the next five years. Details of the Utah engineering initiative may be found at: http://leavitt.li.suu.edu/leavitt/?p=14.

Over a period of several years, approximately $10M/yr in recurring funding was injected into engineering programs in the state, shared by the University of Utah and Utah State. While the general consensus was that the funding was not sufficient to reach the stated goals, one can still see signs of a major positive impact from the program. For example, Figure 2 shows the normalized growth in funded research per tenure track faculty since 2007 for the University of Utah and our set of Tier 1 schools. The rate of growth for Utah is dramatically higher than for the Tier 1 universities, and as a result Utah now compares favorably with the Tier 1 universities in this performance metric as their research funding is now 85 % of the Tier 1 average. A similar positive trend is found when one examines Ph.D. production per tenure track faculty member. Utah's Ph.D./TT production has risen 25% in this period while the Ph.D./TT production of the Tier 1 set has essentially been flat, actually declining slightly. In short, the Utah experience shows that it is possible to achieve improvements in key metrics associated with Tier 1 excellence in engineering. While change has been rapid since 2007, the engineering initiative driving this change is now 13 years old.

Finally, it is important to also note that Utah's tenure track faculty have risen dramatically from 122 in 2005 to 149 in 2010. The growth of faculty is critical to providing stability in key areas. More on this later!

Goal #1

There is a direct correlation between research prominence and national reputation in engineering. *The University of Wyoming aspires to drive the College of Engineering and Applied Science into the top quartile of engineering rankings for graduate education.* Key indicators of performance to be monitored include the metrics of:

- research funding/TT,
- Ph.D. graduates/TT, and
- masters graduates/TT.

The data for the University of Utah and the University of Arizona serve to quantify metrics representative of schools at the top quartile. Driving UW's metrics toward values comparable to schools at or near the top quartile is an explicit and quantifiable goal. Over time, the national rankings from various organizations will naturally reflect improvements in the key metrics identified. We outline a plan to achieve this goal in the section on "graduate education."

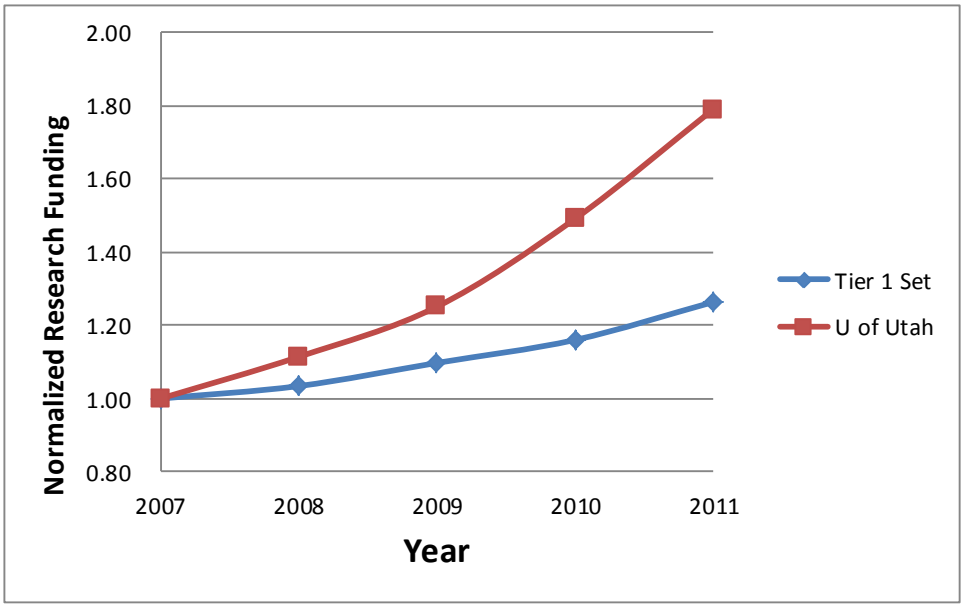

Figure 2. Normalized research growth (i.e., funding relative to 2007 levels) for the University of Utah compared to the average of the Tier 1 set.

Recruiting Undergraduate Students

A premier undergraduate school of engineering begins and ends with the recruitment of outstanding students. Outstanding students have immeasurable positive impacts on the program; they attract other outstanding students, they enhance the reputation of the school and are a powerful and quantifiable metric, they allow the faculty to elevate expectations in the program, and

finally, they go on to do wonderful things for society. Over time, they will also find ways to give back to UW in a multitude of ways!

There are various metrics that may be used to gage the quality of students but, without question, one reliable and moderately valid indicator of academic performance and a readily accessible data set is the entering ACT score for college freshmen. ACT scores are reported on a 36 point scale. The distribution of scores along this scale is highly nonlinear. For example, the information below shows the percentile difference between a 30 and a 36 is quite small compared to the difference between a 24 and a 30.

ACT Score	**Percentile Ranking**
36	99th %
30	95th %
24	74th %

Figure 3 shows a correlation between ACT scores and the first-year GPA for students at UW. The relation is monotonic and almost linear. It demonstrates the value, in terms of academic performance, of attracting students with outstanding ACT scores. There is a wealth of national data available to further support this view. In brief, the ACT score is a good indicator of the probability a student will succeed in engineering courses. At the same time, tests such as the ACT do not measure all of the characteristics needed for later career success, such as creativity, common sense, communication skills, ability to work as part of team, ethical behavior, and good work ethic.

One measure of the make-up of a freshman class of engineering students is to examine the ACT scores of the top quartile (75th %) and the bottom quartile (25th %) of incoming students. For the base set of Tier 1 schools in Figure 1, the 25th and 75th percentile scores are 26-31. In the case of UW these same scores are 22-27.

If one examines the top quartile, we find that an ACT of 31 corresponds to 25 percent of the incoming students residing at the 97th percentile of all students taking the ACT. UW's ACT top quartile score of 27 places 25 percent of our students at the 87th percentile nationally.

Repeating this same analysis for the bottom quartile we find that our Tier 1 students reside at the 83rd percentile while UW's reside at the 62nd percentile. It is the lower end of the student class where UW falls markedly behind the Tier 1 schools.

Finally, an interesting comparison with the University of Utah and the University of Arizona shows that their freshman class profile is nearly identical to UW's. In Utah's case, the similar class profile may suggest that Utah's emphasis with their engineering initiative has been research and graduate education. Our objective is to move UW to a top quartile ranking in both undergraduate and graduate education. The undergraduate effort begins with the recruiting of a great class of students, year after year.

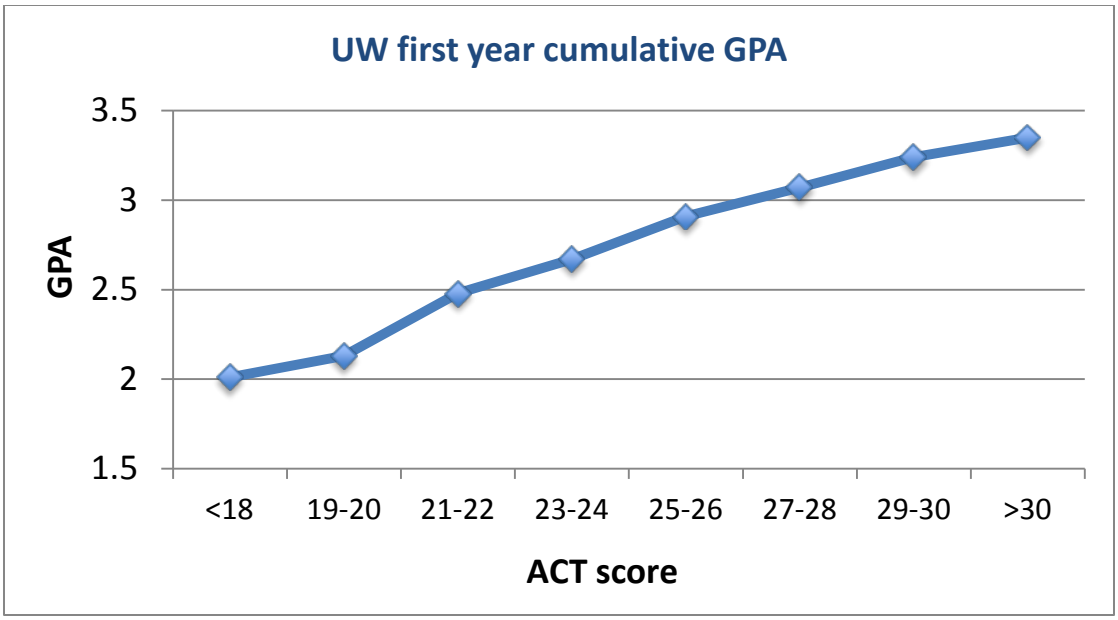

Figure 3. ACT score correlation to first-year academic performance at the University of Wyoming.

It is important to note that academic success is not tantamount to career success. Many very successful engineers who are leaders in their fields were not necessarily those who had the highest ACT scores, or, for that matter, college GPAs. UW must remain open to recruiting engineering students who possess other attributes that are likely to make them successful.

Goal # 2

UW will aggressively pursue outstanding students throughout Wyoming and the nation through a combination of marketing and scholarships. *We propose to provide "Tier 1 Scholarships" of $6,000/yr. annually to the top-quartile of entering first-year students with support lasting for four years for continuing students.*[1] We believe support at his level, combined with effective national marketing and pursuit of other goals outlined in this initiative, should be sufficient to drive our top quartile ACT scores to numbers comparable to our Tier 1 comparators—a score of 31 or greater to be precise. A natural consequence of improvements in our top quartile will be a rise in the bottom quartile as well.

A persistent national problem in engineering is the relatively low numbers of women in the profession. UW is no different and currently women make up 17 % of the undergraduate student population. UW has an opportunity to distinguish itself by recruiting from this poorly tapped talent pool, thereby dramatically altering the percentage of women in the college through a sustained long-term endeavor. *A start toward achieving positive change is a commitment to attempt to devote 1/3 of the top quartile Tier 1*

[1] A total of 500 Tier 1 Scholarships are being planned for based on an enrollment target of 2000-2400 undergraduate students. Moreover, this support would be in addition to other scholarship support for these students, e.g., Hathaway scholarships, private donors, etc.

scholarships to women—representing twice the current percentage of women undergraduate students in the college.

Goal # 3

The initiation of the Tier 1 Scholarship Program represents the perfect opportunity to begin a longitudinal study from program inception. *UW will track the performance of Tier 1 Scholarship students using metrics of GPA, freshmen to sophomore retention in engineering at UW, time to degree, job placement upon graduation and employer/employee satisfaction after graduation.* The relative small student population makes this endeavor a manageable task.

Finally, while UW must strive to improve the quality of undergraduate students, one must temper these goals with an understanding of the higher education landscape in Wyoming. By virtue of being the only university in the state, UW must provide unparalleled access to the students of the state. This access is clearly shown by UW's acceptance rate of 96%. In contrast, the Tier 1 engineering schools in our data set, all of which are located in states with other less selective public universities, have an acceptance rate of 50%. We believe in the open access model provided by UW in giving every qualified student the opportunity to pursue his or her dreams. Occasionally these dreamers produce memorable success stories. In short, recruiting more students at the high end is more important than excluding students at the low end.

Undergraduate Education

UW aspires to deliver an outstanding contemporary undergraduate engineering education to its students, with curricular innovation reflecting the technological pace of today. Our goal is to produce leaders in the field of engineering—engineers who will make a difference, regardless of the precise career they choose to follow. For example, many successful engineering students become engineers, but others become entrepreneurs or executives in businesses or nonprofits. One key to these students' success is a forward-looking curriculum.

Historically, theory and experimental observation formed the foundational pillars of engineering. However, over a period of several decades, computational science has emerged as a critical aspect of engineering solutions. Computational science, more a methodology than a discipline, facilitates simulation, data acquisition, asset management, and visualization and communication. It also facilitates solutions to a large class of problems whose solutions were previously out of reach. Finally, computational science is a gateway to successful high tech spinoffs in a host of important engineering and science sectors.

Computational science is so prevalent today that it is now considered as a third pillar of engineering and shares an equal footing with theory and experiment in importance. Indeed, the majority of advances in technology today are driven by computational solutions. However, while computational science is prevalent in graduate-level research, in the national arena it has yet to

penetrate the undergraduate curricula to the depth needed for undergraduate students to enter industry ready to contribute immediately to advances under development.

Few US engineering programs are as well positioned as UW to pursue computational science as an overarching theme in their undergraduate engineering education programs. UW's world class computational facilities, its setting in an emerging core for data centers, and the nimbleness associated with a small college are important drivers for success in such an endeavor. Moreover, engineering curricular innovation in computational science will provide a strong attraction for the exceptional students we seek to attract to our programs.

Goal #4

UW will undertake major undergraduate curricular innovation to make use of all 3 pillars of engineering education by infusing computational science into the core Engineering Science courses in the college of engineering. Engineering Science courses are taken by every engineering student and represent the foundation of upper division advanced course work. By elevating the presence of computation science in the core curriculum, genuine curricular change at the upper division can occur with the use of advanced computational science algorithms and software. The end result will be an undergraduate engineering program at the leading edge of engineering education in the US. We refer to this innovative curriculum advance as C-STEM.

While curricular innovation in computational science is foremost in our minds, the college of engineering will strive to produce well-rounded outstanding graduates prepared to meet the engineering challenges of the future. An important aspect of professional development of an engineer is a progression of academic and professional experience leading to licensure as a *Professional Engineer (PE).* An early step in the path to licensure is passing the Fundamentals of Engineering (FE) exam. All our students must take the exam as part of the college's graduation requirements; many engineering programs in the U.S. do not have this requirement, and only encourage their students to take the FE exam.

In October of 2012, the national pass rate for first-time test takers of the FE exam was approximately 70% compared to UW's pass rate of 83% for the same set of majors. Historically, UW students have consistently scored above the national average with pass rates typically in the range of 80-85%—despite UW's requirement that all students take the exam.

Goal #5

UW will continue to strive for engineering excellence of all students in the program. *The college aspires to have a consistent pass-rate for the FE exam of at least 90%.* Given UW's historical performance on the FE exam, a 90% pass rate is not unrealistic. Indeed, since 2002, a 90% pass rate has been obtained twice in 19 exams (the exam is administered twice a year). An assessment of program strengths and weaknesses and a drive for continuous improvement are critical in this endeavor.

A 90% pass rate on the FE exam will place UW significantly above national averages, providing a valuable marketing tool for student recruitment. Marketing the college is a consistent theme found throughout this report as part of our drive for Tier 1 excellence.

UW's performance on the national FE exam is a credit to the commitment to undergraduate education by the college's excellent faculty. *Competitive compensation for the faculty is essential if we are to retain faculty members as they represent the foundation to build toward a Tier 1 college of engineering for Wyoming.*

An essential part of an outstanding undergraduate engineering program is a deep and lasting partnership with industry. These connections provide direct employment benefits to our students and corporate partners while opening a communication pipeline to the very latest in technological advances from industry and research discoveries at UW.

A relationship between students and industry partners often begins through a valuable internship in the corporation. The internship is an important part of a student educational experience as they begin to launch their professional careers. Internships also provide a powerful form of recruitment by industry as both the student and the company can explore mutual interests in a long-term career.

Goal #6

UW's College of Engineering and Applied Science aspires to have 90% of its graduates complete at least one professional internship by the time of graduation. The college will actively partner with prospective employers to achieve this goal. Moreover, employment information collected by UW will be used as a means of determining the correlation between internships and future permanent employment.

An important aspect of a rewarding professional career in engineering and science is the opportunity to assume leadership positions within an industry or agency. Leadership development is often inadequately addressed in undergraduate engineering education, owing in part to some of the intangibles associated with defining and teaching leadership.

Goal #7

The college proposes to develop a unique relationship with its industry and agency partners by exploring opportunities to formally develop a required UW/industry/agency leadership program for all undergraduate engineering and computer science students. The integration of leadership development with industry and agencies could occur in multiple ways and continue throughout a student's education at UW.

Several interesting avenues exist for implementing a leadership theme. One possibility is to develop the college's internship (summer employment) program to include guided exposure to leadership practice in an industry or agency. A further interesting possibility is to develop a one-credit, three week short course that students would take once

in their academic career during the month of January (J-term). J-term courses are becoming increasingly popular at UW and the proposed course appears to be an excellent opportunity to take advantage of this time. A J-term course could be located on campus or embedded at an industry site. The opportunities for innovation here are exciting!

Other creative avenues for leadership development exist including partnerships with ROTC as well as the College of Business. Also worth exploring are focused seminar series of invited industry and agency speakers. These series can be built into existing courses, such as a capstone design course, or delivered as part of a seminar series for multiple degree programs.

One of the biggest marketing assets of an engineering school is the ability to advertise outstanding job placement data of its graduates. The college of engineering has failed to take advantage of this opportunity through any sustained form of data collection and the accompanying professional marketing of the data. UW currently has professional staff in place to actively promote job placement of its graduates as well as internships for its students. What is needed now is an accurate assessment of the success of these activities along with solid longitudinal data on professional employment and student satisfaction.

Goal #8

UW will develop a systematic approach to collect employment data of its engineering college graduates by initiating an aggressive survey in January of the preceding academic year's graduates. An effort will be made to reach every graduate and employment data will be collected and percentages computed for those responding to the survey. UW will monitor longitudinal data, seeking opportunities to improve the employment results while incorporating the latest results into marketing the program across the state and the nation.

UW does not need to reinvent the wheel when seeking to effectively promote employment opportunities for its graduates. Indeed, we can learn a great deal from engineering schools that specialize in marketing their students to industry. *The college will determine a set of best practices for effectively placing its students in engineering positions in industry. Based on the information collected, the college will aggressively pursue programs aimed at placing engineering graduates in professional jobs.*

Finally, in considering other avenues beyond the classroom to create a stellar undergraduate engineering experience, we agree with the Task Force assessment that UW alumni represent "an underutilized yet highly loyal resource." Opportunities exist for alumni mentoring programs, formalized recruiting using alumni (a common practice of private institutions), and alumni connections to job placement.

Goal # 9

The opportunities to engage engineering and science alumni are multifaceted and UW would be well served to survey the landscape of various forms of alumni involvement with

engineering schools. Armed with this information, the college will make a concerted effort to engage our alumni in activities designed to enhance the undergraduate experience.

In closing, we believe two objectives of our undergraduate programs should be foremost in our minds. First, when a student walks off campus for the last time, it is our hope that the student says, "I am glad I went to engineering school at the University of Wyoming." Second, we want all our engineering graduates to be highly sought after by industry, immediately upon graduation and for the long haul—to be viewed as the future leaders in the field and, hopefully, in the State of Wyoming. These objectives succinctly sum up our drive for undergraduate engineering excellence.

Graduate Education

UW's graduate education programs have mixed areas of excellence with some areas that are weak or have a very limited presence. The fundamental difficulty in advancing excellence is a lack of depth in faculty numbers in any particular area. For historical reasons, areas of excellence in the College of Engineering and Applied Science tend to be based on the expertise of a faculty hire and not an area of distinction defined by the university. As a result, these areas of excellence are vulnerable to a resignation or retirement of a key faculty member. This feature of the college stands in contrast with recent trends in other fields at UW, such as neuroscience and Earth sciences. Lack of stability in areas of excellence is undesirable and certainly runs counter to the notion of developing a Tier 1 engineering program.

An anecdotal example of the transient nature of areas of excellence in the college is found in the composite materials program developed by Professor Donald Adams beginning in the 1970's. Professor Adams turned the University of Wyoming into the premier institution of higher education for thermo-mechanical testing of composite materials. Companies and organizations from all over the world looked to UW to provide this information in an era where the use of composites was in its infancy. UW was a major player in the explosive entry of composites into the materials community. Professor Adams retirement after a stellar career signaled the decline of an area of excellence that could have been sustained. *Niche areas of excellence disappear as seemingly randomly as they appear*—not a sustainable model of excellence. The random arrival and decline of excellence is a consequence of a once-prevalent philosophy of "letting all flowers bloom." Going forward, the college must adopt a far more focused hiring strategy, aligned with areas of distinction identified in UW's strategic plan and aimed at the development of stable faculty strength in niche areas.

A converse example of building and retaining programmatic depth is the Department of Atmospheric Science (DAS). If we remove the word "department", atmospheric science is truly a niche area of excellence at UW. While DAS contributes to the teaching mission of the college, it has no true undergraduate program that must be supported, allowing the department to focus on graduate-level research. As a result of known stable resources, the program has developed an international reputation while standing the test of time. Many outstanding faculty members have come and gone, yet the department continues to flourish. The Atmospheric Science program is viewed as a model for developing sustained niches of excellence in graduate education.

A quick profile of DAS shows an annual state budget of $1.27M with 8 tenure-track faculty. Annual research expenditures per tenure track faculty are $523K which yields a ratio of 0.81 with respect to the Tier 1 set and on a par with the University of Utah college of engineering. The department also capitalizes on resources unique to UW and Wyoming; the King Air experimental aircraft is one of only two "fully-instrumented" (mission ready) research aircraft in the country and Laramie is also one of the best locations in the world for high altitude balloon launches. The depth of faculty resources, coupled with valuable assets unique to UW and the state, provide a formula for lasting excellence that we intend to emulate in other niche areas.

We have identified five niche areas of excellence that are of major importance to the state, that align with UW's strategic plan, and in which national prominence is attainable. A brief description of each niche area is provided below.

Unconventional Reservoirs

Unconventional hydrocarbon reservoirs represent the future of Wyoming's natural gas and oil production. Indeed, the economic vitality of the state in the coming decades remains inextricably linked to accessing unconventional resources.

Over the last eight years the state has heavily invested in developing energy programs at UW. This effort has created a platform for developing world-leading capability in key technology areas that will lead to breakthroughs in fundamental knowledge critical for optimal production of fossil energy resources, particularly unconventional reservoirs. Chief among them is the world's most advanced multi-scale flow and rock characterization research facility, established at UW over the last six years. In this facility, UW engineers and scientists are concerned with the development of a fundamental, improved understanding of flow and transport in unconventional reservoirs, e.g., shale oil and shale gas. Such understanding is pivotal to extracting maximum value from both unconventional and conventional reservoirs and is being obtained through collaborative multi-scale experiments, imaging, modeling, and simulation of flow and transport in porous media at multiple scales, i.e., meter to nanometer. This research will ultimately contribute to the design of strategies for improved oil and gas recovery from unconventional reservoirs.

UW benefits from an interdisciplinary array of faculty members with expertise in experimental science, mathematical and physical modeling, and high performance computing to advance the state-of-the-art knowledge in unconventional reservoir analysis. Further strengthening of this niche area provides UW an opportunity to achieve national and international prominence for the college—with lasting benefits to the state, the country, and the world.

Advanced Coal Technologies and Energy Conversion and Delivery

This niche area addresses the programs of education and research needed to create the value-adding technologies and expertise for converting Wyoming's energy resources and ensuring their reliable delivery to markets. A topic of primary importance is advanced coal technologies including coal to liquid fuels, hydrogen production, advanced combustion turbines, and advances in

coal gasification technology. Interestingly, the primary research advances needed to improve coal's viability as an energy resource focus on developing new materials capable of meeting increasingly severe service environments. Novel material processing and computational solid mechanics represent major contributors to this research endeavor. Advanced coal technologies provide an opportunity for coal to remain an important part of world energy supplies for the foreseeable future.

Other energy conversion and delivery topics include the sound development and use of Wyoming's renewable energy resources (wind, solar) and nuclear energy resources, possibly in conjunction with technologies for producing liquid fuels and chemicals. UW's chemical, mechanical, electrical, and energy-systems engineering programs will play significant roles in developing this niche, doing so in collaboration with expertise in chemistry, business, and pertinent other UW programs.

Computational Science and Engineering for Fluid Dynamics and Materials Science

As noted in the write-up on undergraduate education, computational science has become a third pillar of engineering, sharing an equal footing with theoretical research and experimental research. Computational science is inherently interdisciplinary, involving expertise in applied mathematics, computer science, and specific engineering application domains. The state of Wyoming is blessed with outstanding high performance computing resources including the NCAR-Wyoming supercomputer and UW's recently acquired on-campus Advanced Research Computing Center. In addition, UW has made a sustained effort over the last 10 years to hire faculty in an array of disciplines whose expertise lies in computational research.

The college of engineering has a core of expertise in computational fluid dynamics, computational materials science, and high performance computing, and collaborates strongly with the mathematics department in areas related to computational science. Computational science and engineering is not only perfectly suited to UW, it is one of the most likely sources of business spinouts from the college. For instance, Firehole Composites is a university spinout with approximately 15 engineers devoted to the computational analysis of failure of high performance composite materials. Numerous other opportunities in computational science and engineering, enabled by the university and state commitments to high performance computing, are poised to support an important aspect of economic development in Wyoming in diverse areas such as aerodynamics of wind turbines, reservoir simulation, solid and liquid combustion processes, water resources, and novel material design and characterization.

Water Resources

The importance of Wyoming's water resources cannot be overstated. Wyoming's location as a headwater state, its largely semi-arid climate, and the roles of water in Wyoming's economy make determining, developing, and managing its water resources critically important. Significant efforts are needed to understand the hydrologic and climate processes influencing the availability of water in Wyoming, and to develop means to ensure its optimum use and quality.

The Water Resource niche area focuses on the science and technology of computational and field hydrology and subsurface flow to address water-resource issues facing Wyoming and the west. Issues of immediate practical importance include the development of energy and mineral resources, agricultural and municipal water supply, and the sound management of watersheds. Two recent large research grants from the National Science Foundation are already advancing UW toward national prominence in field hydrology and subsurface flow. The grants have also provided strong collaborations across colleges, notably with the Department of Geology and Geophysics. Finally, this niche area connects closely with other niche areas of emphasis to UW including unconventional reservoirs, computational science applied to porous-media flow, and atmospheric science.

Biological and Biomedical Engineering

UW's academic planning has made the life sciences an area of distinction. As a result, the university has developed several outstanding programs including interdisciplinary Ph.D. programs in neuroscience, molecular and cellular and life sciences, and the biomedical sciences. Moreover, the past decade has seen biological and biomedical engineering become a significant contributor to growth in the field of chemical engineering nationally and at UW. The Chemical Engineering Department, which offers a Biological Engineering concentration area, now has active research programs in tissue engineering, regenerative medicine, and biomaterials for infectious disease diagnostics, and cancer prognostics, diagnostics, and targeted drug delivery. Electrical Engineering also offers a Bioengineering option. These programs are focused on problems of enormous importance to society in general and the state of Wyoming in particular. In addition to conducting research on health-related issues of critical interest to Wyoming residents, faculty are actively training students who progress to medical school and return to practice medicine in Wyoming. Through infrastructure and programmatic development, the college has an opportunity to bring national recognition to UW biological engineering programs and increase competitiveness for National Institute of Health (NIH) research awards, which are among the largest available for engineering faculty.

An added benefit of the biological engineering niche is the strong attraction of this field for women. Developing this area of excellence will contribute to the college's goal of women making up 1/3 of the undergraduate student population.

Goal #10

UW should boldly develop the niche areas outlined above over the next decade, with the goal of achieving international prominence in each. A commitment of 25-30 faculty positions, in addition to current resources in the areas, is viewed as sufficient to build the faculty depth needed to ensure lasting excellence while elevating UW to national recognition.

Generating momentum in the identified niche areas should lead to elevated funding levels through a national perception of leadership. The faculty numbers proposed here will position UW to compete for high profile national centers of excellence. These national centers typically come

with very substantial federal funding. Center funding is a major source of financial support for the Tier 1 schools noted in this report.

Increased research funding should also lead to opportunities to bring in "*research faculty*." *Research faculty* members are fully supported on grant funding, either individually or through centers of excellence. They add further levels of expertise while bringing in additional funding and advising graduate students. The *research faculty* member can be a powerful driver in advancing the metrics we identified as critical for a Tier 1 institution. At present, UW has very few *research faculty* members, primarily the result of insufficient levels of research activity to support them.

Finally, success in advancing the niche areas of research to national prominence will benefit from developing deep connections with industry and government agency collaborators. Industry research and development divisions provide cutting edge technologies aimed at solutions to their most pressing challenges. It is not uncommon for industry technology advances to lead to further innovation from university partners.

An excellent example of an industry-university partnership was the development of the *finite element method* used to analyze and design all modern structures. The Boeing Company did a great deal of pioneering work in the 1950's in an effort to analyze the extremely complex wing structures of commercial aircraft.. During the 1960's, significant finite element research was also advanced by professors at the University of California, Berkeley while working with structural engineers at Boeing. The synergy between these groups led to technologies that dominated structural analysis for 25 years and that now forms the basis of a multibillion dollar finite element industry with enormous benefits to society.

Another wonderful example of an industry-university partnership is the relationship between the University of Washington and Microsoft. During the early 1980's, University of Washington computer science students made their way across Lake Washington to work for a fledgling company known as Microsoft. In the 1990's, Microsoft exploded on to the international scene and became big contributors to the University of Washington program. Currently, US News and World Reports ranks the graduate computer science program at Washington as the 7th best in the nation. As a result, Microsoft has now been joined by companies like Amazon, Google, and Facebook—all seeking Washington talent to solve their problems. Indeed, a big problem for the university is the inability to produce enough graduates. University of Washington computer science faculty members promote one of their strengths as "the engagement between professors and the tech industry that will one day employ most of the graduates."[2]

The niche areas suggested in this report present superb opportunities to tightly integrate UW researchers with industry. For instance, advances in the field of unconventional reservoirs are

[2] http://www.nytimes.com/2012/07/08/technology/u-of-washington-a-northwest-pipeline-to-silicon-valley.html?pagewanted=all&_r=0

directly tied to industry leadership in horizontal drilling and hydraulic fracturing. Integrating this technology into the college will be a direct benefit to our students who can subsequently make an immediate positive contribution in industry. University researchers also have the opportunity to learn of the immediate challenges ahead with the opportunity to contribute to advances in a rapidly evolving field of huge importance to Wyoming.

An example of a strong partnership in computational science is the relationship between NCAR and UW surrounding the NCAR-Wyoming supercomputer. Student internships and joint faculty appointments are already underway. The NCAR-Wyoming relationship has ideally positioned UW to become a major research player in "big data," a new frontier in computational science.

Goal #11

Industry input is a critical aspect of a successful roll-out of the various niche areas. Industry provides the college a valuable connection to the leading technologies being pursued while identifying challenges and research opportunities with a longer time horizon. *The college will strive to create an atmosphere that promotes industry collaboration on research and academic programs that are responsive to the most current technologies utilized today. We embrace the idea promoted by the Task Force of periodically conducting workshops with corporate CEO's and research vice presidents to keep the college connected to the most pressing challenges of the day.*

A further important aspect of collaboration between the college and industry is the opportunity to hire "professors of the practice," engineers and executives from industry on loan to UW for one year (or more) who would bring their wealth of practical experience to bear on the education of our students. Such professors of the practice have a unique contribution to make in preparing students for the world of work.

The heart and soul of UW's research enterprise lies in the talented graduate students who work with the tenure-track faculty. Graduate assistants are often found in the laboratory, devoting substantial time to extensive experimental studies. They also often play a major role in field work—taking extended stays in the field when faculty are simply unable to do so.

In order to fully develop the niche areas to true national distinction, an infusion of top flight graduate student talent is essential. As in the case of adding faculty to the niche areas, we propose to provide secure long-term support in the form of graduate fellowships for each of the niche areas. These fellowships will be targeted at the most outstanding graduate students and are intended to be used solely to support the research mission. Hence, in contrast with UW's standard graduate assistantships, students would not be asked to contribute to the teaching mission.

Goal #12

We propose to ensure stability of graduate assistant researchers by adding 100 fellowships to the college. Assuming 5 niche areas, 100 fellowships would allow the college

to commit to supporting an average of 5 incoming students per niche area and extending their support for up to 4 years. Furthermore, we propose to fund these students at $33K a year with a 10 month appointment. After adding tuition, fees, and health insurance, the total level of support is estimated at $40K/year.

The gold standard for graduate research fellowships in the U.S. is the National Science Foundation Graduate Research Fellowship Program (NSF-GRFP). Through this intensely competitive program, NSF annually awards approximately 2000 doctoral level fellowships in STEM fields. Fellowship awards total $40,500/yr including a $30,000 stipend and an educational allowance of $10,500 to cover tuition and fees. UW's proposed graduate fellowship program is very comparable to the NSG-GRFP and will position the college to compete for the best academic talent in the nation. The infusion of graduate student talent, combined with depth of faculty numbers and the state's unique resources, will ensure major contributions to the research enterprise and national recognition will naturally follow.

While the proposed niche areas are directly relevant to Wyoming's future, we recognize that the future of Wyoming and the nation is far from static. Periodically, a careful evaluation of niche areas of emphasis should be undertaken to accommodate changing environments and technologies along with new opportunities.

Economic Development and University Spinouts

Google, Sun Microsystems, Silicon Graphics, Cisco Systems, Netscape—these companies are just a few of the high profile business spinouts from Stanford University that fire the imagination of entrepreneurial success. While Stanford enjoys a reputation as one of the finest research and entrepreneurial universities in the country, there are other notable schools. Universities highlighted in a recent article by Capital Formation Institute[3] (CFI) include Purdue, Wisconsin – Madison, and Iowa State (ISU). CFI notes: "ISU, for example, has over 450 active licenses and ranks in the top 5 for active licenses and licenses executed …".

UW's engineering college has some notable successes related to university spinouts. In the past year, two companies born out of research in Mechanical Engineering have gone public. IDES Inc., the world's leader in delivery of a plastics database for engineering applications was publicly acquired in 2012. Firehole Composites, a company developing advanced failure analysis software for composite structures, was publicly acquired in the spring of 2013. Firehole customers include Boeing, Red Bull Formula 1 Racing, General Electric, and Owens Corning. In both the spinouts noted, the parent companies have chosen to leave Wyoming companies in Wyoming—a marvelous outcome for the state and an indicator of the long-term value of spinouts.

[3] http://www.cfi-institute.org/VP%20-%20University%20Spinouts%20Best%20Practices%20and%20Issues%20-%20Palmintera.html

Despite the success of the past year, economic development and university spinouts are currently an underappreciated aspect of the college. The views on business spinouts are not a reflection of on any group of individuals but rather an artifact of the history of higher education. We believe this culture must change if UW wants to fulfill the vision of a Tier 1 engineering school. Some concrete statements on best practices produced by CFI include:

- "Strong and focused university research feeds the pipeline for commercialization. Model universities have built strong, focused research bases by first assessing core competencies and then developing strategic plans around them. Following these plans they have (a) hired 'stars' in targeted fields, (b) targeted federal R&D funds, (c) increased corporate-sponsored research, and(d) promoted state initiatives that leverage federal and corporate funds." We believe much of the advice outlined here is contained in the action items and goals of this report.

- "Entrepreneurial culture is key. Creating an entrepreneurial culture is both "bottom up" and 'top down' , requiring a combination of leadership from the top and entrepreneurial drive from the bottom."

Goal # 13

The college of engineering can make significant advances toward Tier 1 status by *recognizing entrepreneurial activity as a third leg of its mission combined with excellence in teaching and research.* By adopting this attitude, and providing tangible incentives and rewards for entrepreneurial activities, UW can leap ahead of the vast majority of colleges and universities and join a select group of schools. Business spinouts resulting from technology transfer can have an enormous impact on the state economy**.**

Marketing the College

While the preceding goals and objectives outline a solid approach to advance the college of engineering, they will not bring UW the national recognition sought without effective marketing of the initiative and the college. This marketing must be "permanently" sustained and at the highest professional quality. The finest colleges in America relentlessly market their institutions through multiple media outlets, never missing an opportunity to tout their virtues. Indeed, we believe that "perception is reality" is a suitable cliché for defining the importance of marketing.

The marketing effort must touch a broad spectrum of audiences. First and foremost, a statewide effort must be undertaken to elevate our citizens' pride in the college and bring awareness to the college and the initiative underway. The same approach should be extended to the entire Front Range as this audience represents an excellent source of high quality students. Although many Colorado students find their way to UW, we believe we can do much more to attract them—promoting *excellence* in addition to value. Finally, a targeted national marketing program must be undertaken that reaches prospective students as well as peer colleges and universities. Raising our profile with our peers is a particularly important aspect of gaining national recognition.

We refer to our discussion of the Tier 1 set of schools where we noted: "far more important than the numerical ranking is the immediate name recognition of engineering excellence associated with every one of these schools." Recognition is a surely the result of excellence, yet it also leads to further excellence.

UW has some built-in advantages when it comes to marketing the college and the Engineering Initiative. To begin, in a few years, the university will boast a collection of stunning facilities that provide integral support for the college including the Energy Innovation Center of the School of Energy Resources, the Enzi STEM Building, the Energy Engineering Research Facility, and the new engineering building currently in the planning stages. Taken collectively, these facilities will be among the finest the nation has to offer. UW must showcase these facilities as part of a marketing plan—including the visionary planning currently underway.

UW also has an opportunity to partner with a collection of wonderfully supportive industry partners. These partners can help to provide strong and consistent messaging about numerous terrific engineering opportunities. By promoting these opportunities, our corporate partners stand to gain substantial long-term benefits as the quality and number of graduates rise.

Finally, marketing is in large part about image and one cannot change an external image without first creating an outstanding internal image. In this vein, it is imperative to bring the faculty and staff of the college fully on board with the notion of developing an outstanding engineering school. In doing so, UW has an opportunity to promote itself through every message leaving the college. Engagement across the state and the nation represents an opportunity for shameless self-promotion.

This program, as it develops, will provide a model for other programs at UW. Thus, other colleges not included in this particular initiative should not view the initiative as competitive with them, but rather as providing a model for how they can be further developed. The program is an example of how a rising tide can raise all ships. As we achieve greater success in engineering, so in the future can we achieve greater success in other areas of endeavor that are important to our State as well.

Goal #14

UW will develop a professional marketing plan to promote the engineering initiative to prospective students, citizens in the state, and our peer institutions across the nation. The marketing plan should commence with the official launch of this initiative, signaled by Task Force endorsement, legislative financial support, and Trustee approval. Painting the vision through marketing is an important aspect of a long-term drive for excellence.

Finally, we believe one additional audience deserves special attention in the marketing of UW's engineering initiative; the middle school children across our state. In brief, a concerted and sustained effort should be made to develop an engineering presence in middle school.

Goal # 15

There is no question that engineering remains a mysteriously underrepresented field of choice in K12 career discussions. This unfortunate circumstance is arguably driven by lack of exposure to the profession. *UW proposes to work with legislators and K12 to develop a one-semester engineering course for middle school kids involving:*

- College preparation
- Benefits of an engineering degree and higher education in general
- Examples of "cool" engineering—the possibilities are unlimited!
- The science and math behind engineering

We believe this program has an opportunity to fundamentally positively alter the lives of many young students who might never consider engineering as a career.

The involvement of K12 and the university necessitates a careful collaboration with all parties involved. Funding considerations, personnel commitments, and finding some champions in K12 are all necessary for success. We suggest a reasonable approach is to find a couple of early adopter school districts who are willing to invest the effort—over time the payoffs may be remarkable. Finally, legislative approval is a must and any such program should not proceed prior to developing momentum for the project with key elected officials. *Furthermore, funding for the proposed initiative has not been included in the Engineering Initiative request as we believe it should be included as part of the K12 funding profile.*

Budget

An annual budget increase of $14.77 M is required to fully fund the University of Wyoming Engineering Initiative. The budget is directly tied to each of the key areas identified in this report. We echo comments from the governor's Task Force for the Engineering Initiative in that this leap forward requires a broad commitment to excellence.

Resource Commitments	Number	Annual Budget
Faculty Positions	25-30	$ 5,600,000
Graduate Fellowships	100	$ 4,000,000
Undergraduate Scholarships	500	$ 3,000,000
Academic Professionals & Technical staff	6	$ 1,200,000
Support Staff	8	$ 320,000
Professional Marketing & Support		$ 400,000
Major equipment maintenance		$ 250,000
Annual Total		$ 14,770,000

Notes
1. Current college budget with employee benefits is $16.6M
2. Budget estimate above includes employee benefits
3. Request represents approximately 4 % of UW's Section 1 budget

Some budget notes and highlights:

- Faculty positions are devoted to building critical depth to ensure sustained excellence in the niche areas identified.

- Graduate fellowships are nationally competitive and will provide the research engine for the niche areas of excellence.

- Academic professionals such as research scientists and engineers are essential for success in the laboratory driven environment of engineering. Technical staff are also a critical part of the research enterprise and the college is currently understaffed with technical support.

- Undergraduate Tier 1 Scholarships will provide $6,000/yr of support for the college's top quartile of undergraduate students for a four year period. Combined with other scholarship support, UW has an opportunity to recruit an outstanding engineering class every year—the foundation of a Tier 1 program.

- Marketing of the programs nationally and to the state will benefit UW and the state far beyond the college of engineering. We envision outsourcing much of the marketing to a professional organization.

- Failure to plan for maintenance costs of the expensive equipment found in engineering can cripple the operation of the college. A good estimate of maintenance costs is 5-10% annually of the original purchase. The proposed budget is expected to cover maintenance for the 25-30 new faculty hires expected in the college.

The magnitude of the proposed advances for the college of engineering will require a staged funding approach. Academic hiring takes careful planning and there is a definite annual hiring season for faculty that is difficult to circumvent. Moreover, we believe there is merit in developing the niche areas in series as opposed to simultaneously developing them.

To accommodate the staging of the niche areas and the thoughtful development of the initiative in general, we believe the funding should be ramped up over time. A five-year horizon is believed to be sufficient to fully develop the program with proposed annual funding shown.

Year 1	**$5 M**
Year 2	**$7.5 M**
Year 3	**$10 M**
Year 4	**$12.5 M**
Year 5	**$14.77 M**

Finally, private giving is an essential aspect of ensuring long-term success of the Engineering Initiative. In particular, we believe an endowment of $30-40 M is needed to provide the college with critical funding to advance excellence on all fronts. Some examples of the use of these funds include:

- Providing funds for industry visiting faculty to teach critical technologies
- Salary retention for key faculty of outstanding quality
- Named professorships providing discretionary funding for "star" faculty
- Start-up funds for attracting new faculty ($300K-$500K per faculty member is not uncommon)
- Endowed faculty positions
- Developing innovative alumni programs

Goal #16
UW will work with the UW Foundation to formalize plans for a fund raising effort devoted to an excellence endowment of $30-40M for engineering. This program may be a component of UW's next Capital Campaign.

Capital Facilities

Advancing UW to a Tier 1 college of engineering for Wyoming requires numerous programmatic developments outlined in this report. However, many of these changes cannot occur

without substantial growth and upgrades of the college's capital facilities. In brief, the college is space constrained to the point where modernization of teaching laboratories and curricular innovation are being stifled.

Figure 4 shows the footprint of the engineering complex consisting of a collection of buildings built at different times. The heart of the college is the venerable engineering Main Front Building built in 1927. An even older building, referred to as the Sawtooth, was built in 1925 and occupies the central core footprint of the complex. While these buildings represent a substantial amount of the total square footage available, neither is suitable for the placement of modern labs with their demanding power, ventilation, and IT requirements. The inability to properly upgrade these facilities with state of the art laboratories is problematic as 55 % of the total space in the engineering complex is devoted to laboratories.

The Engineering West Wing, also shown in Figure 4, is 52 years old. The size of this building is misleading in that 2 of the 3 floors are used for general university classrooms, leaving only the basement floor for engineering. The location of classrooms in the building, combined with the age of the building, also inhibits laboratory developments.

The newest part of the complex is the engineering north and east wings shown in blue that were built in 1980. From a practical perspective, any upgrades to engineering facilities must occur in this part of the complex. However, the "new" (1980) building is completely full and, indeed, there is an acute shortage of laboratory space. This space shortage has had numerous adverse effects on the research and teaching enterprise; student labs are severely undersized, some experimentally oriented faculty members have no lab space, and hiring decisions are impacted as experimentally oriented faculty may be passed over because of their laboratory needs.

To bring the college facilities up to meet the anticipated demands in classroom and laboratory space, a new building is in the design phase. The building is envisioned to provide 170,000 square feet of space of which roughly 2/3 is devoted to laboratories. However, the proposed new engineering building is not just about additional space, far from it. The need for the building is also a consequence of society's information and technological explosion. New discoveries astound us on a yearly basis and their developments rely on cutting-edge engineering facilities across the country. To venture into the Tier 1 arena, outstanding state-of-the art facilities are essential.

In the design of new engineering facilities, UW has an excellent opportunity to promote innovation through architecture. Construction of a new engineering building affords us the opportunity to weave programmatic integration into the fabric of the office and laboratory arrangements. This concept is nontraditional but not really new. It was the core architectural principle behind Bell Laboratories' Murray Hill headquarters, completed in New Jersey in 1941 and arguably the twentieth century's greatest center of innovation. The facility's design, especially its hallways and office configurations, enabled engineers and scientists from many disciplines to interact with one another, regardless of their department affiliations or project assignments. It

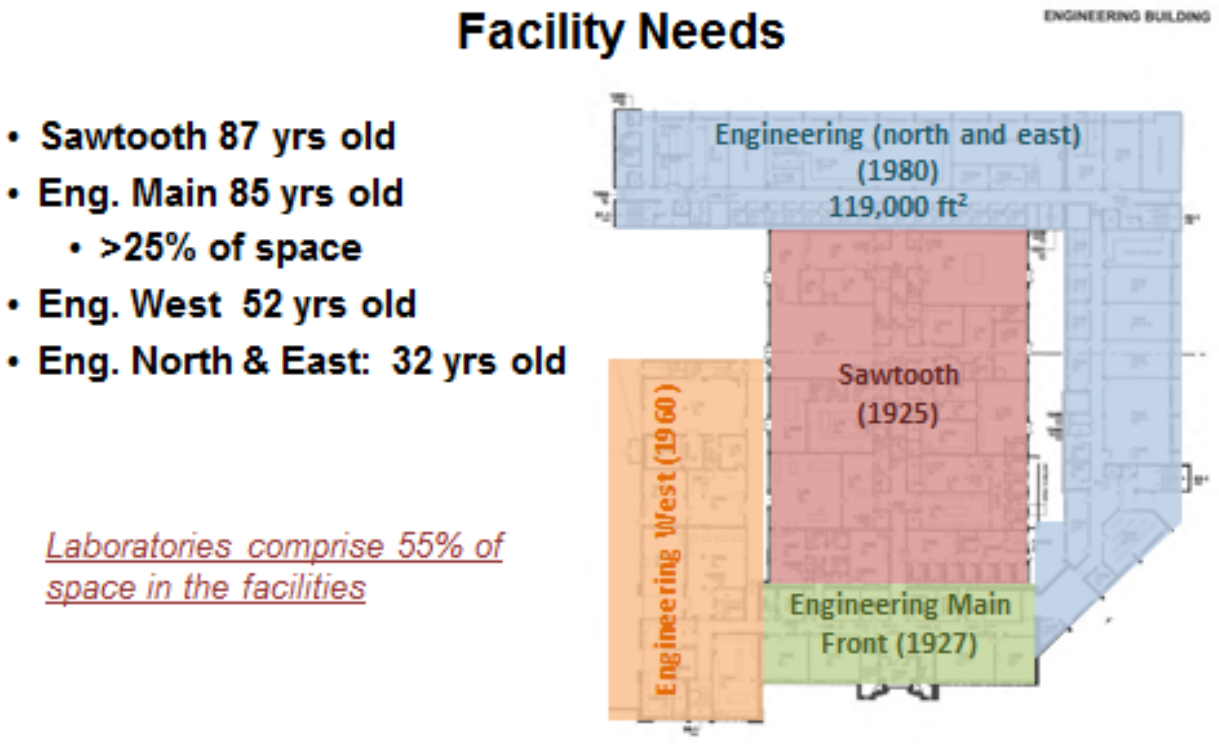

Figure 4. Footprint of current college of engineering facilities.

helped introduce newly minted Ph.Ds. to "the guy who wrote the book." It mixed theorists with experimentalists. From this interdisciplinary ferment emerged the transistor, the laser, satellite telecommunications, the solar cell, light-emitting diodes, the principles enabling digital communications, digital cameras, cellular telephone networks, and the largest number of Nobel prizes of any corporate laboratory in history.

Advancing UW's niche areas of excellence will require strong interdisciplinary connections across departments and colleges. Adopting the building concepts from Bell-Laboratories will emphasize collaborative spaces for faculty and students, while diminishing the architectural barriers that separate different departments and subdisciplines.

In addition to thoughtful placement of our faculty colleagues, the design of the building will focus on encouraging conversation. We envision a building with inviting spaces and corridors designed to create "people eddies," where interaction among faculty and students will naturally occur. Student lounge access for undergraduates and graduates should also be prominently located—all designed to facilitate interactions while generating a powerful attraction for prospective students. In brief, we want the building to naturally market *excellence.*

Goal # 17

The university planning process affords us the opportunity to create the engineering building of our dreams—and the dreams of the future outstanding students we expect to draw to the college. The building's Level 1 Plan provides a sound assessment of the space needed for laboratories, classrooms, and offices. This plan has been completed with an eye toward the laboratories of the future along with thoughtful plans for expansion of the college.

The integration and layout of the building including architectural planning begins with Level 2 planning that has yet to commence. *UW will work carefully with architects to develop a Level 2 plan for a spectacular facility focused on collaborative integration of faculty by niche areas described in this report.* Historically driven disparate departmental interests will be avoided in favor of creating environments that promote collaborative relationships focused on advancing the research goals of the college. An important part of this effort will be the creation of interdisciplinary collaborations between colleges as well as within the college, because much of the best work in science and engineering emerges when interdisciplinary teams work collaboratively on common problems.

The facility will also be inviting for prospective students, while providing a sense of community for current students. We view the *Energy Innovation Center* built for the School of Energy Resources as an excellent example of a facility that has the "WOW" factor the Task Force is advocating to see in engineering building.

While integrating engineering faculty in the new building to support the niche areas of research is foremost in our minds, we have also carefully considered opportunities beyond the college. The Department of Mathematics is arguably the closest department outside the college in terms of faculty collaboration in a host of important research programs. We believe there is merit in exploring the possibility of locating the Math Department in the proposed new engineering building. The synergy of having our math colleagues next door as opposed to across the campus is a valuable asset for inspiration and technological development, particularly in the innovative computational aspects of education and research highlighted in this report.

Goal # 18

Faculty members in the Department of Mathematics are enthusiastic about the opportunity to join their engineering colleagues in a visionary engineering facility. *UW will determine space and cost estimates for moving the Math Department to the new engineering facility. If cost projections are feasible, Level 2 planning will address this exciting opportunity to develop a truly interdisciplinary strategy for advancing engineering excellence.*

Current capital facility funding costs for the engineering building are estimated at $110M. A key component of the funding portfolio is a $15M match from corporate or private donors.

Goal #19

The UW Foundation will make engineering building matching support their highest priority for FY2014. Moreover, if matching funds in excess of $15 M are obtained, UW will seek state support to match these excess funds.

Capital Facility Integration

UW has been extremely fortunate to have the opportunity to develop several outstanding facilities in support of science and energy education. It is important to frame these new facilities in the context of the current needs for the college of engineering. A brief summary of the major STEM-related facilities is provided below.

Michal B. Enzi STEM Facility: The Enzi Laboratory is devoted to support undergraduate science instruction for students in every college in the university except law. The building will house major science laboratories for chemistry, biology, and physics. Computational labs supporting undergraduates in mathematics and computer science are also envisioned for the facility. Every engineering student will spend time in the Enzi facility in their first and second years as they develop their core knowledge in the basic sciences. However, the Enzi facility will not support upper division or graduate engineering course and the building provides no research laboratories. Ground breaking for this facility occurred in March 2013.

Energy Innovation Center: The Energy Innovation Center primarily supports research activities and teaching related to energy. Initial projects include research in enhanced oil recovery, and multiphase flow through porous media (expected to move to the high-bay facility when it is completed), as well as research devoted to conversion of fossil energy resources higher value products. A portion of the space is devoted to house the School of Energy Resources and the Enhanced Oil Recovery Institute staff. In addition, the facility will offer a distance collaboration center, and 3-D visualization research lab, and a state of the art classroom as shared assets for the campus. Finally, the facility offers significant hotel office space for visiting scientists, engineers and other professionals. The facility is expected to have some interaction with petroleum engineering but the majority of engineering disciplines will not directly work in the facility. This facility was completed in spring 2013.

Energy Engineering (High Bay) Research Facility (EERF): The high bay research facility is a yet to be developed building designed to house large scale experiments that are beyond the size of a traditional engineering laboratory. A substantial portion of funding for this facility has come from corporate donations and the desire of donors are reflected in the original outlay of the building. Specific labs to be included are a geomechanics lab, a core-flood facility, a structural engineering lab, a possible wind tunnel and supporting facilities, among others. The high bay facility is currently in the Level 2 planning stages where architectural drawing and design specifications are being laid out.

New Engineering Building: The proposed engineering facility is an integral aspect of the vision and plan for advancing a set of Tier 1 engineering programs for Wyoming. The design and plan of the facility will be thoughtfully integrated to support the objectives of the college and STEM education in general.

Current plans envision locating the new engineering building across Lewis Street and adjacent to the current engineering complex. The proposed location is consistent with the goal of tightly integrating engineering faculty and laboratories with undergraduate science education in the Enzi STEM building, the geosciences housed in the Geology and Geophysics building, and the School of Energy Resources whose new home is the Energy Innovation Center.

In contrast to the envisioned location of the new engineering building, current plans call for the EERF (high bay) facility to be located on the east campus, not far from the central energy plant. The high-bay facility is designed to have an interior clearance of 20 feet and horizontal crane access to move materials from large over the road vehicles (18 wheelers). High bay and horizontal cranes mean clear spans that are not conducive to building floor levels above. Because the EERF requires an estimated 80,000 gross square feet footprint with adjacent service yards, it is not a good fit for the residential neighborhood of the NW science/engineering cluster. The footprint alone would occupy the majority of a city block in this area. The east campus is also much better suited for high frequency heavy traffic loads that may involve hazardous waste. Noise generation and extreme power demands are additional considerations for locating the building on the more industrial east side of campus.

The Road to Tier 1

The Engineering Initiative at the University of Wyoming represents one of the most exciting developments in the history of the college. The initiative poses substantial challenges that can only be met with a deep and lasting partnership between the university, the state, and private industry. A summary of the vision, complete with objective metrics used to measure UW's progress toward attaining that vision, is provided below.

- Identify the qualities of the best engineering schools in the nation and outline a path of excellence to lift UW into the top quartile of national rankings for undergraduate and graduate engineering education. Key metrics we are tracking include research funding/TT, Ph.D. graduates/TT, and MS graduates/TT. Our goal is to develop through engineering education leaders who will raise the economic competitiveness of the State of Wyoming and, ultimately, who will not only fill existing jobs, but contribute to the creation of new ones within the state.

- Through effective marketing and financial support, aggressively pursue the most talented prospective undergraduate students in Wyoming and the nation. The goal is to raise ACT scores of the top quartile to 31, representing students at the 97th percentile of ACT test

takers. A score of 31 would place UW's top quartile of students on a par with the very best programs in the nation.

- Use UW's outstanding computational resources to advance undergraduate curricular innovation by infusing computational aspects of engineering into every aspect of the program from the first year to graduation. The college's small size is a significant advantage as we develop this recognized third pillar of engineering to a level of comparable importance to theory and experiment. Curricular innovation of the magnitude envisioned here will place UW's programs in the vanguard of undergraduate engineering in the United States.

- Graduate outstanding, well-rounded engineering students possessing professional experience and leadership skills obtained through industry internships and programs aimed at leadership development. The college will match the emphasis and passion for undergraduate education with a mission devoted to connecting graduates with professional employment opportunities.

- Boldly develop niche areas of research that have a major influence on Wyoming's future and that align with UW's strategic plan. The niche areas will capitalize on unique assets possessed by the university and the state, making them a natural fit for the college. Lasting excellence in the niche areas will be achieved by hiring 25-30 faculty members to build sufficient programmatic depth to provide immunity from inevitable faculty resignations and retirements. Niche areas of research excellence will be further strengthened with an infusion of 100 graduate fellowships aimed at attracting the brightest academic talent from across the world.

  Research in niche areas will be further strengthened by a concerted effort to integrate faculty into the leading technologies utilized in industry today. This synergistic relationship will have an immediate positive impact on research programs while ensuring our students are receiving the most advanced engineering education possible. UW's industry partners will also benefit by an infusion of academic talent aimed at the pressing challenges they currently face,

- Embrace a culture of economic innovation and entrepreneurial spirit by actively encouraging the development and licensing of intellectual property as well as technology transfer from research discoveries.

- Develop outstanding facilities needed to allow the college to grow while providing critical new space for laboratory research.

- Effectively market every aspect of the college and the university within the state and across the nation. The importance of a professional marketing program to the success of the entire endeavor cannot be overstated.

- Develop effective programs to introduce engineering as an exciting and outstanding career in middle school and/or junior high school throughout Wyoming. This objective is a priceless service to the youth of our state who will, in turn, give back to Wyoming in profound ways.

With a commitment and a vision UW will arrive at a Tier 1 engineering college that will benefit the state in immeasurable ways with a lasting legacy.

Appendix 2

2014 Tier-1 Engineering Initiative implementation plan (Governor's Task Force)

UNIVERSITY OF WYOMING

The University of Wyoming Tier-1 Initiative

Stage One:
College of Engineering and Applied Science

The Implementation Plan

for FY2015-FY2020

WGEESIT Task Force Meeting
Casper, Wyoming
April 3-4, 2014

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Executive Summary

In May 2012, Governor Mead, the State legislature, and the Wyoming Governor's Energy, Engineering, STEM Integration Taskforce (WGEESIT) articulated a vision to propel the College of Engineering and Applied Science (CEAS) and the University of Wyoming (UW) to the realms of excellence in instruction, research, and service. UW's leadership, faculty, and staff are committed to this vision; and equally important, our industry partners have embraced this vision and will help actualize it. Working together, we will have the facilities and resources required to excel in critical elements of our land-grant mission.

In August 2013, Governor Mead asserted *that **it is time to execute the Tier-1 vision and turn it into reality**.* Accordingly, the College's stakeholders in collaboration with the Task Force are developing an Implementation Plan for executing the Tier-1 vision articulated in the *Engineering Initiative Report of May 2013*. The stakeholders include the UW and College leadership, representatives of the faculty, staff, students, National Advisory Board, School of Energy Resources, representatives from the College of Arts and Sciences, and industry partners.

A Tier-1 college is a nationally recognized institution of academic excellence and world-class research. **The unambiguous goal of the Tier-1 Engineering Initiative is to elevate CEAS to national prominence in undergraduate education and selected areas of research, and to enhance economic development in Wyoming**. To this end, our implementation plan focuses on the following aspirational goals:

1. **Excellence in Undergraduate Education:** *The College of Engineering and Applied Sciences has solid educational programs that produce talented graduates, who are in demand by employers. Our goal is to enhance these programs and expand our local recognition to a national reputation.*
2. **World-Class Research and Graduate Education:** *Research leading to discovery and innovation often happens at the interface of different disciplines, where ideas and talents intersect to solve pressing problems. We seek to build world-class interdisciplinary research capabilities in selected areas that will have significant impact on Wyoming and the nation and enrich student mentoring.*
3. **Productive Economic Development through Partnerships:** *We will promote discovery and innovation and seek productive partnerships with the state, national agencies, and industry to actualize research findings and catalyze economic development in Wyoming.*
4. **K-14 STEM Education:** *Strength in K-14 education can enhance the quality and quantity of students who pursue STEM programs at UW and ultimately pursue high-impact careers in the State. We will introduce STEM concepts early in the K-12 educational experience, and we will also enrich the STEM skill sets of UW's freshmen and sophomore students to improve performance and retention.*

Successful implementation of our plans will enable us to **educate and mentor our students** at the highest of levels, **advance science and engineering** to produce significant impacts, and **catalyze the economic development of Wyoming**. We will also contribute to the full internal and external integration of UW's research and service operations, where seamless programmatic and asset integration is accompanied by enduring and productive partnerships with industry as well as state and national agencies.

The plan addresses the time horizon of FY2015 through FY2020 and **proceeds in three phases**. A carefully considered budget that ramps up over the next six years is developed. The programmatic funding for **Phase 1** of our plan is $17.2 million. The State portion of this FY2015-FY2016 biennium budget request totals $8 million (as shown below) with annual funding of $2.7 million and $5.3 million for FYs 2015 and 2016, respectively. The balance of the funds, $9.2 million, is provided by

UW. Specifically, the University will assemble a significant portion of the cost-share to complement the sizeable contribution provided by the UW School of Energy Resources. This significant level of cost-sharing amplifies UW's commitment to the success of the Tier-1 initiative and a productive integration of its programs.

Phase 1	State Appropriation	UW Cost-Share, Including School of Energy Resources	Total Investment
FY 2015	$2.7M (16%)	$9.2M (53%)	$17.2M (100%)
FY 2016	$5.3M (31%)		

State appropriations will continue to be essential in providing resources required for the Engineering Initiative. Nevertheless, as we progress in executing the plans outlined, we anticipate expanded funding through research grants and greater engagement with industry. Specifically, the above investments will be leveraged to expand our research partnerships with industry and national science and engineering funding agencies (e.g., NSF, DOE, and DOD).

This is an outcomes-driven initiative. To achieve tangible progress toward Tier-1 status requires a sustained effort over a six-year period and beyond. The funds committed for Phase 1 (FY2015-FY2016) will be invested in several critical areas to jump-start this historic initiative. Further, as implementation proceeds in the three phases of the plan, we anticipate significant and transformative outcomes.

Initial Enhancements to Build Capacity. By end of Phase 1 in **2016**, CEAS will:

- Add 6 faculty members, 4 research scientists, 10 postdocs, and 45 PhD candidates to support research and economic development in selected niche areas of importance to Wyoming. Initial efforts will focus on (1) Unconventional Reservoirs, and (2) Advanced Coal Technologies and Energy Conversion and Delivery.
- Form 4-6 multi-disciplinary research clusters that will integrate our research capabilities across the UW campus, build partnerships with industry, and increase current productivity in funding and scholarship.
- Provide 90 Engineering Undergraduate Scholarships aimed at attracting the brightest students from Wyoming and the Rocky Mountain Region.

Outcomes. By the completion of Phase 3 in **2020**, CEAS will:

- Offer an outstanding educational experience.
- Increase the undergraduate enrollment from 1,400 to 1800.
- Double the number PhD graduates to 30 per year.
- Double the current productivity in funding and scholarship.
- Increase the number of industrial partnerships and outreach activities.
- Integrate multidisciplinary educational and research environments to focus on problem solving and economic development.
- Establish a competitive capacity in education and research that involves more faculty members, research scientists, post-doctoral researchers, PhD candidates, and undergraduate scholars.

This initiative is the beginning of a process to transform CEAS and deliver greater value to the people of Wyoming. ***This is UW's first in a series of responses to Wyoming's call to excellence.*** Specifically, by 2020 we will achieve the success metrics indicative of our progress toward Tier-1 performance, as described by the National Research Council's analyses of US PhD programs. To this end, an annual assessment of progress will be conducted to contrast our performance with the benchmark measures, success metrics, and targeted milestones. Inevitably, adjustments in the plans, processes, and funding allocation will be made to assure the achievement of our objectives.

1. Introduction

Pursuant to Governor Mead's charge, and with concurrence of the Wyoming Governor's Energy, Engineering, STEM Integration Taskforce (Table A.1), herein is the Implementation Plan to actualize the recommendations articulated in the Engineering Initiative Report of May 2013. The plan focuses on the three primary elements of our mission. It articulates strategies, specific action items, responsible parties, required resources, and targeted outcomes that will be central to fulfilling the vision of the Engineering Initiative. It also provides background metrics to describe the state of CEAS at the present time and in recent history.

Specific action items, projected budgets, and expected outcomes are given in Appendices C-H. Operational matrices with more details on program specifics, milestones, detailed budgeting, and personnel needs will be developed for each area as programmatic funding becomes available.

This plan covers the time horizon of FY2015 through FY2020 and proceeds in three phases. This plan was developed collectively by the college's stakeholders (Table A.2) in collaboration with the Task Force. The stakeholders include the UW and College leadership, representatives of the faculty, staff, students, National Advisory Board, School of Energy Resources, the College of Arts and Sciences, and industry partners. **The unambiguous goal of the Engineering Initiative is to elevate UW's CEAS to national prominence in undergraduate education and selected areas of research, and enhance economic development in Wyoming.**

The ambitious development programs described will require a substantial increase in funding for the College. In this regard, **a strategy of burden sharing and resource leveraging is undertaken**. Specifically, the initial sources for Initiative funding are planned from: (1) State appropriation, (2) UW internal support including the cost sharing by the School of Energy Resources, and (3) private donations. However, as we progress in executing our plans, we also anticipate expanded funding through more successful research grants.

Further, the above investments will be leveraged to expand our research partnerships with industry and national science and engineering funding agencies (e.g., NSF, DOE, DOD). New sustaining funds will also be obtained from new sources as programs grow. These sources include but are not limited to (1) federal programs such as SBIR /STTR, (2) commercialization of intellectual property, and (3) services such as consulting, material and equipment testing, and cooperative development ventures via consortium partnerships.

The required funds will support new faculty positions, research staff, doctoral fellowships, undergraduate fellowships, and interdisciplinary research clusters in targeted areas of importance to Wyoming. The expected benefits from the stated plans include (a) rapid progress toward Tier-1 goals while minimizing the lag time associated with facility development, building completion, and laboratory development; and (b) the opportunity to complement existing technical skill sets of current faculty with strategic hires, who will help in developing the niche research areas and other areas of inquiry as well as offer required technical leadership.

Finally, refining and expanding our academic programs (both undergraduate and graduate) in parallel with facility development will enable us to (a) ramp up our efforts in a carefully planned manner in synergy with infrastructure development, and (b) reach a reasonable degree of fruition for the educational and research programs intended to move us to Tier-1 productivity and excellence.

2. Planning Overview

Our goal is to become a Tier-1 College by building a nationally and internationally recognized institution of academic excellence and world-class research. In doing so, a number of considerations frame our planning process and provide some context:

- ***Baseline Performance.*** Assessment of baseline performance has been conducted to discover what works and at what level within the CEAS and UW context. As such, we are building on the existing foundation and capitalizing on our current strengths. Further, documentation of current performance will provide the basis for measuring our success.

- ***Calibrated Planning.*** In formulating our plans, we could aspire to different levels of achievement. Specifically, CEAS could (a) simply meet the current societal needs of Wyoming using current allocations, or (b) optimize operations and deliver greater value with minimal increase in present resources, or (c) pursue our aspirational goals for growth and excellence as recommended by Governor Mead and the WGEESIT. The resource requirements are different for the three performance levels, and expectations should be reconciled with the level of investment made. The Tier 1 Initiative is certainly an aspirational undertaking that would require significant investments to produce significant outcomes.

- ***Planning and Benchmarking at Proper Scale.*** Sense of scale and proportion is to be considered carefully when developing our plans for enhancing the efficacy of the CEAS programs and benchmarking our outcomes. For example, in our planning, we are aware of the effect of institutional scale in our comparisons. In some cases, per capita (per tenured faculty) comparisons are made on the assumption that normalizing by the number of faculty involved will account for variations in college size. For colleges of diverse size, such comparisons can be misleading. This is because the larger systems benefit from size synergies and suffer less from loss of research capacity of the faculty dedicated to instruction.

- ***Continuous Quality and Tracking Success Metrics.*** A continuous quality mindset and annual evaluation of progress will allow us to assess, adjust, and implement our plans efficiently. As such, identifying and tracking success metrics are essential for improving performance and achieving objectives.

- ***Outcomes-Driven Initiative.*** Successful outcomes validate the efficacy of the plans undertaken and justify the investments made; and more importantly, they pave the way to our aspirations. Our intent is to insist on success and reward it.

