Board of Trustees

Committee on Academic and Student Affairs

Wednesday, November 16, 2022

11:30 a.m. - 1:30 p.m.

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Board of Trustees
Committee on Academic and Student Affairs
November 16, 2022
UW Union Yellowstone West Ballroom

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AGENDA ITEM TITLE: UW Regulation 2-13 WyGISC move to School of Computing, Carman, Allen, Hamerlinck

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:
On May 23, 2022, Gabrielle Allen, Director of the School of Computing, and Jeff Hamerlinck, Director of WYGISC, presented Provost Carman with a proposal to move WyGISC into the School of Computing. The School of Computing is fundamentally about applications of computing, broadly defined, including computation, data science, and information systems. WyGISC is focused on the development and education of geospatial information and technologies and their applications, covering aspects of data science, informatics, and computing. We propose to strengthen both units by moving WyGISC into the new SoC. This will allow SoC to leverage an existing core of expertise and activity and will provide WyGISC with additional opportunities and a sustainable path forward.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
None.

WHY THIS ITEM IS BEFORE THE BOARD:
University of Wyoming Regulation 2-13 requires that the Board of Trustees approve the reorganization/consolidation of academic programs.

ACTION REQUIRED AT THIS BOARD MEETING:
Consideration for approval of the integration of WyGISC with SoC.

PROPOSED MOTION:
"I move to approve the proposal for the integration of WyGISC with the School of Computing"

PRESIDENT'S RECOMMENDATION:
The President recommends approval of this proposal.

Proposed Integration of WyGISC with SoC

On May 23, 2022, Gabrielle Allen, Director of the School of Computing, and Jeff Hamerlinck, Director of WYGISC, presented Provost Carman with a proposal to move WyGISC into the School of Computing with the rationale described in this document.

The School of Computing is fundamentally about applications of computing, broadly defined, including computation, data science, and information systems. WyGISC is focused on the development and education of geospatial information and technologies and their applications, covering aspects of data science, informatics, and computing. We propose to strengthen both units by moving WyGISC into the new SoC. This will allow SoC to leverage an existing core of expertise and activity and will provide WyGISC with additional opportunities and a sustainable path forward.

Details

- WyGISC would remain (at least initially) intact as a center within the SoC, and its faculty would become SoC faculty (potentially within a Spatial Informatics thematic area).
- Jeff Hamerlinck would remain in a role overseeing WyGISC, but also with a leadership (co-director) role in the SoC. Over a timescale of one to two years a new WyGISC director would be recruited (potentially as a joint SoC faculty hire with e.g., Haub).
- The interdisciplinary undergraduate and graduate GIST credentials would continue to be managed by the GIST Program Director, and the approved GIST BS degree reworked to be an option in the new SoC BS/BA degree.

Why Do This?

- WyGISC would benefit from being integrated into a more regular academic unit.
- SoC would gain an immediate cohort of active faculty and an established engagement program in a high-profile area of applied data science and analytics that is central to many important complex applications in Wyoming.
- The startup phase of SoC will be able to utilize existing WyGISC support staff for business operations and marketing.
- It will add breadth to the SoC focus expanding the computing focus to data science and analytics and strengthening the bridge to place-based digital humanities and social science applications.
- It is a natural fit, this is a good time to make the change, and indications are that this would be supported by WyGISC faculty and staff.

Key Issues

- Plan for succession of WyGISC director.
- Clarifying RTP processes for WyGISC tenure-stream and non-tenure-stream faculty.
- Clarification on how to manage legacy GIST graduate teaching assistant line.
- Resolve uncertainty regarding the original model for distribution of WyGISC Distance Education tuition revenue.

- Definition of a truly “interdisciplinary academic program” and what mechanisms, best practices, and budget (e.g., tuition revenue distribution) need to be implemented to make them successful.