Further, we fully embrace these guiding principles:

- ***Integration.*** Our progress requires networking, interdisciplinary collaboration, and partnerships to enrich ideas, share resources, and maximize outcomes.

- ***Diversity.*** The diversity of our student body, faculty, and staff enhances creativity, collective skill sets, and perspectives.

2.1 Assessment and Ranking of Institutions

Assessment and benchmarking of institutions of higher education may occur at the university, college, or discipline level.

University Level Assessment

A Tier-1 university is a nationally recognized institution of academic excellence and world-class research. Nationally, at the university level, three organizations grant Tier-1 status to research universities. They are the Association of American Universities, the Carnegie Foundation for the Advancement of Teaching, and the Center for Measuring University Performance. Recognition by any one of these three organizations is accepted as an indication of Tier-1 status.

For example, a research university is recognized by the Carnegie Foundation as a "Research Universities (RU/VH) - Very High Research Activity" (or Tier-1 status) based on the university's level of research activity as measured by research expenditures, number of research doctorates awarded, number of research-focused faculty, and other factors (such as number of members in the National Academy of Sciences and the National Academy of Engineering). The median values for the quantitative measures for 2011 are:

- About $300 million in research expenditures per year ($180 K per faculty member)
- About 300 research staff in science and engineering (postdoctoral appointees and other non-faculty research staff with doctorates)
- About 300 doctorate degrees awarded per year (135 in STEM, 70 in humanities and social science, and the balance in other professional fields)

Currently UW is classified as "Research Universities (RU/H) - High Research Activity." The University of Wyoming embraces the opportunity and challenges to attain Tier-1 status, and we regard the quest as a decades-long process. In its quest, the University must employ a measured, strategic approach, develop and implement coherent plans for excellence in selected segments of the University, and then successively expand and adapt those plans to the remaining segments of the University deliberately in a progressive fashion.

College and Discipline Level Assessment

To benchmark our performance at the college level, we elect to use the National Research Council (NRC) methodology, as described in their report "*A Data-Based Assessment of Research-Doctorate Programs in the United States.*" In their extensive evaluation of over 5,000 doctoral programs, the NRC offers a discipline-based assessment of doctoral programs, which facilitates comparisons among programs and provide a basis for self-improvement.

In Appendix B, we have summarized the performance metrics and program characteristics of the top quartile of each of the six disciplines offered in our College. ***The College of Engineering and Applied Science will have achieved Tier-1 status when its performance metrics (scaled appropriately by the college's size and mission) are comparable to those programs.*** Popular press rankings are not regarded as authoritative or objective. Hence the status they accord will not be recognized.

2.2 Integration

The Tier-1 initiative will provide a vehicle for education and research that engages faculty from across UW. The focus of our faculty will transcend disciplines as their efforts are directed toward mutual pursuit of the University's mission. In doing so, our purpose is to integrate our activities and resources and develop an environment in which the entire institution is engaged in academic excellence, high-impact scholarly research, discovery and productive collaboration with industry, state, and federal agencies. To achieve this purpose, we need to:

1. Join forces in filling the pipeline with future engineering students and retaining those students through a State-wide K-14 program of teacher education and development, student recruiting, and academic advising and counseling.
2. Conduct collaborative, cross-disciplinary research focused on solving significant problems and catalyzing the economic development of Wyoming.
3. Realize that significant discoveries are a result of problem-focused research that occurs at the interface of many disciplines.
4. Value that productive academe-industry partnerships produce tangible technical impacts for industry and relevance for scholarship.
5. Insist on unfettered access for all contributing faculty to all research facilities and resources.
6. Avoid duplication in facility planning and create quality spaces for interactions for all investigators.

Our fundamental operational principle in implementing the Engineering Initiative is to establish a unified mission and shared resources for the collective success of UW. Our commitment to this principle is demonstrated by the shared resource allocation and the response to the request for proposals to establish the Interdisciplinary Research Clusters, as outlined later in Appendix D.

3. Our Current Operations

Since its founding in 1893, the College of Engineering and Applied Science has contributed in significant ways to the State of Wyoming and the nation. Enrichment of the workforce by talented engineering and science graduates is only one component of its engagement in the economic advancement and welfare of various constituencies. The reality is that CEAS has:

- Solid undergraduate programs that could deliver more graduates with better soft skills and professional polish.

- A research environment whose productivity is constrained by an inadequate number of faculty, graduate fellowships, and resources not commensurate with our ambitions.

The College will optimize its operations through improved efficiencies; however, additional resources are required to realize significant growth and achieve “high-impact” status and national recognition. We need to grow and capitalize on investments beyond the existing instructional base of funding. Such investments when accompanied by sound strategies and effective plans have been shown to generate a disproportionately higher rate of return in nationally ranked programs. With this potential investment in mind, we have conducted an analysis to assess the strengths, weakness, opportunities, and threats (SWOT) of the College and establish a baseline for our current performance.

Strengths

The College has been recognized regionally for its strong undergraduate, graduate, and research programs, as evidenced by the following:

1. The College enjoys the talents and dedication of high-quality faculty.
2. All undergraduate degrees have been, and will continue to be, accredited by ABET.
3. Graduates are recognized for competence, productivity, and an excellent work ethic.
4. Student enrollment exhibited a steady growth over the past ten years.
5. Undergraduate student-to-faculty ratio has been under 20:1.
6. Undergraduate students in engineering programs consistently pass the Fundamentals of Engineering Exam at a rate of 5-12% higher than the national average.
7. Our scholarship and research are notable in many areas, including energy, atmospheric science, materials science, transportation, and computational aerodynamics.
8. Numerous outreach activities are offered to serve the people of Wyoming.
9. The continued support of the State and the unwavering loyalty of our alumni and industrial partners to our educational mission are indeed commendable.

Weaknesses

Some weaknesses exist in the current operations of the College, which impact the operations of our programs. These include:

1. High teaching loads limit our capacity to increase research and economic productivity.
2. Faculty salaries are low relative to market averages, especially for senior faculty.
3. The College has difficulty attracting sufficient numbers of highly talented students.

4. The numbers of faculty, research professionals (scientists and postdocs), graduate fellowships and support staff are inadequate.
5. Laboratories are substandard and outdated; office space is inadequate.
6. Support and maintenance budgets are minimal.
7. PhD production and publication rates are low.
8. Research funding from external sources is relatively low.
9. Enrichment programs are inadequate which negatively affects student retention rates.
10. Undergraduate leadership mentoring is limited.
11. Industrial engagement and significant partnerships that lead to meaningful applied research and intellectual property development are limited.
12. Performance benchmarking has not been a part of the CEAS culture, resulting in challenges in effectively measuring success and allocating resources.

Opportunities

The opportunity to strengthen our programs and address deficiencies is availed by the Engineering Initiative. We strive through the current implementation plan to develop effective programs and activities that will enhance performance and achieve excellence in our academic, research, and outreach programs. The opportunities for advancement include plans and resources for:

1. Enhanced curricula and teaching methods for the educational programs and broader integration of computational science
2. Targeted enrichment, leadership, and research mentoring for undergraduates
3. Further integration of our activities with STEM programs across UW, which began with merging of activities with the School of Energy Resources (SER)
4. Higher research productivity and scholarship through focus and synergy in research realized by deliberate emphasis on selected niche areas of research
5. Productive engagement with industry through significant partnerships and consortia
6. Greater national presence through improved outcomes and better marketing

Threats

We face a number of potential threats to our current operations and the future aspirations for growth. These include:

1. Loss of faculty and staff because of uncompetitive salaries
2. Inability to attract outstanding students and faculty due to weather concerns
3. Poor perception by funding agencies attributed to the inadequacy of the research environment
4. Limited engagement from industry due to lack of infrastructure
5. The silo mentality which obstructs the benefits of research synergy
6. Limitations in depth of expertise in many research areas due to faculty size

Baseline Performance

A set of baseline performance measures has been assembled to serve as a point of reference to our progress toward Tier 1 Excellence. Details are provided in Appendix B for college aggregate performance. Department-level SWOT analyses are available upon request.

4. Our Aspirations

The Implementation Plan focuses on fulfilling our institutional mission and achieving Tier-1 measures of excellence by pursuing the following thematic strategic goals:

1. **Excellence in Undergraduate Education:** *The College of Engineering and Applied Sciences has solid educational programs that produce talented graduates, who are in demand by employers. Our goal is to enhance these programs and expand our local recognition to a national reputation.*
2. **World-Class Research and Graduate Education:** *Research leading to discovery and innovation often happens at the interface of different disciplines, where ideas and talents intersect to solve pressing problems. We seek to build world-class interdisciplinary research capabilities in selected areas that will have significant impact on Wyoming and the nation and enrich student mentoring.*
3. **Productive Economic Development through Partnerships:** *We will promote discovery and innovation and seek productive partnerships with the state, national agencies, and industry to actualize research findings and catalyze economic development in Wyoming.*
4. **K-14 STEM Education:** *Strength in K-14 education can enhance the quality and quantity of students who pursue STEM programs at UW and ultimately pursue high-impact careers in the State. We will introduce STEM concepts early in the K-12 educational experience, and we will also enrich the STEM skill sets of UW's freshmen and sophomore students to improve performance and retention.*

Successful implementation of our plans will enable us to **educate and mentor our students** at the highest of levels, **advance science and engineering** to produce significant impacts, and **catalyze the economic development of Wyoming**. We will also contribute to the full internal and external integration of UW's scholarship and service operations, where seamless programmatic and asset integration is accompanied by enduring and productive partnerships with state and national agencies, as well as industry.

Specifically, by 2020 we will achieve the success metrics indicative of our progress toward Tier-1 performance, as described by the National Research Council's analyses of PhD programs across the nation. As outlined in Appendix B, while a variety of authoritative sources conduct regular assessments of colleges and universities, we have elected to use NRC's methodology. Accordingly, we have assembled the performance metrics and program characteristics of the top quartile of PhD programs in the NRC 2011 assessment. The performance comparison with our aspirational peers (scaled appropriately by the college's size and mission) will include only state universities that achieved top quartile ranking in the specific disciplines offered by CEAS.

An annual assessment of progress will be conducted. The assessment will be informed by the NRC benchmark measures, success metrics, and targeted milestones. Inevitably, adjustments in the plans, processes, and funding allocation will be made to assure the achievement of our objectives.

5. Our Plans

5.1 Excellence in Undergraduate Education

Premise

The CEAS has solid programs that produce talented graduates, who are in demand by employers. Our goal is to broaden and enrich these programs and expand our local recognition to a national reputation.

Strategies for Excellence

- Offering students a life-enriching educational experience that adds significant value to their careers
- Providing students with multiple opportunities for success, and enable them to realize their ambitions
- Training and mentoring for leadership
- Stimulating a mindset among students to embrace the pursuit of excellence
- Providing access to research opportunities and promote scholarship at all levels
- Increasing the number students who may be interested in engineering and computer science careers

Programs and Activities	Supporting EIR Goals*
1. Undergraduate Curriculum Development and Delivery	4, 9, 11
2. Recruitment Program	2, 14, 15
3. Retention Program	3
4. Co-curricular Programs	6, 7
5. Student Professional Development	6, 8, 9
6. Performance Tracking	3, 5, 8

* Goals articulated in the Engineering Initiative Report of May 2013

Student Characteristics

Following are the characteristics that will be tracked to assure progress toward a successful undergraduate educational experience.

- Freshmen test scores, high school GPA and rank
- Student admission-to-enrollment ratio
- Student-to-faculty ratio
- Undergraduate class size
- Student scholarship funding ratio
- Expenditure per student

Success Metrics

We plan to establish and track quantitative metrics of progress towards our objectives for excellence in undergraduate education. In certain cases, qualitative metrics (anecdotal information) can also be useful to identify trends associated with subjective measures of excellence. In doing so, we recognize that our students need to be educated for a life-long career and trained for immediate utility in a host of career options, including industry, consulting, entrepreneurship, government agencies, and graduate school in engineering, medicine, business, and law.

The following list of metrics will be used to evaluate the effectiveness of our enabling programs and activities across all disciplines. Description of the metrics and the associated target outcomes are presented in Appendix C.

- Retention rate
- Time to degree
- Employment or graduate school placement rate
- Employer feedback
- Success rate on the *National Council for Examiners for Engineering and Surveying* Fundamentals of Engineering Exam
- Number of national scholars and fellowships (e.g., Fulbright, Truman, Gates, Rhodes)
- Number of national awards
- Participation ratios: study abroad, internships, undergraduate research, service learning

5.2 World-Class Research and Graduate Education

Premise

Research leading to discovery and innovation often happens at the interface of different disciplines, where ideas intersect talents to solve pressing problems. Accordingly, we seek to build world-class interdisciplinary research capabilities in selected areas of significant impact on Wyoming and beyond.

Strategies for Excellence

In implementing the goals of the Engineering Initiative, we emphasize and continue to strive to have societal benefits integrated into our research efforts. Specifically, our research focus is to address pressing problems facing society, develop innovative solutions, and help advance the knowledge base in science and engineering. We aim to develop a productive environment of learning, scholarship, and innovation; an environment that supports interdisciplinary research across UW.

To be effective in producing significant societal impact, the College has to be selective in its research emphasis. Accordingly, we have elected to focus on niche research areas that are:

- Relevant and of importance to Wyoming and the nation
- Of distinction with critical mass in capabilities (human resources and facilities)
- Conducive to high impact scholarship and effective mentoring of students
- Suited for viable partnerships for sustained funding and engagement
- Amenable to growth and capable of establishing a national presence and reputation

The envisioned niche areas are multidisciplinary in composition, fully integrated in their approach in problem solving, **thus combining experimental work, first-principle modeling, simulation, and field validation** to provide effective and credible solutions to the problems addressed.

Based on a careful analysis, the recommendations of the Engineering Initiative Report of May 2013, and its endorsement by WGEESIT, our goal is to develop world-class capabilities and strive for national prominence in the following four niche areas:

1. Unconventional Reservoirs
2. Advanced Energy Technologies and Energy Conversion and Delivery
3. Computational Science and Engineering
4. Atmospheric Sciences

Further, we will develop the following focus areas and help bring them to full fruition:

1. Water Resources
2. Biological and Biomedical Engineering

These niche and focus areas are of major importance to the State and align well with UW's strategic plan. In developing these areas, some principles are emphasized, including:

- Developing integrated research projects that, (a) emphasize collaborative, (b) interdisciplinary approaches, and (c) transcend department and college boundaries. These characteristics are essential for solving pressing problems in our areas of concern.
- Inspiring and developing the next generation of engineers and scientists is of critical importance, and our efforts will be structured to fully engage both undergraduate and graduate students, increasing the number and quality of advanced degrees awarded.
- Transferring knowledge and technology to our stakeholders, including the State, industry, and the engineering and scientific community at large, is an essential deliverable.
- While developing these niche and focus areas, we recognize there is a broad spectrum of successful research areas already existing in the College, with new areas developing as needs and opportunities arise, and these too will need support to continue to contribute to the College's national reputation.
- Outreach to the public, effectively communicating how our efforts benefit the State and society in general, is essential to expanding our recognition and national reputation.

The key support elements in developing programs toward Tier 1 performance are: (a) increasing the number quality faculty members and graduate students, and (b) increasing the number of technical and administrative staff, (c) developing world-class research facilities, and (d) establishing a faculty workload model that facilitates increased emphasis on research and economic development while preserving our commitment to our classroom responsibilities.

Programs and Activities	Supporting EIR Goals
1. Excellence in Graduate Education	1, 12
2. Develop and Strengthen Niche Research Areas	10, 11
3. Diversify Funding Sources	16
4. Enhanced Research Environment	1, 10
5. Creating a Separate Department for Petroleum Engineering	1, 10, 11
6. Undergraduate Scholarship	2

Success Metrics

The following list of metrics will be used to evaluate the effectiveness of our enabling programs and activities across all disciplines. Descriptions of the metrics and the associated target outcomes are presented in Appendix D.

Research

- Number of archival journal articles, book chapters, books, and national presentations
- Average citations per publication
- Impact indices of journals
- Research expenditures from sponsored programs and grants

- Percent of faculty with contracts, grants or both
- Percent of faculty participating in interdisciplinary projects
- Funding awards per faculty member
- Number of national and international awards and recognitions
- Number of leadership positions in national and international organizations, societies, and editorships

Graduate Education

- Number of first-year enrollment
- Percent of students with grant-funded research assistantships
- Percent of students with state-funded teaching assistantships
- Percent of first-year students with institutional fellowships
- Number of PhD and MS students graduated
- Average number of PhDs completed in six years or less
- Median time to degree
- Percent employed within one year of graduation
- Number of archival journal publications and national presentations by graduate students

The performance of our graduate program and research productivity will be tracked through these success metrics and other performance characteristics outlined in Appendix D. We also plan to assemble performance data for national organizations conducting analyses and benchmarking of disciplines, colleges, and universities across the nation. Notable among these in graduate studies is the National Research Council's *"A Data-Based Assessment of Research-Doctorate Programs in the United States."*

5.3 Economic Development and Outreach

Premise

Discovery and innovation combined with productive partnerships with the State, national agencies, and industry will enhance student education and job placement while catalyzing economic development in Wyoming.

Strategies for excellence

- Developing robust partnerships with state, industry, and federal labs
- Striving for 100% placement of students into the workforce or graduate studies
- Developing intellectual property to drive economic development
- Stimulating technology transfer through UW's Research Products Center
- Enhancing entrepreneurial activity through UW's Office of Research and Economic Development
- Hiring staff to support these efforts and providing incentives for faculty to become actively engaged in these activities

Programs and Activities	Supporting EIR Goals
1. Enhanced Mechanisms for Collaboration with Industry	6, 7, 8, 11
2. Student-Industry/Lab Interaction Program	6, 7, 8
3. Faculty-Industry Interaction Program	7, 11
4. Entrepreneurship Program	13
5. Alumni Outreach Program	9
6. Commitment to Resources Required for Success	6, 7, 8, 9, 11, 13

Success Metrics

The following list of metrics will be used to evaluate the effectiveness of our enabling programs and activities across all disciplines. Descriptions of the metrics and the associated target outcomes are presented in Appendix E.

- Increase in industrial funding across the College
- Number of start-ups based on intellectual property developed in the College
- Number of patents and other measures of intellectual property development
- Number of patents and commercial licenses
- Royalties based on intellectual property
- Number and diversity of companies that recruit on campus and hire our graduates
- Number of SBIR/STTR grants awarded in the College
- Number of visits by industrial partners to the College

5.4 K-14 STEM Initiatives

Premise

Strength in K-14 educational programs is conducive to larger numbers of engineering students and more high-impact careers for UW graduates. Enrichment of freshmen and sophomore skill sets in STEM subjects tempers difficulties associated with access and improves performance and retention.

Strategies for excellence

Education in science, technology, engineering, and mathematics (STEM) concepts is vital for the future of Wyoming and the nation. Introducing STEM concepts early in a child's education will pay dividends in increased enrollment in STEM-related disciplines at the UW and high-impact career opportunities for graduates. The K-14 STEM initiatives provide for increased STEM access for K-12 students and also enhanced retention programs for freshman and sophomore students within STEM disciplines.

The Michael B. Enzi STEM Undergraduate Laboratory Facility will be complete in 2015. This facility will serve as the hub for STEM Outreach activities throughout the state and also onsite Summer STEM teaching workshops. Faculty members from Engineering, Math, Chemistry, Physics, and Biology will undertake the following activities to assists in advancing STEM education across the K-14 educational experience (K-12 and first two years of college):

K-12 Programs

- Review current efforts dedicated to STEM education both at UW, State-wide, and nationally; and identify best practices that will be productive within our context (e.g. Project Lead the Way, www.pltw.org).
- Develop training workshops for K-12 teachers and offer such workshops on campus during the summer session.
- Incorporate engineering in science and math courses.
- Conduct on site-counseling for education districts requiring assistance.

University Programs

- Review current efforts dedicated to skill set diagnostics in math and science both at UW and nationally, and identify best practices that will be productive within our context.
- Develop modules for addressing skill set deficiencies in math and science.
- Facilitate enrichment programs for students requiring assistance.

Programs and Activities	Supporting EIR Goals
1. Middle School Engineering Exploration Program with PLTW	2, 15
2. Teacher Assistance and Development with the Next Generation Science Standards (NGSS)	2, 15
3. Onsite Student Development/Outreach Program	2, 15
4. Enhancement Programs for College Freshmen and Sophomores	3

Our aspirations for excellence in undergraduate education are closely aligned with plans for a University-wide K-14 STEM integration program (K-12 and the first two years of college). Our objectives for recruiting and retention of engineering and computer science students in the College are consistent with University-wide objectives for all STEM programs.

CEAS will integrate its recruiting and retention initiatives with those from outside the College such that collaborative efficiencies and synergies are achieved. Faculty members from Engineering, Education, Math, Chemistry, Physics, and Biology will undertake focused activities to assist in advancing STEM education across the full horizon of our K-14 educational experience. Details are provided in Appendix F.

Success Metrics

- Track "Project Lead The Way" (www.pltw.org) participants through middle school and high school. Determine if there is a higher matriculation rate to UW STEM programs than non-PLTW participating schools.
- Obtain baseline data of students pursuing STEM and computer science majors (e.g. by WY HS).
- Monitor increase by high school. Can changes be correlated with specific programs?
- Develop an assessment plan to measure the effectiveness of the program.
- Measure participation rates within freshman and sophomore enhancement programs. Determine if the retention rate of participating students is higher than non-participating students with similar initial math skills.

6. Administration and Infrastructure Development

Following are specific plans to develop the required administration and infrastructure to fulfill our mission, realize our vision and accomplish our goals.

6.1 Effective Administrative Structure

An effective administrative structure and behavioral change at the individual and College level are required to pursue excellence in our operations.

Strategies

- Modifying the administrative structure to help produce the desired outcomes.
- Embracing and cultivating a culture of excellence in all aspects of our enterprise.
- Fostering transparent budgeting and merit-based resource allocation.
- Developing a sustainable, competitive reward system for faculty and staff.

Objectives

1. Develop a faculty workload model to facilitate accomplishing Tier-1 goals.
2. Reorganize the administrative scheme to provide a staffing structure and a work environment that supports our operations effectively and efficiently.
3. Implement a staff development program and facilitate staff professional growth and promotion.
4. Develop departmental strategic plans to fulfill College objectives.
5. Embrace the pursuit of excellence in all operational tangents and implement continuous quality measures.
6. Issue departmental annual progress reports and disseminate them to relevant constituencies.

6.2 Faculty and Staff Development

One of the primary assets of our institution is the intellectual capital of our faculty and staff. Although we have the commitment of talented and dedicated faculty and staff, the need exists for enabling them and enriching our capabilities with additional faculty and support staff.

Strategies

- Creative and talented faculty and competent staff are essential for a productive educational and research enterprise capable of fulfilling our mission.
- Mentoring of faculty and training of staff adds significant value to our institutional success.
- Sustaining and growing our research capabilities in selected research areas requires teams of researchers that offer depth in numbers and expertise.

Objectives

1. Recruit and retain creative and talented faculty and staff.
2. Espouse the values of diversity in all our recruitment of students, faculty, and staff
3. Build a critical mass of expertise in the niche research areas through strategic hires.
4. Support faculty and staff professional development.
5. Increase the number of endowed chairs and professorships.
6. Strive for competitive compensation for faculty and staff.
7. Assure effective mentoring of young faculty.
8. Facilitate well-designed sabbatical leaves for faculty.
9. Provide effective function-based training for staff.

Appendices C-E outline some of our plans in this regard and other plans will be developed to meet our needs.

6.3 Educating and Training a Diverse Workforce

The rich diversity of our student body, faculty, and staff is enrichment of creativity, skill sets, and perspectives. Accordingly, the College strives to diversify its student body and professionals by including more women, underrepresented minorities, veterans, and persons with disabilities in our workforce. Details are provided in Appendix G.

Strategies

The College subscribes to the University's broad definition of diversity, which encompasses varying geographic, intellectual, ethnic, cultural, academic, and social elements. Further, CEAS is committed to a global view of diversity, ensuring that our teaching and research are relevant to real-world problems, and our social composition includes a variety of voices, thoughts, ideas, and opinions.

Objectives

- Develop a middle school partnership with selected school districts to increase engineering enrollments at UW, with an emphasis on increased women and minority representation among student ranks.
- Strengthen the Engineers Without Borders (EWB) program to serve as conduit for increased student diversity.
- Develop an internship targeted to women and underrepresented groups.

6.4 Departmental Reorganization

The degree programs in Petroleum Engineering were restarted in 2006 within a renamed Department of Chemical and Petroleum Engineering. Petroleum Engineering enrollments have grown tremendously in recent years to a total of 340 students. Managing the program with an administrative staff that is also responsible for Chemical Engineering is no longer feasible. The College, supported by the School of Energy Resources, is currently engaged in splitting the Department into two separate units, and a national search for a new Department Head of Petroleum Engineering is underway. This administrative

reorganization will facilitate improved operations in both Chemical and Petroleum Engineering disciplines. Further details are available in Appendix D.

6.5 Program Coordinator

Recently, UW has hired a senior-level individual (Richard Horner) with an industrial background to serve as Program Coordinator for the Engineering Initiative. Mr. Horner is tasked with various outreach activities to facilitate interactions with industry and state government as described below.

Job Objectives

1. Report to the UW President and co-chairs of the WGEESIT.
2. Serve as an advisor to the President and the CEAS Dean, and chair the Implementation Team meetings.
3. Coordinate efforts among colleges, schools, and other administrative units to facilitate the success of the Tier-1 Initiative.
4. Be responsible for monitoring progress toward Tier-1 objectives and compliance with funding intent.
5. Build bridges with industry and help develop significant partnerships and funding opportunities.
6. Liaise with the State government and legislators to build support for the Tier-1 Initiative.

Our Institutional Expectations

1. Hiring a Program Coordinator is a business proposition. We are complementing our academic talent with business perspective and experience to assure the initiative's success.
2. The Program Coordinator will be an experienced business consultant, not a faculty member.
3. The Program Coordinator is expected to help translate our ideas into workable plans attractive to industrial partners and funding agencies.
4. The Program Coordinator is expected to identify and create alignments within UW and help integrate our operations.

6.6 World-Class Facilities: Capital Program

UW is completing the first phase (Level I) of a comprehensive capital facilities development plan termed the **Engineering Complex Project**. The plan has two objectives:

- Upgrade and expand the college's facilities to match competitive standards for university-based education and research while accommodating foreseeable growth in enrollment and research opportunities.
- Provide the physical infrastructure to achieve the university's vision for its strategic investments in programs.

The Engineering Complex Project forms a key strategic investment enabling the College, working with other university units, to strengthen substantially Wyoming's ability to develop its resources, promote technological innovation, and educate the professionals critical to the state's economic development. The close relationship between engineering and energy compels the planning process to jointly consider space requirements. A CEAS planning team assisted the university's Facilities Planning Office in evaluating our space requirements, and the process identified the need for two new projects:

- Engineering Building Renovation and Expansion (EB)
- High Bay Research Facility (HBRF)

The Level 1 planning process documented these projects to optimize the general functionality and space usage of the EB and HBRF, in additional to existing and planned spaces for the Enzi STEM building and the Energy Innovation Center. The CEAS will be the principal user of Engineering Building Expansion, and is partnering with the School of Energy Resources and others in use of the High Bay Research Facility.

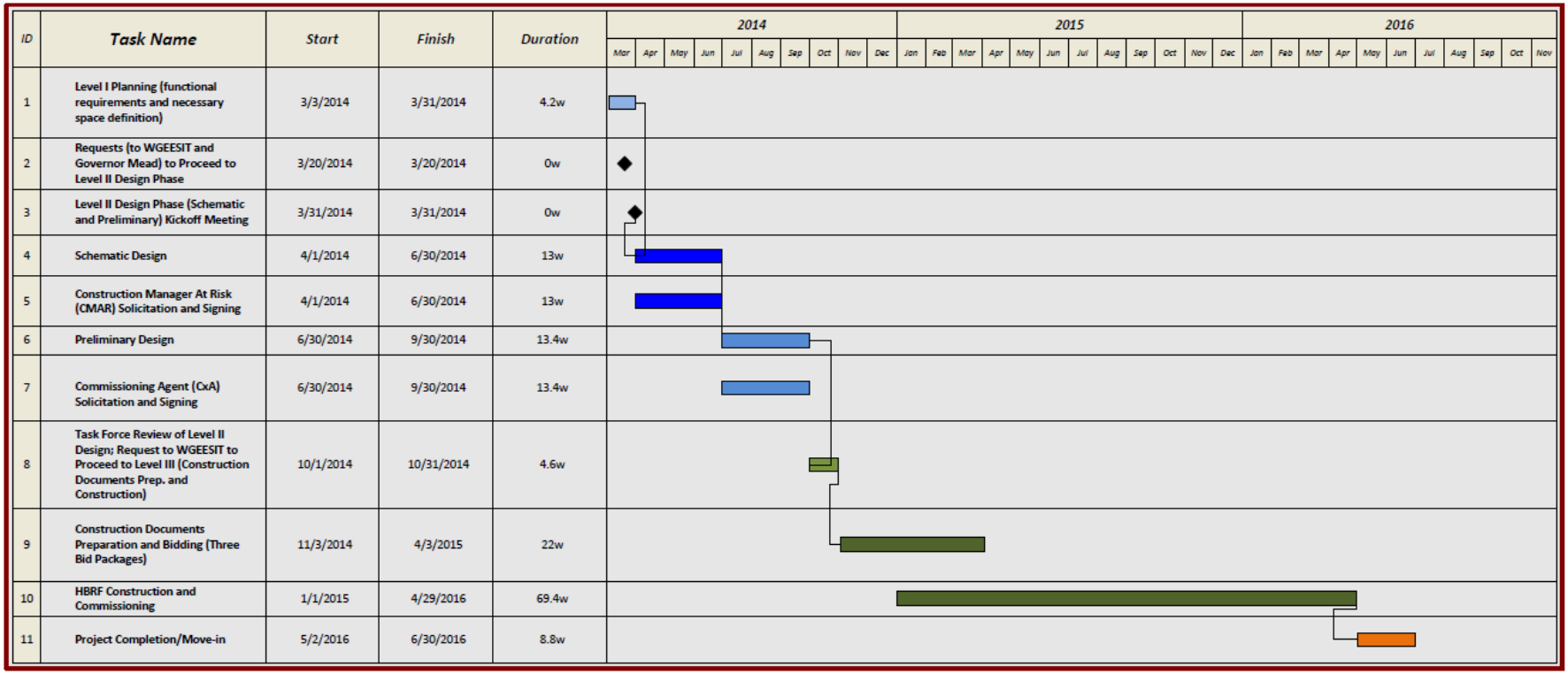
Table 1 below outlines the main features of the facilities. In addition, the general dimensions and benefits are identified. It should be noted that the timeline below (Figure 1) gives an estimate of the principal steps associated with evolution of the Engineering Complex. Procedural and funding considerations will determine the eventual schedule.

Other building projects were carefully considered in the development of the Level 1 programming for the Engineering Complex. A summary is provided below in Table 2. Little overlap, if any, exists between these coordinated spaces. Details of the facilities plan are provided in the Level 1 Report. Further, it should be noted that the EI budget is separate from that designated for capital facilities.

Table 1. Capital Program Summary

Project Title	Facilities	Investment to Accomplish	Buildings Concepts	Possible Sites	Approximate Costs and Possible Funding Sources	Benefits (Figures by students)
Engineering Building Upgrade and Extension	Classrooms, labs, college hub, student support services, common project spaces, fabrication shop, faculty offices	• Undergraduate enrollment from 1400 to 1800 • Graduate enrollment from 250 to 500 • Funded research increased by 50% • Offices to support the above • Lab expansion to support research increase • IT improvement for computational activities	• Sawtooth replaced • New academic building • ~300,000 gsf existing • ~200,000 gsf new	• Use core of engineering building (Sawtooth area) • Remodel existing engineering building • Construct on north side of Lewis St.	**Level I:** (Internal) **Level II: (**$8M approved by in 2014 Wyoming Leg. Level III: TBD Cost TBD in Level II (state appropriation, state match and gifts)	 • High quality facility to support our mission • Excellent programs of education and research • Educated technical work force aligned with Wyoming's needs and values • Expertise to research, innovate, and help commercialize • Strengthened links with Wyoming industry
High-Bay Research Facility	Flexible, large-scale spaces for research	Research labs for: • Geomechanics • Reservoir Studies • structures, materials Final spaces TBD.	Building for mix of research labs, including • Labs with high-bay and strong floor • Assignable floor area sought: ~69,000 gsf	East campus	**Level I:** (Internal) **Level II:** (~$400K from SER[1]) **Level III:** Cost $25.6M for design and construction)	 • Excellent programs of research and education • Increased research capacity, especially for large-scale experiments • Critical infrastructure of energy-related research

[1] School of Energy Resources



ID	Task Name	Start	Finish	Duration
1	Level I Planning (functional requirements and necessary space definition)	3/3/2014	3/31/2014	4.2w
2	Requests (to WGEESIT and Governor Mead) to Proceed to Level II Design Phase	3/20/2014	3/20/2014	0w
3	Level II Design Phase (Schematic and Preliminary) Kickoff Meeting	3/31/2014	3/31/2014	0w
4	Schematic Design	4/1/2014	6/30/2014	13w
5	Construction Manager At Risk (CMAR) Solicitation and Signing	4/1/2014	6/30/2014	13w
6	Preliminary Design	6/30/2014	9/30/2014	13.4w
7	Commissioning Agent (CxA) Solicitation and Signing	6/30/2014	9/30/2014	13.4w
8	Task Force Review of Level II Design; Request to WGEESIT to Proceed to Level III (Construction Documents Prep. and Construction)	10/1/2014	10/31/2014	4.6w
9	Construction Documents Preparation and Bidding (Three Bid Packages)	11/3/2014	4/3/2015	22w
10	HBRF Construction and Commissioning	1/1/2015	4/29/2016	69.4w
11	Project Completion/Move-in	5/2/2016	6/30/2016	8.8w

Figure 1. Preliminary Timeline (this schedule is being developed with our A/E team)

Table 2. Building Functions

Building	Summary
Energy Innovation Center	• Completed 2nd Q 2013 • 30,000 sq. ft.; 1 classroom, collaboration center, 3D visualization lab, 3 research labs; 45 offices; 4 conference/work rooms • Digital Rock Physics (temp), EOR/IOR, Drilling Simulator (temp), Conversion
Enzi STEM Facility	• Commence Construction in 3rd Q 2013; Completion 3rd Q 2015 • 100,000 sq. ft.; 32 teaching labs, 8 prep rooms; 8 offices; no research Labs • Introductory lab courses in chemistry, biology, physics, mathematics, botany, zoology, physiology, computational sciences, computer science and other large-enrollment lab courses
High-Bay Research Facility	• Planned for ~69,000 gsf.; high-bay research labs, conventional labs, offices; no teaching • Center for porous media flow, geomechanics, improved oil recovery, conversion, wind tunnel, structural engineering
Engineering Building	• Currently planned for ~200,000 gsf (new); engineering, CS, and Atmospheric science departments • Faculty/student offices, classrooms, teaching and research labs, workshops, machine shop, drilling simulator; conference rooms, support, and collaboration spaces and flexible laboratories

6.7 Promoting Our Programs

The success of the EI depends on a broad awareness of what we do and where our focus lies. For example, promotion of the College and its programs is essential to recruiting high caliber students at all levels, in recruiting top-notch faculty to UW, in attracting new research funding from both industry and federal agencies, in improving national recognition and rankings, and in establishing UW's Tier 1 position in selected niche areas of research.

Strategies

- Developing brand awareness and cultivating a strong brand recognition
- Building our reputation through high-impact outcomes
- Distinguishing the College for excellence in serving our land-grant mission

Objectives

1. Develop a broad, multifaceted, professional marketing campaign. Collaborate with UW Institutional Marketing and an outside firm to undertake this effort.
2. Develop an improved internet presence.
3. Establish UW as a destination for world-class researchers, visiting scholars, and industrial experts.
4. Promote faculty and students for national awards and recognitions.
5. Incentivize faculty leadership roles in national organizations and editorship of leading journals.
6. Have a stronger presence in national and international conferences.
7. Organize and host more events (symposia, workshops, conferences), particularly in niche research areas.
8. Promote our research and development strategy of discovery through focus on the relevance, synergism through partnerships, and fruition through commercialization.

7. Financial Resources and Budgeting

The implementation plan addresses the time horizon of FY2015 through FY2020. The Engineering Initiative Report of May 2013 projected a total State budget allocation of $65 million for a six-year period and a ramp-up budgeting plan. However, following the recommendation of the WGEESIT Task Force, **the Engineering Initiative will proceed in three phases** with a biennium budget request for each phase. Herein, we present the FY2015-2016 budget and outline the guidelines for future budget requests.

Table 3 presents the programmatic funding request for **Phase 1** of the plan. A total biennium budget of $17.2 million is outlined. The budget includes 17 categories for resource allocation. These resources are allocated to meet stated priorities described above in Sections 1-6 and to produce the desired outcomes. For FY2015-2016 funding, an analysis was conducted to meet this expectation in budget development. Table 4 presents the budget justification for the different budget categories appearing in Table 3. Note that the funding for FY2016 and the personnel target numbers for categories 1-7 are cumulative.

The State portion of this FY2015-FY2016 biennium budget request totals $8 million (as shown below) with annual funding of $2.7 million and $5.3 million for FY 2015 and 2016, respectively. The balance of the funds, $9.2 million, is provided by UW. Specifically, as shown in Tables 5 and 6, the University will assemble a significant portion of the cost-share to complement the sizeable contribution provided by the UW School of Energy Resources. This significant level of cost sharing amplifies UW's commitment to the success of the Tier-1 initiative and a productive integration of its programs.

Table 3 also shows the distribution of funds among the various budget categories. As indicated, 53% of the funds are allocated to faculty and support staff hires, 20% are allocated to graduate fellowships and undergraduate scholarships, 14% are assigned to administration and STEM activities, and 13% are to support the interdisciplinary research clusters.

Beyond state appropriations and UW's cost sharing, sponsored programs and private funds are expected to provide the required resources for the Engineering Initiative. In this regard, the additional resources to be availed by UW's budget allocation represents in part a redistribution of indirect cost returns from federal research awards received by UW faculty. Equally important, this significant level of cost sharing amplifies UW's commitment to the success of the Engineering Initiative and a productive integration of its programs. Given that UW's budget was reduced by over $22 million in the recent round of budget reductions, UW's ability to permanently reallocated existing resources is very limited.

As described in the plans for an improved administrative structure (Section 5.1), specific steps will be undertaken to assure the full implementation of the plans outlined in this budget request. Further, funding allocations for CEAS priorities will be evaluated annually, and adjustments will be made to assure achievements of the strategic objectives. The annual budget will reflect this continued alignment of resource allocation to College priorities.

Careful assessment of our progress in accomplishing the stated goals and moving toward Tier-1 performance will be conducted annually. We will examine the benefits realized from the investments, monitor the success metrics enumerated in the plan, and compare our performance to benchmarks with peer institutions.

As indicated, State appropriations, sponsored programs, and private funds will be required to fund the Engineering Initiative. In fact, the success of this endeavor is predicated on the continued support from the State, active engagement of industry, significant number of research grants, and generous philanthropy. Clearly, our success in obtaining the required resources will demand a significant level of burden sharing by all stakeholders.

Zero-Based Budgeting for FY2017-2020

Zero-based budgeting will be applied to determine the resources required to implement the plans outlined for Phases 2 and 3, which cover FY2017-2018 and FY2019-2020 funding periods, respectively. Specifically, the following guidelines will be used to construct these budgets:

1. Full assessment of the outcomes and deliverables for the preceding funding period
2. Recommended adjustments in plans for the current budgeting period to meet stated expectations
3. Zero-based budgeting for all stated Initiative priorities and credible justification for all allocations
4. Cost-benefit analyses for all major expenditures driven by the desired outcomes
5. Unspent funds carryover between phases to prevent unnecessary expenditures and to gain flexibility in action

Table 3a. Engineering Initiative Biennium Budget for FY2015-FY2016

		FY2015-FY2016 Total Funding				Funding Distribution			
Budget Category	**Resource Allocation**	**Number**	**State Requested Funding**	**UW Funding**	**Total Funding**	**Faculty & Support Staff**	**Fellowships & Scholarships**	**Clusters Related Expense**	**Administration Including STEM**
1	Faculty Positions	6	$672,000	$1,344,000	$2,016,000	$2,016,000			
	" " "								
2	Faculty Support		$1,035,000		$1,035,000			$1,035,000	
3	Graduate Fellowships	45	$2,760,000		$2,760,000		$2,760,000		
4	Undergraduate Scholarships	90	$720,000		$720,000		$720,000		
5	Research Scientists	4	$585,000	$585,000	$1,170,000	$1,170,000			
6	Postdocs	15	$630,000	$910,000	$1,540,000	$1,540,000			
7	Support Staff	12	$660,000	$206,250	$866,250	$866,250			
8	Professional Marketing & Support			$300,000	$300,000				$300,000
9	Major Equipment Maintenance		$62,000	$628,000	$690,000			$690,000	
10	Supplies		$172,500	$172,500	$345,000			$345,000	
11	Professional Development and Travel		$103,500	$103,500	$207,000			$207,000	
12	Faculty Start-up Funds	6		$3,500,000	$3,500,000	$3,500,000			
13	Program Coordinator		$600,000		$600,000				$600,000
14	Commercialization Officer			$140,000	$140,000				$140,000
15	Engineering Research Office			$225,000	$225,000				$225,000
16	Student Services Center			$300,000	$300,000				$300,000
17	K-14 STEM Program			$750,000	$750,000				$750,000
Biennium Total Budget			**$8,000,000**	**$9,164,250**	**$17,164,250**	**$9,092,250**	**$3,480,000**	**$2,277,000**	**$2,315,000**
% Allocation						**53.0%**	**20.3%**	**13.3%**	**13.5%**
Projected Allocation in Engineering Initiative Report			**$12,500,000**						

Table 3b. Annual Budget for FY2015 and FY 2016

		FY2015					FY2016				
Budget Category	**Resource Allocation**	**Number**	**State Requested Funding**	**Number**	**UW Funding**	**Total Funding**	**Number**	**State Requested Funding**	**Number**	**UW Funding**	**Total Funding**
1	Faculty Positions			3	$672,000	$672,000	3	$672,000	3	$672,000	$1,344,000
	" " "										
2	Faculty Support	24	$360,000			$360,000	45	$675,000			$675,000
3	Graduate Fellowships	24	$960,000			$960,000	45	$1,800,000			$1,800,000
4	Undergraduate Scholarships	30	$180,000			$180,000	90	$540,000			$540,000
5	Research Scientists	1	$195,000	1	$195,000	$390,000	2	$390,000	2	$390,000	$780,000
6	Postdocs	4	$280,000	3	$210,000	$490,000	5	$350,000	10	$700,000	$1,050,000
7	Support Staff	7	$288,750	2	$82,500	$371,250	9	$371,250	3	$123,750	$495,000
8	Professional Marketing & Support				$150,000	$150,000				$150,000	$150,000
9	Major Equipment Maintenance		$62,000		$178,000	$240,000				$450,000	$450,000
10	Supplies		$60,000		$60,000	$120,000		$112,500		$112,500	$225,000
11	Professional Development and Travel		$36,000		$36,000	$72,000		$67,500		$67,500	$135,000
12	Faculty Start-up Funds			3	$2,000,000	$2,000,000			3	$1,500,000	$1,500,000
13	Program Coordinator		$300,000			$300,000		$300,000			$300,000
14	Commercialization Officer				$70,000	$70,000				$70,000	$70,000
15	Engineering Research Office				$125,000	$125,000				$100,000	$100,000
16	Student Services Center				$150,000	$150,000				$150,000	$150,000
17	K-14 STEM Program				$250,000	$250,000				$500,000	$500,000
Biennium Total Budget			**$2,721,750**		**$4,178,500**	**$6,900,250**		**$5,278,250**		**$4,985,750**	**$10,264,000**
% Allocation											
Projected Allocation in Engineering Initiative Report			**$5,000,000**					**$7,500,000**			
Budget Notes and Highlights											

Table 4. Purpose and Justification for FY2015-FY2016 Budget

Budget Category		Purpose and Justification
1	Faculty Positions (Academic year salary and EPB)	6 Strategic hires to complement existing technical skill sets, add depth, and, in some cases, offer required technical leadership in the niche areas; these faculty members will also support growth in the undergraduate and graduate programs
2	Faculty Support	One month of salary support per year per faculty member to pursue competitive research funding and support graduate students and undergraduate scholars; 45 faculty members will be involved in ramping up our research productivity and mentoring the additional PhD candidates
3	Graduate Fellowships	One PhD candidate per faculty; the stipends are competitive with top schools; 24 PhD fellowships to grow the graduate program and double the number of graduating PhD candidates to at least 30 candidates per year by 2020
4	Undergraduate Scholarships	Two *Undergraduate Engineering Scholars* per faculty to be mentored within the research clusters; 90 Undergraduate Scholars will recruited to enrich our undergraduate programs with outstanding students
5	Research Scientist (Annual salary and EPO)	Non-tenure track skilled researchers to complement our expertise and amplify our productivity in niche areas; 4 scientists will be recruited for unconventional resources and coal conversion niche areas
6	Postdocs	One postdoctoral fellow per three faculty members to anchore cluster operations; 15 postdoctoral researchers to increase research productivity directly and assist in mentoring graduate students
7	Support Staff	One support staff to facilitate greater productivity in research; 12 staff members are allocated to research groups and to various units to support Initiative activities and provide for an effective administrative structure
8	Professional Marketing & Support	Allocation to help fund a marketing campaign to build visibility and attract talent
9	Major equipment maintenance	Resources to help maintain and service existing equipment for use in pursuing competitive research grants
10	Supplies	Laboratory and computational supplies
11	Professional Development and Travel	Allocation for training, attending conferences, and networking with state and national agencies as well as the private sector
12	Faculty Start-up Funds	Research start up funds for new faculty for research competitiveness, consistent with top schools
13	Program Coordinator	Salary and EPB for Engineering Initiative Program Coordinator
14	Commercialization Officer	Salary and EPB for Commercialization Officer to facilitate bringing research ideas to market
15	CEAS Research Office (CRO)	Salary and EPB for staff members and activities of CRO
16	Center for Student Services (CSS)	Salary and EPB for staff members and activities of CSS
17	K-14 STEM Program	Funding for the STEM Program

Table 5. Sources of Funding for FY2015-FY2016

Total State Funding	**$12,500,000**	This is the projected biennium funding in the Engineering Initiative Report
Total UW	**$9,164,250**	
1. School of Energy Resources (SER)	$4,500,000	Strategic Investment; a 2012 one-time allocation
2. Other UW Funding	$4,664,250	Fund raising and anticipated revenue from research grants will assist with these obligations
Total FY2015-FY2020 Funding	**$17,164,250**	

Table 6. Annual Funding for FY2015-FY2016

Year	Annual Allocation	EI Report Projected State Funding*	State Requested Funding	UW Funding	Total Funding
1	2015	$5,000,000	$2,721,750	$4,178,500	$6,900,250
2	2016	$7,500,000	$5,278,250	$4,985,750	$10,264,000
Total Budget		**$12,500,000**	**$8,000,000**	**$9,164,250**	**$17,164,250**

8. Expected Outcomes

In the Executive Summary of the Governor's Task Force Report (2012), the following recommendations were articulated:

- Define Areas of Excellence
- Improve Integration across Colleges and Facilities
- Improve and Enhance Undergraduate Curriculum
- Improve the Number and Quality of Faculty
- Improve Inflow of Quality Students
- Improve Connections with Industry and Alumni
- Invest in Facilities which Provide for the Above-Mentioned Initiatives
- Leadership, Execution, and Accountability

These recommendations provided the conceptual framework for our planning process. A substantial investment of resources and effort will be required to accomplish the goals set forth. Without a doubt, this endeavor is an exciting challenge for our College and UW. Meeting this challenge will require engagement, collaboration, persistence, and burden sharing by all stakeholders.

In this Implementation Plan, strategies, specific actions, budgets, and milestones have been developed to actualize the Task Force's recommendations. We have also devised an administrative structure to manage the effort. Further, through careful annual assessment and benchmarking, we will be able to reinforce success and make timely adjustments to enhance performance and outcomes.

While cognizant of the long-term nature of this initiative, the expected outcomes of continued investment this initiative are significant and transformative. Specifically, we anticipate that by 2020, CEAS will:

- Be a fully integrated, multidisciplinary educational and research environment that is focused on problem solving and economic engagement.
- Have a greater number of talented faculty, research scientists, postdocs, and exceptional students at all levels.
- Offer an outstanding educational experience supported by effective curricula and modern delivery methods.
- Double its current productivity in scholarship, funding, and number of graduating PhDs.
- Significantly increase the number of industrial partnerships and outreach activities.
- Help infuse the state with technical knowhow for a productive economy.
- Show clear indications of success in advancing UW toward Tier-1 excellence in areas of importance to Wyoming.

Detailed outcomes are presented in Tables 7 to 10 below. Included are our current performance and the anticipated outcomes for Phases 1 and 3 ending in 2016 and 2020, respectively. Additional details are provided in Appendices C-F.

This is only the beginning of a process to transform CEAS and deliver greater value to the people of Wyoming. Through careful strategic planning and the investments made, we will have greater discovery and innovation and more productive partnerships with the state, national agencies, and industry to bring our research to market and catalyze the economic development in Wyoming.

Table 7. Excellence in Undergraduate Education

	Programs and Activities	Targeted Accomplishment	2014	2016	2020
1	Undergraduate Curriculum Development and Delivery	(a) Maintain ABET accreditation of all undergraduate programs (b) Enrich and enhance undergraduate curricula to improve retention and engagement	(a) All programs are currently accredited (b) Begin curricular review	(a) All programs will continue to be accredited (b) All programs will have completed curricular review and implemented enhancements	(a) All programs will continue to be accredited (b) At least one class of graduates will have completed the enhanced curricula
2	Recruitment Program	(a) Increase average ACT scores for entering freshmen (b) Increase number of outstanding freshmen	(a) Average composite ACT score = 25.3 (b) 2 NM scholars in AY 2014 freshmen class	(a) Average composite ACT score = 26 (b) 90 undergraduate scholars	(a) Average composite ACT score = 28 (b) 250-500 undergraduate scholars
3	Retention Program	(a) Enhance retention from year to year and persistence to degree	(a) 41% of entering freshmen graduate from the college	(a) 46% of entering freshmen graduate from the college	(a) 60% of entering freshmen graduate from the college
4	Co-curricular Programs	(a) 100% participation in at least one co-curricular activity (b) 75% participation in at least one co-curricular activity	(a) & (b) 62% participation in summer internship; 33% participation in research; 11% international experience. Some students are double counted.	(a) & (b) All high-impact co-curricular programs are underway.	(a) 90% participation in at least one co-curricular activity (b) 75% participation in at least one co-curricular activity
5	Student Professional Development	(a) 100% placement of graduates for those seeking a professional pathway	(a) 37% placement in permanent employment; 26% plan to attend graduate school; 37% still seeking employment	(a) 100% of freshmen and sophomores have resumes appropriate for internships or undergraduate research postings	(a) 100% placement of graduates for those seeking a professional pathway

Table 8. World-Class Research & Graduate Education

	Programs and Activities	Targeted Accomplishment	2014	2016	2020
1	Develop and Strengthen Niche and Focus Research Areas	(a) Establish four niche and two focus areas of relevant scholarship and productive partnerships with industry for significant economic impact	(a) Identify niche and focus areas; stimulate their internal collaboration and productivity through formation and funding of research clusters.	(a) Research clusters underway with funding from the Engineering Initiative	(a) Four self-sustaining niche areas of research
		(b) Build critical mass of faculty and postdocs	(b) Develop position descriptions for new faculty hires; allocate postdoc positions to clusters	(b) 6 new faculty have been hired, 15 postdocs participate in the niche and focus research areas	(b) 25-30 new faculty have been hired, 15-20 postdocs participate in the niche and focus research areas
2	Diversify Funding Sources	(a) Raise $18M in expendable programmatic funds	(a) & (b) Work with Foundation to identify funding opportunities and partners	(a) $5M in expendable programmatic funds	(a) Raise $18M in expendable programmatic funds
		(b) Raise $5M/year in capital funds for state match		(b) $10M in capital funds for state match	(b) $20M in capital funds, $15 M will be for state match
		(c) $300K/year/faculty member in research expenditures	(c) $135K/faculty member in AY 2013.	(c) $200K/year/faculty member in research expenditures	(c) $300K/year/faculty member in research expenditures
3	Excellence in Graduate Education	(a) Increase PhD student population	(a) Approximately 90 PhD students enrolled in AY 2014	(a) Recruit and sustain EI funding for 24 PhD students; fund an additional 12 new PhD students on research contracts. About 125 PhD students in the college.	(a) Approximately 200 PhD students in the college
		(b) Increase PhD degrees awarded	(b) 17 PhD degrees awarded in AY 2013		(b) Award approximately 30 PhD degrees per year

	Programs and Activities	Targeted Accomplishment	2014	2016	2020
4	Enhanced Research Environment	(a) Increase scholarly output by faculty (b) Host conferences and workshops in targeted areas of research excellence.	(a) & (b) Baseline data are found in Appendix B, Table 2	(a) Niche and focus research area faculty reach national norms in research productivity. (b) Each niche area of research will hold one conference or workshop per year.	(a) Niche and focus research area faculty reach national norms in research productivity. (b) Each niche or focus area of research will hold one conference or workshop per year.
5	Creating a Separate Department for Petroleum Engineering	(a) Split the Department of Chemical and Petroleum Engineering into two units	(a) Department of Chemical and Petroleum Engineering	(a) Department of Chemical and Biological Engineering; Department of Petroleum Engineering as separate departments	(a) Two reformulated departments with renewed visions and strategic directions

Table 9. Economic Development and Outreach

	Programs and Activities	Targeted Accomplishment	2014	2016	2020
1	Enhanced Mechanisms for Collaboration with Industry	(a) Program Coordinator serve as liaison with industry groups (b) Research outcomes and program graduates are integrated into the business community (c) Each department has an industrial affiliates program (IAP)	(a) Hire Program Coordinator (b) Hire Commercialization Officer (c) IAP formed in Computer Science	(a) Program Coordinator identifies prospective partners and initiates relationship formation (b) Commercialization Officer identifies opportunities in each research area (c) Structure of IAP defined for each department	(a) Each department has healthy collaborative relationships with industry partners (b) CTITC effectively commercializes technology developed in the college (c) IAP functioning in each department
2	Student-Industry/Lab Interaction Program	(a) Industry sponsorship of and participation in capstone design projects	(a) Industry sponsorship of capstone design projects in Mechanical Engineering	(a) Each degree program has formed a list of potential industry sponsors for capstone design projects	(a) Capstone design in each degree program engages industry sponsorship and participation
3	Faculty-Industry Interaction Program	(a) 20% increase over baseline in industrial collaborations	(a) Establish baseline	(a) Establish policy for sabbatical leaves to industry	(a) Regular engagement of faculty in industry during summer internships and sabbatical leaves
4	Entrepreneurship Program	(a) Active engagement of faculty and students in entrepreneurship activities	(a) Occasional, uncoordinated seminars related to business development	(a) Seminar each semester on entrepreneurship	(a) Faculty regularly win SBIR and STTR grants. Students regularly participate in the Ellbogen $30K Entrepreneurship Competition
5	Alumni Outreach Program	(a) Track at least 90% of graduates from 2014 onward via social media and other means.	(a) No formal means to track graduates of the college	(a) Develop a tracking system for graduates with the Office of the Registrar and the Alumni Association	(a) Alumni tracking system operational. Regular interaction with graduates via social media.

Table 10. K-14 STEM Initiatives

	Programs and Activities	Targeted Accomplishment	2014	2016	2020
1	Middle School Engineering Exploration Program with PLTW	CEAS faculty and staff will work with WY Project Lead The Way (PLTW) leaders to attempt to expand this offering throughout Wyoming Elementary Schools, Middle Schools, and High Schools. CEAS will also pursue a companion program to expose Wyoming middle school students to a one-semester course introducing the students to the "Way Cool", exciting world of engineering and applied science.	(a) Develop a stronger working relationship between CEAS and Wyoming PLTW – Spring/Summer 2014 (b) Determine what benefits (college credit, scholarships, etc) CEAS may be to provide to graduates of PLTW programs in Wyoming - Spring/Summer 2014	(a) Work with Wyoming PLTW to expand the number of Wyoming school districts who have adopted PLTW as part of their STEM core – Spring 2015	(a) Develop the "Exploration of Engineering and Applied Science" extension course in AY14/15 with course pilot in AY 15/16.
2	Teacher assistance and development with the Next Generation Science Standards (NGSS)	CEAS/SMTC will host teacher summer development workshops on the NGSS	(a) Workshop development Summer 2014	(a) Workshop development Summer 2014	(a) Continue to offer workshops on annual basis
3	Onsite Teacher Support	A series of regional workshops will be held at WY community colleges as a follow up to the summer workshops.	N/A	(a) Conduct follow up workshops	(a) Conduct follow up workshops

4	Onsite Student Development/Outreach Program	The Joint Engineering Council and its constituent student professional societies will develop a series of demonstration kits on STEM and computer science related topics.	(a) Develop kits Fall 2014	(a) Deploy kits Spring 2015	(a) Continue to develop/deploy new kits
5	Enhancement Programs for College freshmen and sophomores	CEAS will develop a series of enhancement programs to best prepare incoming freshman and sophomores for the rigors of engineering study.	(a) Baseline study of retention programs Summer 2014 (b) Funding of proposals from CEAS faculty on expansion of current programs or development of new programs – Spring/Summer 2014	(a) Continued development of freshman/sophomore enhancement programs AY15/16	(a) Continue to monitor program success (b) Improve/add programs as necessary

Appendix A

Engineering Initiative Organizational Structure

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Table A.1. Wyoming Governor's Energy, Engineering, STEM Task Force

Governor Matt Mead State of Wyoming	WYOMING GOVERNOR'S ENERGY, ENGINEERING, STEM INTEGRATION TASK FORCE
Richard J. McGinity, President University of Wyoming	**Dave Bostrom, President** UW Board of Trustees Bostrom Enterprises, LLC
Tom Botts (Retired) Co-Chair Executive VP, Global Manufacturing, Shell Downstream, Inc.	**Jerry M. Calkins, PhD, MD** Chairman, National Advisory Board, College of Engineering and Applied Science
Greg Hill Co-Chair Executive VP & President, Exploration & Production, Hess Corporation	**Khaled Gasem** Associate Provost for Graduate Education & Interim Dean of College of Engineering and Applied Science
Governor Dave Freudenthal (Founding Co-Chair) Senior Counsel Crowell & Moring, LLP	**Paul Lang** Executive Vice President & COO Arch Coal, Inc.
Chad Deaton (Founding Co-Chair) Deaton Properties, L.L.C. Retired Chairman & CEO of Baker Hughes	**Tom Lockhart** Wyoming State Representative District 57 – Natrona County
Dick Agee Founder and Chairman, Wapiti Energy, LLC	**Eric Marsh** Former Executive VP & Senior VP, USA Division, Encana Corporation
	Phil Nicholas Attorney, Nicholas & Tageman, LLC & Wyoming State Senator, District 10 - Albany County
Task Force Staff	
Rob Hurless Energy Strategy Advisor Office of Wyoming Governor Matt Mead	**Ben Blalock** President/CEO UW Foundation
Chris Boswell UW Vice President for Governmental & Community Affairs University of Wyoming	**Mary Ivanoff** UW Foundation

WGEESIT Engineering Initiative Current Organization

The current organization structure for the Engineering Initiative is as follows:

1. An implementation plan for Tier-1 Engineering Initiative should be developed by the stakeholders. The **Engineering Initiative Working Group (EIWG)** was hence formed to help develop the Implementation Plan. Table 1 lists the membership of this stakeholders group. EIWG meetings will be chaired by Dean of Engineering & Applied Science.
2. **A Programmatic Implementation Team (PIT**); comprised of the Provost, Dean of Engineering & Applied Science, Director of the School of Energy Resources, and President of UW Foundation; will review all programmatic plans, monitor progress, and offer guidance to facilitate the success of Engineering Initiative. PIT meetings will be chaired by the Program Coordinator.
3. A **Construction Implementation Team (CIT**); comprised of the Vice President of Finance, Dean of Engineering & Applied Science, Director of the School of Energy Resources, Dr. Jay Puckett, and Mr. Larry Blake, and the Construction Manager; will review all construction plans, monitor progress, and offer guidance to facilitate the success of Engineering Initiative. CIT meetings will be chaired by the Vice President of Finance.
4. PIT and CIT will be assisted by all members of the UW administration as needed.

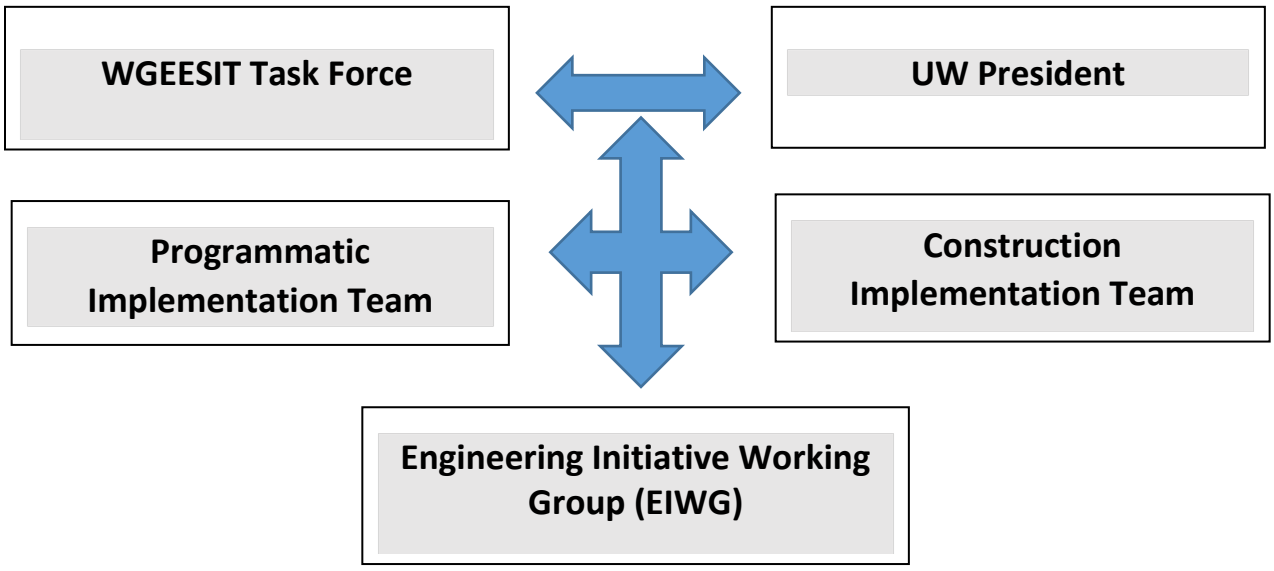

Table A.2. Membership of Engineering Initiative Working Group

Member	Department/Association
Khaled Gasem	CEAS Interim Dean
Jay Puckett	CEAS Associate Dean
Steve Barrett	CEAS Associate Dean
Tom Bailey	CEAS Faculty Council Chairperson
Jerry Calkins	CEAS NAB Chairperson
Andy Hansen	CEAS
Al Rodi	Atmospheric Science
Dave Bagley	Chemical & Petroleum Engineering
John McInroy	Electrical & Computer Engineering
Jim Caldwell	Computer Science
Dick Schmidt	Civil & Architectural Engineering
Paul Dellenback	Mechanical Engineering
Don Roth	School of Energy Resources
Brain Schrader	Research office
Ken Sims	Department of Geology and Geophysics
Victor Ginting	Department of Mathematics
Cricket Farmer-Hoskins	CEAS Dean's office
Baillie Miller	CEAS Dean's office
Rob Streeter	Graduate Student
Libby Hungerford	Undergraduate Student

Appendix B

Background and Baseline Performance

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Contents

Background and Baseline Performance

The College of Engineering and Applied Science (CEAS) consists of six departments that grant undergraduate and graduate degrees in the disciplines. All undergraduate degrees are accredited by either the Engineering Accreditation Commission (EAC) or the Computing Accreditation Commission (CAC) of ABET. See Table 1.

Table 1. Departmental Populations (Fall 2013)

Department	Undergraduate Degrees	Graduate Degrees	Number of Tenure Track Faculty	Number of Lecturers & APLs	Number of Undergrad Students	Number of Graduate Students
Atmospheric Science	BS in Earth System Science	MS & PhD in Atmospheric Science	10	0	5	18
Chemical & Petroleum Engineering	BS in Chemical Engineering BS in Chemical Engineering (petroleum option) BS in Petroleum Engineering	MS & PhD in Chemical MS & PhD in Petroleum Engineering	19	2	499	70
Civil & Architectural Engineering	BS in Architectural Engineering BS in Civil Engineering	MS & PhD in Civil Engineering MS in Civil Engineering/ Water Resources MS in Environmental Engineering	20	3.5	273	32
Computer Science	BS in Computer Science	MS & PhD in Computer Science	9	3	185	27
Electrical & Computer Engineering	BS in Computer Engineering BS in Electrical Engineering BS in Electrical Engineering (bioengineering option)	MS & PhD in Electrical Engineering	14	0.5	152	26
Mechanical Engineering	BS in Mechanical Engineering BS in Energy Systems Engineering	MS & PhD in Mechanical Engineering	13	2.1	356	39
Total			85	11.1	1470	212

Notes:
APL = academic professional lecturer
ABET = accreditation agency for engineering and computer science

Profile

- Undergraduate Enrollment/Faculty ratio is 17.4
- Graduate Enrollment/Faculty ratio is 2.51
- 36 of 85 (42.4%) of faculty members are full professors
- 29 of 85 (34.1%) of faculty members are associate professors
- 20 of 85 (23.5%) of faculty members are assistant professors
- 9 of 85 (10.6%) of faculty members are female

Baseline Data - Undergraduate Programs

Baseline information will be provided on enrollment, degrees awarded, first year retention, persistence to graduation, job/graduate school placement and Fundamental of Engineering Examination (FE) performance.

Enrollment

Figure 1 shows the total undergraduate enrollment for fall 2004 through fall 2013 (beginning of each semester).

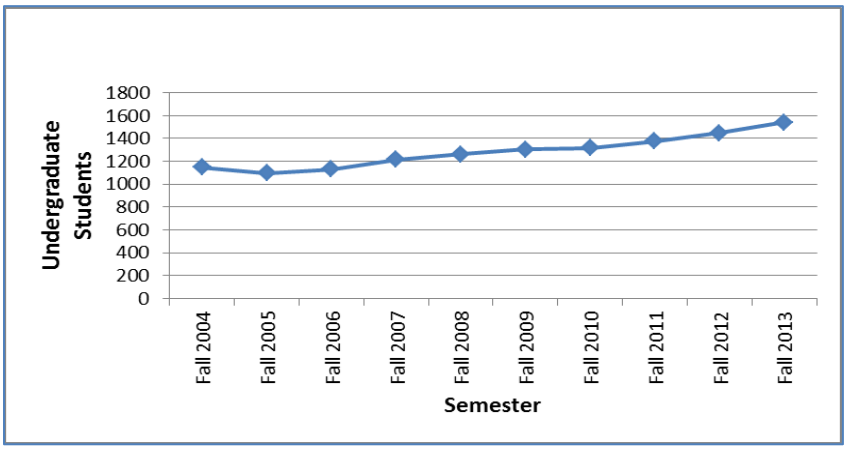

Figure 1. Undergraduate Enrollment

Observations:

- Growth has been steady at about 3% per year.
- Over the past five years, the split between male and female students was essentially constant at 83.8% male, 16.2% female.
- Over the past three years, approximately 6.7% of the undergraduates have declared themselves to be an ethnic minority.
- Over the past five years, the average composite ACT score of the freshmen who matriculated was essentially constant at 25.3 (80^{th} percentile nationally) and the average high school GPA (adjusted to a 4.00 basis) was essentially constant at 3.48.
- Approximately 48% of the students who are granted admission to the CEAS matriculate to the College. Many students choose other majors at UW and ultimately graduate with a UW degree.
- Over the past five years, the percentage of international undergraduate students has consistently increased from 8.4% in fall 2009 to 11.8% in fall 2013 -- primarily due to Chemical and Petroleum engineering.
- In the fall 2013 semester, undergraduate class sizes ranged from 3 to 88 with an average of 28.0.

Degrees Awarded

Figure 2 shows the total undergraduate degrees awarded by CEAS for academic years 2003-2004 through 2012-2013.

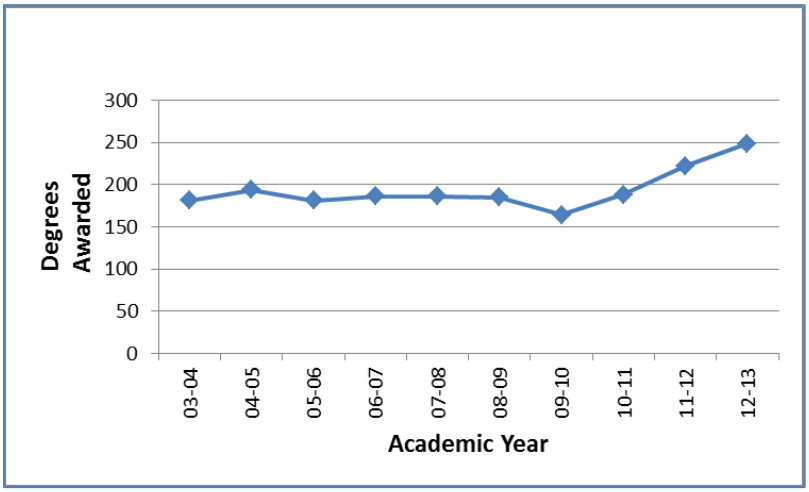

Figure 2. Undergraduate Degrees Awarded

First-Year Retention

Figure 3 shows the retention (within engineering) of freshmen who matriculated at UW. Approximately 40% of freshmen who matriculate as majors in CEAS no longer have declared majors in CEAS after the first semester of their sophomore year.

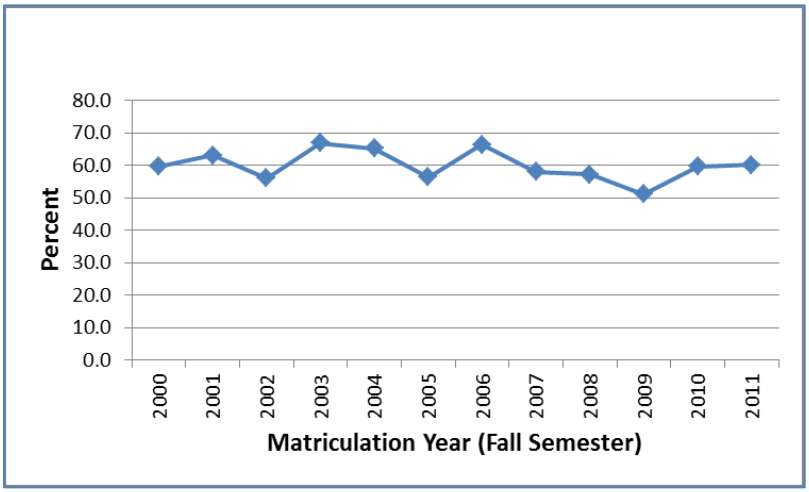

Figure 3. First-year Fall-to-Fall Retention

Persistence to Graduation

Figure 4 shows the average percentage of freshmen who matriculated at UW in CEAS and who graduated in CEAS after four or more years.

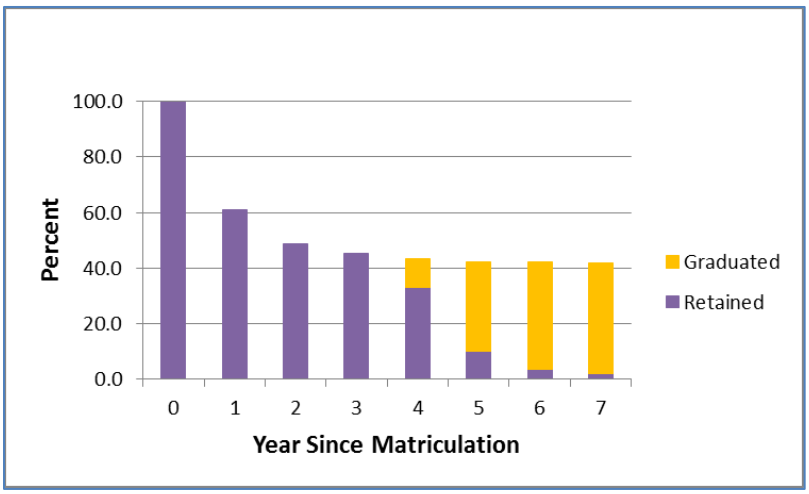

Figure 4. Average Persistence to Graduation

Observations:

- Approximately 10% of the matriculated freshmen graduate with an engineering degree in 4 years, 32% in 5 years or less, 38% in 6 years or less, and 41% overall.
- Average time to graduation is 4.9 years.

Fundamentals of Engineering (FE) Exam

The College requires that all engineering students (thus, computer science majors are excluded) take the Fundamentals of Engineering (FE) Exam as a graduation requirement. Figure 5 below shows the passing rate for both UW seniors and the national average.

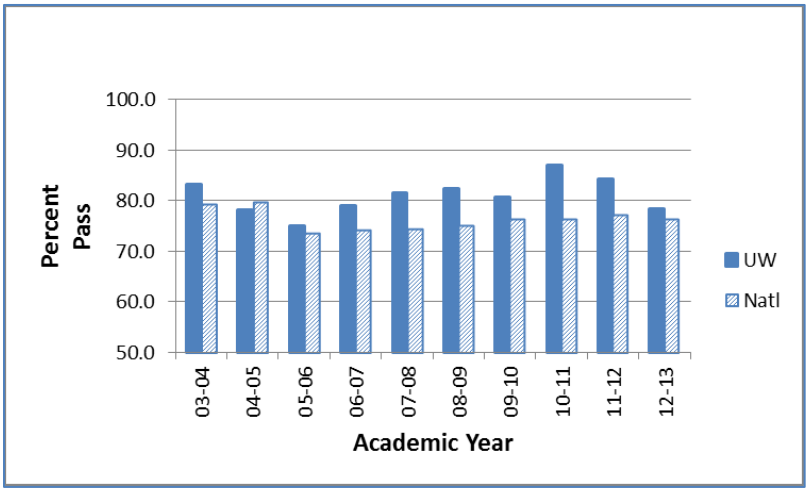

Figure 5. Performance on Fundamental of Engineering Exam

Job and Graduate School Placement

Over the past three years, 250 of the college's graduates have responded to the senior graduation survey (approximately a 40% response rate). The graduates indicate the following:

- 37% have secured a permanent job in their major at time of graduation
- 26% plan to attend graduate school
- 37% are still looking for a permanent job

Student Professional Development

The graduating senior survey asks four separate questions (therefore, the percentages below are not independent). Following are their responses:

- 62% had a summer job associated with their major
- 19% had a co-op for which they earned academic credit
- 33% had an undergraduate research experience
- 11% had an international experience

Scholarship Support

Over the past five years, on the average, 275 undergraduate students receive a total of $347,000 of scholarship support per year. This is an average of $1262 per student per year. This support is in addition to other state and private-supported scholarships such as Trustees, Hathaway, Alumni Association, etc.

Baseline Data – Graduate Programs

Enrollment

Enrollment for the past ten years for the MS and PhD programs is shown in Figure 6.

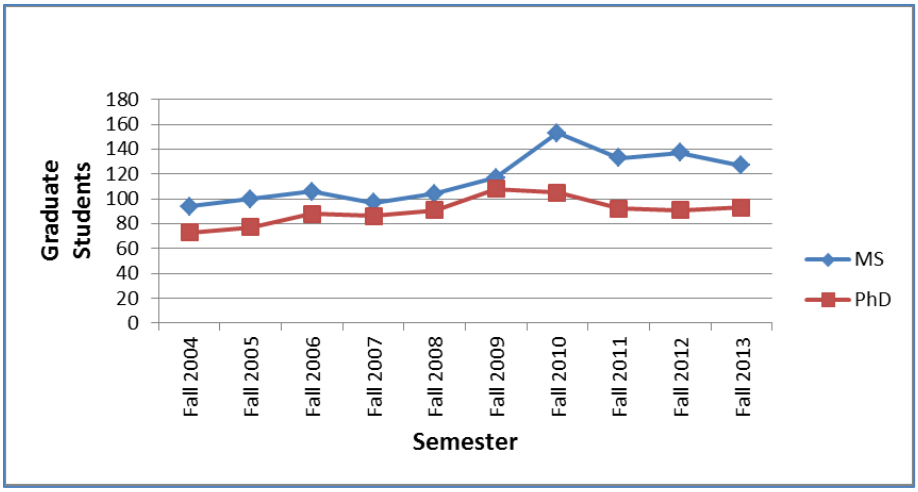

Figure 6. Graduate Enrollment

Observations

- For the past five academic years, the MS students have been 74.4% male and 41.7% international. Over that same time frame, PhD students have been 75.0% male and 76.7% international.
- For MS students enrolled over the past five years, the average GRE Verbal score was 446 and the average GRE Quantitative score was 714. For PhD students, these averages were 450 and 749.
- Over the past three years, approximately 2.9% of the MS students and approximately 2.3% of the PhD students have declared themselves to be an ethnic minority.

Degrees Awarded

Figure 7 shows the total MS and PhD degrees awarded by CEAS for academic years 2003-2004 through 2012-2013.

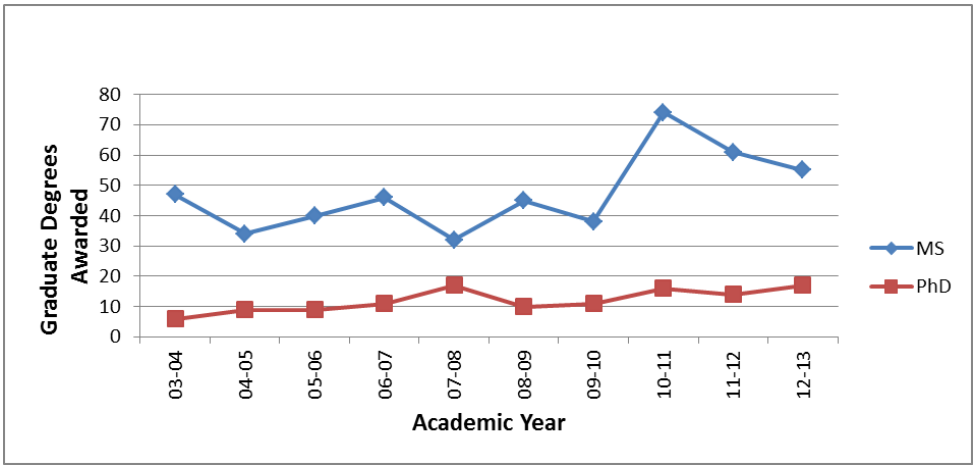

Figure 7. Graduate Degrees Awarded

Research Expenditures

Figure 8 presents the research expenditures for the past 6 fiscal years. Recently, $11.4 million were expended with an average of $135 K per tenure-track faculty.

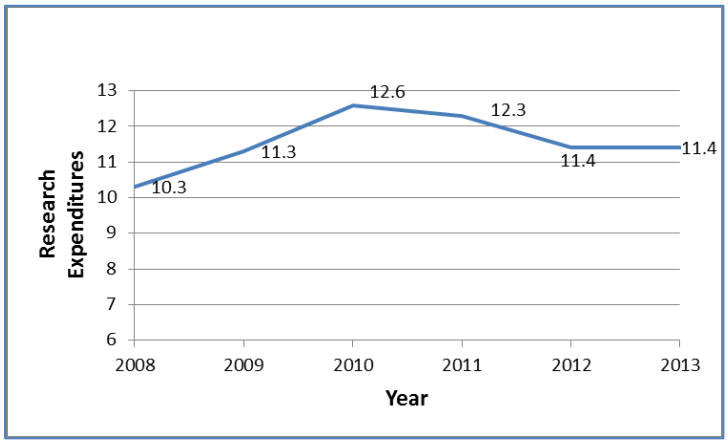

Figure 8. Research Expenditures

Baseline information on Economic Development

The College of Engineering and Applied Science participates in a number of activities (primarily research-based) that have or could have direct economic impacts on the State of Wyoming. Following are some examples:

- The Department of Atmospheric Science is internationally known for its UW King Air (UWKA) atmospheric research aircraft. The UWKA has been supported, under cooperative agreements between UW and NSF for the past 26 years, as a national facility in NSF's Lower Atmospheric Observing Facility program, and supports atmospheric scientists including department faculty

nationally. It has global reach, with recent international projects based in UK, Finland, and Antiqua. The UWKA brings $2.5M annually to the state, in addition to facilitating additional science funding for department faculty. Recent research studies include working with the Wyoming Water Development Commission on State weather modification projects and particle formation from Oil & Gas Operations.

- The Department of Chemical & Petroleum Engineering has conducted research in areas that directly or indirectly support Wyoming ($2.5M annually). The Department's research is well integrated with the UW's School of Energy Resources with projects including coal utilization, CO_2 separation, CO_2 enhanced oil recovery, gas hydrates, natural gas dehydration, wax mitigation in wellbores, drilling techniques, coal bed methane, interfacial and pore-scale transport in porous media, petrophysics, production of crude oil and natural gas, and reservoir engineering simulation. The Department has a small but nationally notable group conducting biomedical research in chemical engineering with primary focus on drug delivery methods. This will be an expanding area for the college as a targeted niche.

- The Department of Civil & Architectural Engineering's service to the State include research contracts totaling $3.4M to solve problems of interest to various State agencies, including WYDOT, WWDC, WYDEQ and WSGS. The Wyoming Technology Transfer Center and Local Technical Assistance Center provide engineering training and services to the counties, local engineers, and the construction industry. In the last three years, the centers have delivered 132 training sessions to 2686 participants and have conducted an additional $3.95M in research studies focusing primarily on rural transportation problems. The Wyoming Water Resource Database provides water resource information and research products for the State. The web sites receive over 200,000 hits annually, largely from professionals and others from Wyoming. The Wyoming Department of Transportation Design Squad, housed on campus within the Department, provides design jobs for at least 10 students per year and three registered professional engineers who supervise their work. The design squad provides roadway designs that go directly to bid and construction. This industrial experience is invaluable to our students. The design squad's annual construction volume has averaged $18M over the last four years. The Land Surveying Certificate offered through the Outreach School to professionals and students unable to study in Laramie provides an invaluable set of skills to our state's and nation's engineers.

- The Department of Computer Science recently started its Industrial Affiliates Program to better connect the students and faculty with the companies seeking to hire their students. The Department is working closely with the College of Education, Secondary Education department to offer a *computer education endorsement program*. This program will provide a path for high school teachers to become "endorsed" to teach computer science classes in Wyoming high schools. Faculty are working with faculty from Electrical & Computer Engineering telehealth issues.

- The Department of Electrical & Computer Engineering's biomedical instrumentation and robotics program, which received over $10M in external research funding in recent years, has already established a remote "telehealth" clinic which connects patients in Farson to Rock Springs, Laramie, and Cheyenne healthcare through the internet. One way to mitigate some problems associated with Wyoming healthcare is through robot helpers to assist patients. This

technology will have an estimated $800 billion dollar impact (U.S.). To help realize this potential, department personnel are teaming with computer science and kinesiology faculty. Current focus areas include statewide telehealth clinics, robotic physical rehabilitation, and advanced wheelchairs. Synchrophasors are used to improve the reliability of the electric grid, and the department has been on the leading edge of synchrophasor applications with over $2.7M in funding over the past decade. A comprehensive training in applied process control has recently been developed. This work has resulted in delivery of a new course in process control with treatments specific to the challenges faced by Wyoming industrial concerns. This new course augments a second course that the department has been offering for the past several years which trains students to operate the Programmable Logic Controllerss that are ubiquitous in Wyoming's mining and energy industry. This program prepares UW's students for employment opportunities in the state of Wyoming.

- The Department of Mechanical Engineering (which also offers a degree in Energy Systems Engineering) is responsible for $1.6M of annual research expenditures, garnered primarily from contracts with federal agencies. Firehole Composites (now owned by Autodesk) of Laramie, employing 15 mechanical engineers with high-tech composite materials analysis software and services, was a company spin-off based on research by ME Department faculty. The Department is the second most prominent financial partner in one of three national VLCoE centers (Vertical Lift Center of Excellence – i.e., helicopters) jointly funded by US Army, USN, USAF, Boeing, Bell, and Sikorsky. Other center participants include U. of Maryland, U. of Texas, Penn State, Georgia Tech, Ohio State, Iowa State, Rensselaer Polytechnic Institute, and U. of Michigan. The Wind Energy Research Center recently developed multiple reports for the Wyoming Infrastructure Authority that showed how utilization of WY's wind resource could result in marketable electrical power to CA and CO.

Benchmarking of Productivity

The goal of benchmarking is to ascertain the quality of our programs, facilitate comparisons with other institutions, and to provide a basis for self-improvement. A number of organizations conduct regular, authoritative assessments of colleges and universities. These include the National Research Council (NRC), the American Society of Engineering Education (ASEE), the Association of American Universities (AAU), the Carnegie Foundation for the Advancement of Teaching, and the Center for Measuring University Performance. CEAS performance in different tangents of our mission will be informed by such analyses.

CEAS Assessment and Benchmarking

To benchmark our performance at the college level, we elected to use the NRC methodology, as described in their report "*A Data-Based Assessment of Research-Doctorate Programs in the United States."* In their extensive evaluation of over 5000 doctoral programs, the National Research Council offers a discipline-based assessment of doctoral programs, which facilitates comparisons among programs and provides a basis for self-improvement.

Table 2 summarizes the performance metrics and program characteristics of the top quartile of each of the six disciplines offered in our College. It also provides some of our current 2013 metrics for each department. We are currently in the process of assembling complete data for this comparison.

The College of Engineering and Applied Science will have achieved Tier-1 status when its performance metrics (scaled appropriately by the college's size and mission) are comparable to those programs. Specifically, our goal is to achieve metric values within the range of performance (Low, High) for the top quartile of each of the six disciplines as indicated in Table 2.

These normed or per capita (per tenured faculty) comparisons are made on the assumption that normalizing by the number of faculty involved will account for variations in college size. For colleges of diverse size, such comparisons in some respects can be misleading. This is because the larger systems benefit from size synergies and suffer less from loss of research capacity of the faculty dedicated to instruction.

Table 3 below provides some CEAS operational data and performance metrics in comparison with a number of engineering colleges that appear in the top quartile of the 2011 NRC assessment. Most of the information was obtained from the American Society for Engineering Education (ASEE) 2012 Database. Note that while the ASEE data are for the academic year 2011-2012, the latest NRC assessment issued in 2010 and updated 2011 is based on 2006 data. The comparator colleges selected span the scale of operations seen across the nation. Specifically, University of Texas and Texas A&M represent the larger size institutions, and University of Arizona and University of Wisconsin are average size in the top quartile set.

The data indicate that our college is relatively small in size; and as such, it does not realize the inherent benefits of scale and synergy. For example, a program endowed with over 200 faculty members, over 1000 PhD students, and the commensurate facilities invariably has the capacity and the synergy to accommodate sizeable research programs and to build partnerships with national funding agencies. Consequently, the research expenditures per faculty are significantly larger.

Table 2. National Research Council 2011 Performance Characteristics for Top Quartile Programs

		Atmospheric Science				Chemical Engineering				Civil Engineering				Computer Science				Electrical Engineering				Mechanical Engineering			
		Entry Value				Entry Value				Entry Value				Entry Value				Entry Value				Entry Value			
	Ranking Range	Average	Lowest	Highest	UW-2013	Average	Lowest	Highest	UW-2013	Average	Lowest	Highest	UW-2013	Average	Lowest	Highest	UW-2013	Average	Lowest	Highest	UW-2013	Average	Lowest	Highest	UW-2013
	Regression Ranking 5th Percentile	4	1	7		10	1	27		10	1	19		12	1	25		13	2	31		15	1	27	
	Regression Ranking 95th Percentile	18	1	44		25	4	65		32	3	90		33	2	60		28	9	57		37	3	66	
	Performance Characteristics																								
1	Publications per Allocated Faculty	1.9	0.7	2.9		3.8	2.2	6.9		1.7	0.7	2.9		2.5	1.8	3.8		2.1	0.9	4.4		2.0	0.8	3.3	1.4
2	Cites per Publication	3.0	2.0	4.0		2.3	1.3	3.7		1.4	0.8	2.5		NA	NA	NA		1.4	0.8	2.4		1.2	0.8	2.0	
3	Percent Faculty with Grants	91%	82%	100%		92%	71%	100%		89%	78%	100%		84%	73%	100%		86%	86%	86%		86%	85%	85%	75%
4	Percent Faculty Interdisciplinary	26%	0%	58%		40%	0%	77%		31%	0%	70%		26%	0%	73%		36%	0%	70%		31%	0%	64%	
5	Percent Non-Asian Minority Faculty	5%	0%	14%		6%	0%	17%		7%	0%	17%		2%	0%	7%		3%	0%	7%		4%	0%	9%	
6	Percent Female Faculty	17%	8%	30%	0%	12%	4%	27%	11%	14%	3%	45%	20%	13%	5%	26%	11%	8%	0%	14%	14%	10%	4%	19%	0%
7	Awards per Allocated Faculty	83%	0%	238%		195%	4%	677%		66%	11%	155%		67%	0%	585%		64%	0%	359%		60%	0%	270%	
8	Average GRE	725	658	767	768	775	753	790	752	773	728	800	745	789	772	800	731	790	761	800	734	775	733	796	759
9	Percent 1st yr. Students with Full Support	94%	62%	100%		99%	85%	100%		76%	38%	100%		90%	52%	100%		73%	73%	74%		77%	76%	76%	88%
10	Percent 1st yr. Students with External Funding	15%	0%	50%		8%	0%	32%		6%	0%	33%		6%	0%	25%		9%	0%	25%		9%	0%	74%	
11	Percent Non-Asian Minority Students	7%	0%	14%	0%	7%	0%	40%	6%	11%	0%	40%	17%	7%	0%	21%	0%	11%	0%	40%	0%	10%	0%	25%	0%
12	Percent Female Students	45%	23%	67%	50%	29%	17%	52%	24%	26%	14%	45%	0%	19%	12%	25%	18%	15%	10%	21%	0%	13%	7%	24%	0%
13	Percent International Students	33%	7%	58%	67%	42%	0%	80%	65%	65%	0%	87%	83%	56%	0%	82%	73%	68%	44%	95%	63%	60%	40%	83%	62%
14	Average PhDs 2002 to 2006	7.1	1.6	23.6	1.0	13.2	6.6	25.0	1.0	13.4	3.4	31.2	0.8	15.0	5.2	30.8	0.2	28.9	4.6	74.4	1.8	15.4	1.6	41.8	0.6
15	Percent Completing within 6 Years	47%	15%	82%		63%	28%	86%		54%	31%	71%		28%	7%	52%		50%	50%	50%		51%	51%	51%	
16	Time to Degree Full and Part Time	5.70	4.67	6.3		5.0	3.3	5.8		4.9	3	6.3		5.8	4.4	7.3		5.1	4	6.3		4.9	3.8	6.3	
17	Percent Students in Academic Positions																								
18	Student Work Space	1	-1	1	1	1	-1	1	1	0	-1	1	1	1	-1	1	1	0	-1	1	1	0	-1	1	1
19	Health Insurance	1	-1	1	1	1	-1	1	1	1	-1	1	1	1	-1	1	1	1	-1	1	1	1	-1	1	1
20	Number of Student Activities Offered	17	15	18		17	13	18		16	9	18		17	15	18		17	14	18		16	12	18	

Table 3. College of Engineering Performance Metrics for AY 2011-2012

	University of Texas	Texas A&M University	University of Arizona	University of Wisconsin	University of Wyoming
Tenure/Tenure-track faculty	266	325	199	186	76
Total Undergrad student enrollment	5543	7628	4931	3812	1331
Student/Faculty member	20.8	23.5	24.8	20.5	17.5
% Female (undergraduate)	28	17	20	15	16
Total MS enrollment	669	1596	1628	621	134
MS/Faculty member	2.5	4.9	8.2	3.3	1.8
% Female (MS)	20	22	18	17	23
Total PhD enrollment	1519	1274	817	957	93
PhD/Faculty member	5.7	3.9	4.1	4.6	1.2
% Female (PhD)	20	19	24	17	17
Research Expenditures	$168 M	$274 M	$76.1 M	$103.1 M	$12.3M
Research Expenditure/Faculty Member	$634 K	$844 K	$382 K	$684 K	$162 K
Non-research budget	$179.5 M*	$50.6 M*	n.a.	n.a.	$11 M

* Not from ASEE Database, it was obtained by request

Appendix C

Details for
Enabling Programs and Activities

Aspiration 1: Excellence in Undergraduate Education

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Contents

Note:

Action numbering: each action is tagged with a unique identification number in the format:

Aspiration #. Major Area #. List#. Sublist # e.g., 2.1.3.1

Colored (green) and bold action descriptions are scheduled for significant progress during the first two years.

Overview:

- Outlined in this document is a series of actions to achieve our goals for excellence in undergraduate education. Two companion documents are also available upon request:
    - "Potential Future CSS Initiatives" – this document maps actions from this plan to additional staff requirements in the CEAS Center for Student Services.
    - "CEAS Recruiting Initiatives: How can we recruit 90-100 additional students in the short term" – this document provides short-, mid-, and long-term actions to increase student enrollment in the CEAS.

- Each proposed action has been provided an impact and a financial cost score. Initiatives are listed in order of anticipated impact.

- We will seek full budget support at the levels identified in this appendix once programs have been established and have proven their effectiveness.

- Budget figures provided in this appendix are for fully funded programs. In the first six years of the program we are requesting $350K per year.
    - $180K per year will be used to staff the CSS with three additional staff members to help implement the actions items.
    - The remaining $170K per year will be used to support the identified action items.

- Approximately $10M has been requested for the CEAS Scholars Program. It is a separate budget item.

1. Undergraduate Curriculum Development and Delivery

EIR Goal # 4 **UW will undertake major undergraduate curricular innovation to make use of all three pillars of engineering education (theory, experiment, computation) by infusing computational science into the core Engineering Science courses in the College of Engineering.**

EIR Goal # 9 **The opportunities to engage engineering and science alumni are multifaceted and UW would be well served to survey the landscape of various forms of alumni involvement with engineering schools. Armed with this information, the college will make a concerted effort to engage our alumni in activities designed to enhance the undergraduate experience.**

EIR Goal #11 **The college will strive to create an atmosphere that promotes industry collaboration on research and academic programs that are responsive to the most current technologies utilized today. We embrace the idea promoted by the Task Force of periodically conducting workshops with corporate CEO's and research vice presidents to keep the college connected to the most pressing challenges of the day.**

The fundamental mission of the institution is to maximize students' learning through excellent instruction and mentoring. The CEAS endeavors to continuously improve in this regard and to provide one of the nation's best undergraduate experiences.

Action 1.1.1 Enhance the freshmen- and sophomore-level course experiences of all students to kindle their creativity and interest in engineering and computer science programs. Offer more creative design opportunities involving open-ended problems, multidisciplinary group activities, independent research, and self-reflection. (Impact: High, Cost: Medium)

Action 1.1.2 Provide opportunities for juniors and seniors to serve as role models for younger students. For example, senior design students would serve as role models for younger students and also provide inspiration regarding later academic challenges as well as career options. (Impact: High, Cost: Low)

Action 1.1.3 **Expand upper division design coursework to include multidisciplinary activities with students from other colleges, especially business and health sciences. Broaden consideration by students of the nontechnical aspects of design: economics, marketing, social impacts, policy implications, regulatory issues. (Impact: High, Cost: Medium)**

Action 1.1.4 **Expand on the model used in Mechanical Engineering for senior design by establishing an industrial consortium in which corporations propose and fund projects for student design courses. Benefits include internships, sabbatical opportunities, collaborative development of intellectual property, international linkages, and opportunities for applied research. (Impact: High, Cost: Medium)**

Action 1.1.5 **Bring more practicing professionals from industry, consulting and government into the classroom as guest speakers and instructors. Recruit senior executives and technical experts for short- or long-term classroom service. The College's National Advisory Board (NAB) and departmental advisory boards can play a role here. (Impact: High, Cost: Low)**

Action 1.1.6 **Engage alumni in business and government leadership positions to participate in panel discussions and forums on emerging trends in professional practice and the associated marketplaces so that UW's programs continue to remain contemporary, preparing graduates for immediate success upon graduation. (Impact: High, Cost: Low)**

Action 1.1.7 Assure that the College's classrooms are using the same tools and techniques (computational tools, design group organization, communication methods) used in the discipline-specific professions. Industry, advisory boards, and UW colleagues outside the College will be included in the discussion. (Impact: Medium, Cost: High)

Action 1.1.8 **Review and evaluate the content and rigor of CEAS coursework at all levels to ensure that our programs are providing graduates with technical and communication skills at levels that exceed national norms. (Impact: Medium, Cost: Low)**

Action 1.1.9 Establish summer and sabbatical opportunities for faculty to work in industry, consulting, and government organizations to further their familiarity with industry practice. The NAB and departmental boards can help provide the necessary connections here as well. (Impact: Medium, Cost: Medium)

Action 1.1.10 Consider alternative delivery methods and implement as appropriate. These include distance and self-paced learning offered by UW and others as well as new approaches involving simulation and computational sciences. (Impact: Low, Cost: High)

Action 1.1.11 Stimulate students to think about the entrepreneurial opportunities that their degree programs and future careers offer. (Impact: Low, Cost: Low)

Action 1.1.12 Coordinate with UW's ECTL to study, synthesize and adapt advances in teaching methods and instructional technology specifically related to engineering and computer science education to enhance the teaching effectiveness and efficiency. (Impact: Low, Cost: Low)

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	Center for Student Services and individual departments	$585,000	• At least one class of students will have completed the enhanced curricula • All degree programs will maintain successful ABET reviews

2. Recruitment Program

EIR Goal # 2 **UW will aggressively pursue outstanding students throughout Wyoming and the nation through a combination of marketing and scholarships.**

EIR Goal # 14 **UW will develop a professional marketing plan to promote the engineering initiative to prospective students, citizens in the state, and our peer institutions across the nation.**

EIR Goal #15 **UW proposes to develop a one-semester engineering course for middle school students and a companion course for pre-service and in-service teachers involving college preparation and benefits of higher education, introduction to STEM fields, examples of "cool" engineering, the science and math behind engineering.**

The recruitment program will cultivate long-term prospects by targeting and developing interest among K-12 students in engineering and computer science education and careers. There should also be a concentrated marketing and scholarship effort that attracts Tier 1 high-school students to UW.

Action 1.2.1 **Hire and organize staff whose primary focus will be recruiting outstanding students. (Impact: High, Cost: High)**

Action 1.2.2 **Develop and implement a strategy to award the majority of the college's current and future scholarships held by the Foundation as four-year awards to new students, rather than the current allocation to existing students as a reward for performance. Include a plan for two-year awards for community college transfers. Retention of these scholarships would be contingent upon satisfactory performance on an annual basis. (Impact: High, Cost: High)**

Action 1.2.3 Expand the size of the college's endowed funds through a campaign targeting key employers and major corporations to establish named scholarships. (Impact: High, Cost: Medium)

Action 1.2.4 Develop a middle-school STEM-Mobile (van equipped with hands-on demonstrations) that can travel the state to raise awareness for the fun and important applications of engineering and computer science. Team with local engineers, employers and teachers to deliver the message. Seek out available demonstration kits to minimize development effort. Identify one part-time staff engineer, preferably female, to oversee this effort and to travel with the STEM-Mobile. (Impact: High, Cost: High)

Action 1.2.5 **Work with UW Marketing and a professional consulting firm to develop and deliver a strategic marketing plan to prospective students and their parents in the state and region. (Impact: High, Cost: High)**

Action 1.2.6 **Expand the *Exploring Engineering* program, a series of hands-on, modular outreach tools that can be used to introduce basic engineering and computer science concepts to regional K-12 students, modeled after recent efforts in the Department of Civil and Architectural Engineering. (Impact: High, Cost: Medium)**

Action 1.2.7 **Continue to promote MathCounts, which engages middle school students of all ability and interest levels in fun, challenging math programs in order to expand their interest in engineering and computer science careers. (Impact: High, Cost: Medium)**

Action 1.2.8 **Strengthen the College's relationships with Wyoming's community colleges and high schools through more active and frequent communication. Consider the possibility of an individual faculty liaison to each community college or school to develop relationships with faculty, students, and administration at the community colleges. (Impact: High, Cost: Medium)**

Action 1.2.9 **Hold high school contests in conjunction with CEAS contests for students – egg drop, robotics, etc., and actively promote to high schools. (Impact: Medium, Cost: Low)**

Action 1.2.10 **Reserve a small portion of the college's scholarship budget for award to promising students who do not qualify under current merit criteria. Additional criteria will need to be established to identify these alternative merit scholars, such as nontraditional students with relevant work experience, veterans reentering civilian life, late bloomers, etc., who might show promise but do not meet ACT, SAT or high school GPA targets. (Impact: Medium, Cost: Medium)**

Action 1.2.11 Expand the existing Science Posse model at UW to include more emphasis on engineering and computer science, distinguishing it from study and investigations in the basic sciences. (Impact: Low, Cost: High)

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	Center for Student Services and individual degree programs	$2,270,000	• Increase in average ACT scores for entering freshmen • Increase in number of National Merit and other superior freshmen

3. Retention Program

EIR Goal # 3 **UW will track the performance of Tier 1 scholarship students using metrics of GPA, freshmen to sophomore retention in engineering at UW, time to degree, job placement upon graduation, and employer/employee satisfaction after graduation.**

Many capable students enroll in UW's College of Engineering and Applied Sciences, but less than one-half will complete engineering or computer science degrees. We need to do a better job of attracting, retaining and cultivating students who have chosen UW, since far more than one-half are capable of successfully completing their degrees and having rewarding careers. The early loss of students from our programs results in lost time, opportunity and resources to all involved.

Action 1.3.1 Formulate a transitions program for community college transfer students, similar to that for incoming freshmen, to acquaint them with the campus, the curriculum, etc. (Impact: High, Cost: Medium)

Action 1.3.2 **Identify an individual responsible for continuing recent efforts to develop and collect data for characterizing the performance of our students while at UW and after graduation. One use of this data set will be to aide in understanding why some students struggle to succeed. (Impact: Medium, Cost: High)**

Action 1.3.3 **Consider a two-stage admission process to the CEAS. The first stage would be composed of "engineering ready" students who have demonstrated acceptable credentials and who are granted full admission to the CEAS. The second stage would consist of students who conventional measures suggest are not ready for engineering studies or who may need to take enrichment coursework. Students in the second stage will receive special mentoring and academic advising. This two-stage system will elevate the average skill sets across engineering classrooms and increase our national stature. (Impact: Low, Cost: High)**

- **Coordinate with UW's Synergy program and other initiatives intended to diagnose and assess the capabilities of students interested in engineering and computer science programs but not meeting conventional predictors of success (ACT scores, etc.). Establish individualized enrichment programs for at-risk students to identify academic, time management, discipline, and other personal areas that need reinforcement. An excellent mechanism for teaching and encouraging student success strategies will be available through UW's new freshmen seminar series to be implemented Fall 2015. Our program directed toward military veterans will be maintained and is consistent with the new programs.**
- **Identify faculty and staff particularly suited to provide informed advisement services to at-risk students through evaluation of performance metrics, personal histories, and interest surveys. Establish a mentoring program to support these students.**

Required Resources	Offices or Personnel in Charge	Estimated Supplementary Budget FY2015-FY2020	Major Milestones by 2020
	Center for Student Services	$340,000	• Enhanced retention approaching 60% persistence to degree

4. Co-curricular Programs

EIR Goal # 6 **UW's College of Engineering and Applied Science aspires to have 90% of its graduates complete at least one professional internship by the time of graduation. The college will actively partner with prospective employers to achieve this goal.**

EIR Goal # 7 **The college proposes to develop a unique relationship with its industry and agency partners by exploring opportunities to formally develop a required UW/industry/agency leadership program for all undergraduate engineering and computer science students.**

The CEAS will openly recognize the distinction between leaders and followers and, in so doing, will encourage all students to be scholars and leaders who aspire to distinguish themselves, their families, their alma mater, and their state. The breadth of educational opportunities for students extends well beyond the classroom to include participation in programs for leadership development, scholarly recognition, undergraduate research, internships, study abroad, service learning and national competitions.

Action 1.4.1 **Establish high-value scholarships for the most qualified students to engage them in research and leadership activities. (Impact: High, Cost: High)**

Action 1.4.2 **Establish an *Undergraduate Research Experience* program to incentivize faculty to include more undergraduate participation in their research programs. Such programs are a primary means of stimulating undergraduates to consider graduate school, develop personal relationships with UW faculty, and ultimately remain at UW for their graduate education. (Impact: High, Cost: High)**

Action 1.4.3 **Continue to develop relationships with regional and national employers to establish internship opportunities for undergraduate students. (Impact: High, Cost: Medium)**

Action 1.4.4 **Expand college support for study abroad opportunities both in English and in foreign languages. Provide staff support in the dean's office to develop and maintain study abroad relationships with partner universities. Coordination with the International Programs Office will be essential. (Impact: High, Cost: Medium)**

Action 1.4.5 **Formulate a leadership and "soft skills" development program for all students modeled after the Tau Beta Pi (i.e., the Engineering Honorary Society) *Engineering Futures* program. (Impact: High, Cost: Medium)**

Action 1.4.6 **Provide active incentives for students to participate in service learning activities through community service, development and application of assistive technologies, Engineers Without Borders, and other means. Staff support for these activities will also be required to keep the programs vibrant and current. (Impact: High, Cost: Medium)**

Action 1.4.7 **Actively promote competitive events such as the Ellbogen $30K Entrepreneurship Competition, ASCE concrete canoe and steel bridge, AICHE Chem-E-Car, ASME/FIRST Robotics and others as a means of heightening national visibility of our programs. (Impact: High, Cost: High)**

Action 1.4.8 Establish a leadership shadowing program in which students shadow senior executives in business and government organizations to observe visioning, strategic planning, and financial aspects of engineering and computer science careers. Interested students could participate in the shadowing program for a day or two or include it as a component of a longer technical internship experience. (Impact: Medium, Cost: High)

Action 1.4.9 Expand travel support, student chapters of professional societies to attend regional and national meetings and participate in the competitions held at those meetings. Provide funds to undergraduates to attend technical conferences, where they can present posters or papers on their undergraduate research. (Impact: Medium, Cost: Medium)

Action 1.4.10 Provide staff support to promising students in development of applications for national-level awards, fellowships, service organizations. (Impact: Medium, Cost: Medium)

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	Center for Student Services and individual degree programs	$13,188,000	• 100% participation in at least one co-curricular activity • 75% participation in at least two co-curricular activities

5. Student Professional Development

EIR Goal # 6 **UW's College of Engineering and Applied Science aspires to have 90% of its graduates complete a professional internship by the time of graduation. The college will actively partner with prospective employers to achieve this goal.**

EIR Goal # 8 **UW will develop a systematic approach to collect employment data of its engineering college graduates by initiating an aggressive survey in January of the preceding academic year's graduates.**

EIR Goal # 9 **The opportunities to engage engineering and science alumni are multifaceted and UW would be well served to survey the landscape of various forms of alumni involvement with engineering schools. Armed with this information, the college will make a concerted effort to engage our alumni in activities designed to enhance the undergraduate experience.**

Preparation of students for careers in engineering and computer science entails more than simply providing classroom instruction, and the CEAS endeavors to simultaneously prepare students for broader aspects of service to the profession. At the same time, UW requires the assistance of its alumni and friends to provide critical feedback and data that are essential to improving the educational experience and ensuring a good fit of graduates to industry needs.

Action 1.5.1 Aggressively engage students at all levels to participate more fully with the numerous student chapters of professional societies as a means for promoting interactions between students and industry professionals. (Impact: High, Cost: Medium)

Action 1.5.2 **Enhance communication with CEAS graduates through permanent email addresses. (Impact: High, Cost: Low)**

Action 1.5.3 **Develop a web portal specific to the college where students and graduates can post resumes and employers can post jobs and internships. A commercially available tool might be available for this task. (Impact: High, Cost: Medium)**

Action 1.5.4 **Develop an accurate alumni database through integration of separate databases developed by the College, the Alumni Association, the Registrar, and the Foundation. This comprehensive database will serve as a model for other colleges within the University and will also assist the Alumni Association, Registrar, and Foundation in accomplishing their respective missions. (Impact: High, Cost: Medium)**

Action 1.5.5 **Implement methods of capturing, archiving and updating employment data for graduating seniors and recent graduates. Coordinate efforts with the Alumni Association and UW Foundation to maintain an efficient and unambiguous line of communication. (Impact: High, Cost: Medium)**

Action 1.5.6 Engage graduating seniors with the importance of sustaining their relationship to the CEAS as a means for input to curricula and improved professional development of students that follow. Students need to be aware that their post-graduate relationship with the University should be one of give-and-take, which will enrich both entities

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	Center for Student Services and individual degree programs	$360,000	• 100% placement of graduates in professional positions or graduate school for those seeking a professional pathway.

6. Performance Tracking

EIR Goal # 3 **UW will track the performance of Tier 1 scholarship students using metrics of GPA, freshmen-to-sophomore retention in engineering at UW, time to degree, job placement upon graduation, and employer/employee satisfaction after graduation.**

EIR Goal # 5 **The college aspires to have a consistent pass-rate for the FE exam of at least 90%.**

EIR Goal # 8 **UW will develop a systematic approach to collect employment data of its engineering college graduates by initiating an aggressive survey in January of the preceding academic year's graduates.**

It will be important to all stakeholders for the CEAS to regularly review and publish its progress on the Engineering Initiative. As an essential component of any outcomes-assessment process, such reviews will facilitate inevitable mid-course adjustments to ensure that we remain on the best possible trajectory to accomplish our goals.

Action 1.6.1 **The college will continue to track the performance of its engineering students on the FE exam and use that nationwide measure of professional readiness as an element of its continuous improvement plan. An appropriate target for UW's "success differential" relative to national statistics will be established. The performance target will account for the changing nature of the FE exam content and administration methods. The move to computer based testing will likely require some adjustment period that will require special attention and monitoring. (Computer Science students are not eligible to take the FE exam and are excused from this requirement.) (Impact: High, Cost: Low)**

Action 1.6.2 **The CEAS Dean's Office will coordinate staff in departmental offices, UW's Career Services office, the Office of the Registrar, the Admissions Office and the Office of Institutional Analysis, and take responsibility for collecting, organizing and analyzing the various metrics (see the list that follows) associated with College performance. (Impact: High, Cost: Medium)**

Action 1.6.3 **Regularly share the results of the analyses and ensuing recommendations with faculty and staff in the College for consideration of changes, improvements, enhancements or termination of various initiatives as part of a continuous improvement plan. (Impact: High, Cost: Medium)**

Action 1.6.4 **Develop an annual "Report Card" review of metrics for public dissemination to document CEAS progress with the Engineering Initiative. This document will be useful to the promotional campaign discussed elsewhere. (Impact: High, Cost: Medium)**

Required Resources	Offices or Personnel in Charge	Estimated Supplementary Budget FY2015-FY2020	Major Milestones by 2020
	All College personnel	$200,000	• Continuation of a culture of continuous and aggressive improvement in all aspects of undergraduate education

7. Metrics of Success and Target Outcomes

Retention Rate

Most students who begin engineering and computer science degree programs do so out of interest and ambition in the fields. Unfortunately many of them lose that interest and ambition during their first year or two. The CEAS intends to implement proven methods of increasing retention so as to afford a larger proportion of our students the prospect of a rewarding educational experience. Current retention rates from freshmen to sophomore year (60%), freshmen to junior year (49%), and persistence to degree (41%) will be targeted for continual improvements until the persistence to degree rate reaches a goal of 60% by AY2020.

Time to Degree

The average time to degree is 4.9 years, but individual data is highly variable and highly dependent upon the vast array of interests and activities pursued by students. Minimizing time to degree is not an objective, since such a goal would detract from students' engagement in extra- and co-curricular activities. Nevertheless, degree programs in the college must offer students predictable rates of progress. Stability and predictability in time to degree is more important. The college will strive to structure its curricula and offer its courses in a manner that minimizes the "one extra semester" problem occasionally faced by students who get off track due to poor choices or performance (most common) or ineffective advising (quite rare).

Placement Rate in Employment or Graduate School

Engineering and computer science, as professional programs, seek to educate students such that, upon graduation, they are ready for placement in full-time employment or graduate school. By 2020, the college anticipates achieving 100% placement of its graduates within 12 months of graduation, for those who wish to pursue a career in the profession.

Employer Feedback

Feedback from employers and graduate program directors provides valuable qualitative evidence for program assessment and improvement. The essential questions are:

(a) Do UW graduates have the technical and nontechnical knowledge, skills and abilities required of their chosen professions?

(b) Do UW graduates demonstrate the professionalism and work ethic required of their professions?

(c) Are UW graduates prepared to become leaders in their professions?

Employer surveys to solicit answers to these and other questions will be implemented. Responses are expected to be dynamic as market conditions change, so a quantitative metric is not appropriate.

FE Success Rate

UW engineering students historically perform well above national averages within their disciplines, and we intend to maintain and enhance that high performance. An appropriate performance target must be established that accounts for UW's degree requirements (all engineering students must sit for the exam), the exam administration method (computer based testing begins in 2014), and the characteristics of the national population also taking the exam.

Number of National Scholars and Fellowships	Accomplishments of students entering our programs as well as those achieved while in our programs serve as important indicators of the college's stature relative to Tier 1 status. Statistics on national scholarships and fellowships (National Merit, Truman, Gates, Rhodes…) won by our students will be measured against those of our comparator institutions to track our progress toward Tier 1 status.
Number of Student Journal Publications and National Presentations	Undergraduate programs in engineering and computer science do not include any requirements for students to produce scholarship (new knowledge). Hence, production of scholarship by undergraduates is another strong indicator of quality for the degree programs and the student body itself.
Number of National Awards	National-level awards to individual students and student groups indicated engagement with and against the best universities in the country. Award-winning entries in competitions (design events, scholarship programs, etc.) raise the profile of the student body and the degree programs.
Participation Ratios	Co-curricular activities provide rich opportunities for academic and professional development of our student. Examples of such activities include study abroad, internships, undergraduate research, service learning. When students begin to bind classroom learning to laboratory or real-world experiences, their education flourishes. The college has a target participation rate of 100% in at least one of these activities and a target of 75% participation in two or more.

Appendix D

Details for Enabling Programs and Activities

for

World-Class Research and Graduate Education

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Contents

Note:

Action numbering: each action is tagged with a unique identification number in the format:

Aspiration #. Major Area #. List#. Sublist # e.g., 2.1.3.1

Colored (green) and bold action descriptions are scheduled for significant progress during the first two years.

1. Develop and Strengthen Niche Areas

EIR Goal # 1 **UW aspires to drive the College of Engineering and Applied Science into the top quartile of engineering rankings for graduate education.**

EIR Goal # 10 **UW should boldly develop the niche areas over the next decade, with the goal of achieving international prominence in each.**

EIR Goal #11 **The college will strive to create an atmosphere that promotes industry collaboration on research and academic programs that are responsive to the most current technologies utilized today. We embrace the idea promoted by the Task Force of periodically conducting workshops with corporate CEO's and research vice presidents to keep the college connected to the most pressing challenges of the day.**

EIR Goal #12 **We propose to ensure stability of graduate assistant researchers by adding 100 fellowships to the college.**

Tier I excellence can be achieved in selected niches by focusing substantial resources on areas of excellence for Wyoming. Together with the Task Force, we have identified potential areas of integration and growth within the selected niche areas and other areas of research that build on our existing capabilities. Here, coordinating efforts with colleagues across campus was essential. The identified niche areas are:

- Unconventional Reservoirs
- Advanced Energy Technologies and Energy Conversion and Delivery
- Computational Science and Engineering
- Atmospheric Sciences

Further, we will develop the following focus areas and help bring them to full fruition:

- Water Resources
- Biological and Biomedical Engineering

The first prong is the start-up and development of research clusters. The fastest way to initiate the development of strength in the desired niche areas is to provide resources to existing faculty in the College. Many existing faculty already have the research infrastructure (laboratory space, equipment, graduate students, etc.) in place and only need encouragement to apply their skills toward the niche areas. Therefore, to provide that encouragement, the College sent out in Fall 2013 a request for proposals (RFP) for the development of research clusters. The RFP had several key requirements:

- The proposed research must be interdisciplinary and include faculty from different programs and departments from across campus.
- The proposed research must indicate how it will become self-supporting with respect to funding within three to five years. The College's contribution is to kick-start research, not to continually support it.
- The proposed research should address one of the key niche areas, although outstanding ideas that show potential for the future development of other niche areas would also be considered.

The specific encouragement provided was the opportunity to receive funding to support a research cluster containing three to six interdisciplinary faculty members, with per-faculty support of one summer month support, one graduate assistantship, two undergraduate

engineering scholars, and 50% of a postdoctoral researcher. These funds would allow existing faculty to quickly start addressing key research areas.

Tangible progress, quantified through well-articulated metrics of excellence, requires a sustained effort over a 5-10 year period and beyond.

The expected benefits from the requested funding include (a) progress toward Tier-1 goals and minimizing the lag time associated with facility development, building completion, and laboratory development; and (b) the opportunity to complement existing technical skill sets of current faculty with strategic hires, who will help in developing the niche and other research areas as well as offer technical leadership.

Action 2.1.1 **The RFP attracted over 20 pre-proposals by December 4, 2013. These pre-proposals will be reviewed by the EIWG by the end of February 2014. The most promising pre-proposals will be selected for preparation of a full proposal with the goal of selecting three to six clusters to begin work July 1, 2014. A solicitation for new research clusters of interdisciplinary UW teams will be issued on a biennial basis.**

The second track in developing our niche areas is new faculty hires. Over the next few years, 25-30 new faculty members will be hired using the Engineering Initiative funds. The first new faculty members are anticipated to be in place by Fall 2015.

Our strong emphasis on the targeted research areas is also expected to result in collaboration with the industry and agencies. To foster momentum in this area, workshops in the niche areas will be conducted annually with private sector CEO's and research leadership.

Action 2.1.2 Along with the planned new Engineering Complex, we will:

1. **Build the critical mass in selected areas of research, thereby enriching and adding to our existing expertise**
2. **Develop core research facilities, infrastructure and staff to support the increased research level.**
3. **To achieve our aspirations, we plan to hire faculty members, who will:**
   - Target the niche research areas
   - Show excellent potential for attracting significant funding
   - Value undergraduate education and have the desire and potential to become excellent teachers
   - Share the value of collaborative research and teaching

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	CEAS Research Office	$23,374,250 (not including new personnel)	• Five productive niche areas of relevant scholarship and productive partnerships with industry for significant economic impact
	CEAS Dean's Office	$47,240,000	• The addition of new talent, including 25-30 new faculty members 3-4 scientists, and 15-20 postdocs

2. Diversify Funding Sources

EIR Goal # 16 **We will work with the UW Foundation to formalize plans for a fund raising effort devoted to an excellence endowment of $30-40M for engineering. This program may be a component of UW's next Capital Campaign.**

Discussion Note, we need to be innovative with the structure of endowments to include non-perpetual agreements whereby the corpus is drawn down over a periods of years with the funding to target specific initiatives.

State appropriations, externally sponsored programs, and private funds will provide the required resources for the Engineering Initiative. Ultimately, our goal is to enrich UW with ideas, talent, and resources to serve our mission effectively.

Action 2.2.1 We will:

1. Build alliances and partnerships with national labs and industry
2. **Seek large-scale corporate and federal sponsorship**
3. **Provide seed funding and incentives for creative research and collaboration**
4. **Promote a culture of interdisciplinary research and collaboration with scholars across the globe**
5. Organize seminars and discussion groups to generate research ideas and coordinate efforts.

Faculty members we will be viewed as true enterprise partners. Thus, our commitment to their success is unwavering.

Action 2.2.2 This commitment entails significant amount of mentoring, including:

1. Share instructional materials and teaching experiences
2. Implement a faculty development program to facilitate best practices in teaching, graduate mentoring, and grantsmanship
3. **Help faculty to network with potential funding sources**
4. Investigate and develop reward mechanisms for successful faculty
5. **Provide service to faculty in reviewing funding proposals prior to submission**

To maintain long-term sustainability, it is essential that diverse funding sources be available. Thus, increasing our endowment is essential in providing the college with critical funding to advance excellence on all fronts.

Increasing our endowment is essential in providing the college with critical funding to advance excellence on all fronts. Some examples of the use of these endowment funds include:

- Named professorships providing discretionary funding and salary for "star" faculty
- Providing funds for faculty to teach critical technologies at private sector sites
- Salary increases for retention for high-performing faculty
- Start-up funding augmentation for attracting new faculty ($300K-$500K per faculty member is typically necessary)
- Innovative alumni and outreach programs, e.g. instruction, professional development, etc.

Action 2.2.3 **A companion fund-raising plan will be developed to complement our state, industry, and external grant funding.**

Required Resources	Offices or Personnel in Charge	Estimated Supplementary Budget FY2015-FY2020	Major Milestones by 2020
	UW Foundation	Within Foundation's budget	• Raise $30 million in expandable programmatic funds within the next capital campaign, or two to three years. • Raise $10 million in capital funds per year to match state
	CEAS Research Office	$200,000 per year for office operations	• Significant increases in externally funded research based on returns from seed funding provided by the cluster model. The aim is to increase current research expenditure to $300 K per TT faculty or at least double it.

3. Excellence in Graduate Education

EIR Goal # 1 **The UW aspires to drive the College of Engineering and Applied Science into the top quartile of engineering rankings for graduate education.**

EIR Goal # 2 **UW will aggressively pursue outstanding students throughout Wyoming and the nation through a combination of marketing and scholarships. [marketing will be important for graduate programs]**

EIR Goal # 4 **UW will undertake major undergraduate [and graduate] curricular innovation to make use of all three pillars of engineering education (theory, experiment, computation) by infusing computational science into the core Engineering Science courses in the College of Engineering.**

EIR Goal #12 **We propose to ensure stability of graduate assistant researchers by adding 100 fellowships to the college.**

Graduate students are key players in both the research and teaching mission of the college. CEAS will implement new mechanisms to build our graduate programs and research. These mechanisms include funding graduate fellowships and promoting and funding startups for interdisciplinary research. Both will result in increasing external research awards. CEAS will push on all fronts to implement these mechanisms. Graduate research and education are tightly linked, so the plans described below to enhance our research programs will also greatly strengthen the graduation education enterprise.

When striving towards the EIR #1 Goal, it is important to recall that Governor Mead's original charge to his Task Force was to "fulfill the challenge of becoming a Tier-1 academic and research institution in areas of excellence for Wyoming."

Action 2.3.1 **Add a total of approximately 100 new PhD graduate fellowships in the period FY2015-FY2020. In FY2015-FY2016, 45 graduate assistants will be established. These fellowships will be awarded through research clusters by a competitive process as described more fully in the previous section. This process will ensure that the new students can be immediately engaged in active research programs and that their interests and skills match research needs.**

Action 2.3.2 Establish Cooperative Research Fellowships for doctoral students to supplement state support, and enhance interaction with outside organizations. Cooperative research fellows will study at UW and take time to also study and work in an external setting. Here *cooperative research environments* (CRE) might include: industry, federal and state agencies, foundations, national laboratories, research institutes, think tanks, consultants, international opportunities, and so forth. A cooperative arrangement may be made with any entity where research and development are conducted at a suitable level.

Action 2.3.3 **Conduct annual assessment of Ph.D. candidate's progress and productivity. Annual progress reports will be written by the student and evaluated by the Ph.D. dissertation committee, including an outside reader. Categories for assessment may include: coursework, internal presentations, conference presentations, refereed papers, development of skills (outside of coursework), etc. The Ph.D. process will be standardized, where possible, across all college programs. This may include: preliminary examinations, research proposals, annual assessments, final defense procedures, and requirements for external validation such as readers, published papers, etc.**

Action 2.3.4 Use of on-line courses, offered by top-tier universities. We will develop a process by which our graduate students could formalize alternative course offerings into their programs of study.

Action 2.3.5 Offer new graduate programs. Upon careful assessment of needs, we could offer:

- MS in Practice in Unconventional Resources (Engineering/Geoscience)
- MS in Practice in Process Development

Action 2.3.6 Offer College- and UW-wide Courses.

We will develop the plans for offering R&D and Systems Courses. This may include, for example, joint seminars and courses in research methods, optimization, stochastics, experimental design, neural networks, data mining and high performance computing.

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	All departments	$17,160,000	• 100 PhD fellows will be added • 30 Additional PhDs will be graduated per year

4. Enhanced Research Environment

EIR Goal # 1 **UW aspires to drive the College of Engineering and Applied Science into the top quartile of engineering rankings for graduate education.**

EIR Goal #10 **UW should boldly develop the niche areas over the next decade, with the goal of achieving international prominence in each.**

EIR Goal #12 **We propose to ensure stability of graduate assistant researchers by adding 100 fellowships to the college.**

EIR Goal #13 **The college of engineering can make significant advances toward Tier 1 status by recognizing entrepreneurial activity as a third leg of its mission combined with excellence in teaching and research.**

An enhanced research environment will be necessary to address all aspect of research and graduate programs support. The goals listed all support directly or indirectly Goal #1. A significant pool of graduate student talent is available from international schools, so national prominence is necessary. We will need to be aggressive on our Ph.D. assistantship offer and the 100 fellowships will be employed to this end. The CEAS' Research office will be directly involved with entrepreneurial activities and will need resources to advance those activities. Finally, market our graduate programs and research products, and opportunities is absolutely critical.

Action 2.4.1 **Expand the scope of the CEAS research office to offer effective administrative support in coordinating major research initiatives, proposal development, and assistance in grantsmanship.**

Action 2.4.2 Assemble a database for expertise and research specialization to facilitate effective interactions with industry and other external partners.

Action 2.4.5 **Help organize and staff on-campus conferences and works shops.**

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	CEAS Research Office	Within CEAS Research Office's budget	• Implement effective, supportive research administrative structure in the college and in the departments. • Add research support APs and staff. • Increase the scholarly contributions of our faculty to levels comparable to institutions with similar research funding levels. • Host several on-campus conferences/workshops per year

5. Create a Department of Petroleum Engineering

EIR Goal # 1 **The UW aspires to drive the College of Engineering and Applied Science into the top quartile of engineering rankings for graduate education.**

EIR Goal #7 **The college proposes to develop a unique relationship with its industry and agency partners by exploring opportunities to formally develop a required UW/industry/agency leadership program for all undergraduate engineering and computer science students.**

EIR Goal #10 **UW should boldly develop the niche areas over the next decade, with the goal of achieving international prominence in each.**

EIR Goal #11 **The College will strive to create an atmosphere that promotes industry collaboration on research and academic programs that are responsive to the most current technologies utilized today. We embrace the idea promoted by the Task Force of periodically conducting workshops with corporate CEO's and research vice presidents to keep the College connected to the most pressing challenges of the day.**

The programs in Petroleum Engineering (PETE) were reinstated in 2006 and now have over 300 undergraduate students and over 40 graduate students. Petroleum Engineering is currently housed within the Department of Chemical and Petroleum Engineering (CPE) along with the undergraduate and graduate programs in Chemical Engineering. This made sense in 2006 when Petroleum Engineering was just restarting. Now, where once existed conveniences and efficiencies from housing PETE within CPE, there instead exist grand opportunities for two separate departments. These opportunities include:

- Better, more innovative curricula for both programs that closely align with the needs of industry and the state and produce graduates that are exceptionally well equipped to contribute in their fields.
- A wider range of research specializations that also provides increased depth in key focus areas that will enhance economic development for the state.
- Improved faculty leadership of interdisciplinary research in four key niche areas: Unconventional reservoirs, advanced energy technologies and energy conversion and delivery, computational science, and biological and biomedical engineering.
- Enhanced external support for both programs, leading to improved sustainability in the event of future changes in the marketplace and the state's budget.
- Decreased undergraduate class sizes, especially in Petroleum Engineering.

A complete plan describing the creation of these two departments and the specific benefits that will arise has been prepared and is available separately upon request.

Action 2.5.1 **Beginning with this Engineering Initiative, includes hiring a department head for Petroleum Engineering and hiring joint faculty positions with the School of Energy Resources that closely align with the unconventional reservoirs and advanced conversion niche areas.**

Action 2.5.2 **Subsequently, additional faculty will be hired to further strengthen the programs in a manner consistent with the priorities of the Engineering Initiative.**

Required Resources	Offices or Personnel in Charge	Estimated Supplementary Budget FY2015-FY2020	Major Milestones by 2020
	CEAS Dean's Office	Captured within the budget identified for strengthening niches	• Two new departments with improved missions • Better integration with the School of Energy Resources and other departments working in energy • New faculty and staff to support increased depth in four niche areas • Significantly improved research productivity.

6. Undergraduate Research Scholarships and Marketing

EIR Goal # 2 **UW will aggressively pursue outstanding students throughout Wyoming and the nation through a combination of marketing and scholarships.**

EIR Goal #14 **UW will develop a professional marketing plan to promote the engineering initiative to prospective students, citizens in the state, and our peer institutions across the nation.**

Research activities impact both graduate and undergraduate educational experience in the classroom and in research labs, where we promote scholarship for all.

Action 2.6.1 **Create the Undergraduate Research Scholars program, where undergraduate students will be mentored by faculty within the research clusters.**

Action 2.6.2 Assist with assessment of course offerings and content to ensure alignment with target research areas.

	Offices or Personnel in Charge	Estimated Supplementary Budget FY2015-FY2020	Major Milestones by 2020
Required Resources	CEAS Student Services Office	$10,428,000	• 500 Undergraduate CEAS Scholars may be mentored with research and other opportunities

Appendix E

Details for Enabling Programs and Activities

Aspiration 3: Productive Outreach and Economic Development

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Contents

Note:

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Colored (green) and bold action descriptions are scheduled for significant progress during the first two years.

1. Enhanced Mechanisms for Collaboration with Industry

EIR Goal # 6 **UW's College of Engineering and Applied Science aspires to have 90% of its graduates complete at least one professional internship by the time of graduation. The college will actively partner with prospective employers to achieve this goal.**

EIR Goal # 7 **The college proposes to develop a unique relationship with its industry and agency partners by exploring opportunities to formally develop a required UW/industry/agency leadership program for all undergraduate engineering and computer science students.**

EIR Goal #8 **UW will develop a systematic approach to collect employment data of its engineering college graduates by initiating an aggressive survey in January of the preceding academic year's graduates.**

EIR Goal #11 **Industry input is a critical aspect of a successful roll-out of the various niche areas. Industry provides the college a valuable connection to the leading technologies being pursued while identifying challenges and research opportunities with a longer time horizon. The college will strive to create an atmosphere that promotes industry collaboration on research and academic programs that are responsive to the most current technologies utilized today. We embrace the idea promoted by the Task Force of periodically conducting workshops with corporate CEO's and research vice presidents to keep the college connected to the most pressing challenges of the day.**

CEAS will implement mechanisms to build relationships with potential employers and to enable productive collaborations with our industrial partners. Some of these mechanisms include: advisory boards (the CEAS National Advisory Board and Department Advisory Boards are examples that are already in place), industrial affiliates programs, collaborative research partnerships, invited talks by industrial experts, and establishing a Center for Technology Innovation, Transfer and Commercialization (CTITC) in collaboration with the College of Business. CEAS will commit required resources to achieve these goals.

Action 3.1.1 Build closer ties with industry by building the expertise of the CEAS National Advisory Board and Department Advisory boards as a foundation for strengthening industrial ties.

Action 3.1.2 Hire a full-time Commercialization Officer. The Commercialization Officer will help identify the needs and challenges facing business and establish opportunities in the college for internships, job placement, graduate research, consulting, and development of intellectual property. All resources presently provided by the Wyoming Business Council – Resource Network will be used(http://www.wyomingbusiness.org/resources). The commercialization officer will report to the CEAS Associate Dean for Research.

Action 3.1.3 Establish additional Industrial Affiliates programs in addition to the existing one in Computer Science. These will link a broader range of industrial partners with students and faculty for internships and employment. These programs and their yearly affiliates meetings provide a means to help the college and departments with curricular issues of interest our partners. Through partnerships, companies are preferentially introduced to Wyoming students and faculty, e.g. they become preferred presenters to recognized student organizations.

Action 3.1.4 Form and strengthen existing alliances with other universities, national labs and national centers, e.g. the NCAR Wyoming Supercomputing Center in Cheyenne.

Action 3.1.5 **Increase interaction with other colleges at UW to enhance opportunities for synergistic activities to enhance economic development. The Colleges of Business, Agriculture and Natural Resources, Arts and Sciences, and Health Sciences all include disciplines poised for collaboration with engineering that have significant economic development potential.**

Action 3.1.6 **Interact with the Wyoming Business Council to identify potential economic needs in Wyoming and to serve in an advisory capacity to the council.**

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	Program Coordinator	$500,000 (2 years)	• Formative implementation of the Engineering Initiative
	CEAS Commercialization Officer	$375,000	• An operational Center for Technology Innovation, Transfer and Commercialization
	CEAS Commercialization Officer & Department Heads	Included in CEAS Research Office budget	• Industrial affiliates programs established for all departments offering undergraduate degrees.

2. Student-Industry/Lab Interaction Program

EIR Goal # 6 **UW's College of Engineering and Applied Science aspires to have 90% of its graduates complete at least one professional internship by the time of graduation. The college will actively partner with prospective employers to achieve this goal.**

EIR Goal # 7 **The college proposes to develop a unique relationship with its industry and agency partners by exploring opportunities to formally develop a required UW/industry/agency leadership program for all undergraduate engineering and computer science students.**

EIR Goal #8 **UW will develop a systematic approach to collect employment data of its engineering college graduates by initiating an aggressive survey in January of the preceding academic year's graduates.**

Students benefit by early experiences with industrial partners and in national labs and centers. A goal of the Engineering Initiative is to facility these experiences throughout their careers at the University of Wyoming.

Action 3.2.1 **Engage students in significant projects with industry and national labs. Mechanisms include utilizing industrial affiliate partners to build portfolios of senior design projects and internships.**

Action 3.2.2 Provide business training opportunities for students.

Action 3.2.3 Enhance the business knowledge of faculty and students through seminars, workshops and short courses. Resources for this activity include resources available via the Wyoming Business Council – Resource Network will be used (http://www.wyomingbusiness.org/resources).

Action 3.2.4 **Increase industrial sponsorship of senior design projects. This model works well at other Universities[1] and provides students with experience working on real-world problems.**

Action 3.2.5 **Increase the number of student internships with industrial and corporate partners. This is a natural outcome of the industrial affiliates programs and of the efforts of the college student services center.**

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	Center for Student Services & Center for Technology Innovation, Transfer and Commercialization	Included in CSS budget	• Will have offered at least one yearly workshop (seminars or short course) on entrepreneurship and business topics for engineers and applied scientists.