Following UW Regulation 2-13, Provost Carman presented the proposal to President Seidel. President Seidel is supportive of the proposal. Also following UW Regulation 2-13, Provost Carman is seeking feedback from WyGISC faculty and staff and forwarding the proposal to the Faculty Senate for their consideration.

Faculty Senate Resolution 410 **Introduced by**
Academic Planning Committee

Resolution Regarding the Integration of Wyoming Geographic Information Science Center (WyGISC) with the School of Computing

WHEREAS, the Integration of Wyoming Geographic Information Science Center (WyGISC) with the School of Computing has been jointly proposed by WyGISC and the School of Computing; and

WHEREAS, the Faculty Senate's Academic Planning Committee (APC) has reviewed the proposal; and

WHEREAS, the APC is supportive of the move of WyGISC to the School of Computing, as shown in the attached report from the APC;

THEREFORE, BE IT RESOLVED by the Faculty Senate of the University of Wyoming that it supports the recommendation of the APC as specified in the report attached hereto.

AGENDA ITEM TITLE: **Program Name Change, Program in Ecology and Evolution (PiE^2)**
Carman/Ahern

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 faculty of UW's Program in Ecology and the UW School of Graduate Education proposes that the Program in Ecology be renamed the Program in Ecology and Evolution (PiE^2). This name change will more holistically describe the scope of research and teaching being conducted by the Program and will better align the Program with national and international scholarship trends. The Program in Ecology faculty has voted in approval of this name change, and the Vice Provost and Dean of the School of Graduate Education support it, as well. The Program in Ecology's doctoral program is one of the largest Ph.D. programs at UW.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
None.

WHY THIS ITEM IS BEFORE THE BOARD:
A change in program and degree requires Board of Trustees approval.

ACTION REQUIRED AT THIS BOARD MEETING:
Recommend approval of the proposed name change to the Program in Ecology.

PROPOSED MOTION:
"I move to authorize the administration to change the name of the Program in Ecology to 'Program in Ecology and Evolution.'"

PRESIDENT'S RECOMMENDATION:
The President recommends approval.

Existing Degree Program Change Request
Title Change, Degree Designation, or CIP Change

Directions: Complete this form and proposal template to request a change to the title (name) of an existing degree program or to request a change to the Classification of Instructional Programs (CIP) code of an existing degree program. The degree program must already be on an institution's program inventory.

- A degree program title consists of the following two parts:

    1. Degree designation, such as Bachelor of Science (BS), Master of Arts (MA), or Doctor of Philosophy (PhD); and,
    2. name of the discipline, such as History, Mechanical Engineering, or Zoology.

- The Classification of Instructional Programs (CIP) is the taxonomic coding scheme used for instructional programs in higher education. Its purpose is to facilitate the organization, collection, and reporting of fields of study and program completions. The academic unit should consult with the Office of the Registrar and Office of Institutional Analysis prior to submitting the proposal to determine whether a change to the CIP code used to classify the program is recommended. For more information, visit CIP Code Information

Process:

1. Faculty of the unit develop a rational for the change.
2. The dean of the academic unit approves the rationale and change and submits the proposal to the Provost.
3. The Provost routes the proposal to the Faculty Senate for consideration by the Graduate Council or Academic Planning Committee.
4. The Provost approves the rationale and change.
5. The Provost reports the proposal to the Academic and Student Affairs Committee of the Board of Trustees.
6. The Board's Academic and Student Affairs Committee will recommend the change to the full Board of Trustees for consideration and action.
7. The proposers hold an implementation meeting with the Registrar, Admissions, OIA, and Advising Managers, and other appropriate units to implement the change. Implementation meetings gather people from all of the units that will take part in ensuring a new or restructured academic program runs smoothly.

Guidance: Name and identity are closely related. A program "brand" as represented by the name has value and so careful planning for a name or designation change is a worthwhile investment. Programs with a long history and many alumni and past employees may find that these groups express strong attachment to the existing name. Thus, the rationale for the name change should be made with full consideration for the impact on the historic connections and with a view to the long-term future. New names should be designed to reflect the nature of the program for many years to come. Ideally,

consultation with and support from the program's students in course and alumni should be evident in the proposal.