[1] Industrial partners pay $40,000 per project to work on senior design projects with computer science students at Harvey Mudd College, for example.

3. Faculty-Industry Interaction Program

EIR Goal # 7 **The college proposes to develop a unique relationship with its industry and agency partners by exploring opportunities to formally develop a required UW/industry/agency leadership program for all undergraduate engineering and computer science students.**

EIR Goal #11 **Industry input is a critical aspect of a successful roll-out of the various niche areas. Industry provides the college a valuable connection to the leading technologies being pursued while identifying challenges and research opportunities with a longer time horizon. The college will strive to create an atmosphere that promotes industry collaboration on research and academic programs that are responsive to the most current technologies utilized today. We embrace the idea promoted by the Task Force of periodically conducting workshops with corporate CEO's and research vice presidents to keep the college connected to the most pressing challenges of the day.**

In many areas, industry is able to provide faculty access to current best professional practices. In other areas, faculties are able to provide research capabilities to industrial partners that they may not otherwise have access to. CEAS will explore new and innovative ways to enhance opportunities for faculty to interact with industry.

Action 3.3.1 Expand and develop internships for faculty to work in industry or at national labs. Industrial opportunities can be pursued with our industrial affiliate partners.

Action 3.3.2 Facilitate sponsorship and funding of faculty summer research visits and sabbaticals working onsite with industrial and corporate partners. One source is the National Science Foundation's Industrial Innovation Partnership program and the Industry & University Cooperative Research Program (I/UCRP).

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	CEAS Commercialization Officer & Departments	Included in CEAS Research Office budget	• Faculty sponsored visits and industrial collaborations will have increased by 20% over a base-line established in 2014.

4. Entrepreneurship Program

EIR Goal # 13 **The college of engineering can make significant advances toward Tier 1 status by recognizing entrepreneurial activity as a third leg of its mission combined with excellence in teaching and research.**

Build on the expertise of CEAS industrial partners, faculty already experienced with business start-up, and programs in the College of Business and the Wyoming Technology Business Center to mentor the next generation of entrepreneurs. Faculty and students will be encouraged to take advantage of existing entrepreneurship courses in the College of Business and new seminars and workshops that will be offered.

Action 3.4.1 **Aggressively develop intellectual property invented in the College and market it to potential industrial partners. This will be a primary function of the *Center for Technology Innovation, Transfer and Commercialization* (see section 3.1 above) and the UW Office of Research and Economic Development.**

Action 3.4.2 Stimulate the development start-up of companies motivated by intellectual property developed in the College by providing administrative and business support through the Center for Technology Innovation, Transfer and Commercialization and the Wyoming Technology Business Center.

Action 3.4.3 **Facilitate faculty and students to pursue Small Business Innovation Research (SBIR) grants and Small Business Technology Transfer (STTR) grants by providing administrative support for grant writing and by widely publicizing successes in this area.**

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	CEAS Dean's office Center for Technology Innovation, Transfer and Commercialization	- 0 -	• Increased participation by students in entrepreneurship courses by more than 50% over a base-line established in 2014.

5. Alumni Outreach Program

EIR Goal # 9 **The opportunities to engage engineering and science alumni are multifaceted and UW would be well served to survey the landscape of various forms of alumni involvement with engineering schools.**

CEAS alumni hold a wealth professional experience, and typically enthusiastic about opportunities to support CEAS, providing an invaluable resource that cannot go untapped.

Action 3.5.1 CEAS will work closely with the UW Alumni Association and NAB to develop ways to deepen ties with alumni.

Action 3.5.2 **Social media provides a powerful tool keeping in touch with alumni. CEAS already has a LinkedIn alumni group as do some departments. We will support development of , encouraging students to join upon graduation.**

Action 3.5.3 CEAS will investigate and implement best practices used by other engineering schools to tap alumni experience and resources.

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	Dean's office, Program Coordinator, Departments	- 0 -	• Tracking of at least 90% of the graduates from 2014 onward with significant increase in membership and interaction in social media groups (LinkedIn, Facebook.)

6. Required Resources

For CEAS to succeed in an aggressive expansion of efforts in economic development, industrial collaborations and outreach will require staff at both the college and the department level with significant incentives for faculty participation.

Action 3.6.1 CEAS will add staff at the level in the Dean's office devoted to economic development and outreach, including a Commercialization officer who will work with the Program Coordinator and the Associate Dean for Research.

Action 3.6.2 Each department will have at least one 1/2 time staff devoted to economic development and outreach to coordinate Industrial affiliates programs, cultivate relationships with companies and national labs and centers, coordinate internships and provide services to students and faculty involved in these activities.

Appendix F

Details for Enabling Programs and Activities

for

K-14 STEM Initiatives

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Contents

Note:

Action numbering: each action is tagged with a unique identification number in the format:
Aspiration #. Major Area #. List#. Sublist # e.g., 2.1.3.1

Colored (green) and bold action descriptions are scheduled for significant progress during the first two years.

Introduction

The College of Engineering and Applied Science has worked collaboratively for several decades with many agencies on campus to provide a pipeline of students interested in pursuing careers in STEM related (science, technology, engineering, and mathematics) and computer science fields. The goal of the K-14 initiatives is to enhance these ongoing efforts as appropriate. We have met with a group of K-16 STEM experts to discuss ongoing initiatives and how to best move forward. We have identified several areas to contribute to maximize impact:

- Middle School Engineering Exploration Program
- Teacher assistance and development with the Next Generation Science Standards (NGSS) and the Common Core State Standards—Mathematics (CCSS-M). These standards contain engineering design practices. http://www.nextgenscience.org/sites/ngss/files/Appendix%20I%20-%20Engineering%20Design%20in%20NGSS%20-%20FINAL_V2.pdf and http://edu.wyoming.gov/commoncore.aspx
- Onsite teacher support with mentoring and materials
- Onsite student development/outreach program employing undergraduate and graduate students to visit schools and provide hands on activities related to engineering and applied science
- Enhancement Programs for College freshmen and sophomores

All actions address goals No. 2 and No. 15.

EIR Goal #2 **UW will aggressively pursue outstanding students throughout Wyoming and the nation through a combination of marketing and scholarships.**

EIR Goal #15 **UW proposes to develop a one-semester engineering course for middle school students and a companion course for pre-service and in-service teachers involving college preparation and benefits of higher education, introduction to STEM fields, examples of "cool" engineering, the science and math behind engineering.**

1. Middle School Engineering Exploration Program with PLTW

Since development of this goal, CEAS faculty have investigated national level efforts in middle school exploration programs. Project Lead The Way (PLTW) is a United States non-profit organization that develops hands-on, project-based science, technology, engineering and math (STEM) curricula for use by elementary, middle, and high schools. PLTW also provides professional development training for teachers who instruct its courses (www.pltw.org).

Professor Dave Whitman attended the Wyoming PLTW Conference in November 2013.

There are three school districts in Wyoming that use the PLTW pre-engineering courses as part of their STEM foundation. PLTW is currently implemented, in Wyoming, at both the high school and middle school level. Nationally, PLTW is offering a program for elementary students starting in fall 2014.

Action 4.1.1 Develop a stronger working relationship between CEAS and Wyoming PLTW – Spring/Summer 2014

Action 4.1.2 Determine what benefits (college credit, scholarships, etc) CEAS may be to provide to graduates of PLTW programs in Wyoming - Spring/Summer 2014

Action 4.1.3 Work with Wyoming PLTW to expand the number of Wyoming school districts who have adopted PLTW as part of their STEM core – Spring 2015

Action 2.1.4 Develop the "Exploration of Engineering and Applied Science" extension course in AY14/15 with course pilot in AY 15/16.

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	CEAS Center for Student Services, Science and Math Teaching Center, and WY Project Lead the Way representatives.	$72,000	• Track PLTW participants through MS and HS. Determine if there is an higher matriculation rate to UW STEM programs than non-PLTW participating schools.

2. Teacher Assistance and Development with the Next Generation Science Standards (NGSS)

Workshops will be taught with faculty and graduate students from UW STEM and computer science disciplines. Workshops will emphasize the use of hands on exercises to assist teachers in incorporating NGSS into their curricula. CEAS will coordinate their efforts with the WY Education Coordinating Council (www.wp-16.org).

Action 4.2.1 **Workshop development Summer 2014. CEAS/SMTC will host teacher summer development workshops on the NGSS with the primary goals of:**

1. **developing inspiring, motivating, problem-based curricula that display how an engineer or scientist identifies and finds solutions (discovery-based) as opposed to the traditional presentation format**
2. **seamlessly integrating new curricula to the current workload such that teachers engage and use the materials.**

Action 4.2.2 **Conduct first workshop Summer 2015**

Required Resources	Offices or Personnel in Charge	Estimated Supplementary Budget FY2015-FY2020	Major Milestones by 2020
	CEAS Center for Student Services, Science and Math Teaching Center, Faculty and graduate students from UW STEM and computer science disciplines, WY Education Coordinating Council	$1.65M	• Obtain baseline data of students pursuing STEM and computer science majors (e.g. by WY HS). • Monitor increase by high school. Can changes be correlated with specific programs? • Develop an assessment plan to measure the effectiveness of the program.

3. Onsite Teacher Support

A series of regional workshops will be held at WY community colleges as a follow up to the summer workshops. Teachers will report on implementation progress and share best practices. UW STEM and computer science faculty and graduate students will provide workshops on additional methods. CEAS will coordinate their efforts with the "Lost in Transition" program (http://www.uwyo.edu/wsup/).

Action 4.3.1 Develop kits Fall 2014. The Joint Engineering Council and its constituent student professional societies will develop a series of demonstration kits on STEM and computer science related topics.

1. **Student society members will uses the kits to discuss engineering and computer science careers at elementary, middle, and high schools.**
2. **Students will attend workshops hosted by the College of Education prior to the visit to help students learn how to best communicate with different grade levels.**
3. **The student educators will be encouraged (travel expenses and small stipend) to visit their home schools. For example, the USAF Academy has used this technique for many decades to successfully spread the work on military careers. Students return to their home schools several days before a major holiday to give presentations.**

Action 4.3.2 **Deploy kits Spring 2015**

Action 4.3.3 Conduct follow up workshops AY15/16. A series of regional workshops will be held at WY community colleges as a follow up to the summer workshops. Teachers will report on implementation progress and share best practices.

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	CEAS Center for Student Services, Science and Math Teaching Center, Faculty and graduate students from UW STEM and computer science disciplines, Wyoming School-University Partnership	$250K	• Obtain baseline data of students pursuing STEM and computer science majors (e.g. by WY HS). • Monitor increase by high school. Can changes be correlated with specific programs? • Develop an assessment plan to measure the effectiveness of the program.

4. Onsite Student Development/Outreach Program

Demonstration kits will be developed to support the outreach program.

Action 4.4.1 **Develop kits Fall 2014. The Joint Engineering Council and its constituent student professional societies will develop a series of demonstration kits on STEM and computer science related topics.**

1. **Student society members will uses the kits to discuss engineering and computer science careers at elementary, middle, and high schools.**
2. **Students will attend workshops hosted by the College of Education prior to the visit to help students learn how to best communicate with different grade levels.**
3. **The student educators will be encouraged (travel expenses and small stipend) to visit their home schools. For example, the USAF Academy has used this technique for many decades to successfully spread the work on military careers. Students return to their home schools several days before a major holiday to give presentations.**

Action 4.4.2 **Deploy kits Spring 2015**

Required Resources	**Offices or Personnel in Charge**	**Estimated Supplementary Budget FY2015-FY2020**	**Major Milestones by 2020**
	Joint Engineering Council, Student professional societies, College of Education	$175K	• Obtain baseline data of students pursuing STEM and computer science majors (e.g. by WY HS). • Monitor increase by high school. Can changes be correlated with specific programs? • Develop an assessment plan to measure the effectiveness of the program.

5. Enhancement Programs for College Freshmen and Sophomores

CEAS will develop a series of enhancement programs to best prepare incoming freshman and sophomores for the rigors of engineering study.

Action 4.5.1 CEAS faculty and staff will work with UW staff to identify diagnostics to assess incoming freshmen (e.g. ACT scores, Compass math placement exam)

Action 4.5.2 **Baseline study of retention programs Summer 2014. CEAS faculty and staff will work with Math Department faculty and the Outreach School to develop math enhancement programs for incoming freshman. These programs will occur 4-6 weeks prior to the start of school and will be jointly offered at the ENZI STEM facility and via the Outreach School for maximum accessibility. The programs will provide instruction on math skill enhancement.**

Action 4.5.3 **CEAS faculty and staff will work with UW faculty and the Outreach School to develop enhancement programs for sophomores. These programs will be scheduled between the freshmen and sophomore summer and will be jointly offered at the ENZI STEM facility and via the Outreach School for maximum accessibility.**

Action 4.5.4 **CEAS will investigate current retention programs for effectiveness and work toward improving and enhancing these programs. Current CEAS retention programs include:**

- **Power Groups**
- **Probation Packets for students seeking reinstatement (contains list of services)**
- **Engineering Floors in the Residence Halls**
- **Scholarship assistance for continuing superior performance**
- **Tau Beta Pi tutoring**
- **ES 1000 (Introduction to Engineering) Design Exercise – expose students to design process and excitement of engineering career**
- **ES 1060 (Engineering Problem Solving) – introduced course to insure students had at least one engineering course during their freshman semesters**
- **EE 1010 (Introduction to Electrical Engineering) – give EE students a glimpse of what is waiting for them**

Required Resources	Offices or Personnel in Charge	Estimated Supplementary Budget FY2015-FY2020	Major Milestones by 2020
	CEAS, UW faculty, Outreach School	$50K	• Measure participation rates within freshman and sophomore enhancement programs. Is this completion rate of participating students higher that non-participating students with similar initial math skills

6. Projected Budget

The roll-up of estimated budget for the actions outline is shown below.

Description	Quantity	Year 1	Year 2
Middle School – Project Lead the Way/Extension Course			
Travel		2,000	5,000
Summer salary for UW faculty member		10,000	10,000
Teacher assistance, development Next Generation Science Standards (NGSS)			
One month summer salary STEM educators	6 @ $15K	90,000	90,000
graduate student support	2@ $25K	50,000	50,000
Travel and supplies		50,000	50,000
Onsite teachers workshop			175,000
Onsite Teacher Support			
Stipend and travel expenses for teachers to attend community college workshops	50@$1K		50,000
Stipend and travel expenses for UW faculty and graduate students to attend community college workshops	10@$1K		10,000
Workshop materials			2,500
Student Development/Outreach Program			
Materials to develop demonstration kits		10,000	10,000
Stipend and travel expenses for onsite visit	50@$500	25,000	25,000
Enhancement Programs for College freshmen and sophomores			
Development funds for enhanced/new retention programs		**10,000**	**10,000**
Total		**$247,000**	**$487,500**

Appendix G

Enabling Programs and Activities
for

Educating and Training a Diverse Workforce

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1. Increasing women and minority numbers in both student and faculty ranks

EIR Goal #2: UW will aggressively pursue outstanding students throughout Wyoming and the nation through a combination of marketing and scholarships.

EIR Goal # 14 UW will develop a professional marketing plan to promote the engineering initiative to prospective students, citizens in the state, and our peer institutions across the nation.

The College of Engineering and Applied Science subscribes to the University's broad definition of diversity, which encompasses varying geographic, intellectual, ethnic, cultural, academic, and social elements. Further, CEAS is committed to a global view of diversity, ensuring that our teaching and research is relevant to real-world problems, and our social composition includes a variety of voices, thoughts, ideas, and opinions.

As engineers and scientists, diversity is the key to our future success. In a 2006 study sponsored by National Research Council, the authors emphasize the 'national crisis in scientific and engineering talent cannot be resolved without educating more women and minorities'.

Addressing today's complex problems requires collaborative, interdisciplinary teams. Diversity in the workforce broadens the pool of life experience, and strengthens our ability to solve problems.

Action 5.1.1 Utilize new recruiting staff to focus increased recruiting effort on prospective women and minority students at all levels.

Action 5.1.2 Consider extraordinary recruiting tactics to improve hiring of women and minority faculty members who are important role models; e.g., ask President McGinity to phone top candidates. Similarly, engage women and minority faculty directly in the recruitment of underrepresented student groups, again through direct phone calls.

Action 5.1.3 Earmark an aggressively-large percentage of new undergraduate EI scholarships for women.

Action 5.1.4 Establish a mentoring program for female undergraduate students in CEAS.

Action 5.1.5 Develop a mentoring program for female graduate students in CEAS.

Action 5.1.6 Earmark new EI faculty positions for women.

Action 5.1.7 Provide recruitment incentives to new female faculty members (e.g., named positions, signing bonuses, summer salary, graduate fellowships).

Action 5.1.8 Develop an endowed professorship and/or a one-year visiting professorship that would be filled by a nationally recognized female engineer or scientist.

Action 5.1.9 Enhance funding support for the expansion of activities sponsored by *The CEAS Mentoring Resource*, a college-wide mentoring program that is available to all faculty, but whose focus is primarily on pre-tenure faculty members in the CEAS.

Action 5.1.10 Increase membership by women professionals on CEAS and departmental advisory boards.

Action 5.1.11 Provide desperately needed services for women faculty and students who also have family roles as mothers of young children. Primary among these services is affordable and conveniently located child care.

Action 5.1.12 Implement selected recommendations from the report: by the National Research Council: *Changing the Conversation: Messages for Improving Public Understanding of Engineering. Washington, DC: The National Academies Press, 2008.*

2. Middle school course development

EIR Goal #15 **UW proposes to develop a one-semester engineering course for middle school students and a companion course for pre-service and in-service teachers involving college preparation and benefits of higher education, introduction to STEM fields, examples of "cool" engineering, the science and math behind engineering.**

We intend to develop a pilot program whose long-term goal is increased engineering enrollments at UW, with an emphasis on increased women and minority representation among student ranks. In cooperation with two Wyoming school districts that are willing to work with us on this experiment, we will design and implement a required one-semester-long course targeted at *middle school* students. Approximately 75% of the course would be devoted to introducing students to the exciting careers available in engineering and computer science. The balance of the course material would address the benefits of higher education, strategies for preparing for college-level training, and application processes. A one-semester course that is championed by these forward-thinking school districts and taught by a talented engineering or applied science instructor could fire the imaginations of many students who would otherwise never hear the word "engineering" in their K-12 educations.

Action 5.2.1 Utilize EI resources to fund instructor(s) for the middle-school engineering course.

Action 5.2.2 UW recruitment staff will work with middle-school staff to track students after taking the course. Some metrics of interest will include student choices for high-school coursework, whether attending college, and whether pursuing engineering.

3. Enhance *the Engineers Without Borders (EWB) program*

EIR Goal # 3 **UW will track the performance of Tier 1 scholarship students using metrics of GPA, freshmen to sophomore retention in engineering at UW, time to degree, job placement upon graduation, and employer/employee satisfaction after graduation.**

The mission of UW's chapter of Engineers Without Borders is to help disadvantaged communities improve their quality of life through implementation of environmentally and economically sustainable engineering projects.

The student organization of EWB provides a proven avenue for engagement of women and underrepresented minorities in engineering. The opportunity to apply their engineering educations in service to the needs of developing communities, and to see their skills directly change and improve the lives of others is a strong incentive for women to pursue engineering degrees. The impact of the technology, rather than the technology itself, is the critical element.

Action 5.3.1 Identify a faculty member with interest, and incentivize appropriately, to play a significant role in expanding participation in the EWB chapter. As membership grows, it may be appropriate to consider multiple simultaneous projects.

Action 5.3.2 Incentivize students to participate in EWB, perhaps by offering elective course credit.

Action 5.3.3 Increase institutional financial support for the broad spectrum of service-learning opportunities available to students to reduce burden on students for fundraising, allowing them to focus on service and community interaction.

Action 5.4.3 Expand the spectrum of service-learning opportunities to include projects and partnerships that don't necessarily fit the EWB-USA model. Service to domestic communities (e.g., Native Americans on the Wind River Reservation), short-term service (e.g., participation of engineering students with the College of Health Science in construction of a health clinic in Honduras), and disaster relief (e.g., support for the victims of the Big Thompson River flood in September 2013). Additional financial support and mentorship will be needed.

Appendix 3

EPS2030 Committee Charge (President Seidel)

UNIVERSITY OF WYOMING

10/11/2022

To: Cameron Wright, Dean, College of Engineering and Physical Sciences, Co-Chair
Tom Peterson, Senior Strategic Advisor to the President for Science, Technology and Engineering, Co-chair
Bryan Shader, Department Head, Electrical Engineering and Computer Science
Ray Fertig, Associate Professor, Mechanical Engineering, Faculty Senate Executive Committee
Danny Dale, Associate Dean, College of Engineering and Physical Sciences
Holly Krutka, Executive Director, School of Energy Resources
Jing Zhou, Professor, Chemistry
Rita Meyer, CEO, Wyoming Energy Futures
Jeff French, Department Head, Atmospheric Science
Patrick Johnson, Department Head, Chemical and Biomedical Engineering
Debashis Dutta, Department Head, Chemistry
Anthony Denzer, Department Head, Civil and Architectural Engineering
Mark Clementz, Department Head, Geology and Geophysics
Jason Williford, Department Head, Mathematics and Statistics
Erica Belmont, Department Head, Mechanical and Energy Systems Engineering
Vamegh Rasouli, Department Head, Energy and Petroleum Engineering
Jinke Tang, Department Head, Physics and Astronomy
Gabrielle Allen, Director, School of Computing

From: Ed Seidel, President Ed Seidel

Re: Engineering and Physical Sciences 2030 (EPS2030) Executive Committee Charge

I am asking for the development of a plan, called "Engineering and Physical Sciences 2030" (EPS2030), that outlines the vision, identifies needs, and sets priorities for the College of Engineering and Physical Sciences over the next 8 years. Recommendations in the plan should be developed and brought to the President, Provost, and Vice President for Research and Economic Development, with a preliminary report by March 6, 2023, and a final report by May 5, 2023. Dean Cam Wright and Special Advisor Tom Peterson are charged with overseeing the development of the plan.

Background

Engineering and physical sciences together form a major driving force for innovation, advancement of knowledge, vibrant student degree programs, cutting-edge research, and economic development. Two key contributors to this area at the University of Wyoming are the Tier 1 Engineering Initiative and the Science Initiative.

The Tier-1 Engineering Initiative, conceived a decade ago, has made considerable progress since its inception, that includes a world-class petroleum engineering program, the Engineering

Education and Research Building, the High Bay research facility, increasing student enrollment (undergraduate and graduate), a very strong Student Success Center (that includes professional advising, career placement/services, internship coordination, K-14 outreach and state-wide programs, recruiting, marketing/communications, alumni relations), greatly increased Ph.D. production, and more. Likewise, the Science Initiative (SI) has made excellent strides with the opening of the state-of-the-art interdisciplinary Science Initiative Building, the Wyoming Research Scholars Program for undergraduate research internships, and Learning Actively Mentoring Program for faculty development in the classroom. Much of the original vision for Tier-1 and SI captured in supporting documents speak also to progress needed in areas such as computational science, materials science, fluid dynamics, biotech, environmental science, data science, and other areas.

Since that original vision, science and engineering at a national level have changed dramatically (e.g., more interdisciplinary, more focus on place-based research and innovation, and more importance on partnerships). UW has faced many changes in administration, multiple budget cuts, loss of experienced personnel, and changes in unit organization, some of which have created challenges to the vision of Tier 1 Engineering and the Science Initiative. But numerous developments aim to provide a platform and synergies to reimagine our programs going forward towards continuing progress to Tier-1 engineering, top quartile science, and more broadly, a path for ***Engineering and Physical Sciences 2030 (EPS2030)***. Among them are:

- The newly named Larry Carrell Deanship for the College of Engineering and Physical Sciences (CEPS), and a renewed commitment to fundraising for engineering and science by the UW Foundation, and President, and Provost.
- The move of Mathematics and Statistics, Physics & Astronomy, Chemistry, and Geology & Geophysics into the College, resulting in a new college name being the College of Engineering and Physical Sciences, which should create new scientific synergies that could enhance programs, for example, in materials science.
- A new School of Computing (SoC), incubated in the College of Engineering and Physical Sciences, as well as a new EECS department (a combination of the original departments of ECE and CS), providing opportunities to enhance computing and computational science in the new college.
- The Wyoming Innovation Partnership (WIP) that builds stronger bridges with Community Colleges across the state, supports partnership and entrepreneurship (through the Center for Entrepreneurship and Innovation) and provides additional R&D opportunities;
- A new Excellence Initiative and extended fundraising campaign is in the planning stages that will both work to support existing faculty to build the strongest programs they can, and to help attract and recruit new faculty to build on our strengths. This can help augment development of EPS2030 going forward, as new priorities are set.
- New federal funding opportunities represented by legislation such as the Chips and Science Act and the Inflation Reduction Act.

Charge

With such new developments and programs, it is time to consider how EPS2030 should be developed going forward. Numerous new possibilities are opened with the above considerations in mind. A non-exhaustive list of questions the plan should address is:

- What resources from both the University and State will be needed to both shore up the existing foundations of Engineering and Physical Sciences, and to build towards priorities set forth by the EPS2030 task force?
- What areas of excellence (both current and future) should be grown and enhanced, and what resources are needed to accomplish this?
- How should the original vision of Tier 1 evolve, given changes in the field, progress to date, changes in the College's personnel/resources, and the administration of UW? What worked well and how do we best tell that story? What did not work? What lessons can be learned from the past decade? What new opportunities are seen given the new developments described above? How does the Science Initiative come into play?
- How will the UW four pillars (more digital, more interdisciplinary, more entrepreneurial, more inclusive) be manifested in the new EPS2030 plans?
- What research areas might be strengthened in CEPS? What new opportunities for growth are seen for the new College of Engineering and Physical Sciences?
- What are the university resources (institutes, centers) and initiatives critical to achieving the EPS2030 vision and how should CEPS interact with these?
- What opportunities can be provided by enhancing partnerships with national labs, such as Sandia, Argonne, INL, and PNNL?
- How can our student programs be enhanced at both the graduate and undergraduate level, given the ability to leverage programs in collaboration with the CEI (including entrepreneurship and corporate partnerships), other colleges, and the School of Computing?
- What new funding opportunities from external agencies and companies may arise as a result of the proposed EPS2030 recommendations? How can the CEPS position itself to take advantage of federal focus on place-inspired research and innovation?
- How can we cultivate new revenue streams for staffing (faculty, staff, graduate students) outside of State support?
- How should we balance the desire for new programs or areas of emphasis with the need to rebuild the foundations of all departments?
- Given the current resources and the results of the program capacity/needs assessment, what is the vision for department sizes and mission within the college?
- What other topics should be considered and developed for an EPS2030 plan?

This charge is no small task, but the need is vital to the future the University of Wyoming. The committee's work will provide an important guide to allow the university and the college flourish.

Strategic Planning Working Group

I am also charging this Executive Committee with consolidating input from a much larger Strategic Planning Working Group, which will be comprised of a single faculty member representative from each department in the College of Engineering and Physical Sciences. Staff members from both college and departmental administration should also be nominated for membership on this Working Group, from which two will be recommended by this Executive Committee, and one or two outside (i.e., industry) members.

In total, the Strategic Planning Working Group will be comprised of approximately 14 members. They will meet regularly with the Executive Committee and coordinate directly with and be

responsible for soliciting input not only from their own department but from constituent entities as well.

I am copying each department head on this email as they will have the responsibility to select the faculty member to represent them on this Working Group, with the expectation that diversity in all dimensions be emphasized.

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Appendix 4

CEPS 2030 FINAL REPORT Guidance Document for the College of Engineering and Physical Sciences (CEPS 2030 Committee)

UNIVERSITY OF WYOMING
College of Engineering and Physical Sciences

WORKING FOR WYOMING & THE WORLD

Cameron H. G. Wright, Ph.D., P.E. | **Dean**
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Tel. 307.766.4992 | Fax 307.766.4444 | www.uwyo.edu/ceas

November 29, 2023

TO: President Ed Seidel
FROM: CEPS 2030 Executive Committee
SUBJ: Final Report, CEPS 2030 Planning Group

Sir,

Attached please find the final version of the primary strategic guidance document for the new College of Engineering and Physical Sciences.

As a preview, note that this Final Report is 110 pages long. However, page 4 is a short Introduction, and pages 5 to 7 constitute the Executive Summary that provides a brief synopsis of the individual department documents created by the larger CEPS 2030 Working Group. Pages 37 to 106 are the unedited input documents from each of the departments. The final section, beginning on page 107, is the input from the Susan McCormack Center for Student Success in CEPS, a vital nonacademic unit in CEPS.

This creation of this report consumed slightly over a year, much longer than we originally anticipated. However, it will be evident that each department took your mandate very seriously and made every effort to develop this into a guidance document that will serve the college for the next decade. Please note that this is not a Strategic Plan per se, but rather a guiding document for how the college can progress into the future, in such a way that the college best contributes to the state and to the institutional goals of the University of Wyoming, while providing a dynamic and vibrant environment for our students, staff, and faculty. Since it is important to know where an organization has been to know where it should be going, the report includes the recent history of the departments. To our knowledge, this is the only document that brings all this together in one place.

The reorganization into a College of Engineering and Physical Sciences, while not singularly unique, presents both unique opportunities and unique challenges. In this report, each department has taken on the task to frame the discussion based on

- the current departmental environment and how the department arrived at this point,
- an estimate of faculty and staff needs for the long-term viability of the program,
- a comparison of each department to peer institutions throughout the US;
- departmental aspirations with regard to advancement in research, teaching, service, student success, and diversity, equity and inclusion; and resources needed to reach these aspirational goals.

This report also discusses, from a broader college perspective, anticipated areas of opportunity and growth (for example in research), as well as recognizing the need to maintain our historical areas of strength.

On behalf of the CEPS 2030 Executive Committee, I submit this to you.

Respectfully,

Cameron H. G. Wright
Carrell Family Dean
Professor of Electrical and Computer Engineering

Atch: CEPS 2030 Final Report

CEPS 2030
FINAL REPORT
Guidance Document
for the
College of Engineering and Physical Sciences

EPS 2030 Working Group	EPS 2030 Executive Committee
Gabrielle Allen Megan Barber Vic Bershinsky Danny Dale Morteza Dejam Anthony Denzer (Chair) Debashish Dutta Ray Fertig Jeff French Cindy Jones John Oakey Cliff Riebe Bryan Shader Jason Williford Peter Wold	Danny Dale Ray Fertig Holly Krutka Rita Meyer Tom Peterson Bryan Shader Cam Wright Jing Zhou

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INTRODUCTION

On October 11, 2022, Pres. Seidel directed an Executive Committee, led by Dean Cameron Wright and assisted by presidential advisor Tom Peterson, to develop a guidance document for future directions in the new College of Engineering and Physical Sciences (CEPS). CEPS is an outgrowth of the reorganization analysis conducted throughout the university beginning in 2021. This new college structure brings together engineering departments with key physical sciences and mathematics departments with the expectation that teaching, research and service synergies can be better facilitated by such a structure.

Given the substantial change in the basic administrative structure of the college and the unique aspects of each department, the Executive Committee also stood up a much larger Working Group comprised of individuals representing every program and every element of the new college. This working group was directed to provide a specific, careful self-study of each department in the college, emphasizing strengths, weaknesses and future aspirations in each of the areas of teaching, research and service. In addition to describing how best each individual department can contribute to the overall college mission, each program was encouraged to define current as well as potential future ways in which collaborative efforts across multiple departments could be realized.

To that end, by mid-summer 2023, individual self-studies had been prepared for all departments by the working group and shared with the Executive Committee. While significant useful information was provided in those documents, most focused rather narrowly on potential contributions by a given department in the absence of any other departments in the college. That is, there was little emphasis placed on collaborations and synergy that could be brought to bear if faculty from multiple departments work together.

The Executive Committee of the CEPS2030 planning effort has taken the responsibility to assemble this Report. The most important parts of this document are the *individual departmental reports* prepared by faculty and staff within each department, under the guidance of their Working Group representative. Those individual reports begin on page 37 of this document.

In addition to the verbatim individual departmental reports, this report is comprised of (a) an EXECUTIVE SUMMARY, (b) an OVERVIEW section summarizing the key elements of the *individual* departmental reports, (c) potential CEPS departmental contributions to college-wide and university initiatives and (d) prospects for financial and community support of CEPS initiatives and their long-term viability, relevance and sustainability.

EXECUTIVE SUMMARY

This Executive Summary provides a high-level integrated perspective of the input from each department in the newly reorganized College of Engineering and Physical Sciences (CEPS). Every effort has been made to fairly and accurately represent the submittals from the departments in this Executive Summary, but the reader is urged to ***refer directly to the appropriate department chapter*** for more detail.

Beginning on page 37, individual department reports are provided verbatim. A section for the Susan McCormack Center for Student Success in the College of Engineering and Physical Sciences, a nonacademic unit vital to the college's mission, is the final section of this report.

As we in the College of Engineering and Physical Sciences look toward 2030, we see exciting challenges and opportunities. We will continue to lead in our traditional areas of strength, but also plan to expand and grow into new areas for which we are well positioned and that will help the state of Wyoming.

We in CEPS are acutely aware that this college encompasses the majority of the STEM disciplines that are both the foundation and the springboard for reaching most of the goals and objectives of the University and its stakeholders, to include achieving Carnegie R1 status. By virtue of this, the ability of the University to reach its goals is inextricably tied to the level of support provided to this college. If this college cannot thrive, the university as a whole will not thrive, and many needs of the state will not be met.

The plans for growth and greater achievements described in this report require sufficient faculty and staff, along with the facilities and equipment for them. The history described in the individual department reports, beginning on page 37, shows a decade-long trend of decreasing faculty and staff numbers that must be reversed. If, for example, Centralized Personnel Management (CPM) decisions are made that don't at least allow for filling vacant positions, resulting in a continued decrease of personnel, then the plans for growth and greater achievements of this college are unrealistic. Even with Tier-1 funding to cushion the decreased support of the state block grant (which is not what Tier-1 funding was ever intended for by the Legislature), the college would at best be patching holes, and that would not allow for growth and greater achievements.

Nearly every department in CEPS has shown, with substantiating data, a history of significant depletion of resources of all types (faculty, staff, graduate student and TA support) over a period of between 10 and 15 years. Most could correlate diminished research productivity and in some cases student enrollments with these declines.

Bluntly stated, the biggest challenge currently faced by the College is how to plan for strategic advancement and improvement of the college in the face of drastic budget reductions occurring for over a decade and continuing to this day. Not only have large reductions in faculty numbers been experienced in virtually every department, but faculty attrition continues to be an issue in

most departments. It is therefore difficult to generate the enthusiasm and optimism for strategic growth that the college desperately needs.

It is also true that never has it been more important for the college to define strategically how to prosper and improve in the face of desperate needs to simply plug gaping holes in the teaching and research capabilities of most departments.

An additional $5.5 million annually has been awarded to the base budget of the College through the Tier 1 Engineering Initiative. That's a significant amount of money, even after accounting for the fact that budget cuts over the last decade have more than equaled that sum. The Dean has presented a plan to add approximately 12 faculty members, 25 graduate assistants, and three additional staff support individuals, and estimate these additions would consume approximately $5 million. The President has requested allocation of a half million dollars from this additional Tier 1 money to the new School of Computing (SoC), with the caveat that this funding will support the engineering and physical sciences-related contributions of the SoC.

From its inception, the Tier-1 Engineering Initiative continues to focus on four strategic goals delineated by the Governor's Tier-1 Task Force:

- Excellence in Undergraduate Education:
- World-Class Research and Graduate Education
- Productive Economic Development
- K-14 STEM Education

Additionally, through the efforts of each department as expressed in their individual reports toward the end of this document, a number of interdisciplinary research areas have been identified as having potential for further growth and expansion. These areas include:

- Human Impacts on Environment and Climate Change
- Energy and Natural Resources
- Next Generation Computing: Cybersecurity, Artificial Intelligence, and Machine Learning
- Biochemistry, Biotechnology and Biomedicine
- Materials

Consistent with these broad themes, the college is already moving to align both hiring and research activity to invest for future growth in new areas of opportunity in which CEPS can be competitive, while maintaining our historical areas of strength that are still important to Wyoming. For example, in 2023 we are already making progress:

- New areas: Controlled Environment Agriculture, Quantum Computing, Materials, Cybersecurity/Blockchain/AI, etc.
- Traditionally strong areas: energy, electric power grid, transportation/construction, atmosphere/weather, mining/extraction engineering, process control, geophysics, chemistry, astrophysics, condensed matter, computational and applied mathematics, etc.

Furthermore, as described in the department-specific sections, CEPS has identified how activities within the College contribute directly to the four ***Pillars*** identified by UW:

- Digital
- Entrepreneurial
- Interdisciplinary
- Inclusive

So the question is: can a strategic approach be taken to add positions into departments in desperate need of faculty lines, but do so in a way that advances key specific research thrust areas? We believe the answer to that question is "Yes".

Approaches that will be used include:

- Implementing a multi-year phased hiring plan;
- Cluster hiring, which requires clearly identifying priority research areas and the discipline to recruit aggressively in these areas;
- Research-area-specific hiring with departmental allocations;
- Fundraising for endowed positions
- Target of Opportunity Hires

Conclusion

Given sufficient resources, the College of Engineering and Physical Sciences is well-positioned and ready to be the key driver to move UW forward toward achieving its institutional goals, to include achieving Carnegie R1 status. As we move forward toward the year 2030…

- …we will not lose focus on the primary mission: "…*to educate, motivate, and mentor the students who are entrusted to us*."
    - All our activities, whether research, teaching, or service, can and must have a direct link to that focus.
- …we will continue to graduate engineers and scientists for another century and more (the first UW engineering graduate was in 1897).

DEPARTMENT-SPECIFIC OVERVIEWS

HISTORICAL AND CURRENT DATA

In this section, we provide the briefest of summaries of the more detailed discussions on this topic found in the individual department's chapter.

Atmospheric Sciences (AS), a graduate program averaged 9 faculty from 2009-2016. Since then, AS has experienced a steady decline in the number of faculty, from a high of 9 in 2016 to a low of 5 in 2022. During this same period (2016-2022), the number of graduate students in the department has remained relatively constant, averaging 25.

Civil and Architectural Engineering and Construction Management offer three courses of study: Civil Engineering (CE), Architectural Engineering (ARE) and Construction Management (CM). Declines in ARE (since 2009) and CE (since 2019) are unwanted, but may be associated with the growth of CM. The CM program has grown faster than anticipated, and the trend line is not sustainable. There is an expectation that the growth rate will flatten. Additionally, the program also serves 73 Land Surveying students. CE and ARE faculty numbers remained steady at about 25 between 2005 and 2015, but have since dropped to about 20 in 2023, counting the positions associated with two searches-in-progress. The CM program currently has 5 faculty, and the overall departmental staff have gone from 5 to 2 in the past 8 years. Overall undergraduate enrollment has remained relatively constant from 2005-2023, but the distribution among CE, ARE and CM shifting away from CE and ARE and strongly towards CM. CM is rapidly growing and now constitutes the largest single program in the department, graduate or undergraduate.

Overall, the faculty has been productive by all measures. Metrics for the past five years show faculty on average teaching 4 courses per year, with about 300 student credit hours taught (per FTE faculty per year). Research productivity is evidenced by $125K in research expenditures, 4-5 journal papers, 3 conference presentations, 1-2 other publications and 2-3 graduate students supervised (per FTE faculty per year).

In 2016, two discrete departments were created from the original combined chemical and petroleum engineering department in order to allow for the independent growth and maturation of Chemical Engineering and Petroleum Engineering. The department of **Chemical and Biomedical Engineering (CBE)** is one of those two departments. For various reasons, while Petroleum Engineering has flourished, the vision to modernize Chemical Engineering has not materialized. CBE has fewer tenure stream faculty positions now than at any time since its creation as an independent department.

The **Energy and Petroleum Engineering (EPE)** department is the second department formed as a consequence of the Chemical Engineering/Petroleum Engineering split in 2016. The Department is currently comprised of 12 faculty, including 9 tenure-track professors, 1 ETT Instructional Professor, 1 annually appointed faculty and 2 Research Scientists. There are 56 graduate students.

The UW **Chemistry** department, as with most chemistry departments, educates a relatively small number of chemistry majors in comparison to the significant number of students taking chemistry as a part of their major. Over the period 2015 to 2023, TT faculty numbers have dropped from 16

to 10. Teaching faculty numbers have dropped from 5 to 4. The number for State-funded graduate assistants is about 15. Given that the general chemistry curriculum serves about 1400 UW students/year, over 115 lab sections associated with the courses are offered each year. The 15 GA slots are supplemented by an equal number of undergraduate TAs (not optimal) in order to cover this load. This has negative connotations for both educational and safety issues.

On July 2022, the department of **Electrical Engineering and Computer Science (EECS)** was formed by combining the Computer Science department and the Electrical and Computer Engineering department. EECS is home to three ABET accredited undergraduate programs (Computer Science, Computer Engineering, and Electrical Engineering), MS and PhD programs in Computer Science, and MS and PhD programs in Electrical Engineering. In addition, it has a bio-engineering option, and a cyber-security certificate at the undergraduate level. Comparing the faculty and student members in 2006 to 2022, we can say TT faculty decreased from 24 to 17, Instructors and Professors of Practice increased from 3 to 5, undergraduate students increased from 300 to 380, with a strong shift towards Computer Science, and graduate students remained constant at about 70, with a strong shift towards the PhD in Computer Science.

After recent retirements within the **Geology and Geophysics (G&G)** Department and the recent loss of four assistant professors, including two who left for more stable positions in the wake of recent turmoil at the University, teaching faculty is at a historic low. An additional five G&G faculty members are set to retire, two at the end of 22-23 AY and another three by the end of the 23–24 AY. While some of the research focus of G&G has evolved toward Earth Science, the department must also maintain its historical links to the energy and mining industries.

Like the Chemistry department, the **Mathematics and Statistics** department is a core discipline that also supports many of the programs on campus. Their undergraduate mission is two-fold: to provide a solid foundation in mathematics and statistics for all students and prepare math majors for graduate school and industry. Since 2015 the department has seen a precipitous drop in faculty in all categories: from 23 Tenured/Tenure track Mathematicians to 15; from 7 Tenured/Tenure track Statisticians (two of which were on administrative leave from the Dept) to 3; from 5 Math Lecturers and 1 Stat lecturer to 6 Math Lecturers and 2 Stat lecturers. The department offers two bachelor's programs and two master's programs in Mathematics and Statistics, a PhD program in Mathematics, and frequently teaches more than 20,000 SCH each year. As a foundational department that serves many programs on campus as well as its own, the current staffing is unsustainable.

Significant changes have occurred historically in the number of T/TT faculty in **Mechanical and Energy Systems Engineering (MESE)**. From 2011-2015 the number of T/TT faculty in the department fluctuated between 12 and 13 with between two and four part-time instructional faculty. During this same period, undergraduate students rose from 300-425 and graduate students fluctuated from 38 to 52, with the proportion of PhD students increasing to about the even split that it is today.

After 2015 faculty numbers began declining because lines were not returned to the department when TT faculty retired, resigned, or were denied tenure. Correspondingly, graduate student numbers in ME began declining, as would be expected. This decline was magnified by the

significant decrease in available GTA positions both from the college as TAs and from the State in the form of Energy GAs.

Today, five TT faculty (a decline of about 60% from the nominal average in the years from 2011-2015) and three full-time instructional faculty represent the MESE program.

Currently, the **Physics and Astronomy (P&A)** department is comprised of 10 T/TT faculty, five focused on Physics and 5 on Astronomy. From a low of 2 graduate students and 17 undergraduate majors circa 2000 (following a moratorium that was placed on their graduate program in the late 1990s), the program has nicely rebounded to a current student population of ~80 undergraduate majors and 40 graduate students. Grantsmanship on a per capita basis was, for the past several years, near or at the top of the A&S College.

LONG TERM NEEDS FOR BASIC VIABILITY

This section focuses on what each department feels are the long-term needs to maintain a *basic teaching and research program.* In a later section, estimates of resources needed to achieve *aspirational objectives* will be presented.

Atmospheric Sciences require 8 TT/T faculty for a viable long-term program, and 1.5 state funded staff to cover both technical and administrative support. Currently, all support in the department is provided through soft funds.

In **CBE,** the core undergraduate curriculum consists of 45 credits and the graduate core curriculum 14 credits. All core classes are taught only once per year. The minors require 15 elective credits per year to sustain an alternating year cycle. The Engineering Science curriculum contribution requires the teaching of 6 additional credits. These obligations represent our absolute baseline teaching load and were used to calculate our minimum annual teaching need despite not including many elective offerings.

At this point in time **Chemistry** faculty losses have resulted in coverage gaps in one or more of the four basic chemistry subdisciplines (organic, inorganic, physical, and analytical chemistry). Even the smallest programs in Chemistry across the United States, independent of their research contributions, average 15 TT faculty and have state GA support for about twice the number students supported by UW.

Faculty losses in **EECS** have limited multiple course offerings per year, as well as offerings of electives. Decreased GA support for teaching has limited the availability of hands-on courses such as laboratories, which once again limits the breadth of the educational experience. Long-term viability requires 25 TT faculty, and 8 lecturers, the latter required to support the department's increasing teaching missions. Also needed is a Computer Support Specialist to provide technical expertise for the new department, and to liaise with UW Information Technology. Finally, an average of 1.0 GTA per faculty member is needed to keep class lab sections small.

It is the opinion of the **EPE** department that an additional 5 full-time faculty are needed to bring the total number of faculty in the Department to 17. The reasonableness of this will depend on enrollment, which has been trending down.

The **G&G** Dept believes they need approximately 28 faculty members to perform their mission.

The **Mathematics and Statistics** program strongly believes that baseline support for a viable Math and Statistics program requires the addition of 2 faculty in Mathematics and 2 in Statistics, and an assurance that future vacancies can be filled to maintain that level of faculty support.

Looking at all considerations for offering a stable undergraduate and graduate **MESE** program, with both required and elective courses and a mix of MS and PhD graduate students, a minimum of 16 T/TT faculty are required. As will be seen in the next section, by any comparison, UW is singularly unique in the inadequacy of support provided to Mechanical Engineering.

PEER COMPARISONS

While an overall set of peer institutions was defined and data pulled from various sources [primarily the ASEE (American Association for Engineering Education) and ACS (American Chemical Society)], this summary table presents only a sampling of the peer comparisons detailed in each departmental report.

The ACS data collected for chemistry categorizes departments nationally as “small, medium and large” based on the size of the PhD program. The **Chemistry** section in this report has a detailed comparison table, but overall, the UW department is small in terms of research faculty and PhD student numbers, but externally supports twice the number of PhD students with external funds as the typical “small” department.

Department	Departmental Statistics	Selected Peer Inst.	Comments, Characteristics of Peers
Atmospheric Sciences	5 faculty 25 grad students	CSU, Utah, Arizona	15-18 faculty 40-80 grad students
Civil and Architectural Engineering and Construction Management	19 TT faculty 5 Instructional faculty 370 UG students 60 grad students	Varies for CE, ARE and CM: Aspirational includes Utah State and Kansas State	USU: 320 CE UGs, 36 faculty KSU: 440 ARE+CM students, 17 faculty
Chemical and Biomedical Engineering	8 TT faculty 1 Instr. Faculty 120 UG students 25 Grad students	CSU, NMSU, UNM, UND	120-475 UG 7-16 faculty
Chemistry	10 TT faculty 4 Instr Faculty 35 PhD students	See text, above	See text, above
Electrical Engineering and Computer Science	17 TT faculty 5 Instr. Faculty 380 UG students 70 grad students	CSU, NDSU, NMSU	School:TTF,IF,UG,G CSU:41,11,1250, 650 NDSU:27,4,600,70 NMSU:33,4,650,235
Energy and Petroleum Engineering	12 faculty 56 grad students	12 programs incl. Texas, TAM, USC, PSU, CSM, Tulsa, TexTech	Faculty sizes range from 6 to 35.
Geology and Geophysics	21 TT faculty 5 research scientists 92 UG students 59 grad students	13 programs incl. Wisconsin, Minnesota, CSM, Oregon, Florida, North Carolina	Faculty sizes range from 10 to 26.
Mathematics and Statistics	18 TT faculty 8 Instr faculty 27 grad students	CSU, IowaSt, Delaware, Idaho	UW educational responsibilities significantly higher even when accounting for institution size
Mechanical and Energy Engineering	5 TT faculty 2 Instr faculty 325 UGs 27 grad students	CSU, NMSU, NDSU	School:TTF,IF,UG,G CSU: 26, 11, 219, 96 NMSU: 14, 1, 336, 42 NDSU: 19,1,646, 24
Physics and Astronomy	10 TT faculty 2 Instr faculty 80 UG students 41 grad students	CSU,NDSU,UNR, MontanaSt,NMSU	TTF 19, 9, 15, 20, 11

ASPIRATIONS

RESEARCH

It is the **Atmospheric Science** department's strategic vision to advance UW's international recognition for the use of advanced observations [aircraft, mobile air quality labs] and high-performance computing to address grand challenges in climate, high-impact weather, water availability, and air quality. Realizing greater interdisciplinarity leads to more impactful research that can be more responsive to state and national needs, Atmospheric Science has significantly expanded their partnerships. For example, they are active in the NSF EPSCOR WyACT (Wyoming Anticipating Climate Transitions) in which the department is partnering with several other units as part of the Lab for Regional Earth System Modeling (LRESM) and partnership building with the School of Computing both through joint appointments and adjunct faculty appointments.

Ultimately, their aspirations are to better align with UW's four pillars of academic success (digital, entrepreneurial, interdisciplinary and inclusive).

Research in the **CAECM** department is driven primarily by faculty "acting independently" according to their report. However, specific individual faculty are enthusiastic about participating in larger UW initiatives including the School of Computing and proposals addressing the CHIPS and Science Act.

Research aspirations in **CBE** capitalize on the integration of current strengths in the department to address new and interdisciplinary problems. Their ambitious intent is to utilize current active research programs in biomaterials and tissue engineering, carbon-based materials, gas and liquid separations, energy conversion and storage, and transport in porous media to seek support for a large-scale center of excellence. To date, no such interdisciplinary center has been established at UW, and success in such endeavors can be institutionally transformational.

The **Chemistry** faculty aspires to develop a graduate and research program in Biochemistry to grow their doctoral student and research grant numbers. To date, the department has had very limited success in attracting research grants from the NIH and the biological programs in NSF, DOE and DoD, restricting the expansion of our graduate program. The plan is to focus future CPM requests in this area.

The **EECS** proposes to achieve a research program that is nationally and internationally competitive and relevant to the state by focusing on a few specific areas that have significant anticipated funding growth and economically disruptive technologies. Those areas are (a) modern power grid data analysis and modeling, (b) artificial intelligence/machine learning/QISE, (c) visual and interactive computing and (d) cybersecurity and the internet-of-things.

The **EPE** faculty want to expand on their strengths in porous media and the use of the high bay facility into other areas such as data analytics and blockchain technology, and alternative energy technologies such as hydrogen storage and geothermal energy.

The **G&G** Dept would like to continue expanding into earth science research methods, which are going beyond field work and are increasingly using sophisticated instruments, analytical methods, and remote sensing that involve large data sets and computational modeling. They also wish to maintain their strength in energy geosciences and management, including strong collaborations with the National Labs via Department of Energy funding.

The only specific research program called out in the **Mathematics and Statistics** report is the planned initiation of a new PhD program in Data Science.

The **MESE** faculty have identified specific research areas, built around existing strengths and areas for future hire, for emphasis. They are materials science/solid mechanics (with funding opportunities through the Materials Genome Initiative and the NASA Strategic Plan 2022), fluid dynamics/aerodynamics and energy conversion.

The **Physics & Astronomy** department is poised to build on its recent successes in the fertile fields of astronomical data sciences and quantum materials and devices. Additional faculty hires are intended to focus on underrepresented candidates with expertise in mining data from large telescopes/surveys, computational astrobiology, and numerical astrophysics/cosmology. The department also envisions two more faculty hires in quantum physics that build upon recent successes in areas crucial to U.S. strategic initiatives in quantum information science.

In the detailed **Physics and Astronomy** chapter, the department presents a number of examples where the department could collaborate with other units within and outside CEPS for the advancement of exciting research initiatives. Included in those ideas are projects specifically focused on campus initiatives.

TEACHING

The **CAECM** department is committed to continuing to deliver strong undergraduate programs in CE, ARE and CM. Both CE and ARE programs have capacity for growth.

The next initiative in **CBE** is to coalesce Materials Science and Engineering research into a formal minor that will be made available to undergraduate students across engineering and physical sciences disciplines. Rather uniquely, CBE has created three internally offered minors, and all are potentially lab-intensive.

The undergraduate **Chemistry** program is required to offer a course in Biochemistry to maintain ACS accreditation. The American Society of Biochemistry and Molecular Biology recommends that the threshold for a Biochemistry program (both undergraduate and graduate research) is about 4 contributing faculty members, and hence this will be a focus of future CPM requests.

Electrical Engineering and Computer Science prides itself in offering a curriculum that bridges the gap between theory and practice, creating an environment in which students can develop the requisite skills demanded by the best employers. Faculty are committed to incorporating best

practices for learning (e.g., active and project-based learning). Approximately 1/5th of our undergraduate students are involved in department research labs. A long-term goal is to give all students access to internship or externship opportunities.

The **EPE** department will develop and teach courses related to Energy Engineering that fall within the faculty's areas of expertise. Geothermal Energy, Subsurface Energy Storage, Hydrogen Storage and CO_2 Sequestration are examples.

The **G&G** Department want to teach courses that span earth science (using an "Earth systems" approach) as well as topics important to the energy and mining industries.

With additional faculty, the **Mathematics and Statistics** department would like to develop new courses to include, but not limited to convex optimization, data science, linear and nonlinear programming, discrete modelling, numerical linear algebra, the mathematics of cryptography, information and coding theory, and Fourier and wavelet analysis.

New opportunities in cutting-edge classroom instruction training for CEPS faculty have arisen since the recent reorganization of UW. Before the reorganization, the Science Initiative-funded Learning Actively Mentoring Program (LAMP) was naturally focused on training science faculty from within the previous iterations of the College of Arts & Sciences and the College of Agriculture. But since the reorganization, a new focus has been placed on recruiting faculty more broadly across campus, and with a special emphasis on new faculty from CEPS. In 2023 alone, 11 of the 33 LAMP Faculty Fellows were from CEPS. Though many faculty from Math/Geology/Chemistry/Physics have been involved in LAMP over the years, only a total of three engineering faculty were previously LAMP Fellows.

SERVICE

The Land Surveying Program in the **CAECM** department is a model outreach program, as are workforce training programs in CM done in collaboration with WYODOT. Other continuing education programs are possible.

An online class for **Chemistry** non-majors has been developed and offered, and the department envisions offering several online chemistry and biochemistry classes. The Chemistry faculty participates in outreach activities to K-12 students and general public through programs including Wyoming State Science Fair, Women in STEM and summer farmer market. The Chemistry faculty takes a key role in the Wyoming Section of American Chemical Society.

Electrical Engineering and Computer Science aspires to serve the State of Wyoming through corporate partnerships, K-12 educational activities, and creating pipelines towards meaningful careers for Wyoming students. This will continue to be done through Engineering Summer Programs for Kids, Engineering Summer Programs for Teachers, and summer camps on computing (e.g., The Art and Craft of Science and cyber-security).

A major component of **G&G**'s service and outreach is provided by its extensive materials characterization laboratories, its nationally-recognized field geophysics facility, as well as the Geological Museum and its collections, which are extensive and highly significant scientifically.

The **Mathematics and Statistics** department aspires to engage more with middle and high schools in Wyoming to provide a greater awareness of the breadth and utility of mathematical and statistical thinking.

The planetarium operated by **Physics & Astronomy** hosts over 7000 visitors each year. Three major summer-time outreach efforts are Astro Camp, Teton STEM Academy, and Launchpad. These week-long programs respectively welcome 26 middle school students, 24 high school students, and 10-20 experienced and/or aspiring science fiction writers to campus.

STUDENT SUCCESS

A **CAECM** aspiration to improve student success is to offer some courses each semester rather than once a year. This is particularly important for the CM program, to have class sizes suitable for project-based instruction. Professional opportunities for **CBE** graduates are incredibly diverse and making those students aware of these opportunities is crucial. To this end, CBE will work closely with the Susan McCormack Student Success Center to help project a modern perspective of Chemical and Biomedical Engineering to incoming Freshmen and articulate their future career opportunities. Many faculty in **CBE** are deeply invested in providing experiential course offerings to its students. They have just launched their first cohort of students in a co-op program. Undergraduate research experiences and international studies are part of their student success aspirations as well.

The **Chemistry** program touches a large fraction of the entire UW student body, primarily through lower division chemistry requirements. While freshman and sophomore level chemistry courses have state-of-the-art laboratory facilities, the junior and senior level laboratories were never renovated and still rely on several outdated instruments that put students at a disadvantage in the real world.

EECS is committed to the success of its graduates and offers a wide range of tutorial services and value-added extracurricular activities through over a half-dozen research labs that currently employ nearly100 students. Given appropriate resources, they aspire to double that number by 2030.

The undergraduate degree program in **G&G** offers pre-professional degrees designed to prepare students either for continued study in graduate school or for entry into the geoscience workforce. Traditionally, the program has focused on preparing students for careers in the oil and gas industry, but moving into the future, there is an increased need to emphasize the Earth system and systems thinking. The department supports strong and highly respected M.S. and Ph.D. degrees in both geology and geophysics. Graduate students have a broad opportunity to pursue their career interests, with 16 research foci.

Math and Statistics needs to offer more courses to mitigate the unfortunate reality that both undergraduate and graduate students are coming to UW less mathematically prepared than previously. For example, we propose short summer online courses for incoming students who place into Calc I or II, or for our incoming graduate students. We do not have the resources to do this currently.

DIVERSITY, EQUITY AND INCLUSION

The **CAECM** faculty is relatively diverse in terms of country-of-origin: 12 (of 24) have a country-of-origin other than the US, and nine different countries are represented. In terms of gender, we have five female faculty, which is the all-time high, but still there is more work to be done.

Among our peer institutions, **CBE** undergraduate student populations average about 32% women or one out of every three graduates. UW CBE is lower than that by a third (~22%). The department is committed to greater promotion of both the chemical engineering and biomedical engineering program widely, but particularly to aspiring women engineers to reset the gender balance of our student body.

Chemistry is starting a Graduate Student Organization for promoting DEI within the student bodies. We envision this organization to work closely with the Wyoming Chapter of ACS in launching student-led initiatives that create an environment appropriate for DEI and better prepare students for the next steps in their career.

EECS views diversity as a source of strength, creativity, and innovation, and this will be reflected in its Broadening Participation Plan in Computing and Electrical Engineering, which is currently under-development.

Geology & Geophysics has long valued diversity. The department recently established a new DEI committee charged with assessing the climate of the department; developing a DEI plan based on current research and best practices; and beginning the implementation of the plan. Full details are provided in the department chapter below.

The **Mathematics and Statistics** department is committed to making every effort to diversify the applicant pool in all future faculty searches.

RESOURCE REQUIREMENTS TO ACHIEVE ASPIRATIONAL GOALS

For **Atmospheric Sciences**, Overall, an objective of 10 to 15 tenure-track/tenured faculty with 4 to 5 of these holding joint appointments in other units will be required. This will allow a graduate program of 40 to 60 students, sufficient to maintain a robust and highly productive program.

For **CAECM**, staff support for proposal writing (either local or centralized), technician support for the High Bay structures lab, and a full-time recruiter for undergraduate students (either local or centralized) is equally critical to new faculty lines to increase research in key areas (to be identified).

For **Chemical and Biomedical Engineering**, realistic projections dictate the hiring of 1 tenure stream faculty member over each of the next three years to simply remain at or close to our

current faculty levels. The departmental allocation of GTAs and GRAs must also be increased to complement our faculty hiring.

Chemistry has clearly documented their rationale for requesting 5 additional research (TT) faculty positions, 1 additional teaching faculty position, a technician needed for maintaining chemistry research instrumentation, 10 additional GA lines, increasing the GA annual remuneration by $3,500 per year and modernizing our research laboratories and junior and senior level teaching laboratories.

For **EECS**, resource needs beyond the baseline needed to achieve its aspirational goals include additional TT faculty (8) and lecturers (2) to bring the department to 40 faculty, technicians to support the teaching and research labs and additional TA-ships (6-8) to support active-learning.

The overarching needs in **EPE** for them to achieve their research and teaching aspirations are (1) the addition of 5 faculty, bringing the department size to 17 and (2) increases in faculty salaries to retain the best researchers in the program.

Recruitment of new faculty members will be vital to rebuilding the **G&G** Department to its full potential. G&G estimates that it will need to hire four faculty members in addition to replacing five pending retirement replacements to rebuild the department to a level that is sustainable over the long term.

To meet the aspirations of the **Mathematics and Statistics** department we will need 8 faculty, together with the ability to replace losses as they occur. Four of the faculty would be tenure-track and cover teaching shortfalls in Analysis and Statistics. With 5 additional tenure stream faculty and 3 visiting assistant professors, we would be more in proportion to our R1 peers. In the same vein, we also request 4 additional GTAs and an additional staff member.

The aspirations for the **Mechanical and Energy Systems Engineering** department described above can be met by getting the department resources back to the minimum viable faculty level.

If the current faculty searches are successful (resulting in the hiring of 4 TT professors), the following additional resources will be required: 7 new TT faculty and 6 additional GTAs to support the new faculty.

The **Physics and Astronomy** department desires to bring its T/TT faculty ranks from 5+5 in P&A to 7+7. A technician is also needed to support the department's suite of instrumentation.

Constructing a 4.5-meter diameter telescope, for example, would enable new science and immediately place UW's astronomy program in the top tier on both national and international levels–no U.S. institutions have 100% access to a telescope of diameter 3.5 meters or larger. All funding mechanisms for a new observatory are possible at this point, including public-private partnerships.

COLLEGE and UNIVERSITY INITIATIVES

HUMAN IMPACTS ON ENVIRONMENT AND CLIMATE CHANGE

We anticipate ongoing research needs in the area of human impacts on environment and climate change. Multiple departments within CEPS are already well-positioned to carry forward this thrust. Research in the Atmospheric Sciences department addresses grand challenges in climate, high-impact weather, water availability, and air quality. Their work involves both cross-campus and international collaboration. For example, NSF EPSCOR WyACT (Wyoming Anticipating Climate Transitions) involves the department as part of the Lab for Regional Earth System Modeling (LRESM).

Geology and Geosciences are working at the intersections, connections and pathways among the "spheres" of the Earth—i.e., the geosphere, hydrosphere, atmosphere, biosphere, and anthroposphere. They address humanity's Grand Challenges: climate change and its impact on biodiversity; quality and quantity of water resources; land-use planning, geohazards (including earthquakes, floods, and landslides); and the development of energy, mineral, water, and soil resources.

Geology and Geosciences has three overlapping areas of exceptional depth: near-surface and hydrologic processes; solid earth and tectonic processes; and geobiology, climate, and carbon (including energy geosciences). All three of these areas are bolstered by strong field efforts, exceptional in-house analytical capabilities, and remarkable faculty-supported instrumentation and collections, notably including those associated with the historic Geological Museum.

They also have strong collaborations with the National Labs via Department of Energy funding. These will also continue to be globally important areas of expertise, even in a gradually "decarbonizing" economy. Hence the department needs to maintain its strengths and future potential in these areas, which are critical to the interests of the state and which will require even more cogent partnerships with environmental and energy interests both with the National Labs and at UW, most notably the Energy Innovation Center, the Haub School, and the new School of Computing.

ENERGY AND NATURAL RESOURCES

Research focused on energy and natural resources, particularly as it relates to Wyoming industry, is extant in many of the departments in CEPS. In Energy and Petroleum Engineering we find significant research expertise in reservoir engineering, simulation, and modeling; drilling techniques; production of oil and natural gas; enhanced oil recovery; CO_2 capture; and carbon engineering. The Department is a recognized leader in reservoir engineering and enhanced oil recovery and is extending research activities into hydrogen storage, subsurface energy storage and geothermal energy.

In Chemical and Biomedical Engineering, research activity contributes to all major revenue producing industries in Wyoming including oil and gas production, petroleum refining, mining, minerals processing, coal conversion, and even agriculture and our advanced civil infrastructure.

Electrical Engineering and Computer Science focus on Modern Power Grid Data Analysis & Modelling. The long-term goal of power system research in EECS is to provide better power system monitoring and operation with the support of signal processing, advanced computing, and intelligent control.

The Mechanical Engineering department has focused research on two aspects of energy conversion, wind energy and combustion sciences. Wind energy is the fastest-growing sector of the Wyoming energy economy. Housed within Mechanical Engineering, the Wind Energy Research Center of Excellence (WERC) has a long history of contributing to the advancement of wind energy technologies. The goal of WERC, upon incorporation into the SER, is to develop collaborative research programs to streamline wind energy development in Wyoming while also providing a trusted resource for information to state and local decision makers. Recent projects have studied using wind energy for hydrogen production and assessing the potential for using wind energy on existing Wyoming coal mines. WERC director, Jonathan Naughton, continues to be the Uber-PI of a DoE Wind Energy Technology Office (WETO) sponsored project.

The Department of Chemistry has a long-standing research excellence in the design of new and improved materials and catalysts for important applications including energy production, CO_2 conversion to value-added chemicals and fuels, and water treatment. The Departments of Chemistry and Physics & Astronomy are spearheading new research efforts into nuclear energy, hydrogen power, energy transmission, energy storage, and the production and applications of rare earth elements. These areas are in alignment with the grand challenges of DOE and NSF as well as the State of Wyoming.

The Wyoming Carbon Engineering Program, supported by the state and directed by the School of Energy Resources, has focused on development of technologies that utilize coal for energy and materials, but with reduced carbon emissions as compared with current coal usage. Multiple areas of research and development within the Carbon Engineering Program have been supported by Mechanical Engineering faculty with energy conversion expertise, including through collaborative research with other departments such as Chemical Engineering and Civil Engineering.

NEXT GENERATION COMPUTING

Not surprisingly, the Department of Electrical Engineering and Computer Science plays a pivotal, but not exclusive, role in the CEPS research contributions to broad research initiatives in the fields of **C**ybersecurity, **A**rtificial Intelligence and **M**achine Learning. Major research emphases in EECS include:

- ***Advances in artificial intelligence (AI)/machine learning (ML)*** and convergence with high-performance computing (HPC) make possible the automation of many knowledge worker tasks

leading to the possibility of sweeping changes in various economic sectors like energy, transportation, advanced robotics, rural health, and agriculture.

- ***Visual and Interactive Computing (VIC).*** Areas of computing disciplines concerning images, computer graphics, 2D/3D models, data processing and visualization, displays, and interactivity are foundational to most computing applications, systems, and state-of-the-art facilities.
- ***Cybersecurity and Internet of Things (IoT).*** The security, resilience, stability, and gained efficiencies of systems and processes within our society require fundamental and applied research which intersects with the entire computing spectrum, including the research areas proposed for EECS. Current research activities in this space at UW (Autonomous Swarms, Security of AI/ML systems, Industrial Control Systems, Blockchain) would be expanded and refocused to programmatically connect with other research initiatives and projects. The Mechanical Engineering department focuses on composite materials, both experimental and computational, with application to additive manufacturing and combining machine learning with material and microstructure design.

In other departments, EPE research is expanding into emerging petroleum research areas, such as the use of Data Analytics and Block Chain technologies in the field of Petroleum Engineering, as well as in existing computational research areas, such as petroleum systems modeling in Wyoming basins.

Successful earth science research must have access to top-end computational facilities with associated software and required IT support.

Mechanical and Energy Systems Engineering continues a strong effort in both computational fluid dynamics (CFD) and experimental aerodynamics with access to outstanding facilities. This group of faculty works together very closely and, with appropriate additions to the faculty, has substantial potential for sustaining and improving its national recognition. Recent efforts within the department have focused on using AI/ML for design of materials and material microstructures tailored for specific engineering applications.

BIOCHEMISTRY, BIOTECHNOLOGY AND BIOMEDICINE

The department of Chemistry and the department of Chemical and BioEngineering conduct research that contributes to the state's small but dynamic and growing biotechnology industries, and even contribute to growth in this area through successful start-up companies.

The modern biotechnology industry has grown in no small part out of chemical engineering departments and chemistry departments by treating cells as living catalysts to produce biological molecules within specialized reactors. From this genesis grew the modern pharmaceutical industry.

MATERIALS

Research in broad areas of materials science, materials engineering and materials technology is found in many CEPS departments. In CBE research related research focuses on biomaterials, thin films, membranes, carbon-based materials, and catalysts.

The Department of Chemistry has a strong research focus on the design, synthesis, characterization, and application of novel materials and catalysts including covalent organic frameworks, two-dimensional materials, mixed oxides, metal nanoparticles, and rare-earth elements. These research efforts involve extensive collaborations with national laboratories, other institutions, and start-up companies. Our newly hired faculty member will expand the materials research to the fields of supramolecular compounds and polymers.

Physics & Astronomy has built strong faculty expertise in the area of materials science. The current research of our condensed matter physics faculty, including two new faculty hires, focuses on materials for quantum computing and materials for next generation spin-electronics. Faculty are also involved in federally funded projects on advanced materials for energy conversion, photovoltaics, waste heat harvesting, magnets and nuclear reactors. We advance technologies for extraction and processing of critical materials including rare earth and carbon materials. Our students and faculty collaborate with researchers across the campus on many interdisciplinary research grants.

The Mechanical Engineering department focuses on composite materials, both experimental and computational, with application to additive manufacturing and combining machine learning with material and microstructure design.

With sufficient faculty members, Mechanical Engineering will contribute to a number of materials-related research efforts. The Materials Genome Initiative is a federal multi-agency initiative to discover, manufacture, and deploy advanced materials at a much faster rate than using traditional approaches. Additionally, NASA has interest in Mechanical Engineering's focus on composites and advanced materials developed for weight reduction and thermal protection of space structures. And in a research area that overlaps with the College's CAM Initiative focus, modeling of integrated computational materials engineering (ICME) to significantly speed up the discovery and design of new materials remains an ongoing focus and will be such for the foreseeable future (see NASA Vision 2040).

Finally, Mechanical Engineering continues to garner support from DoE continues to expand the operating environment of materials. Ongoing funded projects in the department focus on developing novel additive manufacturing approaches for high-temperature materials.

PILLARS

1. ***Digital:*** We will compete for an even larger fraction of the WY allocation of the supercomputer resources at the NWSC and offer such graduate courses as Objective Analysis and Numerical Modeling. Close ties with SoC will provide opportunities for expanded research and greater diversity in student learning.
2. ***Entrepreneurial*****:** The faculty and students within CEPS departments have a long history of entrepreneurial activity. Many of these have utilized the Impact 307 services and continue to do so. Some of these companies have been acquired by larger conglomerates (e.g. Firehole Technologies, Inc.'s acquisition by Autodesk, Inc.), while others continue to support local jobs as growing businesses (e.g. Resono Pressure Systems).
3. ***Interdisciplinary:*** The college initiatives described above all represent significant interdisciplinary research efforts. In addition to these efforts, many of our undergraduate courses draw interdisciplinary audiences, and as the research thrusts above are pursued new courses will developed cross-listed across disciplines.
4. Inclusive*:* The DAS historically has scored poorly in terms of ethnic and gender diversity, e.g. we only hired our first-ever female faculty in 2018, although our graduate student population is rather gender-balanced. The department aims to create an environment that fosters diversity, equality, and inclusion. In particular, we will actively pursue a more diverse population across our graduate students, research scientists and professional staff.

Graduate Student Recruiting

The following are recommendations concerning future graduate student recruitment methods for CEPS. This information is a selection of the best practices assembled from various sources that are judged to be most relevant to the needs of the CEPS. These sources are listed at the end of this document. In many cases the recommendations put forth in these information sources are organized with respect to the "Enrollment management funnel", which is a marketing mechanism used to describe the various stages involved in moving potential graduate students (of which there are many) to fully, accepted graduate students (of which there are few).

The "2021 Graduate Student Recruitment Report" recommends that a successful program pay attention to "the three P's": Program, Promotion and Positioning.

- Program - Of course, the programs offered by an institution should align with the needs of the society the institution serves, which are illustrated by the number of potential graduate students seeking a particular degree. Given that UW has very recently reviewed all academic programs within the university and eliminated those programs with low enrollment, it can be argued that the analysis needed to optimize CEPS graduate programs and align them with

societal needs has already been performed. However, how these programs are structured is of consideration. This report indicates that the results of a survey they conducted show that potential graduate students prefer online (32%) and hybrid (48%) classes compared to in classroom (20%) classes. This data is not broken into potential Master's and PhD students. However, Table #1, taken from this report, indicates that between 2014 and 2019 there was a significant increase in the number of enrolled master's students in Classroom and Hybrid engineering courses. One factor indicated for the increase in online and hybrid class enrollment is the flexibility provided by these courses for students who are working full time. These types of courses provide the flexibility needed for students to insert the coursework for these types of classes into their schedules. This same type of flexibility could be extended to on-campus students who are conducting research-oriented programs. Fully online or hybrid courses would allow students enrolled in research-oriented programs the same type of flexibility desired by off-campus students working full-time jobs. These courses would allow flexibility in the scheduling with other activities, such as lab experiments, teaching assistantships, seminars, and other traditional campus activities.

Table 1: Enrollment changes by field of study between 2014 and 2019.

INTENDED AREA OF STUDY	CLASSROOM	HYBRID	ONLINE	MASTER'S DEGREE % CHANGE (2014-19)*
Business	12%	15%	20%	3%
Health Professions	18%	15%	13%	34%
Computer/Information Science	8%	13%	13%	79%
Education	7%	9%	12%	-5%
Social Services, Public Administration, Criminal Justice	5%	6%	11%	13%
Counseling/Psychology	9%	9%	10%	4%
Arts and Humanities	11%	9%	6%	-4%
Communications	6%	4%	5%	11%
Social Sciences	9%	8%	5%	-2%
Natural Sciences: Biological/Physical/Earth Science	7%	6%	3%	19%
Engineering	8%	6%	3%	17%

*National Center for Education Statistics, Fall Enrollment Data 2014-19, June 2021.

The number of graduate level Distance Learning courses should be increased for all graduate level programs at the CEPS. These can be used for fully online or hybrid courses. It is recommended that incentives should be given to instructors in order to have them record their lectures and prepare fully online graduate courses.

An additional finding of this survey indicated that only those students preferring face to face classes desired the traditional 14-week semester. As this was only 20% of the respondents this indicates that the traditional semester is ranked quite low in desirability. The majority of the respondents to this survey indicated they preferred courses lasting 6 to 9 weeks or 10 to 12 weeks in length. It is recommended that in addition to developing fully online courses our graduate courses be converted to “on demand” courses. This will permit graduate students to move through these courses at an accelerated pace. It is recommended that CEPS programs should work with the newly created School of Computing to develop these “on demand” graduate courses.

- Promotion - How programs are located by prospective graduate students can have a significant impact on the number of graduate students recruited by an institution. The data shown in Table #2 clearly indicates that the majority of potential graduate students are searching for programs online using search engines, such as Google as well as college search sites and program ranking websites.

Table 2: Taken from the report "2021 Graduate Student Recruitment Report”

IMPORTANT* INFORMATION SOURCES AT BEGINNING OF PROGRAM SEARCH	CLASSROOM	HYBRID	ONLINE
Search engines (Google, Bing, etc.)	83%	87%	83%
College search sites	83%	86%	80%
Program ranking websites	77%	85%	78%
Printed rankings guides, etc.	66%	78%	66%
Printed view books, brochures, etc.	74%	74%	66%
Social media platforms	69%	74%	62%
Videos on YouTube or elsewhere	67%	71%	62%
Online chat	58%	70%	58%
Ads on websites	54%	61%	54%
Ads on television	43%	59%	46%
Ads in magazines, newspapers, etc.	44%	57%	42%
Ads on the radio	40%	51%	35%

**This table presents data on the proportions that indicated that each source was either Very Influential or Influential.*

Table #2 indicates that “Hybrid” classes are “Very influential” or “Influential” for searches on every information source more often than traditional classroom and online courses. Advertisements on television, radio and magazines have the lowest impact. It is recommended that if any funds are currently being spent on these types of advertisements that all or the majority of those funds be diverted to the other information sources shown in Table #2.

- Positioning - From the data presented it is clear that quick admission decisions will lead to higher enrollment. The survey results showed that nearly half of potential graduate students expect to be notified of acceptance within one week of applying. CEPS should invest in methods that would shorten this time to acceptance. For instance, grants that are to be used for support of potential graduate students should be made available by the beginning of the Spring semester. Since most applications for graduate programs are made in the spring for admission to the Fall semester it would be necessary to have these funds allocated and made available so faculty may have these funds available to make rapid decisions concerning applicants during the spring semester when potential grad student applications are made. Additionally, it is recommended that support at the CEPS level be increased for the processing and follow up of potential graduate students’ applications. Currently department’s office associates perform the majority of this duty when they can include this task with their other duties. Having someone with the processing and follow-up of these applications as their primary duty could help to ensure that applications are processed rapidly enough to achieve the one-week acceptance expected by nearly half the applicants.

Additional student recruitment information websites stress various points that are summarized here.

- Online information Sources - A number of these articles indicate the importance of optimizing the main source of information for many of these potential graduate students, which is often the institution's website. Recommendations include:
    - Optimize content for online attention. This can be performed by decreasing the “clutter” on a web page and using minimalistic designs in order to rapidly convey information about CEPS.
    - Short recordings of alumni and faculty talking about their experiences at CEPS should be created and posted.
    - Online tours of CEPS should be created and posted for students who can’t travel to the campus.
    - Use social media to convey to students what they can expect at UW and what challenges they may encounter.
    - Publish student content. With the help of current grad students develop blogs concerning overcoming challenges associated with their experiences at UW.

- Off-Campus Recruiting Efforts

- In-state visits - the University of Wyoming's unique situation as being the only four-year institution of higher learning within the state makes visiting other educational institutions for the recruitment of Graduate Students problematic. In other states, four-year institutions can recruit from other four-year institutions that are within their state. Wyoming has a number of community colleges where UW should visit regularly in order to recruit undergraduate students. During these visits it is recommended that at least one session be held regarding graduate education. If advertised properly prior to these recruiting sessions individuals living near these community colleges who have bachelor's degrees could attend these sessions on graduate education at UW. Additionally, these sessions would expose students in undergraduate programs who would be continuing their undergraduate education at UW to the idea of graduate education once they have obtained their undergraduate degrees. This effort could begin to increase state graduate student enrollments after a few years.

- Out-of-state visits - While the opportunity to recruit potential graduate students from within Wyoming is very limited the opportunity for recruitment from universities outside Wyoming is better. UW's proximity to multiple universities in Colorado makes this an attractive opportunity. It is recommended that funding be made available for periodic "roadshows" to occur at universities throughout the West in order to inform potential graduate students that these institutions about CEPS, our programs, facilities and opportunities for continued study.

- Funding - Without a doubt the most important consideration regarding a potential graduate student's selection of CEPS is the availability of funding. The greater the amount of funding available for support the more graduate students CEPS will attract. The number of grants and scholarships available within CPS should be increased. With the help of the Wyoming Foundation grants specifically designated to support graduate students in CEPS should be developed and funded through donations. Alumni engagement by CEPS faculty facilitated with the help of The Foundation could help to fund these grants.

Sources:

- Document: RNL & PLEXUSS (2021). 2021 Graduate Student Recruitment Report. Cedar Rapids, Iowa: Ruffalo Noel Levitz. Available at: RNL.com/Graduate2021.
- Website: https://www.thirdway.org/report/follow-the-money-recruiting-and-the-enrollment-priorities-of-public-research-universities
- Website: https://www.salesforce.org/resources/article/student-recruitment/
- Website: https://callhub.io/student-recruitment-strategies/

Wyoming Innovation Partnership (WIP)

The Wyoming Innovation Partnership (WIP) is a collaboration between Wyoming's Institutes of Higher Education and the State of Wyoming with the goals of

- Aligning education and workforce development and support, innovation, entrepreneurship and research to help drive Wyoming's economy
- Supporting economic growth and diversification and building a highly skilled, ambitious and qualified workforce by linking community goals with the state's economic strategy

The multi-year blueprint will invest American Rescue Plan (ARP) and state funds to

1. Strategically develop the academic and skill development pathways that will advance the state, and its workforce, through collaboration and efficient use of state-wide resources
2. Support and train entrepreneurs, facilitate new business starts, and support small business retention, succession and expansion
3. Partner with economic development organizations and companies to recruit, expand, and relocate new businesses to Wyoming
4. Provide the support infrastructure to
allow for research to develop Wyoming-based commodities
5. Develop business partnerships and attract private funding (matching programs, sponsored research, apprenticeships, internships, etc.).

CEPS activities in the initial phases of WIP include:

- EECS leadership of the development of a BS in Software Development program that is symbiotic with a two-year program developed at Sheridan College and being offered at three other community colleges in Wyoming. This program will be housed in the School of Computing.
- Initial funding to support computing research in areas critical to the state of Wyoming (e.g., wildlife migration, climate modeling, flow through porous media), and to support faculty and students to use the NCAR Wyoming Supercomputing Center resources.
- Purchase of three major imaging instruments to be part of UW's Center for Advanced Scientific Imaging.
- Development and distribution of the Mobile Makerspace units across the state.
- Jump-starting the School of Computing through short-term support of a senior office administrator, a director of engagement, 2 post-docs, and the director of the SoC.
- The creation of a Wyoming DataHub, and pilot projects associated with it. The goal of the Datahub is to improve the discovery and access to research data and associated information products developed by UW and community college researchers.
- A project led by UW's Haibo Zhai on the instrumentation and industrial technologies needed to fully develop hydrogen energy plants in Wyoming.
- Support to jump-start research at UW and some community colleges on controlled environment agriculture.

The WIP provides a platform and potential funding for CEPS faculty and programs to work with community colleges, and state agencies on some of the grand challenges that Wyoming faces.

GARNERING FINANCIAL AND COMMUNITY SUPPORT

Support from Federal Agencies and from Industry

High priority will be placed on seeking external funding from the full gamut of federal funding agencies. We will leverage new assistance in proposal preparation by the UW Research and Economic Development Division (REDD) by having the college investigate supplementing this proposal preparation assistance within the college. We are weighing the benefits of hiring one or more full time people versus contracting with third-party organizations that specialize in this area.

One avenue for industry funding may be to approach petroleum-related companies and corporations to obtain research grants and funding for fellowships. Companies within Wyoming should be given higher priority for this effort. These companies could provide initial startup funding for new instructors teaching energy related courses. Companies could also be encouraged to provide all or partial salaries for these new instructors.

In the long term the CEPS entrepreneurial group and the College of Business could partner with individual researchers within CEPS in order to bring new concepts that are in the research stage, to be fully implemented in newly created companies.

Collaboration with National Labs

An area of promise for significant sustained funding is collaborative work between individual faculty and groups of faculty and the National Laboratories. In contrast with work based in response to calls for proposals, collaborative work can be funded directly from the laboratory or from projects awarded from joint proposals. Such efforts are based on the development of relationships between faculty and their counterparts at the National Labs. These relationships often take years to develop, but once established, many years of collaboration (and funding) can follow. Leveraging existing relationships (fellow graduate students working at labs, etc.) can significantly shorten the time for these relationships to develop.

Collaboration with National Laboratories is not new to the University of Wyoming. For example, there have been long-term collaborations among DoE-funded Pacific Northwest National Laboratory, Sandia National Laboratories and faculty in Electrical Engineering on transmission-related issues. In Wind Energy, there have been similar collaborations among Sandia National Laboratories, the National Renewable Energy Laboratory, and faculty in Mechanical and Electrical Engineering. Other National Labs with long term collaborations include NCAR and NASA.

Based on the success of these past collaborations and the promise of longer-term funding streams, existing collaborations should be strengthened, and additional collaborations should be initiated. Of course, targeting National Laboratories in our area (e.g., DoE: INL, NREL, SNL, LANL, PNL, DoD: AF Academy, AFRL-Kirtland AFB, NSF: NCAR, …) should be a priority due to the ease of collaboration. In addition, identifying those National Laboratories with research focuses closely aligned with faculty or broader college initiatives should be prioritized. Once laboratory personnel

have been identified for potential collaboration, developing relationships with personnel from the lab should be pursued. Promoting exchanges of personnel, providing small seed funding for limited-scope efforts, and other preliminary activities allow for the relationship to develop. Such efforts allow trust between the parties to develop that is needed for larger research efforts with larger responsibilities (and funds). An example of the type of project that might follow from these early efforts is an EPSCoR University/Lab project. Those EPSCoR University-Lab partnership programs encourage the proposal submission from junior faculty.

In summary, collaborative research with National Laboratories can provide long-term, stable research funding for faculty. That said, developing the required relationships for this takes significant effort and time. Incentives for untenured faculty to pursue such relationships should be provided, as often the timescale for such efforts does not fit within a traditional tenure timeframe and thus faculty choose not to pursue such interactions. Introducing young faculty through existing relationships is another good approach. For those who are persistent, the sustained funding that can result is well worth the time and effort invested.

Community Support

As a land-grant university, UW has an obligation to provide for the needs of the state as a key part of its mission. While we certainly provide educational opportunities, we also provide research that benefits the state, outreach, and service activities that meet the needs and enhance the lives of our citizens.

This college is a key contributor to providing for the needs of the state. Whether it's research that provides the basis for first-in-the-country variable speed limits and weight/profile vehicle criteria for road closures due to wind events, advances in enhanced oil recovery, predictive modeling of the power grid to avoid blackouts, methane emission monitoring, support for advanced mining and mineral extraction industries, advanced computing for weather predications, mobile makerspace units distributed across the state… the list goes on and on. Some research-related contributions apply to the entire state, and others to a more limited area. Our outreach and service activities tend to be more locally focused on specific counties, cities, school districts, etc.

If the contributions of the college to the state are done well, and relationships are nurtured in an appropriate way, then we maximize the likelihood that these contributions are noticed and appreciated by the citizens of Wyoming. This is where "community support" comes in.

If the community at large (not just Laramie, or Albany County, but the entire state) has a positive view of how the college contributes in a variety of ways to the state, then this hopefully results in broad community support of UW and college, which in turn translates to legislative support and thus budget support. Thus, serving our land-grant mission in this way is not only the right thing to do, but is also a wise "investment" for the college.

LONG-TERM VIABILITY, RELEVANCE AND SUSTAINABILITY

It is healthy for any academic unit to undergo periodical external review. The expectations for this process are spelled out in great detail in the Academic Program Review SAPP. Salient details include a cadence for reviewing each unit of at least every seven years for established programs, and five years after the establishment of a new academic program. Undergraduate degree programs that produce fewer than five graduates per year averaged over five years, and graduate programs that average fewer than three graduates, may be asked by the Provost to conduct reviews on shorter time scales. Low-producing programs may be recommended for reorganization, consolidation, reduction, or discontinuance.

Periodic external review

Many of the departments in CEPS undergo mandatory review by ABET in order to maintain engineering degree accreditation. These reviews are extensive and in-depth, and highly structured. Most of the issues mentioned in the periodic review discussion below are covered comprehensively in the ABET review process. However, ABET does not review graduate programs, research output, organizational structures except as it pertains to delivery of a robust undergraduate degree program, etc. It is useful, therefore, to call out a review process that would encompass all departments in the new CEPS, realizing that for some programs, many aspects of that review will be covered in the ABET review process.

Periodic self-study and external review are vital to identifying strengths and weaknesses of academic units and moreover to providing recommendations for building on strengths and overcoming weaknesses, even as the standards of excellence in higher education inevitably evolve over time due to economic and cultural changes. Assessments revealed in external review can serve as a basis for sound decision-making regarding institutional planning and budgeting.

External review can take many forms but generally involves a group of three or more evaluators from peer departments at peer or stretch-peer institutions. The team of evaluators, who are often paid a stipend or provided with an honorarium, reviews data about the department, often compiled in advance during a self-study by the department under review. The evaluators may also visit the campus, interviewing members of the department, including students, staff, and faculty, and meeting with key members of the upper administration (e.g., deans and supervisors in academic affairs). Because the members of the committee are familiar with external impressions of the department, their evaluations of department strengths and weaknesses will be untainted by internal impressions of faculty members and administrators.

To facilitate the review, it is recommended that the department under review undertake a self-study that compiles vital statistics about the department, including demographics, graduation rates, and metrics of success in achieving learning outcomes. Making external review and the associated self-study a regular requirement can help instill discipline in the monitoring of vital metrics of success in higher education. As part of the self-study, it is recommended that the department conduct regular surveys of climate and perceptions of success and areas for improvement.

All departments should engage in external review on a regular basis. A typical interval is 4 to 8 years – long enough that the effects of factors such as new hires and changes in curriculum can be evaluated, but not so long that complacency can set in.

INDIVIDUAL DEPARTMENTAL REPORTS

ATMOSPHERIC SCIENCES

A. Historical and Current Data for department

The overarching mission of the Atmospheric Science Department is to build expertise and recognition for the use of observations and numerical simulations to address grand challenges in climate, high-impact weather, and air quality. Through its ownership and operation of nationally-recognized measurement facilities ***and*** unique, ready access to world-class high-performance computing, the department strives for excellence in graduate education providing opportunities for its graduate students that are comparable with only the largest atmospheric science programs in the country.

Figure 1 shows the number of tenure-track/tenured faculty from Fall 2009 to present and the number of graduate students from Fall 2015 to present. From 2009 through 2016, the department maintained an average of 9 faculty, with a high of 10 and a low of 8. Since 2016, the department has seen a steady decline in the number of faculty, from a high of 9 in 2016 to a low of 5 in 2022. During this same period (2016-2022), the number of graduate students in the department has remained relatively constant, averaging 25, resulting in a substantial increase in the student/faculty ratio; 3-to-1 in 2016 and 5-to-1 in 2022.

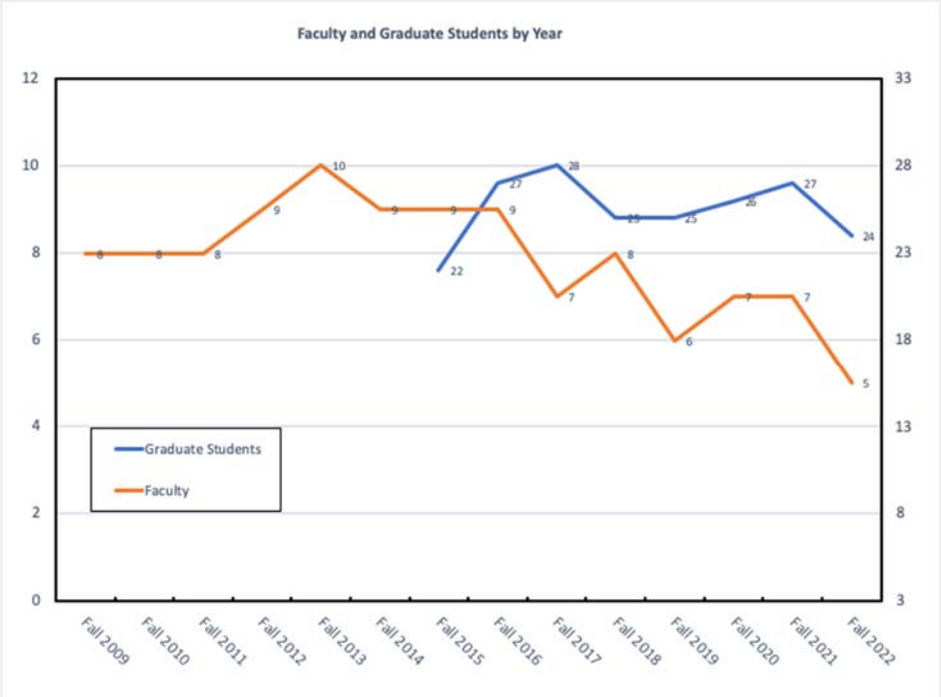


Figure 1 Historical numbers for Tenure-Track/Tenured Faculty and Graduate Students in Atmospheric Science

The trends from figure 1 result from several key transitions in the department. The slight increase in faculty in the early 2010's resulted of the department's efforts to expand expertise into atmospheric numerical modeling at the time NWSC was coming online. The initial decrease in faculty from 2016 to 2017 through 2019 occurred due to retirements. It was at this time that student/faculty ratios begun to climb, as less research-active faculty retired and early/mid-career faculty, that were hired in the early to mid 2010's, expanded their research productivity. Three additional faculty left between 2019 and 2022, all to large, R1 universities. During this period, 1 additional faculty was hired.

At the beginning of Fall 2022, the department was at a critical cusp. With just 5 faculty it was not possible to teach core graduate courses. The situation was entirely unsustainable. However, with two

active TT faculty searches during the 2022/23 AY, one which has just completed successfully and the other which is nearing completion, there is an expectation that faculty numbers will rebound to 7 for Fall 2023. Also, it is expected that graduate student numbers will be at 30, the highest ever in the department.

The department also employs, *when fully staffed*, 5 to 6 MS/PhD-level research scientists, 6 to 7 engineers and technicians, and a business manager; all funded through external grants (no state funds). These individuals are principally responsible for supporting the research enterprise of the department. There are currently no *state funded* personnel in the department to support day-to-day activities such as lab maintenance, safety, classroom demonstrations, etc. At present, these duties are carried supported by research staff and their time is funded through departmental indirect costs.

Needs for Long-Term Program Viability

Seven (7) TT/T faculty is the 'bare' minimum to maintain the program over one or two years. Less than 7 faculty will result in graduate student numbers too low to ensure enough first-year students to offer core courses and sufficient faculty to teach core courses and offer electives. Eight (8) TT/T faculty are need for a long-term sustainable program. This provides enough expertise overlap to ensure multiple faculty to teach core-courses; enough faculty mentors to maintain a robust graduate student population of 28 to 36+ students (which ensures enough students for both core- and elective- courses); and sufficient expertise across sub-disciplines to meet the mission of the department (utilization and support of facilities such as the King Air and mobile lab and supercomputer).

One (1) office administrator is needed to maintain and support the needs of the department faculty, scientists, engineers, and technicians. This includes supporting not only the academic mission of the department but also the research enterprise and support of the transportation aircraft. The department only requires state/university funding for ½ of a full-time position to support the business operations, transportation aircraft and grantsmanship of the department. Roughly one-half of this same position is already (externally) supported through a combination of the King Air Cooperative Agreement (CA) and support of Water Resources Data System (WRDS). ATSC is rather unique amongst departments in CEPS due to the large number of individuals funded through external (ongoing) awards, principally the CA. ATSC, when fully staffed, employs 16 research scientists, engineers, technicians, and aviation professionals, with an annual salary in excess of $2 million. All of these persons are funded through multiple sources, and the management of this requires a dedicated Business Manager.

ATSC also requires one (1) state/university-funded person for engineering/technical support. While the department does currently maintain several engineers and technicians, they are all externally (grant) funded. Support for basic needs in the department such as setting up and maintaining equipment used in classes and teaching, maintaining departmental equipment to support day-to-day activities, ensuring lab safety, etc., cannot be funded through external grants. At present, these duties are split amongst several engineers and technicians, when time allows based on their work duties associated with their external grant support. Their salaries are then paid through *departmental indirect costs* to support these activities.

B. Peer Comparisons

Institution	Similarities	Differences
Colorado State University (CSU)	• Land Grant Institution • MS & PhD Programs • Graduate-only Department • Strong Research Focus • Regionally Located	• R1 University • Large Department (20 faculty, 78 graduate students, 54 full-time researchers)
University of Utah (UU)	• Land Grant Institution • MS & PhD Programs • Strong Research Focus • Regionally Located	• R1 University • Moderately-sized Department (14 faculty, 39 graduate students) • Undergraduate Program
University of North Dakota (UND)	• State (Public) University • MS & PhD Programs • Moderate Research Focus • R2 University • Similar-sized Department (7 faculty, 23 graduate students)	• Undergraduate Program • Less Regionally Located
University of Arizona (UA)	• Land Grant Institution • MS & PhD Programs • Strong Research Focus	• R1 University • Combined Department (AtmosSci and Hydrology) • Large Department (18 faculty, although only 6 in traditional AtmosSci subdisciplines; 71 graduate students) • Undergraduate Program
University of Hawaii (UH)	• Land Grant Institution • MS & PhD Programs • Strong Research Focus • Similar-sized Department (11 faculty, 18 graduate students)	• R1 University • Undergraduate Program • No Regional similarity

C. Department-Specific Aspirations

It is the department's strategic vision to *advance UW's international recognition for the use of advanced observations [aircraft, mobile air quality labs] and high-performance computing to address grand challenges in climate, high-impact weather, water availability, and air quality*. We aim to further solidify research in our areas of strength and broaden our research portfolio. There is much interest amongst funding agencies in constraining weather and climate models through targeted observations, i.e., observationally driven weather/climate predictability improvement. We aim to be a leader in coupled observational and computational research.

Traditionally, the department of Atmospheric Science has been insular from other programs across the university. In the last several years, the department has begun shifting away from that model for good reason. Greater interdisciplinarity leads to more impactful research that can be more responsive to state and national needs. While it is critical to maintain the core capabilities in the department, towards

opportunities to partner closely with other organizations. Two recent of examples of this are the NSF EPSCOR WyACT (Wyoming Anticipating Climate Transitions) in which the department is partnering with several other units as part of the Lab for Regional Earth System Modeling (LRESM) and partnership building with the School of Computing both through joint appointments and adjunct faculty appointments.

Ultimately, our aspirations allow us to align even better with UW's *four pillars of academic success:*

1. ***Digital:*** We will compete for an even larger fraction of the WY allocation of the supercomputer resources at the NWSC, and offer such graduate courses as Objective Analysis and Numerical Modeling. Close ties with SoC will provide opportunities for expanded research and greater diversity in student learning.

2. ***Entrepreneurial*****:** The DAS is largely externally funded, and with ~15 soft-money personnel, we will continue to operate as a small business in Laramie. Several of our PhD graduates have become CEOs of successful companies, and we will continue to foster such opportunities. We will grow industry collaborations, e.g. deploying the research aircraft for commercial purposes and working with industry to reduce greenhouse gas emissions during natural gas production.

3. ***Interdisciplinary:*** Our undergraduate courses draw an interdisciplinary audience, and new courses will be cross-listed across disciplines. Our atmospheric research will become more interdisciplinary, addressing the Earth system (biosphere-air-land-ocean interactions), and driving the development of tools developed within other disciplines (e.g., AI).

4. ***Inclusive****:* The DAS historically has scored poorly in terms of ethnic and gender diversity, e.g. we only hired our first-ever female faculty in 2018, although our graduate student population is rather gender-balanced. The department aims to create an environment that fosters diversity, equality, and inclusion. In particular, we will actively pursue a more diverse population across our graduate students, research scientists and professional staff.

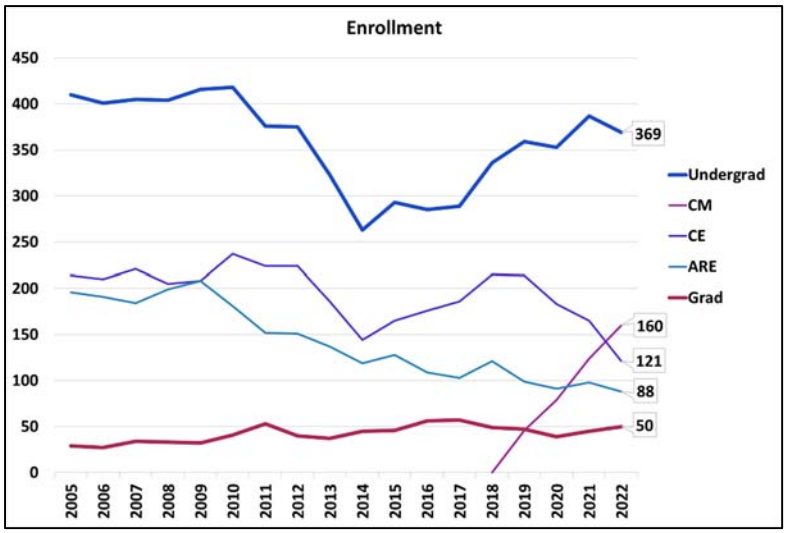
D. Resources Required to Meet Aspirations

To achieve *both* the goals of maintaining core capabilities and developing greater diversity for more interdisciplinarity, all while maintaining our standing as one of the top research-productive departments (per capita), will require additional faculty lines. Some of these should be sought out and supported through joint appointments, some of which will be majority led by Atmospheric Science and others led by partner units. Overall, an objective of 10 to 15 tenure-track/tenured faculty with 4 to 5 of these holding joint appointments in other units will be required. This will allow a graduate program of 40 to 60 students, sufficient to maintain a robust and highly productive program.

CIVIL ENGINERING, ARCHITECTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT

Historical and Current Data for department

Enrollment data for our programs is shown here:



Notes:

- Declines in ARE (since 2009) and CE (since 2019) are unwanted. Some of these declines are probably associated with the growth of CM. We need help in recruiting.
- CM has grown faster than anticipated. (The trend line is frankly not sustainable, but we expect it to flatten.)
- We also serve 73 students in the Land Surveying program.

The staffing data is shown here:

	Civil and Architectural Engineering		Construction Management		
	Tenure-track faculty	Instructional faculty	Tenure-track faculty	Instructional faculty	Staff
2005	19	6	---	---	5
2015	21	3	---	---	4
2023	15	4	4	1	2

Notes:

- 2023 figures include two searches-in-progress.
- It is sensible to isolate Construction Management for the purposes of historical comparison, since it is a new program.
- Staff positions in Accounting and IT were "centralized" after 2015.
- The overall undergraduate student-to-faculty ratio is 15:1.

The faculty is highly-productive by all measures. Metrics for the past five years show:

- 4 courses per year, about 300 student credit hours taught (per FTE faculty per year).
- $125K in research expenditures, 4-5 journal papers, 3 conference presentations, 1-2 other publications, 2-3 graduate students supervised (per FTE faculty per year).

Minimum faculty levels for long-term viability

In Civil Engineering This Includes:	In Architectural Engineering This Includes:
Structures *Environmental* *Water Resources* *Geotechnical* *Transportation* *Surveying*	*Structures* *Building Mechanical Systems* *Building Electrical Systems* *Architecture* *Construction*

The nature of Civil and Architectural Engineering is that they are comprised of a number of sub-disciplines, defined by ABET.

In Civil and Architectural Engineering, we define the minimum need as having three research-active faculty members in most of these areas, for 'critical mass' and to deliver graduate courses. (We can sacrifice Surveying and Architecture as service disciplines, and we can treat Building Mechanical and Building Electrical as a single area.) By this logic, the following needs are identified:

- 1 Tenure-track faculty in Structures
- 2 Tenure-track faculty in Geotechnical
- 2 Tenure-track faculty in Building Mechanical/Electrical

In Construction Management, the minimum need is driven by enrollment growth. Based on anticipated growth, the following needs are identified:

- 1 Tenure-track faculty
- 1 Instructional faculty
- 1 Staff

Therefore in total we believe we need 6 Tenure-track faculty, 1 Instructional faculty, and 1 staff to have fully-served healthy programs.

Peer Comparisons (choose own peers and explain choice)

- For Civil Engineering:
    - Parallel: New Mexico State

      A public land-grant institution (R2) about the same size as UW. Has ~220 undergraduates in CE. Has 16 faculty in CE.

    - Aspirational: Utah State

      A public land-grant institution (R1) quite a bit larger than UW. Has ~320 undergraduates in CE. Has 36 faculty in CE.

    - The Best: Purdue
- For Architectural Engineering:

  Note: Many of the new Architectural Engineering programs (Alabama, Arizona, Oregon State, Texas-Arlington) do not have an Architectural Engineering faculty. They have created a degree program cobbled-together from Civil Engineering, Mechanical Engineering, and Architecture courses. They are poor comparators.

    - Parallel: North Carolina A&T

      A public land-grant HBCU institution (R2) about the same size as UW. Has ~110 undergraduates in ARE. Faculty numbers difficult to parse. Like UW, the ARE program includes architects, because there is not an architecture program elsewhere on campus.

    - Aspirational: Kansas State

A public land-grant institution (R1) quite a bit larger than UW. Has ~200 undergraduates in ARE. Has 17 faculty shared between ARE and CM (GE Johnson Department of Architectural Engineering and Construction Science).

- The Best: University of Nebraska—Durham School/Kiewit Institute

- For Construction Management:
  - Parallel: North Dakota State

    A public land-grant institution (R1) a bit larger than UW. Has ~170 undergraduates in CM. Has 7 faculty in CM, plus 14 in CE in the same department.

  - Aspirational: Kansas State

    A public land-grant institution (R1) quite a bit larger than UW. Has ~240 undergraduates in CM. Has 17 faculty shared between ARE and CM (GE Johnson Department of Architectural Engineering and Construction Science).

  - The Best: Cal Poly, San Luis Obispo

Department-specific Aspirations

Research

Truthfully, we do not have a coordinated agenda for research within the department; everyone is acting independently. Most faculty seek to build and manage their own operation, with their own 'brand'. There is little cooperation and little mentoring or other forms of mutual support. There are few efforts from above to put together large teams to go after large grants.

To characterize the Department's strengths in research:

- Individual research productivity is very high. Several faculty manage Centers or large operations and supervise several staff/post-docs/grad students. Some others work with smaller teams, or none, yet are strong in publications/presentations/outreach.
- Much of our research is oriented to Wyoming problems and the land-grant mission. We complete many projects for UW-SER, WYDOT, Wyoming Department of Workforce Services, Wyoming Water Development Office, and others.
- More broadly, much of our research is oriented to Grand Challenge problems such as climate change resilience, water, infrastructure, sustainable development and sustainable energy, etc.
- Some faculty have entrepreneurial activities associated with their research.
- The High Bay structures lab is a major asset, but it is underutilized and understaffed.

Aspirations: If we could achieve the 'critical mass' of three research-active faculty members in all key subdisciplines (the minimum need identified above), the next logical aspiration would be four research-active faculty members in each area. Or we could identify key areas of strength to build depth.

In either case, staff support for research is a clear opportunity for growth.

Clearly some CAECM faculty members aspire to participate in larger UW initiatives:

- Two are adjunct faculty in the UW School of Computing. (Wang, Zhai)
- Two are in the CHIPS and Science Act Working Group. (Zhai, Zhang)
- One is a Presidential Faculty Fellow. (Zhang)

- One won a Provost's Term Professorship. (Ng)
- One created the Assessment Institute with ECTL. (Jacobs)

Teaching

The main goal is to continue to deliver strong undergraduate programs, to maintain rigor, and to maintain accreditation. This implies 'continuous improvement'—always assessing student learning and making adjustments accordingly. Continuous improvement also means staying abreast of new developments in industry and introducing new topics and tools in undergraduate courses. We are particularly proud of our students' career-readiness, because of our emphasis on project-based learning, soft skills, and becoming fluent in the software tools used in industry.

As mentioned above, both the ARE and CE undergraduate programs have capacity for growth.

Service and Outreach

The Land Surveying program is a model for a 'soft money' outreach program which has great benefits to the State. Similarly, we have successful workforce training programs, in Construction Management, and in partnership with WYDOT.

There is high potential for other 'entrepreneurial' programs of a similar type: Continuing Education for Professional Engineers; for Wastewater Treatment professionals; Certifications in a variety of topics such as Building Information Modeling.

Student Success

Note: The six-year graduation rate for students (entering 2015) in the College of Engineering and Physical Sciences was 60%. We do not find this data parsed by degree programs, but a ~40% attrition rate rings true for ARE and CE. (CM needs more time to assess.)

We believe we have a strong culture of supporting student success, and we are proud of the existing resources (tutoring, advising, career services) and facilities which exist to support student success.

An aspiration to improve student success is to offer some courses each semester rather than once a year. This particularly important for the CM program, to have class sizes suitable for project-based instruction.

Many faculty believe that attrition is not problematic, because UW is an open-access institution and engineering should be difficult. Many faculty also believe that deliberate efforts to raise the retention or graduation rates will necessarily imply that educational standards are being lowered.

DEI

According to "Breaking Through," UW strives to create: "A diverse and international community that includes and respects different ethnicities, genders, sexualities, abilities, cultures and worldviews multiplies our capacity to explore, innovate and educate."

The CAECM faculty is relatively diverse in terms of country-of-origin: 12 (of 24) have a country-of-origin other than the US, and nine different countries are represented. In terms of

gender, we have five female faculty, which is the all-time high, but still there is more work to be done.

Student diversity is difficult to control, since UW is an open-access institution. We do aspire to have more female undergraduates, particularly in the CM program.

Inclusion depends upon a sense of belonging. For students, we seek to offer a wide variety of extra-curricular activities where they can feel involved and build friendships. It is also important for students to have comfortable physical spaces which they can customize to a degree. For faculty & staff, a sense of belonging is helped by communicative, sincere leadership and shared governance.

Resource needs to meet Aspirations

- Staff support: Proposal writing (could be local or centralized)
- Staff support: additional Technician dedicated to High Bay structures lab
- Staff support: additional Recruiter for undergraduate students (could be local or centralized)
- New faculty lines to support research depth in key areas (to be identified)

CHEMICAL AND BIOMEDICAL ENGINEERING

A. Historical and Current Departmental Data

The Chemical and Biomedical Engineering Department grants BS, MS, and PhD degrees in Chemical Engineering, as well as approved minors in Biomedical Engineering and Process Control. Prior to 2016, the Chemical and Petroleum Engineering Department provided a joint home for both chemical and petroleum engineering programs and faculties. In 2016 two discrete departments were created in order to allow for the independent growth and maturation of each department, and particularly for the modernization of Chemical Engineering. This vision has not materialized. Instead, CHE faculty numbers have dwindled due to attrition and the remaining faculty do not represent a tightly integrated disciplinary unit. Replacement faculty lines have been slow to materialize in clear defiance of the profound importance of a robust Chemical Engineering department to the College, University, and State of Wyoming. Despite these headwinds, the CBE department strives to provide a rigorous and modern chemical engineering curriculum for its students while conducting top tier research in chemical processing, biomedicine, and materials science. The department remains highly entrepreneurial and collaborative, highlighting the discipline's unique ability to translate new scientific discoveries into technologies and products. Therefore, the CBE Department remains well positioned to emerge as a lynchpin in the College of Engineering and Physical Sciences in 2030 and beyond. This report will summarize our historical and aspirational resource allocations while highlighting our departmental vision for CBE in the context of its importance to the university and state.

A.1 Faculty Composition

At present, CBE has fewer tenure stream faculty positions than at any time since its creation as an independent department. Figure 1 illustrates the change in CBE's faculty numbers and composition since 2016. Two trends are clearly evident: 1) the sum total of all faculty lines is the same as it was upon departmental creation in 2016, while 2) becoming much more senior in its composition. To this latter point, after the current tenure and promotion cycle, the department will have only *one* Associate Professor and *zero* Assistant Professors. Meanwhile, one tenure stream faculty line has been replaced with an instruction-centric Professor of Practice position. This composition introduces a variety of difficulties for the department's research enterprise as instructional faculty do not contribute in this area and Assistant Professors – the strategic and dynamic lifeblood of the academic research enterprise – are completely missing.

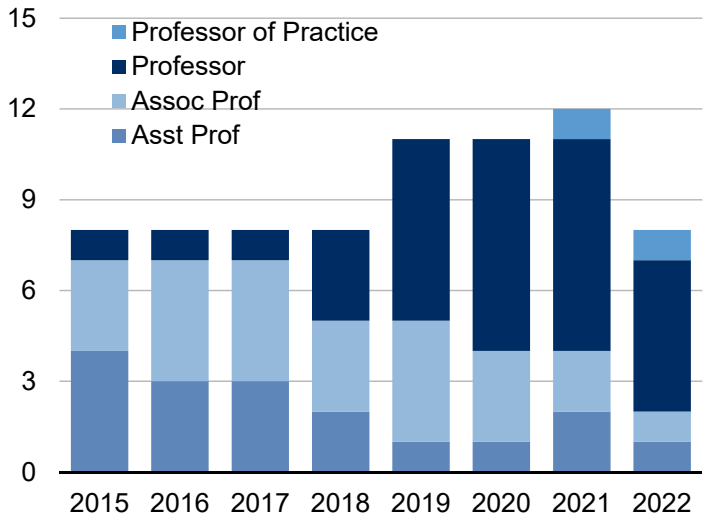


Figure 1. *Faculty lines by position for Chemical and Biomedical Engineering since the creation of a stand-alone CHE Department (2016-present).*

Administrative burdens also erode our overall productivity in several ways. While it is true that Professors do and should contribute much more administratively, our department has received two senior faculty in administrative roles (Dean and Department Head). Additionally, we

have had three opportunity hires placed in tenure track positions. Consequently, at the faculty's peak population, more than half of our members were direct hires or intra-college transfers. This hiring trend has been so ubiquitous, in fact, that – until the current academic year - we have not conducted an open external search to fill a tenure track Chemical Engineering line since ***2009-10***. Our hiring practices and the college's prioritization of our faculty lines for administrative and accommodations has directly contributed to the thematic disarray in which our program currently finds itself.

A.2 CBE Graduate Program

Figure 2 summarizes the number of CBS MS and PhD students on research fellowships or GTA lines since 2016. It is important to note that Chemical and Biomedical Engineering is a research intensive discipline that strongly favors PhD students. Consequently, there are few opportunities to develop professional master's degree programs or even to increase the number of MS students beyond the QuickStart BS/MS program. Nevertheless, we do offer a joint MS/MBA program that has one enrolled students and could be a vehicle for enhanced MS student recruitment.

The CBE graduate program relies primarily upon research fellowships as our State GTA allotment is far below sustaining levels. GTAs are an essential resource to complement teaching capacity, primarily for laboratory and recitation courses, and to strengthen the overall graduate program. We use GTAs heavily in our Unit Operations Laboratory courses (6 credits), Bioengineering Lab (3 credits), Computing Courses (4 credits), and larger, labor-intensive core undergraduate courses (12 credits). Chemical Engineering graduate students are also capable teaching assistants for interdisciplinary courses such as chemistry laboratories. Beyond their teaching duties, GTAs are force multipliers for graduate programs. In Chemical Engineering We have determined that our baseline GTA need as teaching support is 5 GTAs. To support our graduate program, this number is7, which would allow centralized recruiting to fill these spots before moving students to research funding. This is a widely used mechanism across research intensive Chemical Engineering departments and produces higher quality students, higher quality research outcomes, and less administrative burden on faculty to recruit individual students.

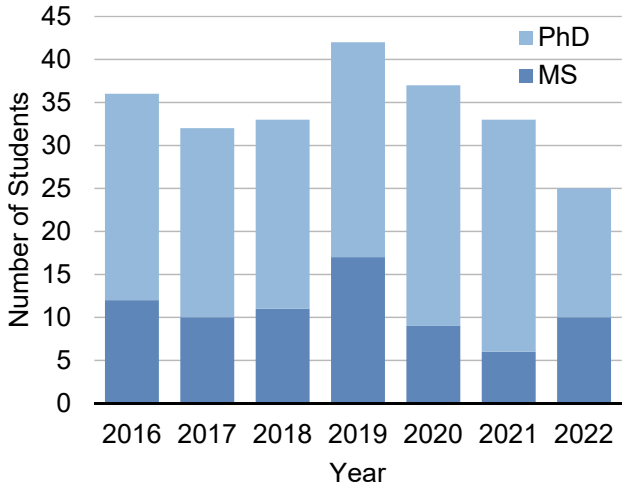


Figure 2. *Chemical and Biomedical Engineering Graduate fellowships since the creation of a stand-alone CHE Department (2016-present).*

A.3. Minimum Faculty Level Needed to Achieve Long-Term Viability

Teaching and research cannot be pursued independently in Chemical Engineering, as the engineering and scale up of new scientific principles and techniques is a continual and self-renewing pursuit. In this spirit, Chemical Engineering is sometimes called "the flywheel of the sciences". It is therefore common for Chemical Engineering faculty to be formally trained in the basic or applied sciences. This is rather unique to Chemical Engineering and uncommon for most

other engineering disciplines. Because we demand research excellence as a department, prioritize the training of PhD candidates over MS students, and rely upon our research enterprise to provide experiences for our undergraduate students, it is imperative that our minimum teaching load remains at 2 courses annually (i.e., a 1+1 or 25% teaching load).

As summarized in Figure 1, our faculty numbers have ranged from 8-12 full time equivalent positions (FTE) with a healthy distribution across faculty levels, since 2016. Following the recent budget crisis, our numbers have plummeted due to departures and retirements. We now have 8 FTE, which include one Professor of Practice and 7 Tenure Stream Faculty. In addition to these counts, we are currently search for one Assistant Professor and one Professor of Practice, which could possibly bring our numbers back to 10 FTE. These numbers – 8 tenure stream and 2 FTRC faculty – are not sustainable to deliver our instructional, research, and service mandates. Annually, our core undergraduate curriculum consists of 45 credits and our graduate core curriculum 14 credits. All core classes are taught only once per year. Our minors require the teaching of 15 elective credits per year to sustain an alternating year cycle. Our Engineering Science curriculum contribution requires the teaching of 6 additional credits. These obligations represent our absolute *baseline* teaching load and were used to calculate our minimum annual teaching need despite not including many elective offerings.

Based on an analysis of our course delivery requirements and anticipated teaching loads, **our minimum, or baseline faculty count is 15 FTE**, preferably heavily skewed toward the tenure stream. Therefore, at the end of the current hiring cycle, assuming successful searches, the CBE Department will be 5 FTE below baseline. We would hope to close this gap by hiring 4 tenure stream faculty and 1 additional teaching professor. Currently, the teaching gap is bridged by hiring adjuncts, graduate student instructors, teaching overload, and even relying upon alumni volunteers to serve as instructors.

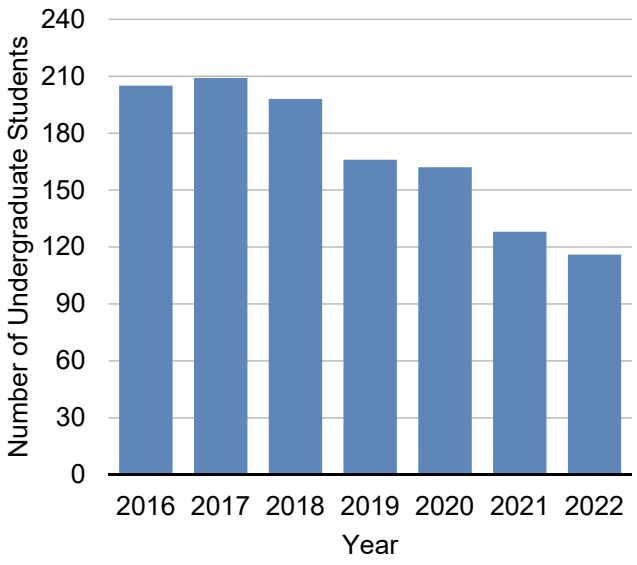


Figure 3. *Chemical and Biomedical Engineering Undergraduate enrollment since the creation of a stand-alone CHE Department (2016-present).*

As a side note, we have at least one Professor who has indicated his intention to retire in the next 2-4 years. Likely, this retirement will occur before we reach our baseline, which will increase our hiring needs even more. Retirements can be anticipated, but the CPM process does not account for this routine and predictable occurrence. The University should have a transitional retirement program in place to replace retiring faculty before they fully leave campus, which will reduce the stress of these losses on departments and programs. And finally, this analysis does anticipate the departure or promotion of younger faculty to other positions, either internally or externally. These losses cannot be anticipated, but it is important to acknowledge that *any* departure would be almost existentially catastrophic to our department, which has been placed in an extremely fragile position.

It must be emphasized that the value of maintaining a Chemical Engineering program is not primarily the education of undergraduate students. This is true across most engineering disciplines where the curricula is increasingly becoming a commodity and programs must differentiate themselves via experiential learning and individualized instruction. This is particularly true in Chemical Engineering. Not captured in the above analysis is the number of students who seek non-coursework research opportunities and leverage these experiences to strengthen their medical or graduate school application portfolios.

B. Peer Comparisons

Of the ten peer universities suggested by the executive committee, eight offer Chemical Engineering programs. These departments were surveyed for total student number and the breakdown of full time equivalent (FTE) appointments. These data are shown below in Table 1 and compiled into a category plot in Figure 4.

Table 1. *Peer Comparisons*

Peer Institution	Enrollment	Tenure Track Faculty	Jointly Appointed TT Faculty	Instructional Faculty
University of Wyoming	116	7	0	1
Colorado State Univ.	473	15	2	1
Montana State Univ.	408	15	0	2
New Mexico State Univ.	121	9	0	1
University of Alabama	684	21	1	0
University of Toledo	276	8	0	1
University of Utah	401	19	6	2
Utah State Univ.	Does not have a Chemical Engineering Program			
Louisiana Tech Univ.	104	7	0	3
North Dakota State	Does not have a Chemical Engineering Program			
Univ. of New Mexico	333	16	0	1
Univ. of North Dakota	202	7	1	1

C. Department-Specific Aspirations The Chemical Engineering Department places graduates in and contributes research activity to each and every major revenue producing industry in the State of Wyoming including oil and gas production, petroleum refining, mining, minerals processing, coal conversion, and even agriculture and our advanced civil infrastructure. To wit, major upstream oil and gas producers hire Chemical Engineers over Petroleum Engineers by a factor of two. This emphasizes that Petroleum Engineering is a sub-discipline of Chemical Engineering, with our faculty able to both teach and perform research successfully in these areas – as we currently do. Chemical Engineers also contribute to the state's small but dynamic and growing biotechnology industries, and even contribute to growth in this area through our successful start up companies. This highlights the entrepreneurial spirit of our small faculty. The following section details the ambition of the CBE department to become a nucleation point within the CEPS for new academic programs, collaborative research projects, research centers, and entrepreneurial activity.

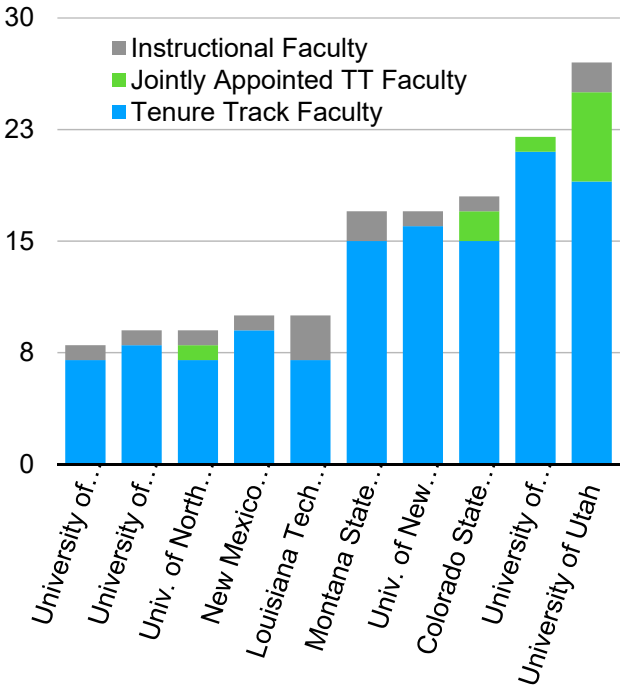


Figure 4. *Total FTE lines (excluding research faculty and office and technical staff) for Chemical and Biomedical Engineering at the University of*

C.1. Chemical Engineering Research Aspirations

Historically, chemical engineering has its roots in petroleum refining and the conception and design of processes for chemical manufacturing. More generally, chemical engineers design and analyze processes that are diverse in nature, ranging from physical to chemical, biological, and even financial. Relying upon the broad foundations of engineering: math, physics, and chemistry, Chemical Engineering has sprawled to include any sub-discipline that can reasonable require "process analysis". This, of course, does still include classically designing equipment, systems, and processes for refining raw materials and for mixing, compounding, and processing chemicals. Increasingly, chemical engineers can be found in industries that produce high value products such as semiconductors, pharmaceuticals, and opto-electronics. Chemical engineers are also highly sought by medical and law schools for their fundamental training and analytical mindset.

The Chemical and Biomedical Engineering department currently has active research programs in biomaterials and tissue engineering, carbon-based materials, gas and liquid separations, energy conversion and storage, and transport in porous media. This research profile is contingent upon the whims of recent hiring practices and has not been shaped to build areas of strength. Future growth will emphasize research breadth with overlapping and complementary strengths. The departmental goal is to build strength and synergy from which centers of excellence may evolve while developing the resilience and degeneracy necessary to withstand attrition. Responding to the needs of the university and state while building upon our current strengths and drawing from the foci of modern chemical engineering, we intend to build out in the areas of process engineering

and control, biomedical engineering, and materials science. These areas are described in detail below:

C.1.1 Process Engineering and Control

Process Control was established as CBE's first internally delivered minor in direct response to the needs of industrial stakeholders from Wyoming. A clear need for more process control specialization in our curriculum was articulated by the companies that hire our undergraduate students and was backed by financial and in-kind resources. Accordingly, in coordination with Electrical Engineering and Computer Science, we now offer an enhanced suite of Process Control courses that allow students to begin specializing as early as their Sophomore year. In the current year we aim to hire a Professor of Practice to guide this program academically, serve as a liaison with industrial stakeholders, and manage fundraising and capital resources for the program.

C.1.2 Biomedical Engineering

Many Chemical Engineering programs across the nation and within our peer group have chosen biomedicine as a research or curricular speciality to co-locate within their department. This is because the modern biotechnology industry has grown out of chemical engineering departments by treating cells as living catalysts to produce biological molecules within specialized reactors. From this genesis grew the modern pharmaceutical industry. Chemical engineers also contribute their expertise to biomaterials and biomedical device design, food science, biological fuels and chemicals, and medical research. Biomedical Engineering is a strength of the CBE Department. Having already built out laboratories and college/university-level core facilities, we are positioned to rapidly add to this strength and grow within biomedicine and the biological and biomedical sciences, which is a lucrative and expanding area for research funding from the NIH, NSF, DoE, DOD, and NASA.

C.1.3. Materials Science and Engineering

A coherent program in Materials Science and Engineering (MSE) has long been a collective ambition of engineering and the physical sciences. An effort to develop a graduate program in MSE has been supported by the Wyoming Space Grant and NASA EPSCoR, and has been coordinated from the Chemical Engineering Department. This existing interdisciplinary materials science program is therefore well positioned to extend to the undergraduate level in the form of a minor, as described below. Currently, three CBE faculty focus upon materials science in some form (biomaterials, thin films, membranes, carbon-based materials, catalysts) and future hires should emphasize research at the intersection of process engineering and materials science. The current funding climate positions materials science as a rich area for research awards, and the recently passed "CHIPS and Science Act" will increase research funding in semiconductor processing, thin films, electronic materials, and related technologies by billions of dollars. Materials science, with a focus upon semiconductor and microelectronics materials and processes is therefore the department's highest research priority and will pay dividends for our faculty and students, alike.

C.2. Chemical Engineering Teaching Aspirations

The CBE Department's next initiative will be to ***coalesce Materials Science and Engineering research into a formal minor*** that will be made available to undergraduate students across engineering and physical sciences disciplines. The model for this minor will be the BME minor in which many departments share course offerings and students may select tracks most appropriate

to their background and preparation. This offering will come to fruition after a long planning period, supported by the Wyoming Space Grant and NASA EPSCoR, which has also produced an interdisciplinary PhD program in Materials Science.

Having created three internally offered minors, the CBE Department will seek to e*nhance its laboratory offerings*, which have been fallow for years given the lack of GTA, faculty, and technician support. CBE has yet to realize its ambitions for the wonderful Interdisciplinary Fluids Lab in the EERB and intends to integrate this facility into courses from the Sophomore through Senior levels.

Finally, the department will work to *support its experiential course offerings*. While we have long offered students the opportunity to earn credit for internships and independent research, we have just launched a Co-op program that is supporting its first cohort. Enhancing the co-op program, research experiences, international study, and other experiential opportunities requires curricular support for which we have not had the necessary resources. Options include developing online courses that students may take to stay on track while working or studying remotely, offering courses multiple times per year, providing resources for independent research, and improving our seminar course.

The activities described above represent bold initiatives, but there are far more pedestrian efforts that we have been prevented from by severely limited resources. These include co-teaching courses to assist junior faculty adjust to college level pedagogy, establishing course assignment rotations among faculty to provide diversity in our offerings, and performing internal reviews to ensure that our curriculum is being delivered consistently and efficiently.

C.3. Chemical Engineering Service and Outreach Aspirations

Chemical Engineering will continue to promote its curriculum and career opportunities to prospective students, provide high level advising and mentoring, and lead at all levels of the university and state. Our faculty will be leaders in their disciplines and will contribute to conferences, journals, and funding decisions at a national and international level. In short, we aim to restore the name of the University of Wyoming as an institution of national repute where innovations are created, careers are launched, and leadership is forged.

C.4. Chemical Engineering Student Success Aspirations

Student success requires first exposing students to the myriad of options that they will face after receiving their BS degree in Chemical Engineering. To this end, we must work more closely with the Susan McCormack Student Success Center to help project a modern perspective of Chemical and Biomedical Engineering to incoming Freshmen and articulate their future career opportunities. We will seek to diversify and broaden on-campus recruiting options to offer students less monolithic career choices. Coops and internships will become an increasingly important tool for both industry relations and student placement and we intend to expand these programs into the DoE National Laboratory system. Finally, we must identify our most talented students early and offer them high quality research opportunities in order to maximize their chances of graduate school success.

C.5. Chemical Engineering DEI Aspirations

Diversity in our faculty and students is a source of strength and dynamism. Among our peer institutions, Chemical Engineering undergraduate student populations average about 32%

women or one out of every three graduates. UW CBE is lower than that by a third (~22%). A groundbreaking MIT study in the 1990s tracked the influx of women into engineering from the sciences and highly correlated this movement with the advent of Bioengineering. We must promote our biomedical engineering program widely, but particularly to aspiring women engineers in order to reset the gender balance of our student body. We also wish to enhance our international programs, both by offering UW students international experiences but also by making it easier for international students to study CBE at UW.

D. Resource Needs to Meet Aspirations

Undergraduate enrollment does not – and should not – drive the need for faculty type or number, nor graduate student allocation. The number of undergraduate courses that are taught on an annual basis is independent of enrollment and one could argue that our current offerings are undersubscribed. Therefore, enhancing undergraduate recruiting to our department is a priority to help realize the potential of the Chemical and Biomedical Engineering Department.

Realistic projections would require that we hire 1 tenure stream faculty over each of the next three years to simply remain at or close to our current faculty levels. To grow as our curriculum and research portfolio according to our ambitions, our hiring rate must therefore outpace attrition. To reach our minimum established baseline level of FTE faculty by 2030, we must strive to hire two faculty per year. Because the pool of high quality Chemical and Biomedical Engineering faculty candidates is smaller than the demand for them, *any constraints placed upon our searches* – whether it be the result of desired research focus or perceived need – severely diminishes our ability to acquire the best possible faculty for our department. If this ambitious pace can be met, the department *may* reach a size that meets or exceeds a desired steady state of 18 FTE by 2030.

The departmental allocation of GTAs and GRAs must also be increased to complement our faculty hiring. GTAs are essential to develop a robust graduate program by supporting each first year cohort, with the ancillary benefit that they help develop and deliver our curricular offerings. GRAs will be used in start up packages to new faculty to maximize early career productivity without teaching requirements. In total, the CBE Department requires a baseline of ***7 GTAs*** and ***6 GRAs*** for these purpose

CHEMISTRY

A. Historical and current numbers for Chemistry

- *Research faculty:* Below is a bar graph showing the steady decline in our research faculty numbers over the past 8 years due to budget cuts and an eroding research infrastructure at the university. Before 2015, the department used to have 4 research faculty members in each of our 4 traditional divisions, i.e., organic, inorganic, physical and analytical chemistry, which helped us maintain a fairly balanced research and graduate curriculum. At this point, we are down to a total of 10 research faculty (from 16) with 3 each in the inorganic, physical and analytical divisions and only 1 in the organic division (Figure 1). Over the past 5 years, faculty shortages have forced us to close down our advanced General Chemistry curriculum (CHEM 1050 and 1060), the trailer sections of the organic series (CHEM 2420 and CHEM 2440) and we are currently offering our introductory organic course for non-majors (CHEM 2300) by hiring a temporary lecturer. At the graduate level, the department is barely able to offer 3 courses each semester that our students are required to register at the minimum for staying enrolled at UW which is severely restricting their progress in the graduate program. We are currently running a search for 1 organic faculty and need another 5 research faculty positions in the coming years to meet our baseline need of bringing back our research and graduate programs to the previous level.

- *Teaching faculty:* We are down from 5 teaching faculty to 4 with one member of this group recently moving to a different academic unit at UW. This individual with a background in biochemistry /molecular biology has been instructing our Biological Chemistry course (CHEM 4400) which we are required to offer for maintaining accreditation for our undergraduate program with the American Chemical Society (ACS). Additionally, our lecturers are currently covering 7 courses on overload which is not sustainable. Thus, we urgently need 1 additional lecturer position to be able to maintain our ACS accreditation and reduce the teaching overload for our lecturers at the same time.

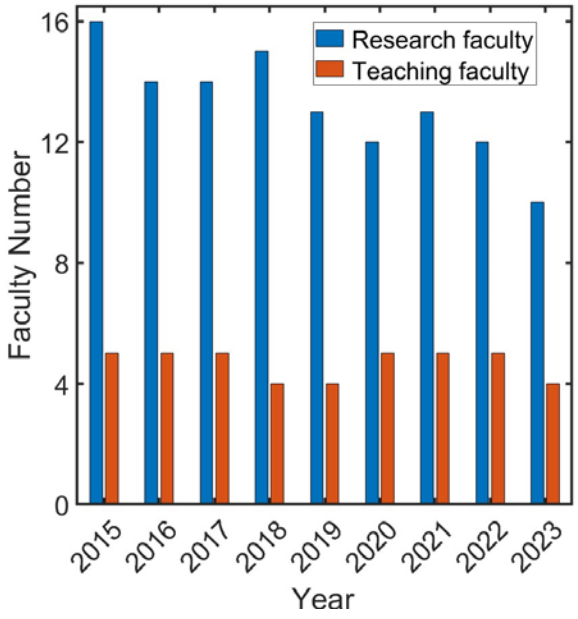


Figure 1. A record of the declining research faculty numbers in the Chemistry department

- *GA positions:* Another area of concern is the limited number of state-funded graduate assistant (GA) lines offered to our Chemistry program which presently sits at 15. The Chemistry department offers several service courses that are essential to students in various disciplines for completing their academic degrees. For example, just our General Chemistry curriculum typically serves over 1400 students each academic year and the department runs about 116 laboratory sections for undergraduate students. Our GAs serve by helping us run these courses, and particularly their laboratory sections, in a safe and productive manner. With 15 GA slots, we are currently forced to operate our laboratories by hiring a similar number of undergraduate teaching assistants (TA) which compromises both laboratory safety and quality of instruction. This is because many of our undergraduate TAs have limited experience in course/laboratory work and sometimes serve as TAs after completing just one semester of a laboratory course. Clearly, the current situation is risky but the department does not have other options. Also to be noted is the fact that the above numbers correspond to a GA per laboratory section of 0.13 which is significantly lower than the corresponding ratio for other departments in the

College of Engineering and Physical Sciences which runs between 0.25 and 0.50. Therefore, another baseline need for our program is to increase our state-funded GA lines to at least 25 which used to be the case about 20 years back.