Programs should also demonstrate that they have consulted with other departments and colleges on campus that may be impacted by the change. Additionally, they should demonstrate they have discussed the change with their Wyoming community college colleagues.

Program names that narrow the program scope or reflect short-term sub-areas or trends in research tools or methodology should be avoided. Proposals should be explicit about all the academic programs and structures that are included in a name change request. For example, list all departments, majors, degrees, certificates, centers, subject listings, minors or other academic elements that are included in the request.

Some common justifications for a change in major name or CIP code are that the new name more accurately reflects the curriculum than the old name; that the activities of the program faculty and the training they offer are more accurately reflected by the new name; and that the name of the discipline has changed and consequently the major should be renamed to reflect this change in the discipline.

Administrative Information
Complete all info in this box, and then complete the appropriate request on p. 3 or 4

1. Proposing Unit: Program in Ecology/Interdisciplinary Programs

2. Current Degree Program Title – *Show how the program appears on the Coordinating Board's approval letter (e.g., Bachelor of Business Administration degree with a major in Accounting)*:
PhD in Ecology

3. Current Degree Program CIP Code: 26.1301

4. Contact Person: *Provide contact information for the person who can answer specific questions about the degree program and change proposal.*

Name: Melanie Murphy

Title: Director, Program in Ecology; Associate Professor

E-mail: melanie.murphy@uwyo.edu

Phone: (307)766-5295

Request for Change in **Degree Program Designation** (e.g., Bachelor of Science (BS), Master of Arts (MA), Doctor of Philosophy (PhD)

Current Degree Program Designation: Doctor of Philosophy (PhD)

Proposed Degree Program Designation: Doctor of Philosophy (PhD)

Proposed Implementation Date (MM/DD/YYYY): NA

Reason for Change:

- Background: An overview explanation of why the change(s) is being requested; how will it improve the degree program and benefit students and faculty?
- Proposed changes: List each proposed change and the specific rationale for that change.
- Logistics: When is the changed proposed to be effective. How will current students in the program be handled? (note: Generally changes are effective for the subsequent fall semester. Current students are assumed to be required to complete the requirements in place when they entered the program unless otherwise agreed upon by the student and program.) Document that you have consulted with alumni and current students when appropriate. Document that you have consulted with other departments and colleges that may be impacted by the change. Document that you have consulted with Wyoming community college colleagues.
- Comparison of current and proposed curriculum, if applicable

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Request Change in **Name of Discipline** (e.g., History, Mechanical Engineering, Zoology)

Current Name: Program in Ecology (PiE)

Proposed Name: Program in Ecology and Evolution (PiE^2)

Implementation Date (MM/DD/YYYY): 1/1/2023

Reason for Change: (see end of document)

- Background: An overview explanation of why the change(s) is being requested; how will it improve the degree program and benefit students and faculty?
- Proposed changes: List each proposed change and the specific rationale for that change.
- Logistics: When is the changed proposed to be effective. How will current students in the program be handled? (note: Generally changes are effective for the subsequent fall semester. Current students are assumed to be required to complete the requirements in place when they entered the program unless otherwise agreed upon by the student and program.) Document that you have consulted with alumni and current students when appropriate. Document that you have consulted with other departments and colleges that may be impacted by the change. Document that you have consulted with Wyoming community college colleagues.
- Comparison of current and proposed curriculum, if applicable

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Request Change in **CIP Code**

Current Code: 26.1301

Proposed Code: 26.1310

Implementation Date (MM/DD/YYYY): 1/1/2023

Reason for Change:

- Background: An overview explanation of why the change(s) is being requested; how will it improve the degree program and benefit students and faculty?
- Proposed changes: List each program you are requesting the CIP code change for and the specific rationale for that change.
- Logistics: When is the changed proposed to be effective. How will current students in the program be handled? (note: Generally changes are effective for the subsequent fall semester. Current students are assumed to be required to complete the requirements in place when they entered the program unless otherwise agreed upon by the student and program.)