B. Peer Comparisons

Below are some peer comparisons of faculty and graduate student numbers and their remunerations for Chemistry departments in selected Mid-American State Universities. This choice for our comparators was

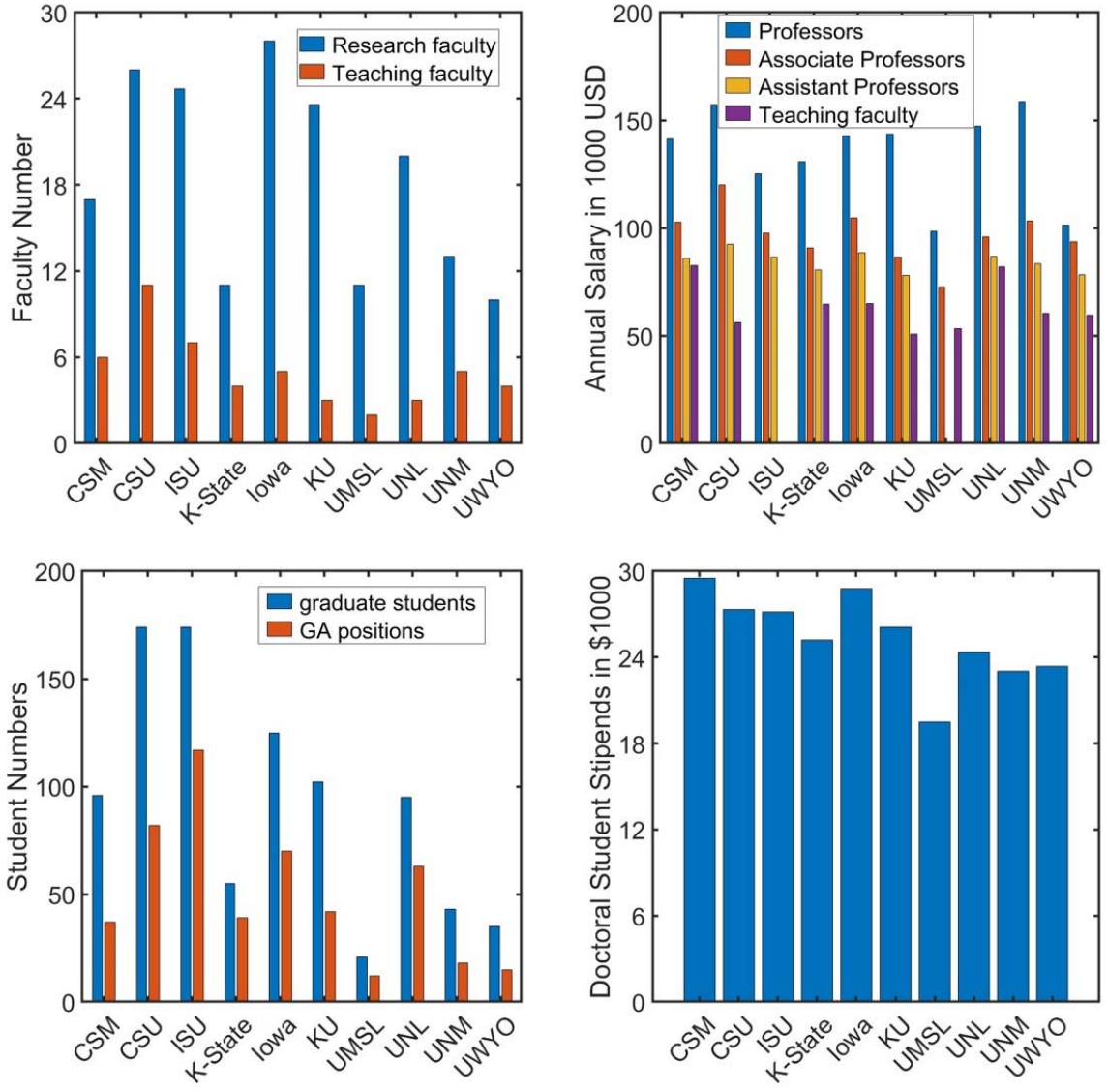


Figure 2. Comparison of faculty and graduate student numbers and salaries for Chemistry departments reported at the 2022 Mid-American State Universities Association (MASUA) meeting

made as we compete for students from similar regions and have a similar cost of living.In spite of the lower faculty and graduate student numbers, we are presently doing quite well in acquiring research grants supporting about 57% of our graduate students through funded projects. Note that this number is significantly greater than the percentage of graduate students (38%) typically supported through project grants in other small chemistry departments like ours across the US based on a survey

Ph.D. Program Survey				
	Small	Medium	Large	UWYO
Average number of Research Faculty	15	20	33	10
Average number of Ph.D. Students	25	70	183	35
Percentage of institute funded GAs	62	55	45	43
Average number of institute funded GAs	15.5	38.5	82.35	15
Average number of grant funded student	9.5	31.5	100.65	20

(https://www.acs.org/content/acs/en/education/students/graduate/survey-of-phd-programs-in-chemistry.html) that was published by the ACS (see Table 1).

C. Department-Specific Aspirations

i. *Research:* The Chemistry faculty aspires to develop a graduate and research program in Biochemistry to grow our doctoral student and research grant numbers. The department has been receiving an increasing number of graduate student applications interested in pursuing a degree in biochemistry for example, but we have not been able to recruit them due to the lack of a graduate program and research faculty in that area. Moreover, the department has had very limited success in attracting research grants from the NIH and the biological programs in NSF, DOE and DoD, over the years restricting the expansion of our graduate program in Chemistry. We therefore plan to focus our future CPM requests in this area.

   Another area our department has been struggling with in recent years is the number and quality of domestic graduate students recruited into the program. In the past two years, only one of our 21 graduate recruit was domestic and a major factor for this struggle is the stagnant remuneration for our graduate students. The current chemistry graduate stipend of $23,375 was adopted about 13 years back and is no longer competitive for attracting high quality students which is hurting our research productivity and quality of GA instructional activities. We feel this stipend needs to be increased by at least $3,500 for us to stay competitive in recruiting high quality graduate students.

ii. *Teaching:* As noted earlier, our undergraduate program is required to offer a course in Biochemistry to maintain ACS accreditation for which the department needs to make a hire immediately. Moreover, he/she will be expected to develop additional courses at the undergraduate and graduate levels for seeding a biochemistry program in the department which is currently not available at UW. The American Society of Biochemistry and Molecular Biology recommends that the threshold for a Biochemistry program is about 4 contributing faculty members which we plan to pursue in our future CPM requests. We envision that some of our future hires in this area may have a joint appointment in other departments helping them meet their teaching needs at the same time. Because many of our chemistry classes are required for a biochemistry degree, this pursuit can be expected to significantly benefit the current Chemistry program as well.

iii. *Service and Outreach:* The department has recently initiated an online class for Chemistry non-majors (CHEM 1000) by hiring a temporary lecturer which has reached an enrollment of over 60 students in its second year of offering. There are at least another couple of courses that we can currently offer for distance education to serve a broader community of students but are unable to do so due to faculty shortages. Once we climb back up to about 16 research and 5 teaching faculty members, we envision offering several online chemistry and biochemistry classes and possibly an online program in this area.

iv. *Student Success – undergraduate and graduate:* One aspect that we pride at UW is the relatively large faculty to student ratio in our classrooms which has been compromised in recent years due to faculty shortages and needs to be restored quickly for student success. Another aspiration for the department is the modernization of our junior and senior level chemistry laboratory infrastructure. Currently, we have state-of-the-art laboratory facilities for the freshman and sophomore level chemistry courses after they were moved from the Physical Sciences (PS) building to the Enzi facility. But our junior and senior level laboratories were never renovated and still rely on several outdated instruments that put our students at a disadvantage in the real world. Similarly, there is a strong need to improve our research environment for boosting our graduate student success. This would require both modernization of the research laboratories in the PS building as well as hiring a technician for maintaining and billing our high-end research instruments.

v. *DEI:* Once the enrollments in our undergraduate and graduate programs are improved, we aspire to start a Graduate Student Organization for promoting DEI in our student bodies. We envision this organization to work closely with local ACS chapter in launching student-led initiatives that create an environment appropriate for DEI and thus, helping our students better prepare for the next steps in their career.

D. Resource Needs to meet Aspirations

- Additional research faculty positions: 5
- Additional teaching faculty positions: 1
- Additional technician needed for maintaining chemistry research instrumentation: 1
- Additional GA lines: 10
- Increase in GA annual remuneration: $3,500 per year
- Modernization of our research as well as junior and senior level teaching laboratories

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

Historical and Current Data for the Department

Prior to July 2022 EECS consisted of two departments (Computer Science, and Electrical and Computer Engineering). The combined department is home to three ABET accredited undergraduate programs (Computer Science, Computer Engineering, and Electrical Engineering), MS and PhD programs in Computer Science, and MS and PhD programs in Electrical Engineering. In addition, it has a bio-engineering option, and a cyber-security certificate at the undergraduate level.

The 2021 Reorganization Committee noted that the "EECS department will be unsustainably staffed at its inception July 1, 2022", and "strongly recommends the strategic hiring of nine additional tenure-track or tenured faculty, four additional non-tenure track faculty, and nine additional technical staff over a five-year period." 2 Tenured faculty and 2 lecturers have departed since then, and 3 faculty and 2 lecturers have been hired. Thus, as of the start of the AY 2023 year, the net change since the report has been the addition of one faculty member.

Below is historical and current data to illustrate the department needs to remain viable.

Faculty and Lecturers
Combined personnel counts are given for the years 2006, and the year 2022.

Type	2007	2022
Tenure-track or tenured	24	17
Instructor/Lecturer	3	4
Prof of Practice	0	1

This represents an 18.5% total decrease in academic personnel; and 29% decrease in TT faculty over this time period.

Majors

Type	2007	2022
BS COSC	123	222
MS COSC	14	6
PhD COSC	18	34
BS EE + BS CPEN	182	156
MS EE	19	16
PhD EE	18	12

As of Fall 2022, there were 222, 90, 66 undergraduate students enrolled in Computer Science, Electrical Engineering, and Computer Engineering, respectively. OIA data shows that the combined departments an increase in about 23.9% undergraduate majors over the same time period.

Graduate assistantships
The CS and ECE departments received a total of 14 State Graduate Teaching Assistants for Academic Year 2021-2022 (seven per department), or 0.7 GTA per faculty member. More GTAs are needed to keep class lab sections small for pedagogical reasons (e.g., less than 40 in COSC and less than lab capacity in ECE).

Staff
Most recently EE and CS were staffed with a (shared) office associate senior, a senior engineer, and a master technician. This has left many duties and responsibilities to be fulfilled by instructors or faculty.

Consequences and lost opportunities
Due to the decrease in faculty numbers, core courses in the undergraduate EE and CPEN majors are no longer taught every semester. This results in students who do not pass one of these courses delaying their graduation by a year

Lower personnel numbers have resulted in a decrease of upper division and graduate course offerings.

Low personnel numbers have limited faculty's ability to incorporate more active-learning in their classrooms, to make some classes more project-based, or provide more students with "internship-like" experiences.

Table 1.

University	UG	Grad	TT Faculty	Inst. Fac.	Total Fac.
U. Wyoming	378	66	17	4	21
Colo. State. U.**	1244	640	41	11	52
U. Utah**	1828	185	99	17	116
Montana State U.**	796	67	26	7	33
NDSU**	598	77	27	4	31
NMSU	645	234	33	4	37
University	UG	Grad	TT Faculty	Inst. Fac.	Total Fac.
U. Wyoming	378	66	17	4	21
Colo. State. U.**	1244	640	41	11	52
U. Utah**	1828	185	99	17	116
Montana State U.**	796	67	26	7	33
NDSU**	598	77	27	4	31
NMSU	645	234	33	4	37

Comparison to peer universities (indicates R1 Institution)**

Peer Comparisons

Peer universities were suggested by the executive committee and accepted as reasonable based on regional competition for students, aspirational metrics for R1, or similarity of college structures. These are show below in Table 1.

Minimum staffing and support levels for long-term viability

The Reorganization committee report recommended

- at least 25 TT faculty, and 8 lecturers. The larger number of lecturers recommended is to support the department's increasing teaching missions.
- a Computer Support Specialist to provide basic, routine, and advanced level computer and software technical expertise for the new department, and "act as a liaison between Information Technology and the supported unit."
- An average of 1.0 GTA per faculty member. More GTAs are needed to keep class lab sections small for pedagogical reasons (e.g.,less than 40 in COSC and less than lab capacity in ECE). The target GTA allocation consistent with the target faculty numbers will be 33 GTAs for EECS.

Departmental Aspirations

Research
The EECS department strives to have a research program that is nationally and internationally competitive and relevant to the state. To achieve this, given its relatively small size compared to U.S. EECS programs, the department has chosen to focus on the following areas that have significant anticipated funding growth and economically disruptive technologies.

- **Modern Power Grid Data Analysis & Modelling.** The long-term goal of power system research in EECS is to provide better power system monitoring and operation with the support of signal processing, advanced computing, and intelligent control.
- **AI/ML and HPC.** Advances in artificial intelligence (AI)/machine learning (ML) and convergence with high- performance computing (HPC) make possible the automation of many knowledge worker tasks leading to the possibility of sweeping changes in various economic sectors like energy, transportation, advanced robotics, rural health, and agriculture. Targeted hiring of several new faculty in computer vision, quantum computing, and advanced ML areas can lead to long term sustainable growth in research funding and graduate students.
- **Visual and Interactive Computing (VIC).** Areas of computing disciplines concerning images, computer graphics, 2D/3D models, data processing and visualization, displays, and interactivity are foundational to most computing applications, systems, and state-of-the-art facilities. VIC requires fundamental and applied research and teaching that is widely interdisciplinary across computing disciplines, including those proposed for the new Department (such as AI/ML and Cybersecurity), and the UW campus. Faculty in health, kinesiology, psychology, geology, anthropology, education, art, and other areas conduct interdisciplinary research and teaching with VIC disciplines. Growth of faculty in VIC will

expand and strengthen interdisciplinary and transdisciplinary research necessary to be competitive for larger external funding sources.

- **Cybersecurity and Internet of Things (IoT).** The security, resilience, stability, and gained efficiencies of systems and processes within our society require fundamental and applied research which intersects with the entire computing spectrum, including the research areas proposed for EECS. While interconnected computational networks have existed for the past 50 years, advances in edge devices with efficient communication techniques have embedded a diverse set of computation sensing/decision making devices as critical components within our society. Current research activities in this space at UW (Autonomous Swarms, Security of AI/ML systems, Industrial Control Systems, Blockchain) would be expanded and refocused to programmatically connect with other research initiatives and projects. Focusing on research initiatives and faculty within four areas of computing, namely physical infrastructure/distribution, communication networks, component hardware, and software security, will enables EECS to quickly gain critical mass that can be leveraged to attract competitive mid-scale funding (~$5 million) to then support re-enforcement and growth of core programmatic research areas. An interesting characteristic of the proposed cybersecurity thrust includes a focus on offensive (Red-Teaming) research that informs defensive research and commercial applications. Existing partners span industry, DoE (labs), and federally entities interested in fundamental research and workforce development. Given the importance of this thrust to national security, we expect this area to grow in terms of available funding (federal and industry), commercialization opportunities, and researcher/student interest.

Teaching

EECS faculty endeavor to train the next generation of top-quality engineers, researchers, and scientists. With a combination of successful, funded research and top-level industrial experience. EECS professors bridge the gap between theory and practice, creating an environment in which students can develop the requisite skills demanded by the best employers. Faculty are committed to incorporating best practices for learning (e.g., active and project-based learning). Approximately 1/5th of our undergraduate students are involved in department research labs. A long-term goal is to give all students access to internship or externship opportunities.

The department's well-defined research vision and focus on significantly growing funding and economically disruptive technologies will help attract more students, both local and international into our programs. Furthermore, elective courses tailored to address specific research activities in new areas of research will enhance the doctoral degree programs. A constant and large pipeline of our own high GPA UG students via the QuickStart BS/MS program and international students is an essential and crucial component for the proposed combined department to sustain and grow the external research funding/

Service & outreach

EECS aspires to serve the State of Wyoming through corporate partnerships (internships and research), K-12 educational activities geared to growing supply of tech-savvy graduates for Wyoming, and creating pipelines towards meaningful careers for Wyoming students. This will continue to be done through Engineering Summer Programs for Kids, Engineering Summer

Programs for Teachers, and summer camps on computing (e.g. The Art and Craft of Science) and cyber-security).

Student Success
EECS is committed to the success of its graduates, and offers a wide-range of tutorial services and value-added extra-curricular activities through over a half-dozen research labs that currently employ nearly100 students. Given appropriate resources, we aspire to double that number over by 2030.

Broadening participation
EECS views diversity as a source of strength, creativity, and innovation, and this will be reflected in its Broadening Participation Plan in Computing and Electrical Engineering, which is currently under-development. Our commitment to excellence in teaching, research, outreach is critically linked to creating an environment where each person can use their identify, culture, background, experience, status, and opinions to flourish and enrich UW.

Resource needs beyond the reorganization recommendations to meet aspirations

- Additional faculty (8) and lecturers (2) to bring us up to 40 faculty.
- Additional technicians to support teaching and research labs
- Additional TA-ships (6-8) to support active-learning

d. Resource needs to meet Aspirations
45+
GTA 1
Staffing 9
Space

ENERGY AND PETROLEUM ENGINEERING

The Petroleum Engineering Department offers education, cutting-edge research, unique facilities, and professional service to support the petroleum industry and contribute to the state and the university's economic health. Petroleum engineers identify and extract oil and gas resources from subsurface reservoirs, which can be either conventional or unconventional in nature. Petroleum resources are a vital energy source to fuel society and feedstock for the petrochemical industry. The Department has significant research expertise in reservoir engineering, simulation, and modeling; drilling techniques; production of oil and natural gas; enhanced oil recovery; CO_2 capture; and carbon engineering. The Department is a recognized leader in reservoir engineering and enhanced oil recovery. Several of the faculty work in collaboration with the School of Energy Resources, and one faculty is jointly appointed with the School of Energy Resources. The Department has recognized the growing need for additional energy sources and solutions will result in an energy transition during the next few decades and has chosen to expand its focus to include Energy Engineering.

All indications are that Petroleum Engineering enrollment is driven by hiring trends in the petroleum industry and is not related to any local conditions or issues at UW. The Ph.D. enrollment in the UW Petroleum Engineering Department is the largest in CEPS, fourth largest at UW, and the seventh largest among the eighteen US institutions offering Ph.D. degrees in Petroleum Engineering. The UW Petroleum Engineering Department was ranked 12th out of eighteen comparator programs in 2022 by US News and World Report.

The average time to degree for undergraduate students is 4.5 years for non-transfer students and 2.9 years for transfer students. The average time to degree is 2.9 years for M.Sc. students and 5.0 years for Ph.D. students. These average times to degree are consistent with all degree programs in the College of Engineering and Applied Science.

Historical and Current Data for department

Since the Department's formation in 2015, the Department has lost nine full-time faculty members. These being Dr. Shunde Yin, Mr. Ken Baum, Dr. Bahareh Nojabaei, Dr. Xuebing Fu, Dr. M.P. Sharma, Dr. Maciej Radosz, Dr. Fathi Elldakli, Dr. Pejman Tahmasebi, and Dr. Dennis Coon. A fully-time instructor from SER was also assigned to assist the Department at the time of its formation, Dr. Dario Grana (SER Assistant Professor in PETE and Geology and Geophysics). Additionally, two partial or contract instructors are no longer associated with our department. These being Mr. Gustave Anderson and Mr. Evan Egenolf. These losses have been only partially offset by the hiring of new faculty. However, in many cases the Department has lost individuals with many years of experience, and they have been replaced with individuals with significantly less experience in the field. In addition to the losses mentioned above, since the start of this year, two more faculty members, Mr. Douglas Cuthbertson and Dr. Khaled Gasem, have announced their retirements. This brings the total losses for the Department to 11 full-time faculty members in eight years, a loss rate of nearly 1.5 faculty members per year.

The Department is currently comprised of 12 faculty, following two retirements announced at the beginning of 2023. This includes nine (9) tenure-track, one (1) ETT Instructional Professor, and one (1) annually appoint faculty and two (2) Research Scientists. There is one (1) Post-Doctoral researchers and 56 Graduate Assistants. The Department's staff includes one (1) Office Associate Senior and five staff

members serving the Center of Innovation for Flow Through Porous Media (COIFPM). COIFPM staff includes two (2) Lab Managers, and one (1) Business Manager.

a. Current situation

The loss of near 1.5 faculty members per year is of extreme concern to the Department. This is especially concerning now that the Department is hoping to expand its focus to include aspects of Energy Engineering. It is believed that the Department will be unsuccessful in this new initiative, if additional faculty are not hired and additional resources, such as funding for training and outreach efforts, are not made available.

i. Defining minimum faculty levels for long-term viability

Given that The Department has lost two faculty since the beginning of 2023 it is believed that an additional five full time faculty position need to be added bringing the total number of faculty in the Department to 17.

b. Peer Comparisons

The Petroleum Engineering Program at the University of Wyoming was ranked 12th in the nation by US News and World Report for 2022. The other universities with programs ranked higher are shown in Table #1, along with the faculty count for the departments administering those programs.

Table 2: Top 12 Petroleum Engineering Program Rankings

School Name	Faculty number	Ranked in 2022 by US News
University of Texas at Austin	31	1
Texas A&M University	35	2
Stanford University	20	3
University of Tulsa	15	4
Colorado School of Mines	16	5
University of Oklahoma	15	6
Pennsylvania State University	7	7
Louisiana State University	14	8
University of Southern Cal	6	9
University of Houston	13	10
Texas Tech University	12	11
University of Wyoming	11	12

A plot of US News and World Report's ranking of Petroleum Engineering programs and the number of faculty in with these departments responsible for these

programs (see Figure #1) indicates a trend that suggests the greater the number of faculty available in these departments the higher the program ranking.

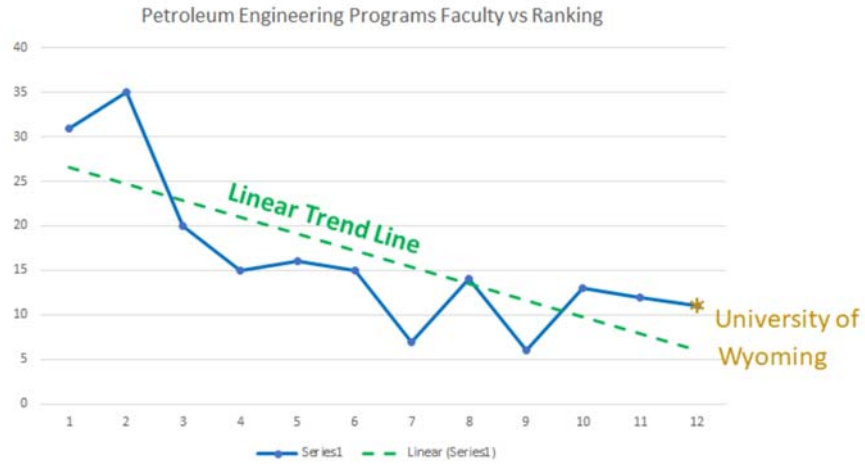


Figure 2: Program Rank vs Faculty Numbers

It is believed that this relates to a greater number and variety of course subjects being offered and taught within the program as well as a decreased service workload per individual faculty member as the overall service burden is distributed over more individuals. The Department believes that increasing the number of faculty will allow the following;

- Greater diversity of petroleum engineering related subjects being offered within the Department's Petroleum Engineering Program.
- Development and offering of Energy Engineering courses.
- Decreased Service requirements for individual faculty members as the Department's Service workload is distributed among a higher number of faculty.
- Increased time spent by faculty members on chosen research areas as a result of the decreased Service workload. (This, in turn, help the Department to assist to a great extent the University's efforts to achieve R1 status).

c. Department-specific Aspirations

i. Research – The Department is recognized for its research into a number of subject areas, such as Flow Through Porous Media, and its facilities, such as the High Bay Research Center, are acknowledged as state of the art. The Department wishes to expand its reputation in emerging petroleum research areas, such as the use of Data Analytics and Block Chain technologies in the field of Petroleum Engineering, as well as in existing petroleum research areas, such as petroleum systems modeling in Wyoming basins and flare mitigation technologies. Many other petroleum related research areas are also currently being investigated.

In addition to petroleum related research the Department wishes to extend research activities into various Energy Engineering subjects, such as hydrogen storage, subsurface energy storage and geothermal energy. All of these fields leverage existing strengths with the Department related to the understanding and exploitation of subsurface reservoirs.

ii. Teaching – The Department has a large repertoire of courses that cover many aspects of petroleum engineering and align well with the curriculum recommended by the Society of Petroleum Engineering, which is the lead authority for ABET in this field. These include courses on conventional and unconventional reservoirs. Some subjects, such as gas technology, are not taught due to lack of expertise within those areas. The hiring of new faculty could help to fill some of these gaps in the Department's course offering. Additionally, it is hoped that the Department could begin to develop and teach courses related to Energy Engineering that fall within the faculty's areas of expertise. Geothermal Energy, Subsurface Energy Storage, Hydrogen Storage and CO2 Sequestration are some of the topics in this discipline the Department wishes to develop and offer.

iii. Service and Outreach - Given the loss of nearly 1.5 faculty members per year the Department's capacity for service and outreach is not as high as desired. The resulting Service and Outreach requirements placed upon the Department is resulting in effort being diverted from research efforts. The Department is well aware of the University's desired goals with regard to obtaining R1 status. The hiring of additional faculty would allow a redistribution of the Department's Service and Outreach workload, thereby, decreasing the effort required of individual faculty members. The resulting time savings per individual faculty could be reallocated towards research, which would help to achieve the University's desired R1 status.

iv. Student Success – undergraduate and graduate - the department has been recognized with regards to student success in a number of areas. The Ph.D. enrollment in the UW Petroleum Engineering Department is the largest in CEAS, fourth largest at UW, and the seventh largest among the eighteen US institutions offering Ph.D. degrees in Petroleum Engineering. The UW Petroleum Engineering Department was ranked 12th out of eighteen comparator programs in 2022 by US News and World Report.

The average time to degree for undergraduate students is 4.5 years for non-transfer students and 2.9 years for transfer students. The average time to degree is 2.9 years for M.Sc. students and 5.0 years for Ph.D. students. These average times to degree are consistent with all degree programs in the College of Engineering and Physical Science.

v. DEI - The Department has a high degree of diversity within it with faculty, postdocs and graduate students originating from localities all across the world and coming from highly varied backgrounds. One area where diversity is not as great as these other areas is the undergraduate community. As with most undergraduate programs The Department's undergraduate students typically originate from nearby regions within the western US and Canada. Increased access to scholarships by international students is one way in which diversity within this group could be increased.

d. Resource needs to meet Aspirations

The greatest need that the Department currently has is a way to attract new faculty and retain existing ones. The stagnation of salaries during the past number of years has resulted in a disparage between the University of Wyoming and its contemporaries. Figure #2 shows the comparison between the number of tenure-track faculty members within the College of Engineering and Physical Sciences and its contemporaries. As can be seen the number of tenure-track faculty members within the College has remained nearly flat during the past approximately 20 years, whereas the vast majority of its contemporaries have significantly increased their faculty. While it is recognized that there are many reasons an individual might leave their current position (lower salary, lack of recognition, little local infrastructure, etc.) the College can only control a certain number of these factors. A significant increase in salary would help to make the College of Engineering and Physical Sciences more competitive for attracting new faculty and help to retain existing faculty. The Department considers this essential for the development of our new Energy Engineering initiative.

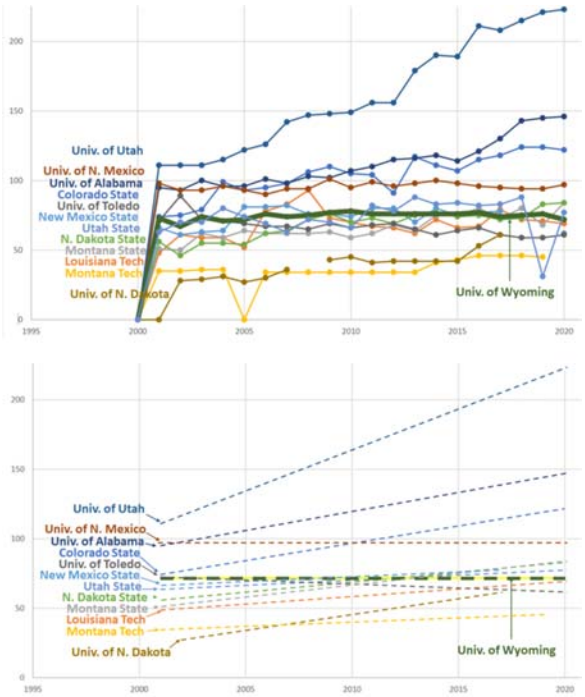


Figure 3: Total Tenure-Track faculty numbers by comparator college

In addition to attracting new faculty and retaining existing faculty, increasing current enrollments, particularly undergraduate students for petroleum engineering, is essential. In order to accomplish this, the Department believes that funding should be made available for scholarships and additional teaching and research assistantships for graduate students. This would allow the recruitment of talented students for our energy

engineering programs and the replenishment of our petroleum engineering undergraduates. Additionally, this would help with diversity within the undergraduate community. Finally, we believe that closer ties between our department and the petroleum industry and the emerging non-fossil fuel energy industry are needed. It is hoped that these will help the Department to achieve our other baseline needs as well as help to further our research efforts. Towards that goal the Department requests assistance at the college or university level to facilitate connections with these industries, perhaps with the assistance of the Wyoming Foundation and / or CEPS entrepreneurial group.

GEOLOGY AND GEOPHYSICS

Synopsis for the Department of Geology and Geophysics[1]

The Department of Geology and Geophysics (G&G) has a long history of academic, educational, and outreach achievement. Its impactful engagement with students, industry, the scientific community, the broader public, and, critically, the state of Wyoming, extends back to the University's founding in 1887. This is reflected in strong support from a loyal base of alums and industry connections that play both an active and vital role guiding and supporting the Mission of the department. For more on G&G's central role in natural resources see the Mission outlined in the University's 2017–2022 strategic plan.

Historical and current data for department

Overview

Today, G&G remains strong, continues to excel in undergraduate and graduate education, and is well respected by its academic peer community, ranking near the upper quartile in Earth science graduate programs according to recent US News and World Report rankings. However, recent budget cuts, reorganization efforts, and personnel changes in the University administration have created significant concerns about how G&G can sustain its outstanding reputation and success. These threats pose potentially dire consequences for G&G's future. They include maintaining breadth and depth in core disciplines and sustaining strong instrumentation and associated analytical capabilities, including vital staff and institutional structures. Perhaps most critically, the challenge of retaining faculty under difficult circumstances has played out in the loss of four of G&G's junior faculty to other institutions since 2020.

Additional challenges include adapting to the evolving broader directions and interdisciplinary scope of the Earth sciences in academia and society. These changes are affecting Earth science departments across the country, but addressing them and charting a path for the future has been particularly critical and challenging for G&G because of institutional volatility and reinvention, which makes strategic planning especially difficult.

A minimum faculty level for long-term viability

Currently, G&G has 24.25 total faculty members, including one current search and four senior, associate or assistant research scientists who are vital to the department's research, outreach, and service missions but whose job descriptions do not include teaching requirements. Two of the 20.25 tenured and tenure-track faculty members with teaching in their job descriptions were added from the now-eliminated Department of Geography. They do not teach courses in the original G&G degree programs, but instead continue to teach required courses in the geography degree program, which was not historically housed within the G&G department. Hence, the 24.25 mark is down substantially, to effectively 18.25 versus 26 at our peak in the early 2010s. After recent retirements and the recent loss of four assistant professors, including two who left for more stable positions in the wake of recent turmoil at the University, our teaching faculty is at a historic low. What's more, an additional five G&G faculty members are set to retire, two at the end of 22-23 AY and another three by the end of the 23–24 AY.

In a faculty survey conducted over a one-week interval in February 2023, the department determined from faculty participants that a minimum level of faculty of 28.25 faculty members would be needed to continue to conduct a comprehensive program of research, teaching, service, outreach, and diversity, equity, and inclusion (DEI) efforts. These four new additions at the assistant professor level will be vital to infusing bright, young talent into a department whose demographics are now heavily weighted towards veteran full professors. Planning for rebuilding after the imminent retirements will be critical to the department's continued success.

Peer comparisons

The Department of Geology and Geophysics is ranked 51st nationally in the US News and World Report for graduate programs in the Earth sciences. The University's list of institutional comparators and their ranks in terms of Earth sciences graduate programs is shown in Table 1.

Table 1. Ranks of Earth science programs at University of Wyoming comparators

Peer Institution	USN Rank	Stretch Peer Inst.	USN Rank
Montana State	89	Clemson	100
New Mexico State	131	Colorado State	46
North Dakota State	Not Ranked	Kansas State	Not Ranked
Oklahoma State	89	Texas Tech	113
South Dakota State	No Dept.	University of Utah	40
University of Idaho	100	University of Maine	89
University of Montana	100	University of Nebr	113
University of Nevada, Reno	56	Univ of New Mex	46
University of Rhode Island	89	Washington State	100
Utah State University	89	West Virginia	113

The peer institutions selected by the University of Wyoming are not good comparators for G&G; some are not ranked, and one has no Earth sciences department. Among the "stretch" peers, there are only three Earth Sciences departments ranked ahead of G&G. Moreover G&G is tied with at least one Ivy League institution (Dartmouth) not on the list. Table 2 shows G&G's proposed list of comparators that bracket our ranking and that represent both land-grant and comparable private Earth Science departments.

Table 2. Ranks of Earth science programs at proposed G&G comparators

Institution	Type	USN Rank	No. of Faculty
University of Wyoming	*Public*	*51*	*24.25*
University of Wisconsin, Madison	Public	12	21
University of Minnesota	Public	24	24
Colorado School of Mines	Public	28	17
University of Oregon	Public	33	17
University of Florida	Public	40	18
SUNY Stony Brook	Public	46	15
University of North Carolina	Public	51	13
Dartmouth College	Private	51	10
University of Alaska, Fairbanks	Public	56	15
University of Nevada, Reno	Public	56	26
University of Oklahoma	Public	56	23
Syracuse University	Private	81	14
University of Cincinnati	Public	100	16

Department-specific aspirations

The Earth sciences are increasingly engaging in an Earth System Science (ESS) approach to research and education, working at the intersections, connections and pathways among the "spheres" of the Earth—i.e., the geosphere, hydrosphere, atmosphere, biosphere, and anthroposphere. In addition, it focuses on applications that address humanity's Grand Challenges: climate change and its impact on biodiversity; quality and quantity of water resources; land-use planning, geohazards (including earthquakes, floods, and landslides); and the development of energy, mineral, water, and soil resources.

Research

Earth science research methods are expanding beyond field work to use sophisticated instruments, analytical methods, and remote sensing; increasingly large data sets; and computational modeling. Hence Earth science research is becoming more collaborative and inter- or even trans-disciplinary. Moreover, successful Earth science research must have access to modern analytical facilities (including local technical support and ability to travel to dedicated facilities) as well as access to top-end computational facilities with associated software and required IT support.

The department is well poised to continue to be a leader in research amid these trends. It has three overlapping areas of exceptional depth: near-surface and hydrologic processes; solid earth and tectonic processes; and geobiology, climate, and carbon (including energy geosciences). All three of these areas are bolstered by strong field efforts, exceptional in-house analytical capabilities, and remarkable faculty supported instrumentation and collections, notably including those associated with the historic Geological Museum.

Crucially these areas are at the center of many of humanity's Grand Challenges. For example, some of the most practically and scientifically important areas of Earth sciences in the coming decade and beyond will undoubtedly encompass the highly interdisciplinary topics of the near surface. These include hydrology, the "critical zone," spanning the atmosphere, hydrosphere and weathered layer, and studies of past and present climate change. G&G exhibits notable strength in these areas. This includes a nationally recognized Near Surface Geophysical facility that serves the research and teaching missions of the University, the state, and academic institutions across the country. In addition, the department has a strong core of highly productive faculty members working on paleoclimate and paleoecological problems that depend on the exceptional analytical facilities and collections and the faculty that maintain and curate these facilities.

Likewise, G&G has strength in energy geosciences and management, including strong collaborations with the National Labs via Department of Energy funding. These will also continue to be globally important areas of expertise, even in a gradually "decarbonizing" economy. Hence the department needs to maintain its strengths and future potential in these areas, which are critical to the interests of the state and which will require even more cogent partnerships with environmental and energy interests both with the National Labs and at the University, most notably the Energy Innovation Center, the Haub School, and the new School of Computing. More can be done to realize these partnerships in University planning, programs, and research.

Teaching

Earth science education is also evolving to reflect an Earth systems approach. This is motivating Earth science departments to conduct across-the-board curricular reviews to reassess the appropriate balance between traditional disciplinary courses (e.g., Mineralogy, Petrology, Structural Geology) and thematic courses (e.g., Climate Change or Geodynamics). Including new technologies (analytical instrumentation, geophysics, remote sensing, computational modeling) must be balanced with field instruction in departmental course offerings and degree requirements. An increasingly important skill for entrance in both the workforce and graduate studies is mastery of geographic information science (GIS). There is no consensus on the best curriculum for next generation Earth science education, and every department has its own opportunities and challenges, but this general landscape motivates discussions that all departments should pursue to be dynamic and impactful.

The Earth science workforce market is subject to strong externalities such as markets for extractive resources (primarily oil, gas, and minerals). This boom-and-bust cycle has historically been reflected in enrollments in Earth science courses and majors. This cyclical pattern is further

complicated by the fact that recruitment of majors to Earth sciences degrees has historically been challenging nationwide. Although many students in Wyoming have formal coursework in the Earth sciences during K-12 education, this is not the case outside of Wyoming, and most students do not get career counseling that encourages enrollment in Earth sciences may lead to an important, interesting, and fulfilling career path. Nationally, more than half of incoming Earth science majors are transfer students at the college level from other disciplines. Historically, many of G&G's own undergraduates were transfer students, but recently, with centralized advising on campus, G&G has seen a precipitous drop in enrollments that outstrips the declines one might predict from the boom-bust cycle noted above. This makes a renewed focus on in-house advising and excellence in the introductory courses and other types of visibility vital to recruiting students to the undergraduate program.

Service and outreach

A major component of G&G's service and outreach is provided by its extensive materials characterization laboratories, its nationally-recognized field geophysics facility, and its Geological Museum and its collections, which are extensive and highly significant scientifically. Maintenance of these facilities and of the service and outreach missions hinges on the department's four assistant or associate research scientists and one research professor, all of whom also contribute to the reputation and work of G&G. They are absolutely essential to running these facilities. In addition to supporting the service and outreach missions, they are also essential to the research enterprise, because the facilities they support are central to G&G's funded research projects. These people also provide critical instruction in techniques used by graduate students. They comport themselves as faculty, and they have the respect and voting status of tenured and tenure-track faculty G&G. It is essential that the University recognize and support their critical contributions to the health of the department and its stature in research. In addition, there is a need for an additional research scientist to help the department maintain its rock preparation, materials characterization, and field capabilities and create new efficiencies and opportunities.

Student success

Undergraduate student success: The undergraduate degree program in G&G offers pre-professional degrees designed to prepare students either for continued study in graduate school or for entry into the geoscience workforce. The degree requirements are in line with those of most geoscience departments[2]. However the design and activities of the courses are being reevaluated to ensure that modern expectations are realized: e.g., utilizing quantitative skills across the curriculum, emphasizing communications skills (written, oral, graphical), and professional ethics, as well as embedding problem-solving and course-based undergraduate research experiences into coursework. These considerations are focused on a student-centered approach. G&G has already formalized specific content and concept-based learning goals for their introductory courses. These are complemented by additional cognitive learning goals such as critical thinking, introduction to the scientific method, how to use models, and the understanding

and use of uncertainty. This review of student learning outcomes is being expanded to include all departmental degree programs.

Traditionally the program has focused on preparing students for careers in the oil and gas industry, but moving into the future, there is an increased need to emphasize the Earth system and systems thinking. There is a related need to address emerging issues related to the survival of humanity in the Anthropocene and what geoscience knowledge and expertise can do to address associated Grand Challenges. A close association with the energy sector has exposed the Department to historic boom-and-bust cycles with big impacts (both positive and negative) on student success that are outside G&G's control. Further diversifying the degree programs to include Geophysics, Environmental Geology and Hydrology, and Geology and Earth System Science focused on career paths in other allied disciplines, will position the Department to keep enrollments up and ensure student success during uncertain economic times, and provide training for a large variety of career paths that will be of interest to students with diverse backgrounds and interests.

Graduate student success: The department supports strong and highly respected M.S. and Ph.D. degrees in both geology and geophysics. Graduate students have a broad opportunity to pursue their career interests, with 16 research foci and primary faculty identified for each field, 30 graduate classes in geology and 16 graduate classes in geophysics. The degree requirements (course work, graduate exam schedule) are clearly posted on the Graduate Degree website along with opportunities for student funding and student awards. Self assessments indicate that communication skills are prioritized and thus in line with what employers believe to be critically important in hiring decisions[3]. The department has shown nationwide leadership in mentoring graduate students. Many go on to assume faculty positions of their own at institutions across the country and around the world. In addition, G&G provides access to recruiters, notably through its sponsorship of the Rocky Mountain Rendezvous (RMR) job fair and its associated activities. However, systematic efforts on behalf of mentoring for the many other career options available to geosciences students can be better developed.

The department has continued to attract strong students, and although there was some flattening or even a decrease in applicants before the pandemic, applications have increased to record level this year in the wake of the department's decision to pay the application fees of all students. This has greatly increased the diversity of the applicant pools, and this has translated in the past two years in recruitment of strong international students who might not have had resources to submit an application. Continued focus and group recruitment supported by Graduate Recruitment Initiative (Academic Affairs), URDM, and other support for successful grad recruitment is being pursued.

Diversity, equity, and inclusion (DEI)

G&G has long valued diversity as a strength in its research enterprise, its service and outreach exercises, and in its undergraduate and graduate education missions. In the summer of 2020, the department established a new Diversity, Equity, and Inclusion Committee charged with

(i) assessing the climate of the department; (ii) developing an DEI plan based on current research and best practices; and (iii) beginning the implementation of the plan. Initially an amalgamation of 5 faculty members and 15 enthusiastic graduate students, the committee has since split into a faculty committee with two student representatives and a separate, larger student committee with faculty mentorship. These two committees are now working together to achieve the department's DEI goals. Overall, G&G students (and particularly the graduate students) have been highly energetic about these efforts (as reflected in their involvement in the committees). This has injected vital positive energy that has facilitated several notable accomplishments in DEI since 2020. These include but are not limited to:

- participation in the national Unlearning Racism in Geosciences (URGE)[4] initiative, which provided all participants in the committee with access to cutting edge resources on implementing successful, achievable goals in DEI in the Earth Sciences;
- removal of both the Graduate Record Examination requirement (which is widely recognized as a barrier to inclusion) and the application fee (another barrier to inclusion) from our graduate application process;
- development of a faculty mentoring program for junior faculty;
- requirement of DEI statements in applications for faculty positions and the consideration of those statements in all faculty hires;
- development, administration, and analysis of a department-wide climate survey designed to gauge attitudes of inclusion held by faculty, staff, and students;
- implementation of results of climate survey into consideration of votes on many matters before the faculty in faculty meetings; and
- construction of a gender neutral bathroom in the Earth Sciences Building.

The G&G department anticipates that, over the long term, G&G faculty members and students will continue to develop and implement a flexible, cutting-edge DEI plan both in concert with campus-wide DEI efforts by the Office of Diversity and in support of the President's inclusivity pillar. The department is committed to continuing its efforts in the face of trending backlash and even outlawing of DEI initiatives across the country.

Resource needs to meet aspirations

G&G builds on a grand legacy as one of the premier institutions of Earth science higher education in the Rocky Mountain region. It is well-positioned to continue this leadership by addressing humanity's Grand Challenges in the 21st Century. Yet this position has been threatened by recent budget cuts, a disorienting reorganization that has forced the unit to move to a different college, and reductions in faculty that have resulted as junior faculty have left for more stable positions elsewhere.

Current research interests span much of the breadth of the Earth system science across all of geologic time including resources and sustainability issues for Wyoming and society. Yet some areas have been undercut by recent losses both at the assistant professor level and through

retirements. Additional retirements, anticipated within the next two years, will further eliminate more than 25% of the G&G tenured faculty. The impact on the ability to teach key courses will be profound. Recruitment of new faculty members will be vital to rebuilding the department to its full potential. G&G estimates that it will need to hire four faculty members in addition to five pending retirement replacements to rebuild the department to a level that is sustainable over the long term.

The graduate program remains strong with a high (>60% on average) acceptance rate of offers made to high-achieving students. However, graduate student enrollment could decrease due to fewer opportunities afforded by fewer tenured and tenure track faculty members in the wake of losses to junior faculty and both recent and future retirements. Meanwhile, undergraduate enrollments have dipped more sharply than expected based on industry trends, but in lock step with increased enrollments in the School of Environment and Natural Resources (ENR) and possibly reflecting a change in advising culture as students expressing an interest in Earth Systems have increasingly been guided by centralized advising to seek degrees in ENR rather than G&G. This highlights a need to shift to more department-centric advising and career services.

Undergraduate and graduate students are well-served by robust degree programs. But curricular change in the undergraduate program has yet to align with future interests and societal needs. Efforts in curricular change have been hampered by uncertainty in University budget and mission and in personnel turnover both within the department and at the administrative level, because this has led to major uncertainty in resources that will be available. Stability within the University and confidence about alignment with the University's mission will contribute to efforts to evolve the program for 21st Century challenges and position the department to be a leader in both undergraduate and graduate education in Earth science of the future.

G&G maintains excellent research facilities, including vital staff and faculty specialists that serve the University, the state of Wyoming, and the broader Earth science community. This is a major component of G&G's service and outreach program as well as its research enterprise. However, during the recent reorganization, all of these positions were threatened by the proposed budget cuts. While these changes never materialized, the existential threat has left a lasting impression on our faculty, and many have begun seeking jobs elsewhere. Retaining them is a major uncertainty and threat to G&G's service and outreach mission and also to its research enterprise. In addition, the department estimates that it will need to add at least one position at the assistant research scientist level to ensure that the research facilities can operate at a sustainable level in the future.

Faculty in G&G are engaged in the affairs of the institution and have secured a national reputation in their service to the Earth science profession. There will be challenges ahead in terms of budgets, staffing and technical support, and changing institutional priorities. However, G&G has the energy, enthusiasm, good faith, and the promise of continued accomplishments to ensure wise growth and evolution provided that there is strong partnership and sufficient support from the administration and at the University.

References and notes

[1]Some of this text is adapted (and in some instances extracted verbatim) from the May 2019 report "Review of the Department of Geology and Geophysics University of Wyoming" by Professor Suzanne Anderson (University of Colorado, Boulder), Professor Richard Aster (Colorado State University), and Professor David Mogk (Montana State University). This report was based on data generated in self-study conducted by the department, as well as an on-site visit, which included interviews with faculty, staff, graduate students, undergraduate students, and administrators in Academic Affairs.

[2]Summits on the Future of Undergraduate Geoscience Education: http://www.jsg.utexas.edu/events/future-of-geoscience-undergraduate-education/.

[3]http://www.jsg.utexas.edu/events/summit-on-improving-geosciencegraduate- student-preparedness-for-the-future-workforce/.

[4]https://urgeoscience.org/

MATHEMATICS AND STATISTICS

Mathematics and Statistics is a core discipline that also supports many of the programs on campus. As such, our mission is multifold. First and foremost, we strive to improve the quantitative literacy, problem solving and critical thinking skills of our student body. We aim to prepare them for a world where such skills are highly sought after, and creative thinking in an analytical framework is imperative. This gives important background skills to STEM fields through our service courses and minors, which primarily are 1000-2000 level courses. To our majors we give a background for graduate school or work in industry. Our secondary math education majors take our full math major, and as such get a thorough background in the subject they are teaching so they have a larger view of mathematics and what it can do. Our math graduate program gives the students opportunity to do cutting edge research in preparation for a career in industry or academia. Our statistics Bachelors and Masters programs give a robust introduction to data analysis, and the majority of these courses also serve other STEM disciplines.

Mathematics and Statistics is typically one of the larger departments at a University. Our department was, in fact, an entire division of A&S, before its move to the current college. In 2015 Mathematics and Statistics was comprised of: 23 Tenured/Tenure track Mathematicians, 7 Tenured/Tenure track Statisticians (two of which were on administrative leave from the Dept) and 5 Math Lecturers and 1 Stat lecturer. Our department currently has 15 Tenured/Tenure track Mathematicians, 3 Tenured/Tenure track Statisticians and 6 Math Lecturers and 2 Stat lecturers. One of the Stat Full professors is retiring in Spring, and we are currently searching for one Statistics tenure track professor. These losses have hampered our ability to teach our courses, innovate new ones, produce new research, and obtain grants. Our department has two Bachelors programs and two Masters programs in Mathematics and Statistics, a PhD program in Mathematics, and frequently teaches in excess of 20,000 SCH each year. As a foundational department that serves many programs on campus as well as our own, our current staffing is unsustainable. Below we will outline some of the issues we are facing, and some predicted benefits of a greater investment.

One issue is the overworking of the remaining faculty, and the corresponding drop in research productivity. In regard to research, in 2017 we had 17 faculty involved in grants compared to our 10 faculty currently engaged. As another measure of change in research production, MathSciNet lists 41 publications in 2015 compared to a mere 17 in 2022. Note that this measures strictly mathematical publications only (as opposed to Interdisciplinary); nevertheless, this drop is very concerning. This drop in productivity mirrors our loss of faculty, some of which were “heavy hitters” in terms of funding, such as Greg Lyng, Farhad Jafari, Myron Allen, Hakima Bessaih, and Snelhalita Hurzurbazar, who were lost without replacement. The department also has only one tenure-track faculty at present who is up for tenure consideration next year. Our department is comprised of 12 full professors, 5 Associates and 1 Assistant Professor. A number of these faculty are nearing retirement. An investment of early career, ambitious researchers would increase both grant production and publications. We also have an opportunity in new hires to foster stronger ties to other engineering departments.

In teaching, a lack of faculty has caused us to narrow the number of courses we provide, has prevented us from running experimental courses for undergraduates, has forced us to dual list certain graduate and undergraduate courses (which is not a good fit for our math courses), has required that we utilize more early graduate students to teach our classes (as opposed to being discussion leaders for which

they are better suited), and has kept most teaching loads at 2/2 or higher for TT faculty. Two of our tenured faculty are actually teaching 18-19 CH a year, comparable to the teaching load of a lecturer. This dramatically reduces their time for research. To meet our teaching needs, we require at least two more tenure-track faculty in math Analysis (broadly defined) and two more in Statistics, and we must be allowed to replace losses as they occur.

b. Peer Comparisons (choose own peers and explain choice)

Given that our department provides services to such a large number of programs and students on campus, we will measure the size of our department resources relative to our student body size. One comparator is Colorado State University, chosen because it is the closest neighboring land-grant University, and it is an R1 institution. We have roughly 34% of its student body, with CSU having 32,586 students. Their Math and Statistics departments are separate, so we will combine them to compare to our resources. They have 69 tenure stream faculty, 9 postdocs/visiting positions, 8 lecturers, and 13 tenure stream faculty who are joint with other departments (Computer Science, Electrical Engineering and Education), as well as 5 lecturers and 2 temporary lecturers, and 110 graduate students, and 9 full time staff with 3 undergraduate part-time staff. Our department has 18 tenure stream faculty and rarely has visiting positions or postdocs, with 27 graduate students, and only 2 staff. In particular, we have roughly 26% of their tenure stream faculty despite being a university of 34% their size. Their department also has a typical 2/1 teaching load for research faculty, whereas we are mostly 2/2 or more.

We also look at Iowa State, another R1 land grant University which has research in our areas of algebra/combinatorics, analysis, applied math, statistics, and some additional areas. They have a similar size to CSU, with 30,708 students. In Math and Statistics combined, they have 68 tenure stream faculty, 9 postdocs/visiting positions, 13 lecturers, 110 graduate students, and 11 staff. Again, Math/Stat at UW is disproportionately small in comparison.

Another comparator is University of Delaware. The University of Delaware is a land grant institution with similar Math research groups (in particular Combinatorics, Analysis and Applied Math). Its Statistics department is not only separate, but also merged with Economics, so we will only compare Math programs. UD has a little over twice our student body, with 24,039 students. They have 41 tenure stream faculty, 4 postdocs/visiting positions, 8 temporary assistant professors, and 13 tenure stream faculty who are joint with other departments (Computer Science, Electrical Engineering and Education), as well as two lecturers and two temporary lecturers, and 55 graduate students. Our department has 15 math tenure stream faculty and rarely has visiting positions or postdocs, with 22 graduate students in math, so we are far less than half their numbers. Their department also has a 2/1 teaching load for faculty.

For another comparator, we look at University of Idaho. They are an R2 institution, and their enrollment is roughly the same as UW's. They have a merged Math/Stat department with the same size as ours, 26 faculty, and 2 searches running this year. Their research activity is less than ours, with 7 active grants, and only 7 publications listed in MathSciNet for their department in 2022. This is not an aspirational

peer, but instead a comparator that demonstrates where the department will go in time if there are no additional resources. We note that despite being equal in size they have twice as many staff as our department does.

c. Department-specific Aspirations

In support of the Engineering tier 1 initiative, we note that top Engineering Colleges go hand-in-hand with top Mathematics departments. For example, the top Engineering College is MIT, a land grant institution with roughly the same total enrollment as our own; nevertheless, it has a staggering 54 faculty in Mathematics. Our comparators above all have higher ranking Engineering College (CSU 79, Iowa State 48, UD 45 according to US News and World Report) with the exception of University of Idaho (unranked).

i. Research: Our department aspires to greatly increase its grant production and publication levels, aiming to have most tenured faculty on some funded project. This will require an investment of faculty to bring our tenure stream faculty to a 2/1 teaching load, to compete with our aspirational peers. These new faculty will also be selected to help build ties with other programs in engineering. We also need tenure stream faculty to design and run a PhD program in Data Science, a charge given to our department by Academic Affairs.

ii. Teaching

An influx of faculty would help us mitigate many of the problems with course delivery and assignment listed above. With an investment of faculty, the department would also have freedom to develop new courses. Areas we could develop courses in include (but are not limited to): convex optimization, data science, linear and nonlinear programming, discrete modelling, numerical linear algebra, the mathematics of cryptography, information and coding theory, and Fourier and wavelet analysis. These courses would be of interest to those in STEM outside our major as well.

iii. Service and Outreach

The department aspires to engage more with middle and high schools in Wyoming to provide a greater awareness of the breadth and utility of mathematical and statistical thinking. On Giving Day, we raised $22,870 to fund future outreach visits. A greater pool of faculty would help with the logistics of reaching as many Wyoming schools as possible.

iv. Student Success – Undergraduate and graduate students are coming to UW less mathematically prepared than in previous years. One mitigation is the co-requisite model for remedial math. However, this model is designed to only reach the students in the most dire straits and does not address the fact that math skills weakness is appearing at all levels. We need to offer more courses to mitigate this, for example with short summer online courses for incoming students who place into Calc I or II, and for our incoming graduate students. We do not have the resources to do this currently.

v. DEI

Our department is committed to diversity and inclusion. Mathematics and Statistics as general disciplines have low representations of females and minorities. In future searches we will make diversifying our applicant pool a priority.

d. Resource needs to meet Aspirations

To meet our aspirations we will need 8 faculty, together with the ability to replace losses as they occur. Four of the faculty would be tenure-track and cover our teaching shortfalls in Analysis and Statistics. The other four could be any combination of visiting assistant professors and tenure-track professors, either of which would contribute to the research and course development of the department. For example, with 5 additional tenure stream faculty and 3 visiting assistant professors, we would be more in proportion to our R1 peers. In the same vein, we also request 4 additional GTAs and an additional staff member.

MECHANICAL AND ENERGY SYSTEMS ENGINEERING

Historical and Current Data for Department

The mission of the Mechanical Engineering department is to provide an excellent educational opportunity for its students, significant and timely world-class research, and service to our community and state. Because of the decline in resources allotted to our department over the past 8 years, our ability to achieve this mission has been severely crippled.

Figure 1 shows the historical numbers of tenured/tenure-track faculty in the department. From 2011-2015 the number of T/TT faculty in the department fluctuated between 12 and 13 with between two and four instructional faculty (although not of these were full-time). During this same period, our undergraduate student numbers rose from 300-425 (Fig. 2). Graduate student numbers during this same time period fluctuated from 38-52, with the proportion of PhD student increasing to about the even split that it is today.

Around 2015 our faculty numbers began declining as a result of not receiving faculty lines back from TT faculty that either retired, resigned, or were denied tenure. (Coincidentally, this corresponds to when Tier-1 funding began in the College.) Correspondingly, graduate student numbers in ME began declining, as would be expected, although a time lag can be observed. Graduate student number decline was magnified by the significant decrease in available GTA positions both from the college as TAs and from the State in the form of Energy GAs.

In the department today we have five TT faculty (a decline of about 60% from our nominal average in the years from 2011-2015) and two full-time instructional faculty. As a department, we have typically averaged per capita external research expenditures of $150K/yr. Thus, the loss of 7 faculty members results in a research expenditure loss of more than $1M/yr and lost revenue to the University via indirect expenses of nearly $500K/yr. The faculty decline has put immense pressure on the remaining members of the department related to required departmental, college, and university service roles; student interactions; teaching loads; and research synergy and collaborations. Thus, in the near-term, this historical expenditure average is likely to decline until a critical mass of faculty is brought back.

Currently searches are underway, which, if successful, would bring our numbers to seven TT faculty and three full-time instructional faculty. As of 2022 our undergraduate numbers are about 325 and our graduate student (as of March 2023) numbers are about 27, split evenly between MS/PhD students, with a significant percentage of those set to graduate in the near future and will not be replaced immediately. Our graduate student numbers in the near future will likely remain in the low 20s. This is simply not a sufficient critical mass to run a high-quality graduate (particularly PhD) program. With the requirement to have a minimum of five students in a graduate class, we have reached a point where we simply cannot offer the graduate courses we need with sufficient regularity. This is already impacting our graduate recruiting significantly.

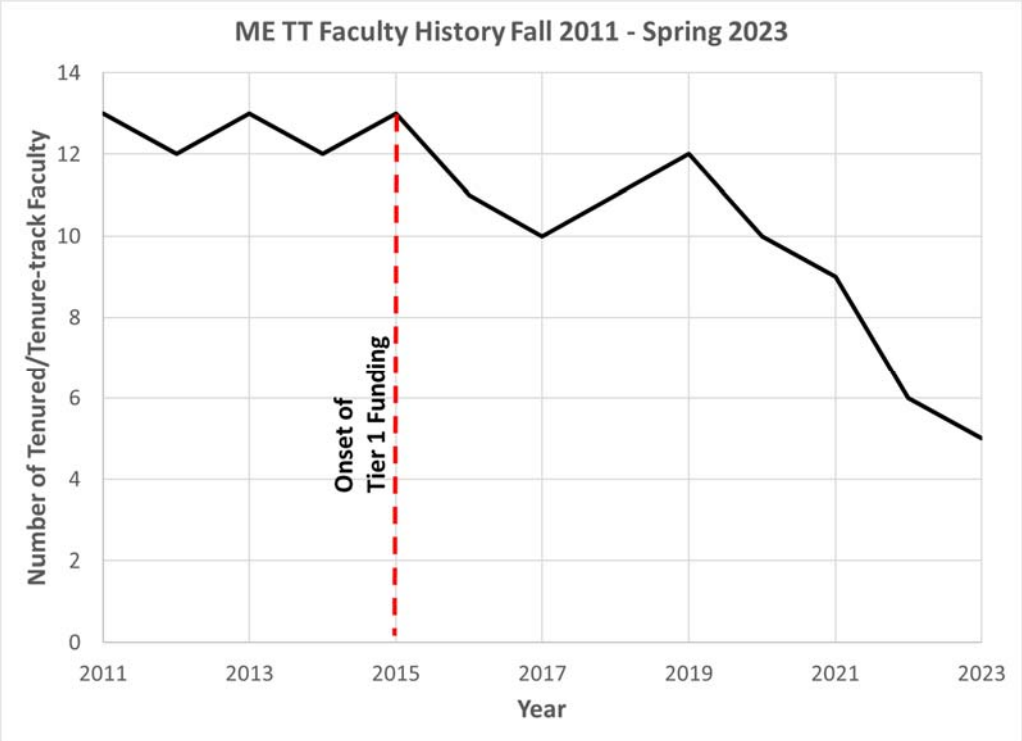


Fig. 1 Historical tenured/tenure-track faculty numbers for Mechanical Engineering from 2011-current.

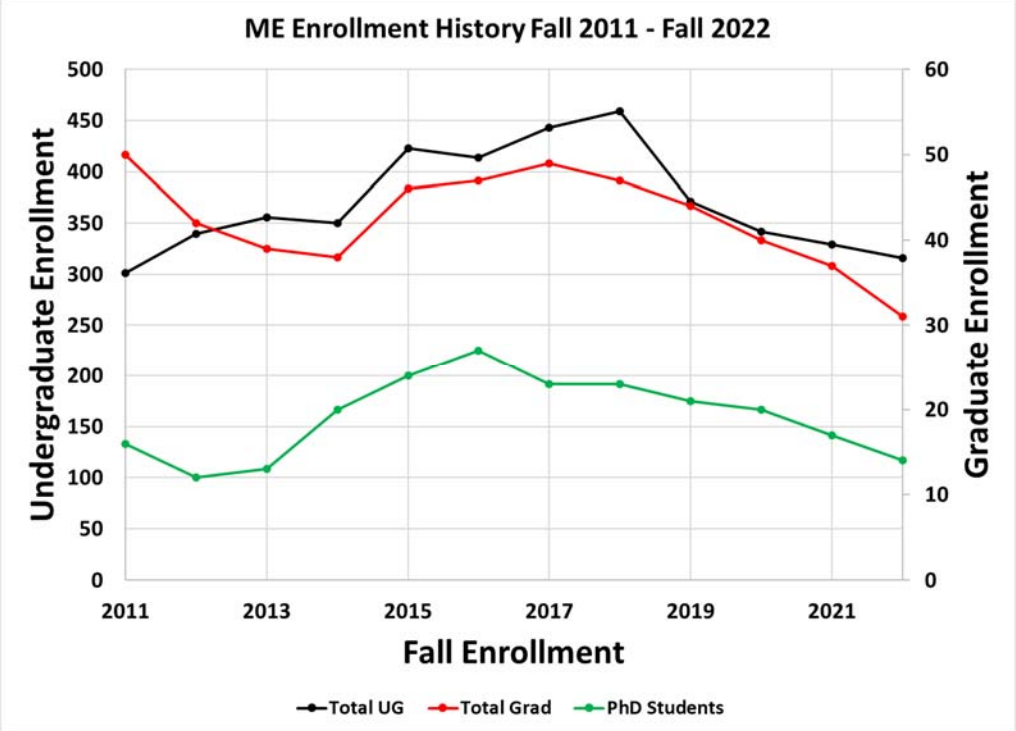


Figure 2. Historical student enrollment for Mechanical Engineering from 2011-2022.

Minimum Faculty Level for Long-Term Viability

As mentioned above, a minimum average of 40 graduate students is required a viable graduate program evenly split between MS and PhD students (this number would go up as the fraction of PhD students increased). This requirement is based on a minimum of five students in graduate classes, with classes split between core graduate classes taught annually and biennial offerings of more advanced courses in the core fields of focus in our department (energy conversion, mechanics/materials, and fluid dynamics). Based on historical averages of non-state funded GTAs and the current GTA allocation model in the college, at least 80% of these 40 students would need to be supported on external research grants.

Using the minimum stipend level for each student, an assumed research expenditure at the historical average of $150000/TT/year and assuming research funds include two months of summer salary (assume $11,000/mo. + fringe and indirect) plus supplies, travel and other research expenditures of about $23,000/year leads to a total required research expenditure of $2.4M. **This would require 16 TT faculty.**

On the teaching side, we need to teach at minimum 50 courses per year (42 UG and 8 Grad), assuming and ES commitment of 2 courses per semester. With a course load of 1/1 for research active faculty and a 3/3 load for instructional faculty, we would need a **minimum of three full-time instructional faculty** to meet our teaching needs. Thus, **with the current GTA allocation, the minimum faculty level in the department for long-term viability is then 19 (16 TT + 3 IP)**. These numbers can be adjusted slightly depending on GTA allocation. For example, an additional 6 GTAs split evenly between MS and PhD and funded for the calendar year would reduce the minimum number of TT faculty required to 13 and require an additional instructional faculty member for a department size of 17. These numbers are consistent with the peer comparisons show below.

Peer Comparisons

Peer universities were suggested by the executive committee and accepted as reasonable based on regional competition for students, aspirational metrics for R1, or similarity of college structures. These are show below in Table 1.

Table 1. Comparison to peer universities (indicates R1 Institution)**

University	UG	Grad (MS/PhD)	TT Faculty	Res. Fac.	Inst. Fac.	Total Fac.
U. Wyoming	325	27 (15/12)	5	0	2	7
Colo. State. U.**	219	96 (38/58)	26	4	11	41
U. Utah**	834	254 (126/128)	37	1	6	45
Montana State U.**	899	58 (26/32)	22	13	11	46
NDSU**	646	24 (12/10)	19	1	1	21

NMSU	336	42 (19/23)	14	0	1	15
U. Toledo	714	36(19/17)	16	1	6	23

Department-Specific Aspirations

Mechanical Engineering Research Focus Areas

The discipline of mechanical engineering consists of at least 8 sub-disciplines, including materials science, fluid mechanics and aerodynamics, energy conversion, heat transfer, manufacturing and production, design, control systems, and solid mechanics. Even when our faculty size was 15, the Department's faculty never had the expectation of covering all bases within the discipline. This is doubly true now that we have only 5 tenure-track faculty. Thus, we have focused our faculty expertise in three primary research areas and aspire to continue our outstanding scholarship in these areas. However, the span of these areas and the breadth of mechanical engineering in general allows at least one of these focus areas to be relevant in nearly all major national funding initiatives.

1) Materials Science/Solid Mechanics has long been an area of strength within the Department due to a focus on composite materials, both experimental and computational. We seek to augment this effort in areas of additive manufacturing and in combining machine learning with material and microstructure design.

Some of the broad national initiatives that this focus area integrates with are (not exhaustive):

Materials Genome Initiative: The goal of this federal multi-agency initiative is to discover, manufacture, and deploy advanced materials at a much faster rate than using traditional approaches. The 2021 Strategic Plan for this Initiative identifies three goals for the upcoming years: unification of a materials innovation infrastructure of advanced modeling and experimental tools, harnessing the power of materials data, and educating the materials research and development workforce.

NASA Strategic Plan 2022: Materials research spans a broad spectrum of objectives for enhancing the space program. In particular, focus on composites and advanced materials are highlighted for weight reduction and thermal protection of space structures. Specific to computation modeling, integrated computational materials engineering (ICME) to significantly speed up the discovery and design of new materials remains an ongoing focus and will be such for the foreseeable future (see NASA Vision 2040).

Department of Energy (High-Temperature Materials): The DoE continues to push the envelope of the operating environment of materials. Ongoing projects in the department are funded by through this effort (currently through NETL USTR Turbine Research) focus on developing novel additive manufacturing approaches for high-temperature materials.

This area is positioned well to further grow the existing interdisciplinary materials science program at UW. Additionally, the focus on AI/ML for microstructure design integrates well with goals for the School of Computing (SoC). This area of the department has also historically collaborated well with the School of Energy Resources (SER) in the Carbon Engineering Initiative. We aspire to keep and enhance these collaborations.

2) Fluid Mechanics/Aerodynamics has had impressive national and international visibility. There is a strong effort in both computational fluid dynamics (CFD) and experimental aerodynamics with access to outstanding facilities. This group of faculty works together very closely and, with appropriate additions to the faculty, has substantial potential for sustaining its national recognition.

3) Energy Conversion/Combustion is such a traditional area within ME that every program is obligated to staff expertise in this area. However, energy conversion is so broad an area that we have recently focused our research specialization into the wind energy and combustion sciences.

Some of the state and national initiatives that this area integrates with include, but are not limited to:

i. Wind energy is the fastest-growing sector of the Wyoming energy economy. Housed within Mechanical Engineering, the Wind Energy Research Center of Excellence (WERC) has a long history of contributing to the advancement of wind energy technologies. The goal of WERC, upon incorporation into the SER, is to develop collaborative research programs to streamline wind energy development in Wyoming while also providing a trusted resource for information to state and local decision makers. Recent projects have studied using wind energy for hydrogen production and assessing the potential for using wind energy on existing Wyoming coal mines. WERC director, Jonathan Naugthon, continues to be the Uber-PI of a DoE Wind Energy Technology Office (WETO) sponsored project.
ii. Wyoming Carbon Engineering Program: Supported by the state of Wyoming and executed by the School of Energy Resources, the Carbon Engineering Program has focused on development of technologies that utilize coal for energy and materials, but with reduced carbon emissions as compared with current coal usage. Multiple areas of research and development within the Carbon Engineering Program have been supported by Mechanical Engineering faculty with energy conversion expertise, including through collaborative research with other departments such as Chemical Engineering and Civil Engineering.
iii. Federal Inflation Reduction Act and Bipartisan Infrastructure Law: Recent federal legislation, including the Inflation Reduction Act and the Bipartisan Infrastructure Law, contains numerous clean energy programs with research funding for energy conversion topics such as clean fuels, hydrogen production, carbon capture, long-duration energy storage, geothermal energy, and nuclear energy. The Mechanical Engineering Department has current expertise in several of these areas, but the Department has lost its faculty with expertise in other critical energy focus areas such as nuclear energy and geothermal energy.

Although these areas are not called out specifically in the CHIPS Act, the $61B increase in existing university R&D functions at universities is expected to benefit all of these areas, as they have been funded by NSF and other federal agencies for decades.

In addition to outstanding scholarship in these three broad areas, the department aspires to continue to actively engage in technology transfer and facilitate economic development. One example of this is Resono Pressure Systems, which is currently incubated in the WTBC and was started by on of our current professors Jonathan Naughton. Another example is Firehole Technologies, Inc., which was created by faculty within the department, and was ultimately acquired by Autodesk, Inc.

Our dramatic decline in TT faculty (12-13 down to 5) not only results in a decline in production in aggregate, the decline is disproportionate to the numbers because of the loss of synergy among the faculty in the department. Our primary focus through 2030 is to recover faculty numbers back to a point where significant synergies can be realized in each of the three areas described above and our graduate program is growing and productive. If this is achieved, the department will be better positioned to look forward to the creation of research centers that can draw more prominent researchers and students, as well as attempting to fund research focused staff scientists and/or postdocs for additional research output.

Resource Needs to Meet Aspirations

The department aspirations described above can be met by getting the department resources back to the minimum viable faculty level. If the current faculty searches are successful (2 TT, 1 IP), the following additional resources will be required:

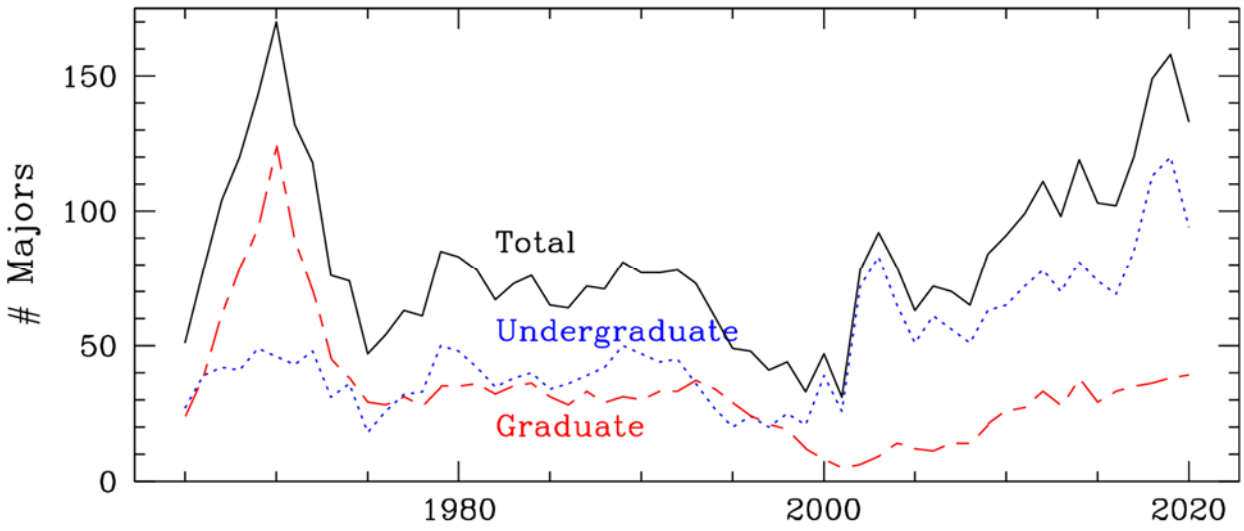
9 new TT faculty (roughly split evenly among the three focus areas)

Additional GTAs to support the new faculty (assuming 3 new hires/yr for next 3 years) – 6

PHYSICS AND ASTRONOMY

a. ***Historical and Current Data for department***

Like all academic units, the Department of Physics & Astronomy (P&A) prioritizes providing a fundamental curriculum as well as pursuing cutting-edge research. In terms of teaching needs, P&A does not provide core (i.e., required) courses at a reasonable frequency. Several upper-division courses are offered on two-year cycles which often leads to individual students delaying graduation by a full year. On the graduate side, at least one required course is offered on a three-year cycle. From a research perspective, there is a minimum critical mass necessary for maintaining momentum and continued excellence. P&A long ago cast aside any notions of pursuing research breadth, and instead has reasonably focused on building excellence in just two core areas: condensed matter physics (frequently referred to as materials science) and astronomy. The critical mass for providing minimum quality educational and research experiences for both undergraduates and graduate students in these two subdisciplines is 7+7. Not including full-time teaching faculty (i.e., FTRCs), the Department currently has 5+5, but there are two faculty searches underway on the condensed matter side. Note that our aspiration of 14 T/TT faculty is below historical peaks (17 T/TT in the mid 1990s and 27 T/TT in the mid 1970s).



b. ***Peer Comparisons (choose own peers and explain choice)***

Colorado State University – Mountain West, medium size physics program
Montana State University – Mountain West, medium size physics & astronomy programs
University of Toledo – competitor for graduate recruiting
University of Nevada Reno – Mountain West, medium size physics program
North Dakota State University – competitor for graduate recruiting
University of Idaho – Mountain West, medium size physics program

Iowa State University – competitor for graduate recruiting
Utah State University – Mountain West, medium size physics program
University of Maine – competitor for graduate recruiting
New Mexico State University – Mountain West, medium size physics & astronomy programs

*c. **Department-specific Aspirations***

P&A is poised to build on its recent successes in the fertile fields of astronomical data sciences and quantum materials and devices. Investment to strengthen our programs, in particular, to increase the number of research faculty in these two areas, is not only essential for the Department to approach national eminence but also advances UW's land-grant (and associated space-grant) mission and President Seidel's vision of the four pillars.

We envision to embark on the next phase of making the Department more diverse and more interdisciplinary by completing two more faculty hires in astronomy, a physics subfield where half of the recent Ph.D. recipients are female and investments at the national level are succeeding to broaden participation by scientists of color. The searches will target underrepresented faculty with expertise in mining data from large telescopes/surveys, computational astrobiology, and numerical astrophysics/cosmology. Expansion in these areas will complement existing expertise while enhancing the return on UW's investment in the telescope infrastructure that has been responsible for the marked increase we have seen in enrollment and extramural funding. These are current growth areas within astrophysics that will create new channels for interdisciplinary collaboration with UW faculty in computer science, the geosciences, and the life sciences. Expanded faculty expertise will carve new funding opportunities spanning traditional disciplinary boundaries that take advantage of recent cross-cutting initiatives at NSF, NASA, DOE, and private foundations. One enduring impact on UW and Wyoming will be producing B.S. and Ph.D. graduates consummately trained in applied computation—purveyors of knowledge, innovation, and wealth for a digital age. We envision a close collaboration and joint effort with the School of Computing to enhance UW's national standing in this important area.

We also envision two more faculty hires in quantum physics that build upon our recent successes in areas crucial to U.S. strategic initiatives in quantum information science. The CHIPS and Science Act of 2022 authorizes billions for NSF's Directorate for Technology, Innovation, and Partnerships. These funds will accelerate domestic development of national, economic-security-critical technologies that will encourage transformative and fundamental scientific discoveries. Such technologies include artificial intelligence, quantum computing, advanced manufacturing, 6G communications, energy, and materials science. This clearly indicates that the federal government has already increased, and will continue to increase, its investment in quantum science and materials-science-related technology. We will target underrepresented faculty with expertise across the broad areas of quantum information, materials and devices. These new hires will complement research in—and strengthen

interdisciplinary ties to—Chemistry, Chemical and Biomedical Engineering, Electrical Engineering and Computer Science, Mathematics and Statistics, and the School of Computing. With a critical mass of faculty from across these units, postdoctoral researchers, and students at all levels, we plan to establish the **Wyoming Institute for Quantum Science and Engineering** (WIQSE) at UW. WIQSE will focus on designing and fabricating quantum materials and devices for applications in energy and future computational technologies. We envision WIQSE will become a regional center, unique along the Front Range for a confluence of experimental capabilities and potent computational resources. B.S. and Ph.D. students will be trained to design and fabricate quantum devices. This will place students at the forefront of entrepreneurial ventures critical to sustaining and diversifying Wyoming's economy while maintaining and advancing national preeminence in science and engineering. Physics students at all levels will be encouraged to pursue coursework outside CEPS, e.g., in the College of Business, and/or a minor in entrepreneurship, by making our degree programs more flexible.

Interdisciplinary programs where P&A could lead or assist

P&A is strongly interested in further growing the interdisciplinary materials science program at UW.

P&A will use new grant funding to establish the Wyoming Institute for Quantum Science and Engineering (see above).

P&A would be happy to help UW develop and foster Data Science and Software Engineering programs in the School of Computing.

Future goals and opportunities

The astronomy faculty advances many of the highest-ranked goals articulated in the National Academy of Sciences 2010 and 2020 decadal surveys, using facilities and techniques emphasized within the 2021 United States Innovation and Competition Act (USICA). Discipline-specific expertise includes; **galaxies**, **cosmology**, **large surveys**, **instrumentation**, **stars**, **planets around other stars** (exoplanets), **quasars** and **data science**. Faculty and their teams of students harvest large datasets from a variety of space- and ground-based facilities, including UW's *Red Buttes Observatory, the Wyoming Infrared Observatory (WIRO) and the Apache Point Observatory consortium*, as well as next-generation DOE (USICA §2117), NASA and NSF facilities such as the Dark Energy Spectroscopic Instrument, the James Webb Space Telescope (USICA §2634), and the Nancy Grace Roman Space Telescope (USICA §2634) (Astro2020). Their teams harness Wyoming-based, and national, **high performance computing** (HPC; USICA §2005) facilities to comb these datasets, employing, e.g., machine learning (USICA §2005), artificial intelligence (USICA §4206), and numerical methods. Wyoming students are prepared for careers in STEM disciplines of national need (USICA §2522, including teaching in rural and high-need schools) as they develop the skills required for a technical workforce

(USICA §2210, 6112). Faculty-inspired outreach programs like *Science Kitchen*, *the UW Teton STEM Academy*, *the UW Windy Ridge Foundation Astrocamp*, *Launchpad*, *the interdisciplinary WySLICE program, and the innovative Astronomy REU at WIRO* prepare K-16 scholars for careers in technical fields and better equip K-12 teachers (USICA §2661-64). Established alliances with minority-serving institutions like the California State University CAMPARE program broaden participation in STEM fields in order to utilize the full potential of the national workforce (USICA §6121). Key related efforts include *the Wyoming State Science Fair*, *the Harry C. Vaughn Planetarium*, *and the NASA Wyoming Space Grant Consortium* (USICA Part VI, §2664).

Abundant access to HPC and telescopes positions UW astronomers and students to lead competitive proposals and forge collaborative research in areas of national concern. Faculty hires in computational areas such as data science, time-domain astronomy and numerical modeling of exoplanetary atmospheres[1] will solidify the new College of Engineering and Physical Sciences as a national leader in these growing subfields. Such hires will elevate the group to a nationally competitive seven faculty, magnify the value of UW, State, and private investment in astrophysical facilities, and bolster the Department's associated education and outreach in a rural region. Since ⅓ of new Astronomy PhDs are women, faculty hires in this group are a promising strategy to achieve diversity and equity in UW physical sciences.

d. ***Resource needs to meet Aspirations***

As explained in the first section on Historical and Current Data, P&A desires to bring its T/TT faculty ranks from 5+5 in P&A to 7+7. A technician is needed to support the department's suite of instrumentation.

In terms of facilities, Phase I of the Science Initiative included the construction of an $85M cutting-edge research facility and supporting programs such as the Wyoming Research Scholars Program and the Learning Actively Mentoring Program. Phase II of the Science Initiative included ~$50M for renovating Physical Sciences and Biological Sciences, plus another ~$50M for upgrading the ~50 year old astronomical observatory on Mt. Jelm. Since this initial visioning of the Science Initiative, UW astronomers have continued to diligently work with astronomical observatory design and manufacturing teams to scope out what is possible on our current site. Constructing a 4-meter diameter telescope, for example, would enable new science and immediately place UW's astronomy program in the top tier on both national and international levels—no U.S. institutions have 100% access to a telescope of diameter 3.5

[1] A UW-built state-of-the art WIRO instrument will soon initiate a sensitive exoplanet search.

meters or larger. All funding mechanisms for a new observatory are possible at this point, including public-private partnerships.

SUSAN MCCORMACK CENTER FOR STUDENT SUCCESS

a. Historical and Current Data

The mission of the Susan McCormack Center for Student Success in the College of Engineering and Physical Sciences is to help students develop their full potential by creating a culture of success through active involvement in education and career planning. The current staff of the SMCSS includes one office associate, one marketing and communication specialist, one recruiter, one career services associate director, one advising manager, six advisors, and one engineering outreach program manager. The recruiting efforts for the college can benefit from the addition of an assistant recruiter to help with covering multiple events both on and off campus, such as focusing on science fairs and school visits, resource fairs on campus and other college activities.

It is expected that the addition of the physical sciences departments and increased awareness will add to the student populations and feeder event/schools. A wider outreach nationally, for example, can bring students in from regions/states where computer sciences, astrophysics, and geology industries can benefit from a prepared workforce. As far as our Career Service office goes, it would be helpful to have a dedicated employer engagement professional. In the past and currently the associate director role focuses on relationships with employers, though the career services associate director coordinates events, visits with students, engages with faculty, and helps teach the ES 3100 course. If we had someone who was fully dedicated to coordinating with employers, they would be able to build and maintain valuable relationships more effectively overall.

We have six academic advisors plus one advising manager. Every advisor sees roughly 220-250 students each, give or take. We are very holistic in our advising process, meaning that we actually *talk* with our advisees about their career goals, struggles, and long-term ambitions. We try very hard not to *just* be transactional in our interactions. For that reason, 220-250 advisees per advisor is a very heavy load. The recruiting efforts for the college can benefit from the addition of an assistant recruiter to help with covering multiple events both on and off campus, such as focusing on science fairs and school visits, resource fairs on campus and other college activities. It is expected that the addition of the physical sciences departments and increased awareness will add to the student populations and feeder event/schools. A wider outreach nationally, for example, can bring students in from regions/states where computer sciences, astrophysics, and geology industries can benefit from a prepared workforce.

Currently, the CEPS engineering outreach program manager's outreach efforts include 9 different initiatives and programs, which is a struggle for one person to manage. This unit could function more effectively with the addition of an SMCSS Event Coordinator. This position could handle things that take up so much of the outreach program manager's time such as booking catering for multiple events, booking rooms, handling mail outs (this office sends out approximately 70 packages for Engineers Week, over 300 promotional packets, etc.), helping with communication and coordination of many events. This would allow the program manager to spend more time developing new outreach efforts and improving participation in current efforts. In addition, it would be helpful to have 5-10 more student ambassadors. Currently, this office has to turn down 3-5 requests per month, as we do not have enough people to cover the ever-growing amount of requests for visits to UW and visits to classrooms.

Two recent changes are hoped to help meet the mission goals of the Center for Student Success. First, two additional instructional faculty are being added that will allow the entire Engineering Science (ES)

program to be taught and overseen as a whole, rather than a "tax" to each department to support teaching one of more sections of an ES course each semester. We firmly believe this will enhance the consistency and quality of the ES program, which has been shown to have a large influence on student success, retention in our college programs, and time to degree. Second, we plan to elevate our Outreach director to be an Assistant Dean, with more oversight of these key areas of the student success and recruiting missions, and to provide this person with some form of assistance in this role (TBD).

b. Peer Comparisons

The colleges below were chosen based on size and similarities to the UW Engineering and Physical Science program.

Program Staff	**UW/CEPS**	**Montana State/College of Engineering**	**Colorado School of Mines**
Marketing	1	3	3
Recruiting	1	2	5
Career Services	1	2	3
Advising	7	8	11
Outreach	1	4	4

c. Department-Specific Aspiration

i. Research: This office would love to restart the Undergraduate Research Program.

ii. Teaching:

1. Continue with career services classes and be able to offer more.
2. Increase the number of professional development opportunities for Wyoming's K-12 teachers in all STEM fields.
3. Increase the number of K-12 camps and programs offered

iii. Service and Outreach:

1. Increase the number of students/educators reached in all outreach efforts.
2. Offer more opportunities for students seeking career services
3. Visit more schools and offer more recruiting events to increase enrollment in the CEPS.
4. Increase marketing efforts to showcase the success of the SMCSS in all areas.
5. Increase donors and sponsors funding programs.

iv. Student Success – undergraduate and graduate:

1. Be able to do more during advising sessions that will help students stay in school and succeed in classes.
2. Have a working list of labs willing to participate in the undergraduate research scholars' program and be able to offer professional development courses for these scholars.

v. DEI:

1. Increase outreach efforts to the reservation schools and the schools with ESL enrollment.

2. Increase number of minorities and females in the student ambassador program, undergraduate research scholars' program, and admitted/enrolled students.
3. Begin "Introduce a girl to engineering" day outreach initiative.
4. Create a traveling STEM activities initiative that the outreach ambassador team can take to rural and reservation schools.

d. Resource needs to meet Aspirations

More staff is needed to meet all aspirations. However, there is a concern regarding how UW (and/or the College) is (or is not) incentivizing current and future personnel to stay with UW (and/or the College). UW and the College has a lot of turnover in regards to personnel, how is the committee looking to change that? What is UW (and/or the College) offering in terms of incentive for current/future personnel to work here? Are there pathways for personnel (especially staff personnel) to receive regular pay raises? Promotions? Currently, if a staff member does well and wants to move up in their job position title they have to wait until someone retires/leaves/etc…so there is little incentive to stay. Currently, if a staff member does well there are no regular pay raises/bonuses/cost of living adjustments, so again there is little incentive to stay. In addition, when many personnel are looking for more flexible work environments (remote work/flexible hours/etc..) UW and the College do not offer those incentives to help entice personnel. The recruiting efforts for the college can benefit from the addition of an assistant recruiter to help with covering multiple events both on and off campus. It would be beneficial to have an SMCSS Event Coordinator. The position could potentially be part-time and/or partially remote to increase the applicant pool. They can take the lead on things like the career fair, the Engineering Summer Program, Showcase Saturday, etc. Those of us who work on these events would not be totally hands off, it would just be nice to have someone as a collaborator and point of contact for each of these. I believe this would allow us to work on other efforts that surround our positions. It would be helpful to have a dedicated employer engagement professional, who was fully dedicated to coordinating with employers. They would be able to build and maintain valuable relationships more effectively overall. An additional advisor is needed to share the load of advising so that our advising loads can decrease to 170-200. That is a much more reasonable load for us to be able to thoroughly handle things. Not only do we have our holistic methods of advising, but this college requires a lot of paperwork for academics and advisors are bogged down by that. Each department has their own rules/regs and so the paperwork can be overwhelming. Additionally, someone needs to be hired to handle Scholarships. This person could then be a point of contact for alumni and governmental relations, too, thus replacing what we lost when our alumni relations coordinator left. A K-14 outreach coordinator is needed to help with the college's outreach efforts. The current workload and ever increasing number of requests is a struggle for one person to manage. In addition, it would be helpful to have 5-10 more student ambassadors. Currently, this office has to turn down 3-5 requests per month, as we do not have enough people to cover the ever-growing amount of requests for visits to UW and visits to classrooms.

Appendix 5

CEPS_strategic_planning_Nov2024 (Dean Wright)

College of Engineering and Physical Sciences (CEPS)
CEPS Strategy: building toward 2030

Last updated November 2024

This document outlines some top-level strategy ideas for CEPS.

The recent increase to the Tier-1 budget allows the college to be more proactive in its quest to make even greater progress toward the goals of the Tier-1 Engineering Initiative (EI). Note that EI, despite the name, is also inclusive of the physical science departments and the mathematics and statistics department in the college, as they are vital to the basic goals of the EI.

Our current efforts and strategy are not aimed toward recreating the college of the past, but rather to build and evolve toward the college of 2030, which *must* include moving into new areas of research and teaching that are appropriate for what we see for the future. This was described in the CEPS 2030 report, submitted to President Seidel and Provost Carmen in Nov 2023.[1] **The thrust of the CEPS 2030 plan is to move into new areas of research (which are both <u>important to the state of Wyoming</u> but are also areas in which CEPS has a reasonable chance of being nationally or internationally <u>competitive</u>) while at the same time maintaining support to the state in mainstream engineering and science areas that important Wyoming stakeholders expect and demand.**

Important point: the college walks a fine line with our stakeholders. This critical balance between moving into new areas and maintaining existing areas important to the state is something closely watched by a variety of powerful stakeholders. These stakeholders include most of the original members of the Tier-1 Engineering Initiative Task Force; the CEPS National Advisory Council (and individual engineering department industrial advisory boards); key members of organizations such as the Wyoming Engineering Society, the Petroleum Association of Wyoming, and the Wyoming Mining Association; and many CEOs/CTOs/Presidents of various companies located in or having interests in Wyoming.[2] These stakeholders communicate with the Dean of CEPS regularly, offering advice, asking for updates, and checking up on the "new/existing areas" balance referenced above. It's important to note that these stakeholders also communicate their satisfaction or displeasure freely with UW Trustees, Wyoming state and federal legislators, and the Wyoming Governor. This is a very challenging balancing act which the CEPS Dean has navigated successfully for over 5 years so far, keeping this diverse group of stakeholders relatively satisfied with where the college is and where it is going.[3]

To be more specific about new and existing areas, the CEPS 2030 report listed the areas that are restated below. Note that many areas are pursued in close collaboration with SER.

- CEPS will grow in **new** areas: Artificial Intelligence, Controlled Environment Agriculture, Quantum Information Science and Engineering (QISE), Advanced Materials,

[1] This 110-page report was created over a year's time, with an 8-person Executive Committee, and a 15-person Working Group, representing every CEPS department, SoC, and external industry representatives.
[2] Many of these key stakeholders are also major donors to CEPS and to UW.
[3] Other important (albeit less politically powerful) stakeholders are our students, their parents, our faculty and our staff. They too appear to be satisfied with where the college is and where it is going.

Cybersecurity/Blockchain, Nuclear. Note: a broad area that spans many of these other areas, mentioned by the Tier-1 Task Force, is Computational Science and Engineering (CSE).

- CEPS will also support mainstream **existing** engineering and science areas as demanded by the state: energy of all forms and sources, electric power grid reliability and industrial power distribution, robotics, transportation/construction, atmosphere/weather, mining/extraction engineering (such as for bentonite, coal, trona), separations (such as for trona, bentonite, etc.), process control (such as for petrochemical refineries, trona mining operations, etc.), geology/geophysics/earth science, chemistry, astrophysics, condensed matter, computational and applied mathematics, etc.
- CEPS will also put **new emphasis** on existing areas: for example, we are evolving the traditional chemical engineering specialty of separations to emphasize new foci important to Wyoming (such as rare earths, lithium, uranium, and other strategic minerals), embracing nontraditional uses of coal such as for building materials ("char bricks") and for asphalt, mining/drilling expertise being applied to carbon capture utilization and storage (CCUS), to helium extraction, and to uranium mining.

One development not mentioned in the CEPS 2023 report, as the uncertainly at the time of writing was high, is the fact that a significant part of the Safran Passenger Innovations division is moving to Laramie, and they desire to nurture a closer relationship with CEPS, (particularly EECS, SoC, and ME). After several meetings, we know that the stated needs of Safran division leaders fit into the "new," "existing," and "new emphasis" areas specified above. Other aerospace industry representatives are also becoming more interested in CEPS.

Regarding the "new" areas, CEPS has already been moving forward in these areas, making considerable progress in just the last two years. A general survey was conducted in June 2024 of the various units of the college, yielding a headcount of faculty members working in these new areas; this is shown below. Each faculty member has multiple grad students also working in these areas.

- Artificial Intelligence: **12** (plus 3 more in the cross-college Center for Blockchain and Digital Innovation, or CBDI). Of the 12, 7 are in the EECS Department. And a new EECS hire for the coming year works in AI applications of Controlled Environment Agriculture, making the total 13 (plus 3 in CBDI).
- Controlled Environment Agriculture: **1** (plus the new hire into EECS, making the total 2)
- Quantum Information Science and Engineering (QISE): **9**
- Advanced Materials: **17** (includes carbon engineering)
- Cybersecurity/Blockchain: **2** (plus 3 in the CBDI)
- Nuclear: **9** (includes energy production, materials, and uranium)

Note that separating Artificial Intelligence as shown above is somewhat misleading, as AI applications certainly span across the other areas. This level of activity, and the future hires mentioned later in this document, show a commitment to and a consistency with President Seidel's vision for the AI Initiative at UW. The UW Distinguished Postdoc Program directly supports AI. The area of Computational Science and Engineering also spans most all other areas.

The college is also currently "incubating" the School of Computing (SoC), and the current plan is for SoC to become an independent unit in the future. SoC has many joint hires with other units, both in CEPS and other colleges. As of June 2024, they are:

Dane Taylor, 60/40, SoC/MathStat
Ellen Aikens, 60/40, SoC/Haub
Sean Field, 60/40, SoC/Anthropology
Ben Koger, 60/40, SoC/ZooPhys
Stefan Rahimi, 75/25, Atmospheric/SoC
Meridith Joyce, 60/40, SoC/Physics - starting this August
Jake Hawes, 60/40, SoC/Haub - starting January
Gabriel Barrile, 75/25, ZooPhys/SoC – located at UW Casper, starting this August

As can be seen, three of the joint hires are with other CEPS units (MathStat, ATSC, Physics). We are planning on at least two more joint hires with SoC and EECS in the coming year. The Dean of CEPS and the Director of SoC meet regularly and coordinate plans for future hires.

While the discussion above appears to focus mainly on research areas, we never lose sight of the fact that our students are always one of our highest priorities. Indeed, the phrase on our website, signs, and various documents say that a prime focus for CEPS is to *educate, motivate and mentor the students entrusted to us*.

Additional points of consideration as we plan toward 2030.

1. In addition to research activity related to AI, CEPS is developing new educational support for this new area. In particular, CEPS plans to help support the new MS in AI degree program (a joint EECS-SoC program). One proposed avenue of support is to use a portion of Tier-1 funding to support GA-ships for the initial cohort of students in this program to help it get started more quickly than it would otherwise. Initial discussions with Bryan Shader resulted in the following target:

- 5 students for 2 years each, at a cost of approximately $170k/year.

This would help establish the program, and move UW forward more quickly in AI. If used as RAs, these students could be utilized to support ML/Data Science research with corporate partners.

The intent is that this would be a relatively short-term commitment. Once this support sunsets, CEPS can direct the funding elsewhere it is needed.

We will also evaluate the feasibility of broadening this type of support to the MS in QISE.

2. In a more general sense, there is a need for the college, working mostly with EECS, MathStat, and SoC, to support the further development of the area of Computational Science & Engineering (CSE) within CEPS. Ideas:

Initiate some broad searches in CSE. For example,

- HPC could end up with a tenure home in ATSC, G&G, EECS, ME, Chem, or CBE;
- Data Science (could end up with tenure home in MathStat, EECS, or P&A;

- Optimization could end up with tenure home in MathStat, EECS, ME, or EPE (optimization in this context includes areas such as AI, ML, as well as much of Data Science).

We expect similar broad searches from SoC in CSE, some of which may be joint hires with CEPS.

A pressing need around computing at UW is the area of CSE. Over the years, UW has invested in interdisciplinary researchers (both in and out of CEPS) who use computing. But UW in general has not invested as much in core computing, and hence the desire to emphasize CSE.

3. We plan to discuss more the idea of having some of the future CSE hires, when appropriate, to be structured as majority appointments in CEPS and up to 25% appointments in SoC (this is worded with the assumption that in the near future SoC will be separate from CEPS).

4. Another possibility is to identify two positions in the broadly defined area of computing that would be beneficial to CEPS, SER, and SoC; with each putting in a to 2/3 FTE in funding. SER is very interested in this.

5. A significant part of the Tier-1 budget goes toward supporting specific student-focused efforts such as the Susan McCormack Student Success Center (encompassing career services, internship coordinator, recruiter, advisors, student ambassadors), the Undergraduate Research Scholars Program (generous 4-yr scholarships, with an undergrad research component), the Innovation Wyrkshop (makerspace), etc. These programs have proven to be very strong factors in recruiting and retention of students, which has a **direct positive effect on enrollment numbers**.

- Given the positive effect on enrollment, funding toward efforts such as the Undergraduate Research Scholars Program should be increased in the coming years.

Appendix 6

FY15-FY26 Tier-1 budget appropriations (Dean Wright and Megan Barber)

Tier 1 Budget Development

	FY15	FY16	FY17	FY18
Original Apprpriation	2,571,750	5,113,164	4,150,963	3,797,686
Budget reduction			353,277	
Budget available	2,571,750	5,113,164	3,797,686	3,797,686

Original Apprpriation	FY19	FY20	FY21	FY22
Budget reduction	4,184,718	4,184,718	4,769,026	4,292,123
Budget available			476,903	
	4,184,718	4,184,718	4,292,123	4,292,123

Original Apprpriation	FY23	FY24	FY25	FY26
Budget reduction	3,792,352	9,292,351	9,292,352	9,292,352
Budget available				
	3,792,352	9,292,351	9,292,352	9,292,352

Appendix 7

WES - CEPS Overview for 2024 (Dean Wright)

Update: 2024 College of Engineering and Physical Sciences (CEPS)

Cameron Wright, Ph.D., P.E.

Carrell Family Dean

February 6, 2025

UNIVERSITY OF WYOMING

CEPS Overview: Ten departments, the School of Computing (incl. WyGISC), and the new Engineering Science Division. Depts:

1. Atmospheric Science
2. Chemical & Biomedical Engineering
3. Chemistry
4. Civil & Architectural Engineering & Construction Management
5. Electrical Engineering & Computer Science
6. Energy & Petroleum Engineering
7. Geology & Geophysics
8. Mathematics & Statistics
9. Mechanical Engineering
10. Physics & Astronomy

Updates: College Organization

Interesting factoids about CEPS:

- Now the second largest college at UW (only A&S has more total students, but CEPS has the most graduate students)
- We now span 7 buildings across campus
- We now have added responsibility for the Observatory atop Jelm Mountain, the Red Buttes Observatory, the UW Planetarium, the Geology Museum,… more
- The number of faculty and staff has almost doubled (>300)
- The cultures and expectations of engineers and scientists are a little different, to be sure, but…

All the departments are getting along quite well, interdisciplinary collaborations are rapidly increasing, and overall we are coalescing into a good team

Dean's Office:

Steve Barrett (home dept: EECS)

- Associate Dean for Undergraduate Programs

Chip Kobulnicky (home dept: Physics & Astronomy)

- Associate Dean for Graduate Programs

Cindy Jones (home dept: SMCSS)

- Assistant Dean for Student Success

David Mukai (home dept: CAECM)

- HT Person Professor, and Head of the Engineering Science Division

Geology & Geophysics Dept:

Mark Clementz

- Department Head
- Returned from sabbatical
- Professor

Leadership Updates (cont.)

Electrical Engineering & Computer Science Dept:

Ian Walker

- Department Head
- Recruited from Clemson
- Professor and Wyoming Excellence Chair

- **Tenure & Promotion to Associate Professor:**
  - Ping Zhong Math/Stat (resigned, poached by another university)
  - Jifa Tian Physics & Astronomy
- **Promotion to Professor:**
  - Shane Murphy Atmospheric Science
  - Te Yu Chien Physics & Astronomy
- **5-yr Fixed Term with Rolling Contract and Promotion:**
  - Bradley Carr Geology & Geophysics Senior Research Scientist
  - Nathan Clements Math/Stat Senior Lecturer
- **5-yr Fixed Term with Rolling Contract:**
  - Robert Erikson Dean's Office/ES Senior Lecturer
- **3-yr Fixed Term Rolling Contract with Promotion:**
  - Christina Knox Math/Stat Associate Lecturer

Tenure and Promotion

- **14 Retirements or Resignations in the past year**

WyGISC/SoC	Di Yang
Geology & Geophysics	Ken Dueker
Mathematics and Statistics	William Weber
Physics & Astronomy	Aysenur Bicer
Mathematics and Statistics	Jorge Flores
Mathematics and Statistics	Ping Zhong
Civil & Architectural Eng Constr Mngmt	Milan Zlatkovic
Petroleum Engineering	Brian Toelle
Mathematics & Statistics	Dan Stanescu
Geology & Geophysics	Mike Cheadle
Physics & Astronomy	Michael Pierce
Mechanical Engineering	Kari Strube
Geology & Geophysics	Barbara John
Atmospheric Science	Bart Geerts

Retirements and Resignations

New Faculty

- **27 new hires in the past year**
  - 14 Assistant Professors
  - 11 Assistant Lecturers/Instructional Professors
  - 1 Department Head (Full Professor)
  - 1 Professor of Practice
- **Engineers and Surveyors like to count:**
  - 14 Retirements or Resignations versus 27 new hires
  - Gain of 13 faculty members
- **15 Faculty Searches Ongoing**
  - Plus a 5-position cluster hire in AI across several colleges, including CEPS

Major	BS	MS	PhD
Atmospheric Sci	--	2	4
Architectural Eng	18	3	--
Chemical Eng	24	5	4
Civil Eng	39	15	7
Computer Eng	11	--	--
Computer Sci	34	8	2
Construction Mgt.	28	--	--
Electrical Eng	7	7	1
Energy Systems Eng	3	--	--
Environmental Eng	--	1	--
Mechanical Eng	52	8	3
Petroleum Eng	14	4	8

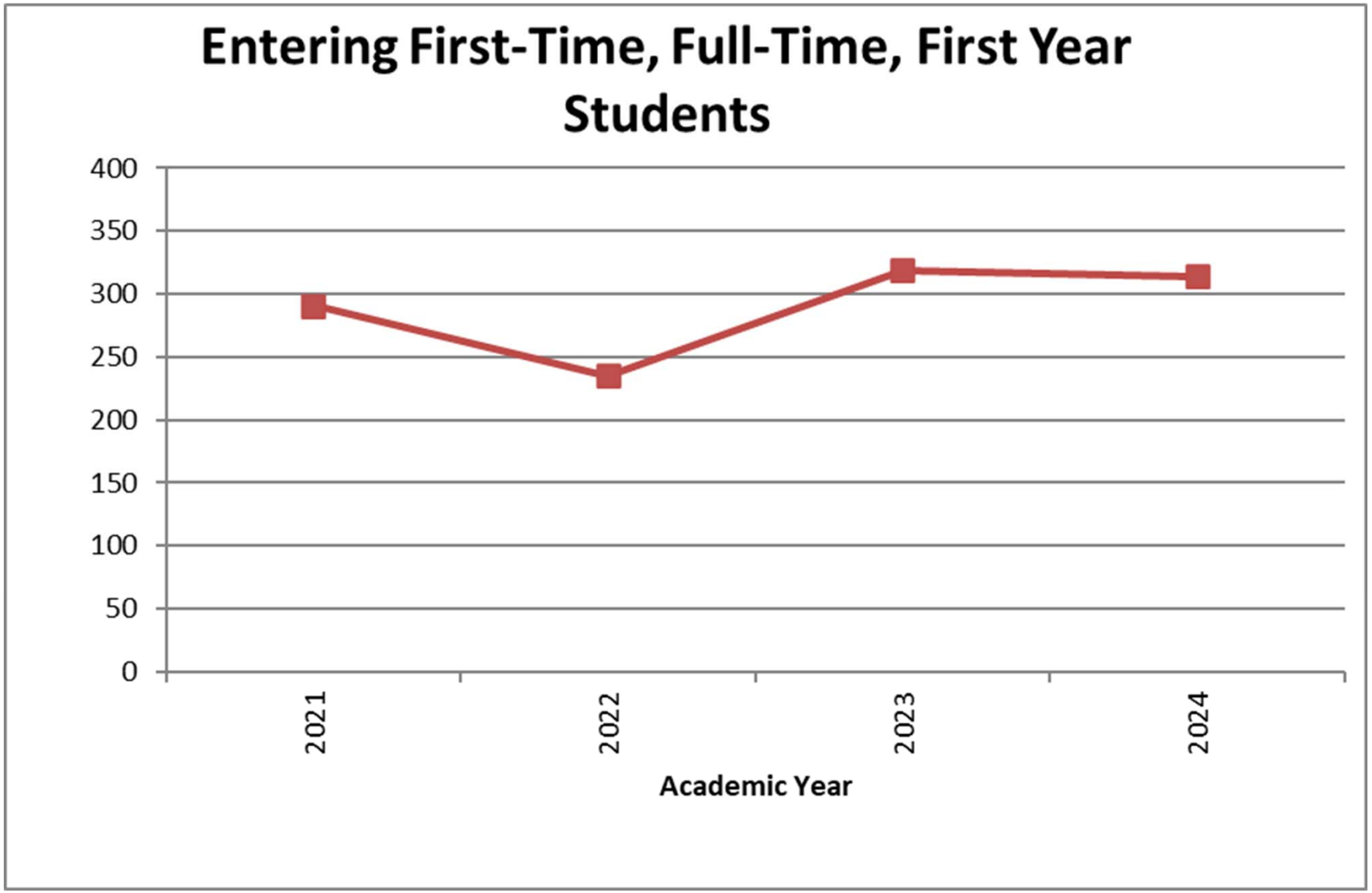
AY 2023-24 CEPS Graduates

Physical Sciences

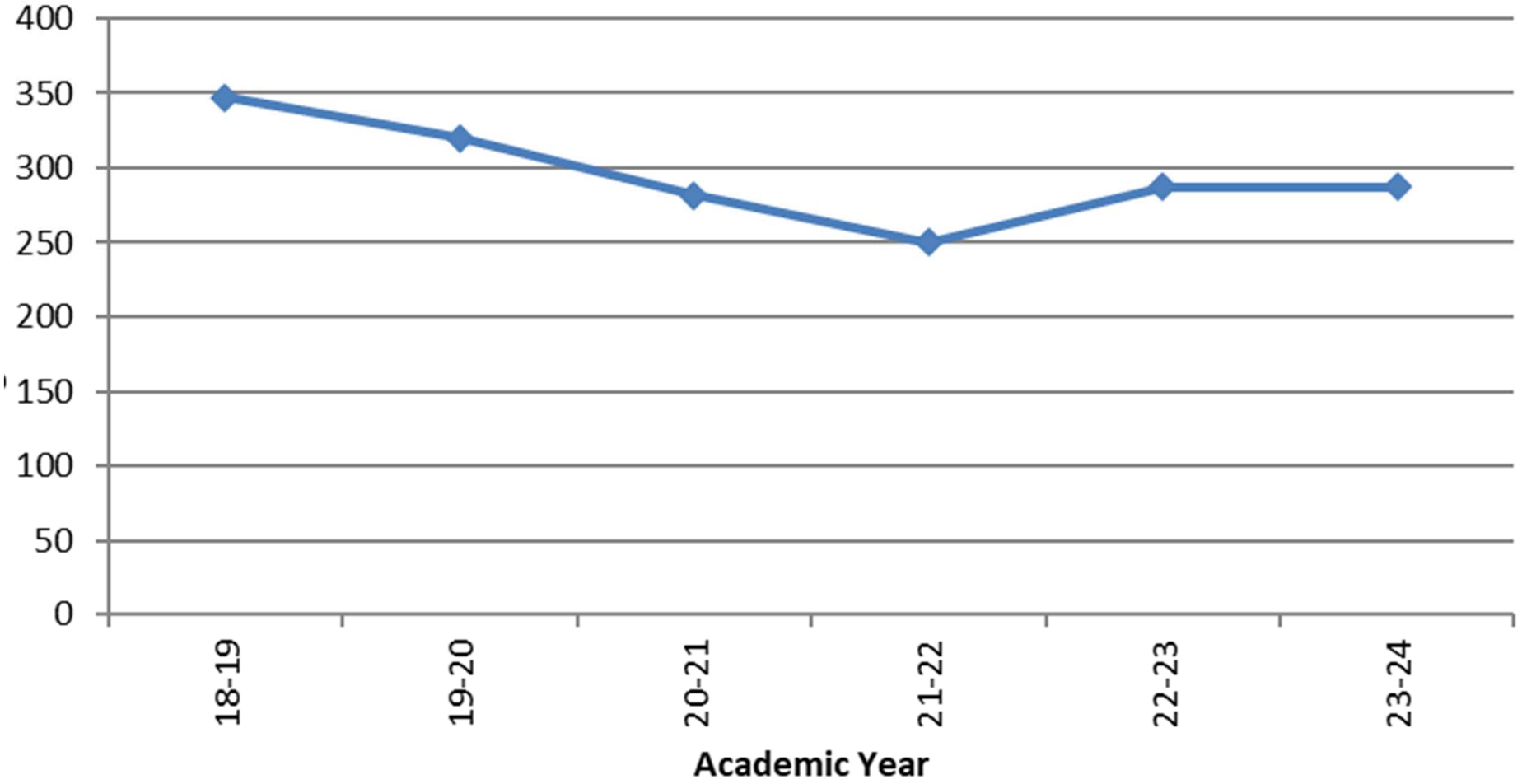
Major	BS	MS	PhD
Chemistry	16	0	6
Geology	17	17	2
Mathematics	12	0	1
Physics/Astronomy	6	10	4
Statistics	6	4	0

	BS	MS	PhD
Totals (% Female)	**287 (21%)**	**84 (35%)**	**42 (19%)**

AY 2023-24 CEPS Graduates

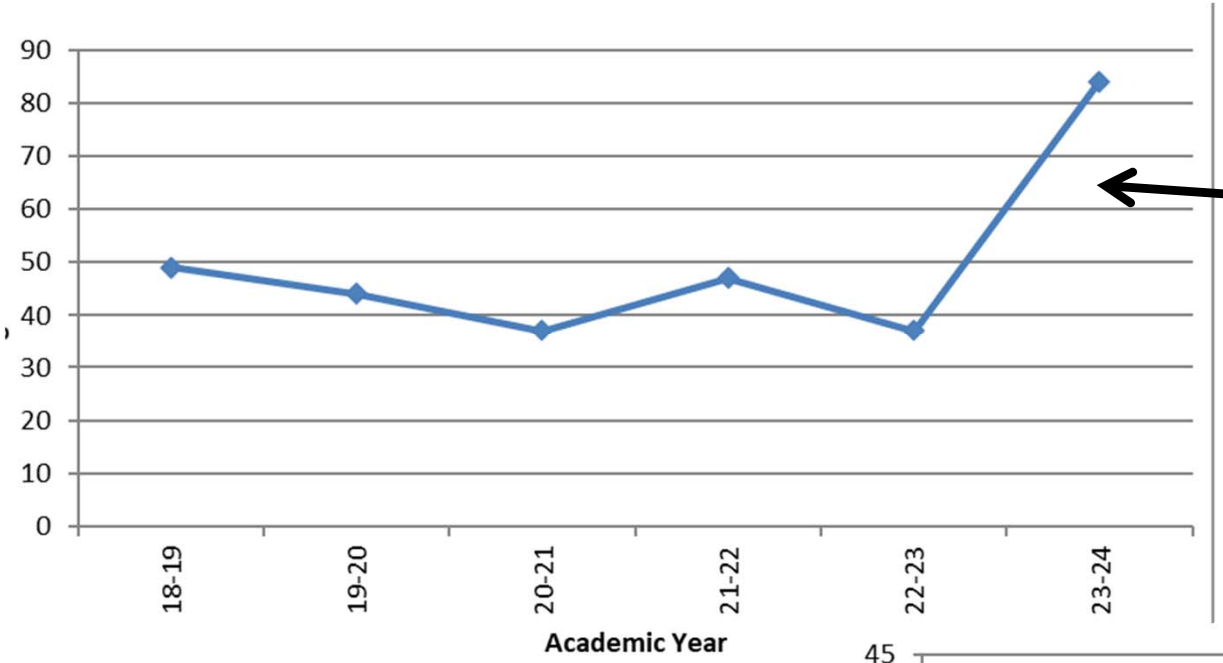


Entering Freshmen



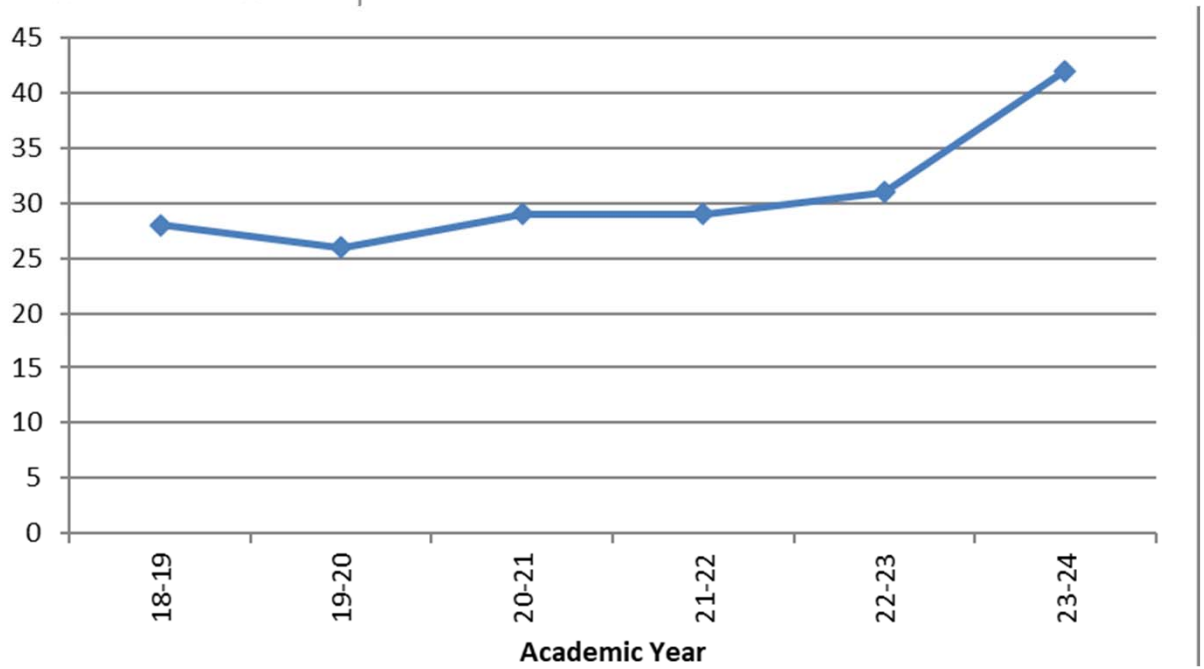
*Mathematics & Statistics added for the 22-23 AY
*Physical Science Majors added for 23-24 AY

Bachelor's Degree Production



MS Degrees

PhD Degrees



*Mathematics & Statistics added for the 22-23 AY
*Physical Science Majors added for 23-24 AY

Graduate Degree Production

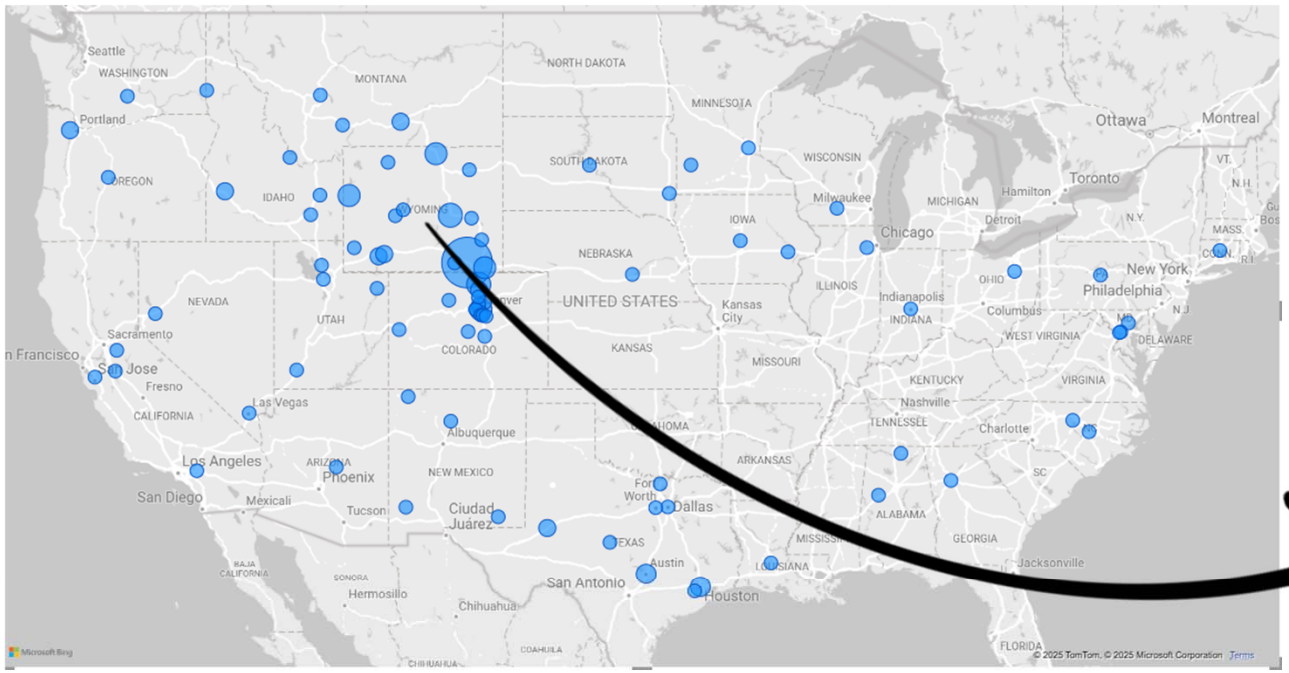
Post-Graduation Plans

Career Outcome Response Rate: 73.4%

(299 submitted surveys/407 students invited to submit a survey – includes graduate and undergraduate students)

- Accepted Employment: 67.5%
- Grad School: 14.1%
- Military: 1.7%
- Not Seeking: .7%
- Volunteering: .3%
- Still Looking: 15.7%

Location Information



Other Top Locations of Employment

- Colorado
- Texas
- Idaho
- Montana
- Utah
- California
- New Mexico
- Oregon
- Washington
- INTL: 3 Students

40%

59/147 responses

Stayed in WY

2024 Employment Outcomes

Salary Information for Undergraduates

Major	Average Salary Offer	Median Salary Offer	Range of Salary Offers
Architectural Engineering *N=3	$63,333	$66,000	$50,000 - $74,000
Chemical Engineering *N=5	$75,800	$78,000	$66,000 - $80,000
Civil Engineering *N=14	$69,985	$70,250	$45,000 - $87,100
Computer Engineering *N=3	$92,333	$92,000	$85,000 - $100,000
Computer Science *N=5	$72,800	$72,000	$51,000 - $85,000
Construction Management BS *N=9	$73,055	$72,000	$62,000 - $80,000
Electrical Engineering *N=3	$97,166	$96,500	$80,000 - $115,000
Mechanical Engineering *N=14	$78,607	$76,500	$61,000 - $108,000
Petroleum Engineering *N=6	$107,100	$110,000	$75,500 – $120,000

Top Employers

University of Wyoming

HDR

Kiewit

BARNARD

MilliporeSigma

SAFRAN

2024 Employment Outcomes (cont.)

Selected by the CEPS Awards & Recognition Committee

- Hall of Fame
- Distinguished Engineer or Scientist Award
- Distinguished Service Award

Please nominate deserving people by visiting the URL https://www.uwyo.edu/ceps/development/awards/index.html

Selected by the students of Tau Beta Pi

- Outstanding Engineering Alumnus Award
- Wyoming Eminent Engineer Award

Please nominate deserving people by contacting Associate Dean, Steve Barrett, at email steveb@uwyo.edu

Awards and Recognition

Recognized at the 2024 CEPS Awards Banquet

- Outstanding Freshmen, Sophomore, Junior awards (too many to list)
- JEPSC Outstanding Senior: Alicia Thoney, CompSci, Sheridan, WY
- WES Student Engineer of the Year: Hannah Hood, EE, Cheyenne, WY
- Tau Beta Pi Outstanding Member: Anna Steele, CHE, Cheyenne, WY
- CEPS Outstanding Undergraduate Teaching Award: Jorge Flores-Matute
- Sam D. Hakes Outstanding Graduate Research & Teaching Award: Morteza Dejam
- Tau Beta Pi Outstanding Staff Award: Jeremiah “Jerry” Schuchardt
- CEPS Outstanding Staff Award: Mēgan Barber

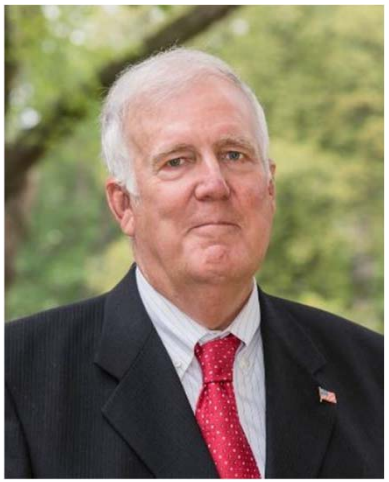
Recognized at the 2024 CEPS Awards Banquet

- Wyoming Eminent Engineer or Scientist:
  - Vince Garcia

- Alumnus Eminent Engineer or Scientist:
  - Gene Humphrey

Recognized at the 2024 CEPS Awards Banquet

- CEPS Distinguished Engineer Award:
  - William G. Lapsley



- CEPS Hall of Fame Award:
  - Andy Krieger

Recognized at the 2024 CEPS Awards Banquet

- CEPS Hall of Fame Award:
  - Kim Krieger

- CEPS Hall of Fame Award:
  - Pat Tyrrell

The State of the College Today

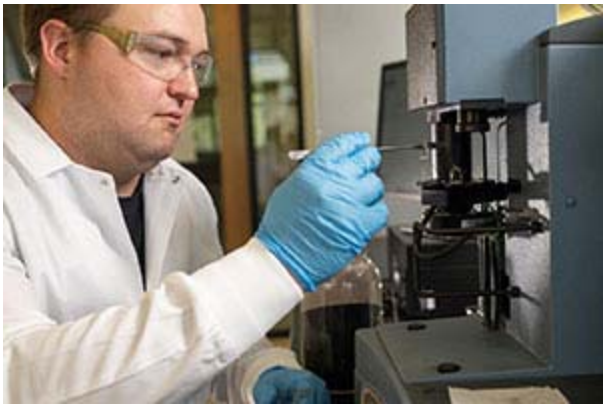
- We are starting to see a turnaround in faculty and staff numbers. But we have to keep pushing forward, after many years of reductions.
- We have incorporated our new departments well.
- The new legislature may be less supportive of UW programs in general
  - We hope CEPS is spared a return to reductions
- Our students are still graduating and getting good, well-paying jobs.
- We remain hopeful that the “slope” will continue to be positive going forward.

UNIVERSITY OF WYOMING

Appendix 8

“UW Ascends to Highest Level of Research Universities” (UW News)

UW Ascends to Highest Level of Research Universities



Graduate student Eli Ellis, of Cheyenne, works in a UW laboratory to find new ways for the refining and use of coal. The university's research prowess in energy, agriculture, natural resources, biomedical sciences, artificial intelligence and many other fields has been recognized with UW being designated as an R1 university by the American Council on Education and the Carnegie Foundation for the Advancement of Teaching. (UW Photo)

The University of Wyoming has reached the highest level of American research universities, reflecting the university's broad impact and evolution into a world-class hub for research, innovation, entrepreneurship and public scholarship.

UW is one of 187 institutions nationwide designated as an R1 university by the American Council on Education and the Carnegie Foundation for the Advancement of Teaching. Today's (Thursday) announcement puts UW in the top tier of U.S. research universities, as just 4.8 percent of the nation's nearly 4,000 accredited, degree-granting institutions have reached this "very high research activity" category.

"Achieving Carnegie R1 status increases the value of a UW degree; serves as an impressive recruiting tool for faculty, staff and students; enhances our ability to boost the state's economy; enriches the student experience through research opportunities; and builds on the already extraordinary sense of pride among members of the UW community," UW President Ed Seidel says. "Getting to this point has taken years of effort. I'm delighted we have achieved this milestone, and we will keep working hard to enhance our value to students and the state of Wyoming."

Through strategic investments in the last few years, such as the formation of the UW Graduate School and new programs to support research, UW has been supporting faculty members and students to foster its research enterprise. The university now stands at $166 million annually in research expenditures, an increase of 78 percent since 2021, ranking UW 42nd among the 318 public universities without a medical school.

Additionally, Carnegie R1 status is a measure of a university's scholarly production. UW regularly produces close to 100 Ph.D. graduates each year.

"Ultimately, this designation sets the stage for economic gains and job growth in Wyoming, beyond even the nearly 14,700 jobs and more than $1.3 billion annually that UW contributes to Wyoming's economy," says Parag Chitnis, UW's vice president for research and economic development. "Most

importantly, it will benefit our students, because faculty engaged in research generate new knowledge that advances the education students receive both inside and outside of the classroom. Students will be more prepared for careers through inquiry-focused work in labs and creative spaces."

UW researchers are tackling a wide variety of challenges in fields that are crucial to Wyoming's current and future economy, including energy, agriculture, natural resources, biomedical sciences and artificial intelligence. To learn more about the university's research enterprise, read the latest issue of UWyo Magazine.

Among the changes made in recent years to boost UW's research performance were a reorganization of academic departments to better assemble teams for addressing complex problems for which there are large grant opportunities; reworking UW's Science Initiative to make it more competitive, with interdisciplinary centers that will allow faculty and students to do more than they could do in just their home departments; starting a School of Computing to link the entire academic enterprise with common expertise; creating an Office of Industry and Strategic Partnerships and boosting the Center for Entrepreneurship and Innovation to enhance impact on the state's economy; expanding the Department of Electrical Engineering and Computer Science with new faculty positions; and creating an Artificial Intelligence Initiative, which includes faculty positions, postdoctoral programs, corporate partners, computational facilities and seed grants across the campus.

"UW graduates have long demonstrated that they can compete with graduates of even the most elite universities in the country, but now there's an added measure of prestige associated with their UW diplomas," Seidel says. "And, because the prestige of R1 status traditionally has served as magnet for people looking to work and study at the top of their fields, UW is now even more attractive to top-tier faculty and students from around the world."

About the American Council on Education

The American Council on Education unites and leads higher education institutions toward a shared vision for the future. With more than 1,600 member colleges, universities and associations, the organization designs solutions for today's challenges and advances public policy to support a diverse and dynamic higher education sector. Learn more at www.acenet.edu.

About the Carnegie Foundation for the Advancement of Teaching

The mission of the Carnegie Foundation is to catalyze transformational change in education so that every student has the opportunity to live a healthy, dignified and fulfilling life. Enacted by an act of Congress in 1906, the foundation has a rich history of driving transformational change in the education sector.

Appendix 9

CEPS Career Services weekly email example (CEPS Career Services staff)

Cameron H G Wright

From: CEPS Career Services <tgrabner-uwyo.edu@shared1.ccsend.com>
Sent: Monday, February 17, 2025 12:50 PM
To: Cameron H G Wright
Subject: CEPS Weekly Jobs/Internships/Resources Bulletin 2/17/25

UNIVERSITY OF WYOMING

College of Engineering and Physical Sciences

SUSAN MCCORMACK CENTER FOR STUDENT SUCCESS

CAREER SERVICES

WEEKLY BULLETIN

Schedule an Appointment for internship or full-time job assistance!

Internship Highlight

INTERNSHIP HIGHLIGHT

Isabelle Orozco

Senior | Chemical Engineering

Wyonics LLC | Research Engineer Intern

Internship Reflection:

"Wyonics has allowed me to apply the concepts I have learned in my classes in the real world and to apply new ideas to those concepts."

Note to Current CEPS Students:

"If you don't think you know enough or that it will be too challenging, you're wrong. Every internship will give you the tools you need to succeed, and you will be so grateful you made the leap to try something new and grow your skills."

Weekly Career Meme/Advice

Tailor your resume and use relevant keywords to get passed Applicant Tracking Systems (ATS) and increase your chances of making it to an interview!

Check out the career services website or schedule an appointment for resources on applying to jobs and internships, follow-ups, tailoring your resume and cover letter, resume reviews, etc.

CEPS Career Services Homepage

Announcements and Events

Alumni Speaker Events with Paul Schuman

Paul SChuman is a Principal Engineer with Simpson Gumpertz & Heger Inc's (SGH) Structural Engineering Group. His PhD research focused on the repair of shear deficient reinforced concrete bridge components using anchored FRP externally bonded composites.

All are welcome to join Paul's class presentations below:

ARE 3300

- **March 6th, 9:35 am**
- **EN 3104**

CM 3160

- **March 6th, 11:00 am**
- **GE 216**

Please feel free to join one or both of Paul's class presentations to learn more about the work he does with SGH including his forensic analysis, new design work, repair and renovation projects, and expert witness work regarding failure cases.

Math, Statistics, and Data Science Careers Panel

Join us for an exciting professional panel event where industry experts will share insights into their careers, offer advice on navigating life after college, and highlight the diverse opportunities available to graduates.

- **February 6gh. from 4:00-5:30 PM**
- **EERB 251**

***Food will be provided!**

<u>Etiquette Dinner Event</u>

Enjoy professional instruction on dining etiquette from Christy Porter. Appetizers and a 3-course meal.

- **Friday, March 7, from 6:00 - 8:30 PM**

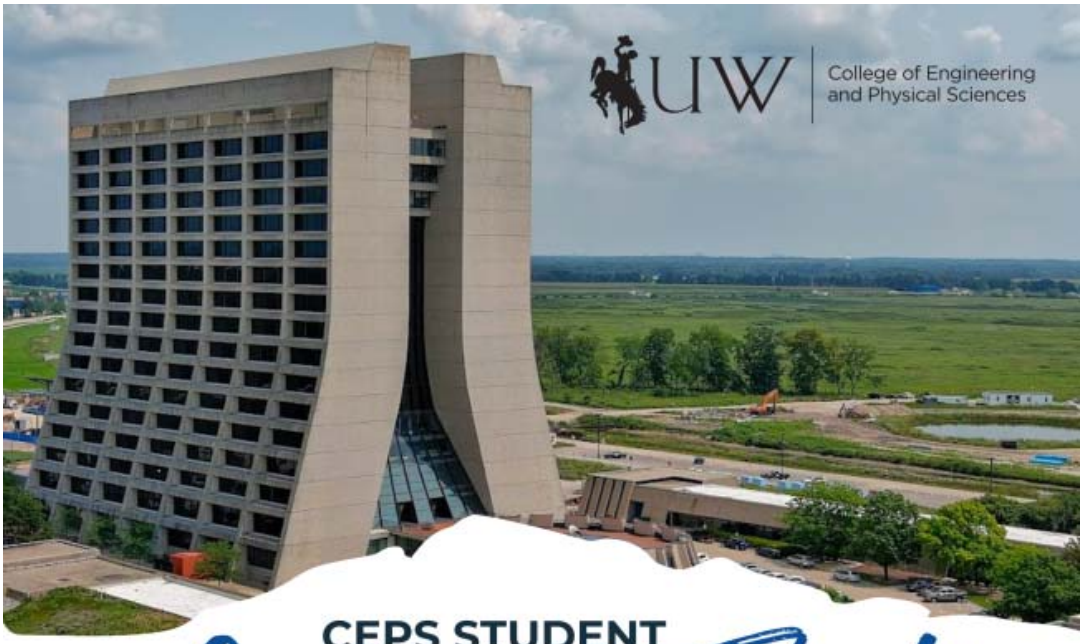
***This is a ticketed event with limited seating. Acquire tickets from ACES front office in 222 Knight Hall. Must have a ticket to attend.**

CEPS Student Career Trek

Join us for a **FREE 3-night trip** to the greater Chicago area to visit two national labs including the **Fermi Accelerator and Argonne National Labs.** This is a great chance to learn more about these labs and build connections!

August 19th- 22nd, 2025

***To register, scan the QR code, click below, or find it on Handshake!**
***We can only take a limited number of students, so fill out the questionnaire to the best of your ability.**
***Deadline to apply is March 7, 11:59 PM**
***For questions, contact tgrabner@uwyo.edu**



CEPS STUDENT

Career Trek

Join us for a **FREE 3 night trip** to the greater Chicago area to visit with two national labs including the **Fermi Accelerator and Argonne National Labs.** This is a great chance to learn about these labs, and build connections!

Fermilab

Argonne NATIONAL LABORATORY

August 19th - 22nd, 2025

To register for the event, scan the QR code (or find it on Handshake) and fill out the short questionnaire.

Please be aware that we can only take a limited number of students, so **fill out the questionnaire to the best of your ability**.

Contact us for questions: tgrabner@uwyo.edu **DEADLINE TO APPLY IS March 7, 11:59 P.M**

Click Here to Register!

Virtual Recruitment Event with Pacific Northwest National Laboratory

You can positively impact science, energy, and national security. Hear Pacific Northwest Laboratory researchers discuss innovative projects and our lab's culture. Plus, recruiters answer questions about applying for full-time jobs, postdocs, and internships!

- **March 17-20, from 1:00-4:00 PM PT Daily**

***This event is free and open to all grade levels, career levels, and academic programs.**
***For questions, visit careers.pnnl.gov or email careers@pnnl.gov**

Change the World at a National Laboratory

VIRTUAL RECRUITMENT EVENT

March 17 - 20

1:00 - 4:00 PM PT daily (4:00 - 7:00 PM ET)

You can make a positive impact in science, energy, and national security. Hear **Pacific Northwest National Laboratory** researchers discuss innovative projects and our lab's culture. Plus, recruiters answer questions about applying for full-time jobs, postdocs, and internships!

Scan to register:

Or visit: ***bit.ly/pnnl-career***

This event is **free** and **open to all grade levels**, **career levels**, and **academic programs**.

Register now. Come and go as needed.

Questions? Visit careers.pnnl.gov or email careers@pnnl.gov

"After I graduated, I completed a two-year postdoctoral fellowship at PNNL and then was hired there as a senior research scientist. I found it to be an incredibly innovative, collaborative, and supportive environment. One of my recent graduates is also getting her start at PNNL. **I would highly recommend attending Career Connections** to learn more about opportunities at U.S. Department of Energy national laboratories."

DR. RYAN KELLY, PROFESSOR
BYU DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

The National Laboratories

The National Laboratories are looking to hire UW students! Make sure to check out internship and career opportunities with the 17 laboratories in the

National Laboratories. Below are some of the labs that have recently been engaged with UW:

INL

Idaho National Laboratory is home to more than 5,700 researchers and support staff focused on innovations in nuclear research, renewable energy systems and security solutions that are changing the world.

For Internship and Careers **Idaho National Laboratory**

Argonne

At Argonne, we view the world from a different perspective. Our scientists and engineers conduct world-class research in clean energy, the environment, technology, national security and more. We're finding creative ways to prepare the world for a better future.

For Internship and Careers **Argonne National Laboratory**

NREL

From breakthroughs in fundamental science to new clean technologies to integrated energy systems that power our lives, NREL researchers are transforming the way the nation and the world use energy.

For Internship and Careers **NREL Transforming Energy**

Los Alamos

LANL is a multi-program, federally funded research and development center for the National Nuclear Security Administration (NNSA) of the U.S. Department of Energy (DOE). LANL's priority roles are serving as a nuclear weapons design agency and a nuclear weapons production agency; addressing nuclear threats; and performing national security science, technology, and engineering.

For Internship and Careers **Los Alamos National Laboratory**

Science Undergraduate Laboratory Internships (SULI)

The Science Undergraduate Laboratory Internships (SULI) program encourages undergraduate students and recent graduates to pursue science, technology, engineering, and mathematics (STEM) careers by providing research experiences at the Department of Energy (DOE) laboratories. Selected students participate as interns appointed at one of 17 participating DOE laboratories/facilities. They perform research, under the

guidance of laboratory staff scientists or engineers, on projects supporting the DOE mission

For more Information SULI

Internships, Research, and Part Time Positions

Research Experiences for Undergraduates (REU)

The U.S. National Science Foundation is an independent federal agency that supports science and engineering in all 50 states and U.S. territories. The Research Experiences for Undergraduates (REU) program supports active research participation by undergraduate students in any of the areas of research funded by the National Science Foundation. REU projects involve students in meaningful ways in ongoing research programs or in research projects specifically designed for the REU program.

Click Here for More Information!

Robotics Internship

9H Research Foundation | Laramie, WY | Summer 2025

Apply to be part of team for a Summer 2025 internship (480 hours). Earn $8,640 per student ($18/hour) while gaining real-world, applied problem-solving experience.

Project Overview:
Develop & build a rugged, water-resistant Robot for culvert pipe inspections, able to navigate and measure distances within pipes and be adaptable for integrating various culvert cleaning and clearing tools.

Mechanical Engineering Intern Assignment:
1. Research and Expert Consultation: The intern will research & consult with experts to understand the requirements for a culvert-exploring robot.

2. Design and Planning: The intern will design an all-terrain robot platform that includes, a rugged waterproof design, the capability to navigate challenging terrains, video systems to assist in navigation.
3. Implementation: The intern will construct & build the design using 3D printing, CAD software, and other tools.
4. Analysis and Reporting: The intern will prepare a report evaluating the project's feasibility, successes, and areas for improvement, including Assessing the method's feasibility for culvert inspection, identifying successful and developing project aspects, proposing improvements, and summarizing lessons learned.

Internship Location: Laramie, WY
Project Duration: May 19, 2025 – August 08, 2025 (40 hours/week for 12 weeks, flexible)
All Wyoming-based undergraduate or graduate students.

How to Apply:
Submit the following to paulb@9hfoundation.org :
- Cover letter, expressing why you are interested in this opportunity & your qualifications (coursework, training, experience) - Current resume, including GPA

Application Deadline: April 18, 2025
Student Pay: $18/hour – a maximum of 480 hours. There is some schedule flexibility.

Full Time Jobs

EAGLE ENGINEERING & SURVEYING, INC.
908 BIG HORN AVE – WORLAND, WY 82401
WWW.EAGLE-WYO.COM
(307) 347-8276

Civil Engineer in Training

Eagle Engineering & Surveying, Inc. | Worland, WY | February 2025

We are the City Engineers for both Worland and Basin, and work on a wide array of projects – water, sewer, transportation, planning, structural, etc. We also do a lot of land surveying, primarily with a Leica GPS system and robotic Total Station.

Looking for a sharp Engineer – the ideal candidate would:

- Be a Civil Engineering graduate or soon-to-be graduate from an accredited college;
- Be an E.I. or able to become an E.I. soon, with a goal to be a Wyoming P.E. soon;
- Have AutoCAD or AutoCAD Civil 3D experience – you will work on ACAD Civil 3D;
- Click Below for More Information!

If you are interested in applying, please send your resume and transcript to Jesse Frisbee, P.E.L.S. at Eagle Engineering & Surveying, Inc., P.O. Box 638, 908 Big Horn Avenue, Worland, WY 82401, or email jf@eagle-wyo.com.

Click Here for More Information!

Civil Engineer in Training

City of Laramie | Laramie, WY | February 2025

The City of Laramie is searching for someone to play a key role in the success of the City's Engineering Division. This person will perform project management, on-site construction inspections, utility and roadway design in Civil 3D, utilize GIS in a municipal setting, perform traffic engineering, review development, and work with the public to ensure projects are the best they can be for the citizens of our community.

Skills:

- Proficient in Civil 3D and GIS
- Understands public works infrastructure and what it takes to construct a project from the surface down.
- Has excellent communication skills.
- Click Below for More Information!

Qualifications:

- Two years of civil engineering experience with a preference given to municipal work.
- EI /EIT Certification
- Baccalaureate level education from a recognized university with major course work in Civil Engineering or related programs.
- Click Below to Learn More!

***Offers Benefits Package**
***Application open until filled**
***Applicants who are offered an appointment are required to pass a comprehensive background investigation, drug and alcohol screening, and driver's license check.**

Click Here for More Information!

Graduate Students

Modeling & Quantitative Analytics (MQA) Intern

Moody's Financial Services| New York, NY |June 2025

At Moody's, we unite the brightest minds to turn today's risks into tomorrow's opportunities. We do this by striving to create an inclusive environment where everyone feels welcome to be who they are-with the freedom to exchange ideas, think innovatively, and listen to each other and customers in meaningful ways.
If you are excited about this opportunity but do not meet every single requirement, please apply! You still may be a great fit for this role or other open roles. We are seeking candidates who model our values: invest in every relationship, lead with curiosity, champion diverse perspectives, turn inputs into actions, and uphold trust through integrity.
Skills and Competencies:

- Experience in financial modelling - experience in credit risk, credit derivatives, corporate finance or structured finance a strong plus.
- Proficient in one of the programing languages such as MatLab, R, Python, SQL, VBA or others
- Working knowledge of MS Office tools
- Excellent verbal, and written communication, presentation and interpersonal skills.
- Ability to work independently and handle workflow, to adapt to a changing environment, and prioritize tasks accordingly
- Strong organizational skills, analytical thinking, and attention to detail

Education:

- Students studying towards a Master's Degree or PhD, in Finance, Accounting, Economics, Mathematics, Statistics, Financial Engineering, Data Science or related fields
- Graduation date of December 2025 - June 2027
- Ability to work during program dates: June 2nd - August 8th 2025

Responsibilities:

- Work on a research project identified by the team manager that involves data analysis and helps to identify trends to support credit views
- Support projects to design, develop and maintain quantitative models and scorecards used in the ratings process for Structured Finance and Fundamental asset classes
- Prepare documentations along the model/scorecards development process, make sure replicability of the model, adhere to model/scorecards verification and validation/approval requirements
- Assist in quantitative projects to update and improve existing credit rating models and scorecards, or to provide data analysis to assist rating processes
- Research econometric, statistical and mathematical techniques to evaluate performance of econometric models

About the Program:

Moody's 10-week summer internship program is a premier opportunity for students to immerse themselves in a hands-on learning experience, guided by Moody's commitment to integrity, excellence, and insight. The program takes place each summer from June - August and positions are available for undergraduate and select graduate students. Internships are full-time, offering a comprehensive view of Moody's business and culture, and a chance to build professional and technical skills. Programmatic elements include networking, mentorship, leadership speaker series and volunteering events. Interns complete project work determined by their team that have real impact, fostering a sense of accomplishment and professional growth. Throughout the internship, participants receive mentorship from Moody's professionals, gaining insights into diverse career paths and cultivate a comprehensive understanding of the company. Networking events and workshops further enrich the experience, providing a platform for professional development and collaboration. As a Moody's intern, you will gain real-world experience, turn inputs into actions, and be integral part of the team.
For US-based roles only: the anticipated hiring hourly rate for this position is $35/hr.

Click Here to Apply!

Statistical Technical Writing Intern (Graduate Level)

SAS Data and AI Solutions| Cary, NC |May 2025

JMP, *a subsidiary of SAS*, is committed to empowering scientists and engineers via our world-class family of statistical software products. For over 35 years, JMP has enabled customers to speed new drugs to market, to design better products and processes, and to figure out how to restore ecosystems. Advancements are made when brilliant people use JMP statistical discovery software to see what they've not seen before. If you are a problem solver, a connector, and someone who enjoys helping others, then a JMP internship may be the right fit for you!

As a *Statistical Writer Intern*, you will work closely with professional statisticians who develop software that is used throughout the world. You will be responsible for software documentation writing activities, throughout the software release cycle. You will be responsible for working with JMP statistical software development teams to produce technical documentation that describes how to use JMP software to achieve business and scientific goals. You will also engage with JMP statistical software development teams to contribute to the overall software quality and customer satisfaction.

Qualifications:

- You're a graduate-level college student enrolled in an accredited program, not graduating prior to December 2025.
- Currently pursuing a Master's degree or a PhD in statistics, machine learning, computational mathematics, industrial engineering, operations research, or a related field including extensive coursework in mathematics, from an accredited university.
- Strong communication skills – both written and verbal.
- Leadership abilities. Your past experiences demonstrate you'll take initiative and go above and beyond the call of duty.
- You're interested in the future of analytics and embrace technology.
- Be comfortable with a certain degree of ambiguity. A successful intern can create specific actions and paths from ambiguous goals and requirements.
- You're curious, passionate, authentic, and accountable. These are **our values** and influence everything we do.
- Experience with:
    - a high-level language like JMP, SAS IML, MATLAB or R
    - creating automation scripts, preferably with Java or Python
    - multiple operating systems, such as Windows and Macintosh

Timeline:

- Applications open: December 2024
- Interviews begin: December 2024 on a rolling basis.
- Internship: May 20 – August 8, 2025. If your university is on a quarter system, we can be flexible on start date.

Equivalent combination of education, training and experience may be considered in place of the above qualifications. Resumes may be considered in the order they are received. JMP employees performing certain job functions may require access to technology or software subject to export or import regulations. To comply with these regulations, JMP may obtain nationality or citizenship information from applicants for employment. JMP collects this information solely for trade law compliance purposes and does not use it to discriminate unfairly in the hiring process.
To qualify, applicants must be legally authorized to work in the United States, and should not require, now or in the future, sponsorship for employment visa status.

Click Here for More Information!

Resources for Students!

Pathways to Programming: A Career Guide for Aspiring Women Developers

Visit NSA Resources for Students

CEPS Career Services Website

handshake

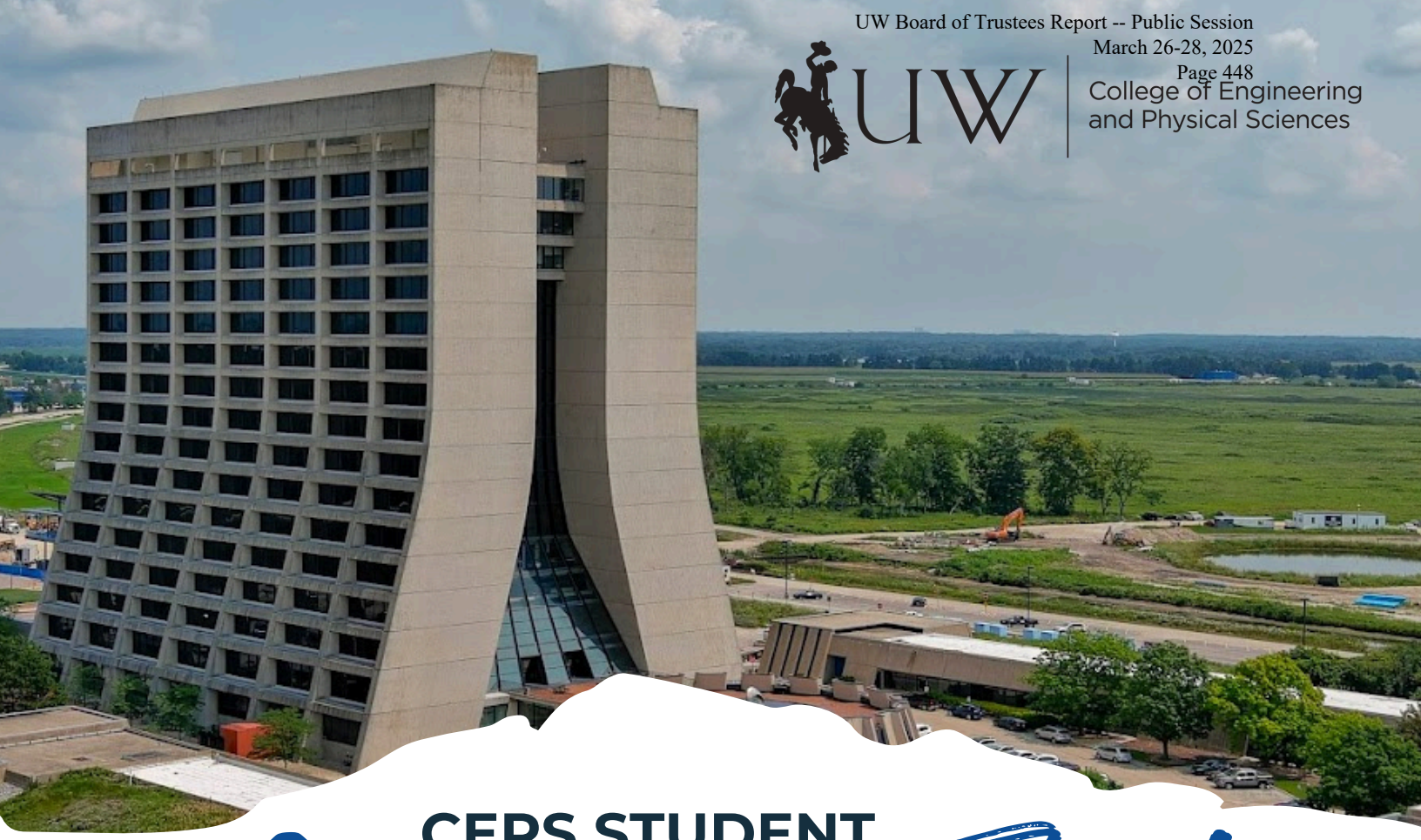
Let your story SOAR

Build an experiential transcript in SOAR and explore
even more job and internship opportunities through Handshake.

Appendix 10

CEPS Career Services student trek to Argonne National Lab (CEPS Career Services staff)

UW College of Engineering and Physical Sciences



CEPS STUDENT Career Trek

Join us for a **FREE 3 night trip** to the greater Chicago area to visit with two national labs including the **Fermi Accelerator and Argonne National Labs.** This is a great chance to learn about these labs, and build connections!

Fermilab

Argonne NATIONAL LABORATORY

August 19th - 22nd, 2025

To register for the event, scan the QR code (or find it on Handshake) and fill out the short questionnaire.

Please be aware that we can only take a limited number of students, so **fill out the questionnaire to the best of your ability**.

Contact us for questions: tgrabner@uwyo.edu

DEADLINE TO APPLY IS March 7, 11:59 P.M

Appendix 11

CEPS Career Services resume, internship, etc. help by appointment (CEPS Career Services staff)

Cameron H G Wright

From: endnfac-eng@uwyo.edu on behalf of Tyler Robert Grabner <tgrabner@uwyo.edu>
Sent: Tuesday, January 28, 2025 10:17 AM
To: students-eng; grad-eng
Cc: fac-eng; Annie Cowger
Subject: Career Prep Events Happening Next Week (Recruiter Panel, Federal Resume Workshop, Interviewing Workshop)
Attachments: Drop In Resume Reviews (1).pdf

Hello All!

Please see the **career prep events happening next week** (Feb 3rd -7th)that are applicable and available to ALL majors including undergraduate and graduate students.

Federal Resume Workshop with the USDA

- Connect with Sasha Charny with the United States Department of Agriculture Natural Resource Conservation Service to learn about the differences between a federal resume and a private industry resume! This would be a great time to learn abou this information and build a connection!
- 2/4 | 4 pm - 5 pm | EN 1062

Interviewing Workshop with Safran Passenger Innovations

- Join Heather Simmons with Safran to get some tips for interviewing with employers! Again, this is a great time for some of this advice, but also a good time to connect with a Safran rep. They are looking to grow their Laramie office and hire students in CoSci, Electrical Engineering, Computer Engineering and possible Math/Stats.
- 2/5 | 12 pm - 1 pm | EN 1062
- **Food included!**

CEPS Internship Awareness Panel Featuring Trihydro, WY Enterprise Technology Services, and GH Phipps

- Join company reps to learn about the internships they offer, why they are important, and advice for getting an internship yourself! This would be a great time to learn and network!
- 2/6 | 4 pm - 5 pm | EERB 255
- **Food included!**

CEPS Drop in Resume Reviews

- Feel free to stop by EN 2079 next week for 15 minute resume reviews! We will mostly be taking a look at the readability and relevance of your resumes to help you prepare for the fair!
- Happening at various times, please see the attachment for more information.

Thank you, and we hope to see many of you at these events!

Tyler Grabner (He/Him)
Manager, Career Services
College of Engineering and Physical Sciences
Susan McCormack Center for Student Success

University of Wyoming
Office: Engineering Building 2079B
307-766-4277 | tgrabner@uwyo.edu
Visit our CEPS career services website
Book an appointment! – Student link | Employer link

Appendix 12

UW Leadership Academy – 2025 (Dr. Haller)

UNIVERSITY OF WYOMING
LEADERSHIP ACADEMY

PREPARE TO LEAD WYOMING'S FUTURE.

Leadership Academy is an immersive experience for high-achieving University of Wyoming students with a passion for leadership, innovation, and collaboration. Students will:

EXPLORE WYOMING INDUSTRIES

CONNECT WITH CIVIC & BUSINESS LEADERS

DEVELOP SYSTEMS LEADERSHIP SKILLS

MEETING DATES FALL 2025:

Aug. 21-22, 2025: Orientation & Education Focus (Laramie, WY)
Sept. 3-5, 2025: Tourism & Outdoor Recreation Focus (Jackson & Lander, WY)
Oct. 2-3, 2025: Manufacturing & Community Services Focus (Sheridan, WY)
Oct. 30-31, 2025: Energy Focus (Casper, WY)
Dec. 5, 2025: Final Presentations & Graduation (Laramie, WY)

MORE INFORMATION:

- Leadership Academy is a 3 credit course. Hours occur during the meeting dates.
- All lodging & meals for each session will be provided.
- Transportation will be provided for students to and from offsite sessions.
- Attendance at all meeting sessions is expected.
- Excused absences for other classes will be provided for all participants in the program

Leadership Wyoming

UW College of Business
Center for Principle-Based Leadership and Ethics

LEARN MORE OR APPLY:
UWYO.EDU/ETHICS/LEADERSHIP-ACADEMY/

Appendix 13

9H Summer 2025 Internship (9H)

9H RESEARCH FOUNDATION

Robotics Internship
$8,640 Internship
Summer 2025

Searching for Two Mechanical Engineering Interns:

Apply by April 18th

www.9Hfoundation.org

$8,640 Applied Internship Opportunity

Attention: Undergraduate and Graduate students

Apply to be part of team for a Summer 2025 internship (480 hours).
Earn $8,640 per student ($18/hour) while gaining real-world, applied problem-solving experience.

Project Overview: Develop & Build a rugged, water-resistant Robot for culvert pipe inspections, able to navigate and measure distances within pipes and be adaptable for integrating various culvert cleaning and clearing tools

Mechanical Engineering Intern Assignment:

1. Research and Expert Consultation: The intern will research & consult with experts to understand the requirements for a culvert-exploring robot.
2. Design and Planning: The intern will design an all-terrain robot platform that includes, a rugged waterproof design, the capability to navigate challenging terrains, video systems to assist in navigation.
3. Implementation: The intern will construct & build the design using 3D printing, CAD software, and other tools.
4. Analysis and Reporting: The intern will prepare a report evaluating the project's feasibility, successes, and areas for improvement, including: Assessing the method's feasibility for culvert inspection, identifying successful and developing project aspects, proposing improvements, and summarizing lessons learned.

$8,640 Applied Internship Opportunity
Attention: Undergraduate and Graduate students

Internship Location: Laramie, WY

Project Duration: May 19, 2025 – August 08, 2025 (40 hours/week for 12 weeks, flexible)

Who is eligible? All Wyoming-based undergraduate or graduate students.

How to Apply:

Submit the following to paulb@9hfoundation.org : **Application Deadline:** April 18, 2025

- Cover letter, expressing why you are interested in this opportunity & your qualifications (coursework, training, experience)
- Current resume, including GPA

Student Pay: $18/hour – a maximum of 480 hours. There is some schedule flexibility.

Mentorship:

The interns will be integrated into a team, briefed on their goals, and introduced to the significance of their project in merging robotics in agricultural practices. They will spend the initial phase researching and planning their approach, supported by experts from various fields such as coding, robotics, engineering, and ranch management. This multidisciplinary mentorship aims to prepare the intern for a comprehensive project execution—from conception through implementation.

A significant emphasis will be placed on the documentation of the project process and the formulation of a detailed final report. This report is intended to assess the feasibility of robotic culvert inspection, serving as a valuable resource for the agricultural community. By detailing the project's outcomes, challenges, and lessons learned, it aims to inspire and guide ranchers in adopting innovative technologies to modernize their operations.

The success of the internship is measured not by the immediate product, but by the depth of understanding and the potential application of the findings in real-world scenarios.

9H Ranch Partnership:

The 9H Ranch is an operating agricultural operation, with more than 50,000 acres in Wyoming. Producing hay, alfalfa, corn, and cattle, they have agreed to allow students unfettered access to the land for their projects. The 9H Ranch manager will be a source of knowledge, guiding the interns in what is needed for successful ranching operations and how technology can help their endeavors.

UplinkRobotics Partnership:

Wyoming Tech Startup UplinkRobotics will be offering mentorship and guidance to the interns in this internship in the form of knowledge, tools, guidance, workspace, etc. Their experience will help the interns bring robotics to ranchers.

About 9H Research Foundation

The 9H Research Foundation's goal is to prepare students for a fulfilling career by funding real-world practical projects, scholarships, internships, awards, competitions, & prototypes.

In addition to a traditional education, 9H gives students the opportunity to work on applied projects with real-world value. This is the best way to achieve our goal of preparing students for a competitive career. Since 2020, the 9H Foundation and its founder have contributed nearly $2M dollars towards student internships, scholarships, competitions, and project funding.

As a hub for innovation, the 9H Foundation engages students with paid practical projects & internships that elevate their professional marketability & bolster their skills.

With student input through senior design projects & energy competitions, the 9H Research Foundation has built a 500kW, 5-acre solar research facility for the benefit of UW; the power sold from the 30-year life of the solar farm will directly fund UW students.

"The 9H Research Foundation projects represent an amazing opportunity for students from the University to be closely involved in applied projects & engineering competitions"

Cameron Wright
Dean of Engineering & Physical Sciences

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If you would like to learn more about 9H Research Foundation, we'd love to talk with you.

Paul Bonifas
Director
paulb@9hfoundation.org

Appendix 14

Gifts_to_CEPS_2014-2025 (UW Foundation)

University of Wyoming Foundation
College of Engineering and Physical Sciences Giving Totals
FY 2014 - FY 2025

Year	Total Before Private Research Funding	Private Research Funding	Total
2014	$ 6,670,729.00	-	$ 6,670,729.00
2015	$ 2,577,809.00	-	$ 2,577,809.00
2016	$ 3,322,597.00	-	$ 3,322,597.00
2017	$ 7,823,087.00	-	$ 7,823,087.00
2018	$ 17,367,992.00	-	$ 17,367,992.00
2019	$ 3,029,718.00	-	$ 3,029,718.00
2020	$ 4,390,366.00	-	$ 4,390,366.00
2021	$ 4,354,292.00	-	$ 4,354,292.00
2022*	$ 10,996,103.00	$ 509,830.00	$ 11,505,933.00
2023	$ 6,705,339.00	$ 908,347.00	$ 7,613,686.00
2024	$ 4,100,464.00	$ 491,827.00	$ 4,592,291.00
2025 **	$ 3,915,769.00	$ 328,720.00	$ 4,244,489.00

* Private Research Funding was not counted until FY 2022
** 2025 is as of 2/24/2025

Total 2014-2025**	**$**	**77,492,989.00**

Total gifts for Tier-1 related buildings

High Bay Research Facility (HBRF):	**$**	**33,390,509.00**
Engineering Education and Research Building (EERB):	**$**	**5,534,983.00**

Total CEPS and Tier-1 related gifts, all:	**$**	**116,418,481.00**

AGENDA ITEM TITLE: **Service Contract and Procurement Reports**, Evans

UW Regulation 7-2 (Signature Authority) Contracts Board Report - December 16, 2024 - February 15, 2025

Contract Number	Contract Name	Contract Type	Department	Supplier	Signed Date	Agreed Amount	Signer
22112PFMAMDec2020	INVESTMENT ADVISORY AGREEMENT AMENDED	Services Contract	AVP of Fiscal Administration	PFM Asset Management LLC	2025-01-22	200,000.00	Alexander Kean, Vice President, Budget & Finance
22111-NationalCollectionSystems-Sep2024	Collection Services Contract - NCM	Services Contract	Budget & Institutional Planning	National Collection Systems, Inc	2025-01-22	400,000.00	Alexander Kean, Vice President, Budget & Finance
12104-Tecan-June	Agreement for Services	Services Contract	College of Agriculture & Natural Resources	Tecan US Inc	2025-01-22	171,646.99	Kelly Crane, Dean/Extension Educator, Sr
12106-Wildlife Air-August 2023	Agreement for Services	Services Contract	College of Agriculture & Natural Resources	Wildlife Air LLC	2025-01-16	1,500,000.00	Ed Seidel, President
12110AmandaMorrisonDec2024	AGREEMENT FOR SERVICES BETWEEN THE UNIVERSITY OF WYOMING AND AMANDA MORRISON	Services Contract	College of Agriculture & Natural Resources	Amanda Morrison	2025-01-07	59,768.00	Kelly Crane, Dean/Extension Educator, Sr
12110RebeccaSwensonDec2024	AGREEMENT FOR SERVICES BETWEEN THE UNIVERSITY OF WYOMING AND REBECCA SWENSON	Services Contract	College of Agriculture & Natural Resources	Rebecca Swenson	2025-01-13	53,206.00	Kelly Crane, Dean/Extension Educator, Sr
12110VirginiaSchutteNov2024	AGREEMENT FOR SERVICES BETWEEN THE UNIVERSITY OF WYOMING AND VIRGINIA SCHUTTE	Services Contract	College of Agriculture & Natural Resources	Weaver Schutte, Virginia Grace	2024-12-19	53,206.00	Kelly Crane, Dean/Extension Educator, Sr
12111-UOInfoGraphicsLab-2024	Agreement for Services	Services Contract	College of Agriculture & Natural Resources	University of Oregon	2024-12-20	101,438.00	Kelly Crane, Dean/Extension Educator, Sr
12111_WWRC_EG_RMEF_2025	Agreement for Services	Services Contract	College of Agriculture & Natural Resources	Western Wildlife Research Collective, LLC	2025-01-22	72,000.00	Kelly Crane, Dean/Extension Educator, Sr
12301SUGroupJune2024	SU Group	Services Contract	College of Agriculture & Natural Resources	Specialty Underwriters LLC	2025-01-22	87,979.00	Kelly Crane, Dean/Extension Educator, Sr
Agreement for Services Andres F. Ramirez-Mejia	Agreement for Services	Services Contract	College of Agriculture & Natural Resources	Andres Felipe Ramirez Mejia	2025-01-22	76,500.00	Kelly Crane, Dean/Extension Educator, Sr
13271-DunkleyMusic-Dec24	Agreement for services	Services Contract	College of Arts & Sciences	Dunkley Music Inc	2025-01-26	101,602.00	Adrienne Freng, Interim Dean/Professor
14004-State of WY MOU-Jan 2025	MOU with State of Wyoming OCIO	Services Contract	College of Business	State of Wyoming	2025-01-31	120,000.00	Scott Beaulier, Dean/Professor
15001-UofKansas-Jan2025	University of Kansas	Services Contract	College of Education	University of Kansas	2025-02-05	70,000.00	Jenna Shim, Dean/Professor
15002-TwoRevolutions-May2022	Two Revolutions LLC	Services Contract	College of Education	Two Revolutions LLC	2025-01-22	1,035,000.00	Ed Seidel, President
16001-SSIA-May 2024	Agreement for Services	Services Contract	College of Engineering & Applied Science	SSIA Technologies LLC	2025-01-22	230,170.00	Cameron Wright, Dean/Professor
16101FlightSafety10.2024	Flight Safety	Services Contract	College of Engineering & Applied Science	Flight Safety International Inc	2025-01-22	76,605.00	Cameron Wright, Dean/Professor
16102-Bio-Logic USA LLC-Dec2024 (2)	Lab Software	Services Contract	College of Engineering & Applied Science	Bio-logic USA, LLC	2025-01-08	50,491.18	Cameron Wright, Dean/Professor
16103-GraceInstruments-June2024	Lab Equipment/Software	Services Contract	College of Engineering & Applied Science	GRACEINSTRUMENT INDUSTRIES, LLC	2025-01-22	256,596.56	Cameron Wright, Dean/Professor
16103-IXRF Systems-June2024	Software-Warranty Agreement	Services Contract	College of Engineering & Applied Science	IXRF, Inc	2025-01-22	414,492.00	Cameron Wright, Dean/Professor
16103-Keyence-May2024	Laboratory Equipment	Services Contract	College of Engineering & Applied Science	Keyence Corporation of America	2025-01-22	78,114.25	Cameron Wright, Dean/Professor
16203AarhusUniversitetOct2024	Agreement	Services Contract	College of Engineering & Applied Science	Aarhus Universitet	2025-01-22	98,582.00	Cameron Wright, Dean/Professor
17107_FORVIS_COST REPORT 2024-2029	Cost Report Preparation	Services Contract	College of Health Sciences	FORVIS, LLP	2024-12-23	80,000.00	Michelle Hilaire, Vice Provost/Clinical Professor
11001_BrianJeffries_July2024	11001_BrianJeffries_July2024	Services Contract	Enhanced Oil Recovery Institute	Brian E Jeffries	2025-01-22	150,000.00	Holly Krutka, Executive Director
28350-AegeanAurora-Oct2024	Aegean Aurora - Greece January 2025	Services Contract	Global Engagement	AEGEAN AURORA TRAVEL DESIGNERS	2025-01-22	62,800.00	Isadora Helfgott, Vice Provost/Assoc Professor, Global Engagement
10401WSUJanuary2025	Agreement for Lab Services	Services Contract	Haub School of Environment and Natural Resources	Washington State University	2025-01-27	50,000.00	John Koprowski, Professor/Dean/Wyo Excellence Chair
23001-Insight Global LLC-May 2024	Master Service Agreement	Services Contract	Human Resources	Insight Global, LLC	2025-01-22	600,000.00	Alexander Kean, Vice President, Budget & Finance
23001-Payscale, Inc-Dec 2022	Payscale Master Service Agreement	Services Contract	Human Resources	Payscale, Inc.	2025-01-22	239,450.00	Alexander Kean, Vice President, Budget & Finance
23001-Vector Solutions-May 2024	Services Agreement	Services Contract	Human Resources	Scenario Learning LLC dba Vector Solutions	2025-01-22	62,600.00	Alexander Kean, Vice President, Budget & Finance
40002 AVI, BU 57 Auditorium, August 2024	BU057	Services Contract	Information Technology	AVI-SPL LLC	2025-01-22	99,930.62	Jennifer Chavez, Interim Vice President/CIO
40002 Zoom,	Q2749641	Services Contract	Information Technology	Zoom Communications Inc	2025-01-22	99,796.00	Jennifer Chavez, Interim Vice President/CIO
40004_Dell_Red_Hat_Renewal_Jan2025	Red Hat Renewal	Services Contract	Information Technology	Dell Marketing LP	2025-01-24	90,272.70	Jennifer Chavez, Interim Vice President/CIO
40004_Tommy_TQL_VMware_Renewal_Subscription_Jan2025	VMware Renewal Subscription	Services Contract	Information Technology	TommyTQL LLC	2025-02-07	194,734.08	Jennifer Chavez, Interim Vice President/CIO
40004_Transact_June 2024	Transact Order Form	Services Contract	Information Technology	Transact Campus Inc	2025-01-22	547,282.99	Jennifer Chavez, Interim Vice President/CIO
61002HaldaJanuary2025	Halda- Univ. of Wyoming New Deal	Services Contract	Institutional Marketing	Halda, Inc.	2025-02-13	50,000.00	Chad Baldwin, Assoc VP, Comm&Mkting
70430MeganBradleyCommNov2023	Agreement for Svc. Megan K. Bradley Communications	Services Contract	Institutional Marketing	Megan K Bradley Communications LLC	2025-01-22	85,250.00	Chad Baldwin, Assoc VP, Comm&Mkting
90001 - Agile Sports Technology - May 2024	HUDL MSA	Services Contract	Intercollegiate Athletics	Agile Sports Technologies dba HUDL	2025-01-22	75,000.00	Jennifer Chavez, Interim Vice President/CIO
90014 JC Hospitality June 2024	Group Sales Agreement	Services Contract	Intercollegiate Athletics	JC Hospitality	2025-01-22	90,431.54	Matthew Whisenant, Deputy Director
90202 - Red Card - April 2023	Dining Services Agreement	Services Contract	Intercollegiate Athletics	Red Card	2025-01-07	350,000.00	Thomas Burman, Athletic Director
90202 UNC 08.2030	2030 FB UNC	Services Contract	Intercollegiate Athletics	University of Northern Colorado	2024-12-19	425,000.00	Matthew Whisenant, Deputy Director
90202-WestinWestminster-Jan2025	Group and Event Agreement	Services Contract	Intercollegiate Athletics	Westin Westminster	2025-01-17	61,105.00	Thomas Burman, Athletic Director
90203-ClassicClub-February2025	2.23.25 Wyoming Men Desert Invitational	Services Contract	Intercollegiate Athletics	Classic Club	2025-02-11	66,000.00	Thomas Burman, Athletic Director
10001MinesandAssoicatesJan2025	UW College of Education Comprehensive Culture Assessment and Improvement Plan	Services Contract	Provost	Mines and Associates PC	2025-01-15	60,900.00	Tami Benham-Deal, Senior Vice Provost/Professor
10012-GrayDecisionIntelligence-December2024	Subscription Renewal for Program Evaluation Software	Services Contract	Provost	Gray Decision Intelligence, Inc.	2025-01-24	106,920.00	John Turpen, Interim Provost/Professor
10502 - Vertiv Corporation - January 2025	Vertiv Preventative Maintenance Agreement - UPS Batteries	Services Contract	Research & Economic Development	Vertiv Corporation	2024-12-23	235,344.00	Parag Chitnis, Vice President/Professor, Research & Economic Development
70001SchedMDDec2022	Slurm Support WYO20221111	Services Contract	Research & Economic Development	SchedMD LLC	2025-01-22	52,230.00	Parag Chitnis, Vice President/Professor, Research & Economic Development
70005APIOiX032024	APIOiX	Services Contract	Research & Economic Development	Apio, LLC	2025-01-22	600,000.00	Parag Chitnis, Vice President/Professor, Research & Economic Development
70007WyomingBusinessCouncilJuly2024	Contract between WBC and UW	Services Contract	Research & Economic Development	Wyoming Business Council	2025-01-22	1,413,800.00	Ed Seidel, President
70008-CSUVetDiagLabMarch2023	CSU Veterinary Diagnostic Lab	Services Contract	Research & Economic Development	Colorado State University	2025-01-22	50,000.00	Farrell Rapp, Director, Research Services
70007WestedgeJuly2024	Marketing 2024-2025	Services Contract	Research & Economic Development	West Edge Collective LLC	2025-01-22	60,000.00	Parag Chitnis, Vice President/Professor, Research & Economic Development
71005NationalPartnershipforJuvenileServices-Dec2024	71005NationalPartnershipforJuvenileServices-Dec2024	Services Contract	Research & Economic Development	National Partnership for Juvenile Services	2025-01-06	300,001.00	Parag Chitnis, Vice President/Professor, Research & Economic Development
33011 - Nutrislice - 0323	Nutrislice Contract University of Wyoming 5_1_2023 (2)	Services Contract	Residence Life Dining	Nutrislice Inc	2025-01-30	62,795.50	Alexander Kean, Vice President, Budget & Finance
10501-EndpointIndustrialControls-June2024	EP2408_01 C/O #01 Terms & Conditions--Distillation and Reactor Project	Services Contract	School of Energy Resources	Origin Automation & Controls, DBA Endpoint Industrial Controls	2025-01-14	68,423.15	Holly Krutka, Executive Director

10501-Entech Strategies-Jan 2025	Agreement for Service between UW & Entech Strategies for the CMLA	Services Contract	School of Energy Resources	ENTECH Strategies LLC	2025-01-26	50,000.00	Holly Krutka, Executive Director
10501-TriHydro_Dec2022	Agreement for Services Btwn UW & TriHydro Corp.Amendment No.3	Services Contract	School of Energy Resources	TriHydro Corp	2025-02-04	522,341.00	Holly Krutka, Executive Director
10501-WRI-CoalToAsphalt-April2024	WRI Coal to Asphalt Research	Services Contract	School of Energy Resources	Western Research Institute	2025-01-22	1,644,999.75	Ed Seidel, President
10501HySpexIncNovember2024	HySpex UAV Configuration	Services Contract	School of Energy Resources	HySpex Inc	2025-01-22	272,150.00	Holly Krutka, Executive Director
19002-ClarivatePQAccessBuild-Nov2024	Clarivate ProQuest Access and Build License Agreement	Services Contract	University Libraries	ProQuest, LLC	2025-01-02	251,267.52	Cassandra Kvenild, Dean/Librarian ETT
19002-ClarivateProquest-Nov2024	Clarivate Terms Master Client Agreement	Services Contract	University Libraries	ProQuest, LLC	2024-12-19	1,614,050.73	Ed Seidel, President
19002-ClarivateWebOfScience-Nov2024	Order Form Date: November 22, 2024	Services Contract	University Libraries	Clarivate Analytics LLC	2025-01-08	1,287,920.12	Ed Seidel, President
19002-E&E News-Jul2024	E&E News by Politico Contract No.Q-59972 IP Access	Services Contract	University Libraries	E&E News	2025-01-22	51,464.00	Cassandra Kvenild, Dean/Librarian ETT
19002-EBSCO-Nov2024	EBSCO LICENSE AGREEMENT	Services Contract	University Libraries	EBSCO Information Services	2024-12-17	114,897.07	Cassandra Kvenild, Dean/Librarian ETT
19002-HF Group-April2024	AGREEMENT FOR SERVICES BETWEEN THE UNIVERSITY OF WYOMING AND HF GROUP	Services Contract	University Libraries	HF Group LLC dba Houchen Bindery	2025-01-22	500,000.00	Cassandra Kvenild, Dean/Librarian ETT
19002-MyJoVE-Jul2024	MyJoVE Corporation service agreement	Services Contract	University Libraries	MyJoVE Corporation	2025-01-22	74,549.40	Cassandra Kvenild, Dean/Librarian ETT
19002-NewsBank(Readex)-Nov2024	NewsBank License Agreement for Subscription & Perpetual License Sales	Services Contract	University Libraries	Newsbank Inc	2025-01-22	85,799.00	Cassandra Kvenild, Dean/Librarian ETT
19002-SimplyAnalytics-Aug2024	SimplyAnalytics, Inc. Academic Terms of Agreement	Services Contract	University Libraries	SimplyAnalytics, Inc.	2025-01-22	55,786.64	Cassandra Kvenild, Dean/Librarian ETT
19002-WSJ-Nov2024	SUBSCRIPTION AND PERPTETUAL ACCESS AGREEMENT	Services Contract	University Libraries	Wall Street Journal / Barron's	2024-12-20	68,486.76	Cassandra Kvenild, Dean/Librarian ETT
26001AreteDesignGroupDec2024Amend4WestStadiumRenovation	Amendment No. 4	Services Contract	University Operations	Arete Design Group	2024-12-20	63,403.00	William Mai, Vice President, Campus Operations
26001AreteDesignGroupMay2024Amend3UWAquaticsCenter	Amendment No 3	Services Contract	University Operations	Arete Design Group	2025-01-22	272,490.00	William Mai, Vice President, Campus Operations
26001FCIConstructorsDec2024CO20LawSchoolExpansion&Renovation	Change Order No. 20	Services Contract	University Operations	FCI Constructors of Wyoming, LLC	2024-12-20	145,274.00	William Mai, Vice President, Campus Operations
26001FDLConsultingMay2024ArchitectAgreementSheridanR&EMaintenanceFacility	Architect Agreement	Services Contract	University Operations	Fleur De Lis Consulting, LLC	2025-01-22	147,300.00	William Mai, Vice President, Campus Operations
26001FremontSafetyLLCOct2024FY25IndustrialHygieneServices	Consultant Agreement	Services Contract	University Operations	Fremont Safety	2024-12-20	450,000.00	William Mai, Vice President, Campus Operations
26001GEJohnsonConstructionJan2025CO11WestStadiumRenovation	Change Order No. 11	Services Contract	University Operations	GE Johnson Construction Co	2025-02-13	520,939.00	William Mai, Vice President, Campus Operations
26001GEJohnsonConstructionNov2024Amend2UWAquaticsCenter	Amendment No. 2	Services Contract	University Operations	GE Johnson Construction Co	2024-12-17	3,938,062.00	William Mai, Vice President, Campus Operations*
26001GEJohnsonConstructionNov2024CO10WestStadiumRenovation	Change Order No. 10	Services Contract	University Operations	GE Johnson Construction Co	2025-01-13	94,000.00	William Mai, Vice President, Campus Operations
26001GEJohnsonConstructionNov2024CO9WestStadiumRenovation	Change Order No. 9	Services Contract	University Operations	GE Johnson Construction Co	2025-01-13	67,685.00	William Mai, Vice President, Campus Operations
26001GHPhippsWyomingDec2024MemorialFieldhouseWrestling&TennisOffice	Agreement Between Owner & Contractor	Services Contract	University Operations	GH Phipps Construction of Wyoming	2024-12-20	606,900.00	William Mai, Vice President, Campus Operations
26001IronSpurArchitecture&DesignJan2025MemorialFieldhouseCondensateMainReplacement	Architect Project Agreement	Services Contract	University Operations	Iron Spur Architecture & Design	2025-01-30	91,932.00	William Mai, Vice President, Campus Operations
26001JEDunnJan2025CO18StudentHousing&Dining	Change Order No. 18	Services Contract	University Operations	JE Dunn Construction Company	2025-02-05	120,391.00	William Mai, Vice President, Campus Operations
26001JEDunnJune2024CO7StudentHousing&Dining	Change Order No. 7	Services Contract	University Operations	JE Dunn Construction Company	2025-01-22	76,570.00	William Mai, Vice President, Campus Operations
26001ME3,LLCToyotaofLaramieMay2024SponsorshipContract	Jacoby Golf Course - Sponsorship Contract	Services Contract	University Operations	ME3 LLC DBA Toyota of Laramie	2025-01-22	94,500.00	William Mai, Vice President, Campus Operations
26001OfficeShopIncSept2024DiningHall&ResidenceHallAncillaryFurniture	Agreement Between Owner & Contractor	Services Contract	University Operations	Office Shop	2025-01-22	485,791.38	William Mai, Vice President, Campus Operations
26001PrairieEquipmentJan2025Amend1(GMP)LaramieR&EFeedMill	Amendment No. 1	Services Contract	University Operations	Prairie Equipment LLC	2025-01-24	5,078,000.00	William Mai, Vice President, Campus Operations**
26001PrimaryElectricDec2024UpgradeFireAlarmSystemCentennialComplex	Agreement Between Owner and Contractor	Services Contract	University Operations	Primary Electric Inc	2025-01-26	293,400.00	William Mai, Vice President, Campus Operations
26001SolTerraJune2024ConsultantAgreementQualityControlEngineeringServicesAquaticsCenter	Consultant Agreement	Services Contract	University Operations	SolTerra Engineering Inc	2025-01-22	100,250.00	William Mai, Vice President, Campus Operations
26001SolTerraMay2024Amend1QualityControlServices	Amendment No. 1	Services Contract	University Operations	SolTerra Engineering Inc	2025-01-22	69,740.00	William Mai, Vice President, Campus Operations
26001UndergroundWorxLLCJan2025ScienceInitiativeUtilityDe-Couple	Agreement Between Owner & Contractor	Services Contract	University Operations	Underground Worx LLC	2025-02-13	1,056,476.00	William Mai, Vice President, Campus Operations
26001alm2sOct2024Amend14StudentHousing&Dining	Amendment No. 14	Services Contract	University Operations	alm2s	2025-01-22	162,910.00	William Mai, Vice President, Campus Operations

*Board of Trustees approved on September 26, 2024.

**Board of Trustees approved on January 23, 2025.

UW Regulation 7-2 (Signature Authority) Procurement Board Report - December 16, 2024 - February 15, 2025

PO Date	Supplier Name	Line #	Description	Quantity	Line Unit Price	Total Line Price	Total PO Amount	Department	Last Approver	Last Approver Title	Approval Date
12/16/2024	Oracle America, Inc.	1	Oracle CPQ 2271216	1	788,860.29	788,860.29	**788,860.29**	Enterprise Infrastructure	Chavez, Jennifer	Interim Vice President/CIO	12/16/2024
12/16/2024	Johnson-Lancaster and Associates, Inc.	1	Smallwares for new dining hall	1	129,008.70	129,008.70	**129,008.70**	Facilities Construction Mgt	Samp, Michael	Assoc VP for Univ Operations	12/16/2024
12/16/2024	Adbay.com Inc	1	Agreement for travel, administrative tasks, design, and revision of processes for in-person strategic planning session and marketing plan development.	1	50,000.00	50,000.00	**50,000.00**	VP for Research & Economic Development Office	Koprowski, John	Professor/Dean/Wyo Excellence Chair	12/16/2024
12/16/2024	Black Hills Energy	1	NATURAL GAS SERVICE RELOCATION- 15TH ST FROM SORORITY ROW TO IVINSON	1	42,556.56	42,556.56		Facilities Management	Samp, Michael	Assoc VP for Univ Operations	12/16/2024
12/16/2024	Black Hills Energy	3	NATURAL GAS SERVICE RELOCATION - WILLETT & 15TH STREETS	1	14,552.75	14,552.75		Facilities Management	Samp, Michael	Assoc VP for Univ Operations	12/16/2024
12/16/2024	Black Hills Energy	2	NATURAL GAS SERVICE RELOCATION - 15TH ST FROM NORTH OF LEWIS TO SORORITY ROW	1	137,073.11	137,073.11	**194,182.42**	Facilities Management	Samp, Michael	Assoc VP for Univ Operations	12/16/2024
12/19/2024	Bargreen-Ellingson Inc.	5	BOWL, CHINA Libbey Model No. 840-901-065	84	91.84	7,714.56		Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/19/2024	Bargreen-Ellingson Inc.	6	DINNER FORK ABC Procurement Model No. MWI-05	139	1.74	241.86		Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/19/2024	Bargreen-Ellingson Inc.	7	COFFEE / TEASPOON ABC Procurement Model No. MWI-01	139	1.10	152.90		Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/19/2024	Bargreen-Ellingson Inc.	8	DINNER KNIFE ABC Procurement Model No. MWI-08	33	3.44	113.52		Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/19/2024	Bargreen-Ellingson Inc.	9	PLASTIC BEVERAGEWARE Libbey Model No. 109303	334	51.06	17,054.04		Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/19/2024	Bargreen-Ellingson Inc.	10	MUG, CHINA Libbey Model No. 840-901-911	28	76.78	2,149.84		Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/19/2024	Bargreen-Ellingson Inc.	1	PLATE, CHINA Libbey Model No. 840-435C	167	89.63	14,968.21		Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/19/2024	Bargreen-Ellingson Inc.	2	BOWL, CHINA Libbey Model No. 840-355-009	125	154.04	19,255.00		Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/19/2024	Bargreen-Ellingson Inc.	3	BOWL, CHINA Libbey Model No. 840-901-018	125	93.55	11,693.75		Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/19/2024	Bargreen-Ellingson Inc.	4	PLATE, CHINA Libbey Model No. 840-410C	84	41.14	3,455.76	**76,799.44**	Facilities Construction Mgt	Bryant, Darcy	Deputy Director, Business Serv	12/19/2024
12/20/2024	TransLoc Inc.	1	Transloc monthly service for bus Oct 2024-Sept 2025	1	46,910.40	46,910.40		Transportation Services	Kunkel, Paul	Director, Transportation Services	12/20/2024
12/20/2024	TransLoc Inc.	1	Transloc monthly service for bus Oct 2024-Sept 2025	1	11,727.60	11,727.60	**58,638.00**	Transportation Services	Kunkel, Paul	Director, Transportation Services	12/20/2024
12/20/2024	Presidio Networked Solutions LLC	1	Dorm AP WO# 175458-001	1	239,651.46	239,651.46	**239,651.46**	Facilities Construction Mgt	Samp, Michael	Assoc VP for Univ Operations	12/20/2024
12/21/2024	FEI Company	1	Helios 5 Hydra UX	1	3,773,286.00	3,773,286.00	**3,773,286.00**	Center of Innovation for Flow through Porous Media	Seidel, Ed	President	12/21/2024*
12/21/2024	FEI Company	1	Spectra Ultra - FEG Scanning Transmission Electron Microscope (S/TEM)	1	9,088,272.00	9,088,272.00	**9,088,272.00**	Center of Innovation for Flow through Porous Media	Seidel, Ed	President	12/21/2024**
12/28/2024	HySpex Inc	1	HySpex Inc is providing a UAV configuration system to attach to the 3D Viz Center's drone as well as a training service. Coming from 3D Viz State funding - 1264.	1	272,150.00	272,150.00	**272,150.00**	School of Energy Resources Directors Office	Krutka, Holly	Executive Director	12/28/2024
01/06/2025	Weaver Schutte, Virginia Grace	1	Contractor services as a training expert for Bethann Merkle's NSF-funded Scicomm LIFT project through 12/31/2028	1	53,206.00	53,206.00	**53,206.00**	Zoology & Physiology	Boyles, Victoria	Dir, Business Operations	01/03/2025
01/07/2025	SKYWEST CHARTER, LLC	1	Charter Flights for Volleyball for 2024 season	1	52,888.00	52,888.00	**52,888.00**	Womens Volleyball	Brodie, Samuel	Assoc AD/Budgeting & Fin Mgmt	01/07/2025
01/09/2025	Amanda Morrison	1	Contractor services as the project manager for Bethann Merkle's NSF-funded Scicomm LIFT project through 12/31/2028	1	59,768.00	59,768.00	**59,768.00**	Zoology & Physiology	Boyles, Victoria	Dir, Business Operations	01/09/2025
01/10/2025	AllOver Media, LLC	1	UW Student Recruitment Advertisements on Steamboat & Winter Park Resort Ski Lifts, 2024-2025	1	92,750.00	92,750.00	**92,750.00**	Institutional Marketing	Baldwin, Chad	Assoc VP, Comm&Mkting	01/10/2025
01/11/2025	Wyoming Wrestling RTC	1	Money was raised during the 2024 Cowboy Joe Club Auction via a paddle raise for the Wrestling RTC. Need to transfer this money from UW to them. Attached is the list of individual donations/paddle raises.	1	50,000.00	50,000.00	**50,000.00**	Cowboy Joe Club	Brodie, Samuel	Assoc AD/Budgeting & Fin Mgmt	01/11/2025
01/13/2025	Rebecca Swenson	1	Contractor services as an external evaluator for Bethann Merkle's NSF-funded Scicomm LIFT project through 12/31/2028	1	53,206.00	53,206.00	**53,206.00**	Zoology & Physiology	Boyles, Victoria	Dir, Business Operations	01/13/2025
01/14/2025	Bio-logic USA, LLC	1	Item No. VMP3e-CHAS; EIS3e-01; DC3e-01 ; CCH-1VMP-3e chassis - 16 slots - NO channel - includes EC-Lab software package-Shipping included in cost; Potentiostat/Galvanostat board; 4-Point coin cell holder for BCS-805/810 or cell cable with	1	50,491.18	50,491.18	**50,491.18**	VP for Research & Economic Development Office	Miller, Jamison	Dir, Business Operations	01/14/2025
01/17/2025	GenScript USA Inc	3	Shipping	1	375.00	375.00		Animal Science	White, Daniel	Financial Analyst	01/17/2025
01/17/2025	GenScript USA Inc	2	L00847-A Name: SARS-CoV-2 Surrogate Virus Neutralization Test Kit; Qty: 11; Catalog No: L00847-A; Size: 96.0Tests	11	700.00	7,700.00		Animal Science	White, Daniel	Financial Analyst	01/17/2025
01/17/2025	GenScript USA Inc	1	L00847-A Name: SARS-CoV-2 Surrogate Virus Neutralization Test Kit; Qty: 89; Catalog No: L00847-A; Size: 96.0Tests	89	700.00	62,300.00	**70,375.00**	Animal Science	White, Daniel	Financial Analyst	01/17/2025
01/22/2025	NCS Pearson, Inc.	1	ED TPA voucher for Spring 2025/Fall 2025	200	300.00	60,000.00	**60,000.00**	College of Education Deans Office	Montez, Kimberly	Dir, Business Operations	01/22/2025
01/24/2025	Spacesaver Intermountain, LLC	1	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,374.46	8,374.46		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/24/2025	Spacesaver Intermountain, LLC	2	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,374.46	8,374.46		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/24/2025	Spacesaver Intermountain, LLC	11	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,386.68	8,386.68		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/24/2025	Spacesaver Intermountain, LLC	10	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,386.68	8,386.68		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/24/2025	Spacesaver Intermountain, LLC	9	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,386.68	8,386.68		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/24/2025	Spacesaver Intermountain, LLC	8	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,374.45	8,374.45		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/24/2025	Spacesaver Intermountain, LLC	7	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,374.45	8,374.45		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/24/2025	Spacesaver Intermountain, LLC	6	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,374.46	8,374.46		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/24/2025	Spacesaver Intermountain, LLC	5	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,374.46	8,374.46		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/24/2025	Spacesaver Intermountain, LLC	4	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,374.46	8,374.46		University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025

01/24/2025	Spacesaver Intermountain, LLC	3	Spacesaver Intermountain, LLC; Archival Museum Cabinet Model 424	1	8,374.46	8,374.46	**92,155.70**	University Art Museum	Frank, Cheri	Assistant Director, Business Operations	01/17/2025
01/28/2025	CompuGov Inc.	5	Spare Parts-12TB Seagate X12 SAS 3.0 12Gb/s 7.2K RPM Enterprise HDD	20	242.22	4,844.40		Advanced Research Computing Center	Chitnis, Parag	Vice President/Professor, Research & Economic Development	01/28/2025
01/28/2025	CompuGov Inc.	6	Spare Parts-240GB Intel DC S4600 SATA 6Gb/s Enterprise SSD	5	42.12	210.60		Advanced Research Computing Center	Chitnis, Parag	Vice President/Professor, Research & Economic Development	01/28/2025
01/28/2025	CompuGov Inc.	4	Spare Parts-15.36TB Samsung BM1733 U.2 NVMe Enterprise SSD (1DWPD)	2	1,728.81	3,457.62		Advanced Research Computing Center	Chitnis, Parag	Vice President/Professor, Research & Economic Development	01/28/2025
01/28/2025	CompuGov Inc.	2	NVME OSD Nodes-RS720A-E12-RS24U-2KW10G ASUS - Custom Configured 2U Rack Server for NVME OSD Nodes-RFQ Quote#KLW-2024-42	5	29,973.92	149,869.60		Advanced Research Computing Center	Chitnis, Parag	Vice President/Professor, Research & Economic Development	01/28/2025
01/28/2025	CompuGov Inc.	3	Spare Parts-20TB Seagate Exos X20 SAS 3.0 12Gb/s 7.2K RPM Enterprise HDD	2	433.33	866.66		Advanced Research Computing Center	Chitnis, Parag	Vice President/Professor, Research & Economic Development	01/28/2025
01/28/2025	CompuGov Inc.	1	HDD OSD Nodes-RSZ13PE-D16-12D2U-CTO ASUS - Custom Built 2U Rack Server for HDD OSD Nodes-RFQ quote #KLW-2024-42	3	10,998.12	32,994.36	**192,243.24**	Advanced Research Computing Center	Chitnis, Parag	Vice President/Professor, Research & Economic Development	01/28/2025
01/28/2025	Gray Decision Intelligence, Inc.	3	Program Evaluation Software and Implementation Services - Year Three	1	35,640.00	35,640.00		Office of Online & Continuing Education	Bagley, David	Vice Provost, Faculty Affairs/Professor	01/28/2025
01/28/2025	Gray Decision Intelligence, Inc.	1	Program Evaluation Software and Implementation Services - Year One	1	35,640.00	35,640.00		Office of Online & Continuing Education	Bagley, David	Vice Provost, Faculty Affairs/Professor	01/28/2025
01/28/2025	Gray Decision Intelligence, Inc.	2	Program Evaluation Software and Implementation Services - Year Two	1	35,640.00	35,640.00	**106,920.00**	Office of Online & Continuing Education	Bagley, David	Vice Provost, Faculty Affairs/Professor	01/28/2025
01/29/2025	Ken Garff Cheyenne	1	2024 Ford F250 6.8L	1	55,783.00	55,783.00	**55,783.00**	College of Agriculture, Life Sciences & Natural Resources Deans Office	Boyles, Victoria	Dir, Business Operations	01/29/2025
01/29/2025	EAB Global Inc	1	Three month agreement for EAB to provide high quality adult learner recruitment services for the online MBA program. See attached approved agreement.	1	90,350.00	90,350.00	**90,350.00**	MBA & Professional Graduate Programs	Tyrrell, Geoff	Business Manager, Executive	01/29/2025
01/29/2025	Primary Electric Inc	1	Centennial Complex Fire Alarm Upgrade	1	293,400.00	293,400.00	**293,400.00**	Facilities Management	Samp, Michael	Assoc VP for Univ Operations	01/29/2025
01/29/2025	Renner Sports Surfaces	1	UW Track Resurfacing Project – Memorial Fieldhouse	1	393,990.00	393,990.00	**393,990.00**	Facilities Engineering	Samp, Michael	Assoc VP for Univ Operations	01/29/2025
01/30/2025	Dunkley Music Inc	2	Piano fallboard/clamp lock	1	110.00	110.00		College of Arts & Sciences Deans Office	Hughes, Carolina	Dir, Business Operations	01/30/2025
01/30/2025	Dunkley Music Inc	1	Steinway Model A Grand Piano	1	101,492.00	101,492.00	**101,602.00**	College of Arts & Sciences Deans Office	Hughes, Carolina	Dir, Business Operations	01/30/2025
01/30/2025	GH Phipps Construction of Wyoming	1	Memorial Fieldhouse Wresting & Tennis Offices	1	606,900.00	606,900.00	**606,900.00**	Facilities Engineering	Mai, William	Vice President, Campus Operations	01/30/2025
01/31/2025	Flight Safety International Inc	2	Flight Safety Pilot Recurrent and Initial pilot training as per service agreement dated 9/1/2024-8/31/2025.	1	25,547.50	25,547.50		Atmospheric Science	Greenawalt, Kaylyn	Director, Shared Business Serv	01/31/2025
01/31/2025	Flight Safety International Inc	1	Flight Safety Pilot Recurrent and Initial pilot training as per service agreement dated 9/1/2024-8/31/2025.	1	64,452.50	64,452.50	**90,000.00**	Business Enterprises	Greenawalt, Kaylyn	Director, Shared Business Serv	01/31/2025
01/31/2025	Wyoming Department of Agriculture	1	As per MOU, reimbursement to WDA for income for the WY State Seed Analysis Lab FY25 Quarter 2: 10/1/24-12/31/24. Total payment - $78,882	0	78,882.00	0.00		Agricultural Experiment Station	Boyles, Victoria	Dir, Business Operations	01/31/2025
01/31/2025	Wyoming Department of Agriculture	1	As per MOU, reimbursement to WDA for income for the WY State Seed Analysis Lab FY25 Quarter 2: 10/1/24-12/31/24. Total payment - $78,882	1	78,882.00	78,882.00	**78,882.00**	State Seed Lab	Boyles, Victoria	Dir, Business Operations	01/31/2025
02/04/2025	Sinclair Television Group, Inc.	1	UW TV Advertising Spot, Josh Allen, Superbowl 2025 broadcast-Beaumont TX, Oklahoma City OK, Dayton OH, Bakersfield CA, Omaha NE, Boise ID Fox affiliates stations	1	253,000.00	253,000.00	**253,000.00**	Institutional Marketing	Baldwin, Chad	Assoc VP, Comm&Mkting	02/04/2025
02/04/2025	StarRez Inc	1	Software Subscription for UW Housing & Dining Services	1	22,266.45	22,266.45		Housing	Greenawalt, Kaylyn	Director, Shared Business Serv	02/04/2025
02/04/2025	StarRez Inc	1	Software Subscription for UW Housing & Dining Services	1	11,133.22	11,133.22		Residential Campus Dining	Greenawalt, Kaylyn	Director, Shared Business Serv	02/04/2025
02/04/2025	StarRez Inc	1	Software Subscription for UW Housing & Dining Services	1	22,266.45	22,266.45	**55,666.12**	Housing	Greenawalt, Kaylyn	Director, Shared Business Serv	02/04/2025
02/04/2025	Telesource Services, Inc.	1	New Yealink MP56 Teams IP Phone, New Audiocodes C455HD	1	187,470.00	187,470.00	**187,470.00**	Enterprise Infrastructure	Chavez, Jennifer	Interim Vice President/CIO	02/04/2025
02/05/2025	Bartels & Stout Inc	1	MoticEasyScan PRO 24 Scanner, Plan UC 4x/0.1, S APO Objective 40x/0.75, Installation and Training by Motic Professional 1, Shipping | Motic EasyScan 24	1	66,893.00	66,893.00	**66,893.00**	Agricultural Experiment Station	Boyles, Victoria	Dir, Business Operations	02/05/2025
02/05/2025	Iron Spur Architecture & Design	1	Memorial Fieldhouse Condensate Main Replacement	1	87,600.00	87,600.00		Facilities Management	Bryant, Darcy	Deputy Director, Business Serv	02/05/2025
02/05/2025	Iron Spur Architecture & Design	2	Memorial Fieldhouse Condensate Main Replacement – Reimbursables	1	4,332.00	4,332.00	**91,932.00**	Facilities Management	Bryant, Darcy	Deputy Director, Business Serv	02/05/2025
02/06/2025	Vertiv Corporation	1	5 year maintenance service agreement for UPS batteries at High Bay Research Facility	1	20,000.00	20,000.00		Center of Innovation for Flow through Porous Media	Chitnis, Parag	Vice President/Professor, Research & Economic Development	02/06/2025
02/06/2025	Vertiv Corporation	1	5 year maintenance service agreement for UPS batteries at High Bay Research Facility	1	20,000.00	20,000.00		Center of Innovation for Flow through Porous Media	Chitnis, Parag	Vice President/Professor, Research & Economic Development	02/06/2025
02/06/2025	Vertiv Corporation	1	5 year maintenance service agreement for UPS batteries at High Bay Research Facility	1	10,000.00	10,000.00		Center of Innovation for Flow through Porous Media	Chitnis, Parag	Vice President/Professor, Research & Economic Development	02/06/2025
02/06/2025	Vertiv Corporation	1	5 year maintenance service agreement for UPS batteries at High Bay Research Facility	1	20,000.00	20,000.00		Center of Innovation for Flow through Porous Media	Chitnis, Parag	Vice President/Professor, Research & Economic Development	02/06/2025
02/06/2025	Vertiv Corporation	1	5 year maintenance service agreement for UPS batteries at High Bay Research Facility	1	25,000.00	25,000.00		Center of Innovation for Flow through Porous Media	Chitnis, Parag	Vice President/Professor, Research & Economic Development	02/06/2025
02/06/2025	Vertiv Corporation	1	5 year maintenance service agreement for UPS batteries at High Bay Research Facility	1	125,344.00	125,344.00		Center of Innovation for Flow through Porous Media	Chitnis, Parag	Vice President/Professor, Research & Economic Development	02/06/2025
02/06/2025	Vertiv Corporation	1	5 year maintenance service agreement for UPS batteries at High Bay Research Facility	1	15,000.00	15,000.00	**235,344.00**	Center of Innovation for Flow through Porous Media	Chitnis, Parag	Vice President/Professor, Research & Economic Development	02/06/2025
02/10/2025	Nexstar Media Inc.	1	UW TV Advertising Spot, Josh Allen, Superbowl 2025 broadcast-Denver, Colorado Springs, Billings, Sacramento, Amarillo Fox Affiliates	1	283,175.00	283,175.00	**283,175.00**	Institutional Marketing	Baldwin, Chad	Assoc VP, Comm&Mkting	02/10/2025
02/13/2025	TommyTQL LLC	1	VMware Renewal Subscription 6/30/2025-6/29/2028	1	194,734.08	194,734.08	**194,734.08**	Enterprise Infrastructure	Chavez, Jennifer	Interim Vice President/CIO	02/13/2025
02/13/2025	Scripps Media, Inc.	1	UW TV Advertising Spot, Josh Allen, Superbowl 2025 broadcast-Salt Lake City	1	84,000.00	84,000.00	**84,000.00**	Institutional Marketing	Baldwin, Chad	Assoc VP, Comm&Mkting	02/13/2025
02/13/2025	Colorado Hazard Control LLC	2	CRANE 5TH & 6TH: REMOVE AND DISPOSE OF ASBESTOS FLOOR TILE, MASTIC AND ACOUSTIC CEILING TEXTURE.	1	364,855.00	364,855.00		Facilities Management	Mai, William	Vice President, Campus Operations	02/13/2025
02/13/2025	Colorado Hazard Control LLC	1	CRANE 3RD FL N, 4TH & STAIRWELLS 1-6: REMOVE AND DISPOSE OF ASBESTOS FLOOR TILE, MASTIC AND ACOUSTIC CEILING TEXTURE.	1	484,050.00	484,050.00	**848,905.00**	Facilities Management	Mai, William	Vice President, Campus Operations	02/13/2025

*Board of Trustees ratified on January 23, 2025.

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