Background. The Program in Ecology (PiE) is an interdepartmental doctoral program housed at the University of Wyoming in the high plains of Laramie. PiE is one of the largest PhD programs at the University of Wyoming, and provides advanced, integrated training in the science of ecology. The Program's central mission is to produce broadly trained scientists who will lead the field of ecology in the coming decades. As part of their education, PiE students develop skills in relevant technologies, gain exposure to a variety of disciplinary and interdisciplinary perspectives, and prepare to look ahead as new scientific opportunities and societal needs emerge. The Program instills a strong commitment to advancing ecological knowledge and applying it effectively to problems of societal concern.

The program is grounded in the natural history of organisms in their environment, but incorporates tools and perspectives from across the biological, physical, mathematical, computational, and earth sciences. Students develop conceptual, historical, and philosophical perspectives spanning the entire range of sub-disciplines in ecology, while receiving advanced training in the sub-discipline of their individual interest. PiE fosters long-term career development by exploring the linkages of ecology with other disciplines, and by scanning the ecological horizon or emerging questions, concepts, and approaches that will shape the field in years to come.

Proposed Changes and Justification. We propose changing the Program in Ecology (PiE) to Program in Ecology and Evolution (PiE^2).

1) Ecology and Evolution is a common graduate program and university unit. Institutions with "Ecology and Evolution" include the following: University of Colorado, University of Arizona, University of Kansas, Yale, University of Michigan, UC-Los Angeles, UC-Irvine, UC-Santa Cruz, UC-Davis, Columbia University, Rice University, Princeton, Cornell, University of Tennessee, University of Connecticut, Brown University, Tulane University, University of Chicago, University of Pittsburgh, Indiana University (Ecology, Evolution and Behavior). Michigan State University (PhD program), Harvard (Organismic and Evolutionary Biology Department), University of Toronto (EEB department), Boise State University (PhD program), The Ohio State University, University of Minnesota, Stony Brook University, University of Kansas, and Univ. of Illinois

Urbana-Champaign (Program in Ecology, Evolution, and Conservation Biology). Changing our name, especially as we aspire to R1 status, will help us compete for graduate students, faculty and research funding with these programs. Ecology and Evolution is broadly represented in scientific journals, including examples that include both ecology and evolution in the title (e.g. these journals and their impact factors: Nature Ecology and Evolution (15.46), Annual Review of Ecology, Evolution, and Systematics (14.34), Methods in Ecology and Evolution (6.36), Ecology and Evolutionary Biology (3.26), Ecology and Evolution (2.91), Evolutionary Ecology (2.13), Ethology, Ecology, and Evolution (1.58), Plant Ecology and Evolution (1.34)).

2) PiE^2 more holistically describes who we are and what we do as a program and is more inclusive of faculty and students (as well as future program members) while in no way detracting from ecology. The faculty and students include broadly defined ecologists, evolutionary biologists, and evolutionary ecologists. While "ecology" is a sufficiently broad umbrella for some of our evolutionary biology students who study evolutionary ecology, it excludes a growing (e.g., Dr. D. Tank) and competitively funded (e.g., new NSF grant to Dr. C. Wagner) component of our program. Program in Ecology and Evolution would reflect the totality of the work, training, and activity of the program. The potential of adding "evolution" to the graduate program name helped attract new faculty (e.g., Dr. Tank, director of the herbarium) to UW and to PiE^2; an inclusive name is also an incentive for evolutionarily focused faculty to continue participating in a highly productive, interdisciplinary PhD program.
3) Including evolution in the name would make PiE more attractive to excellent PhD students in evolution. Ecology faculty broadly report more contacts from prospective graduate students than faculty with an evolutionary biology focus, which may be partially attributed to the current name not explicitly including evolution.
4) The faculty and student overwhelming support the name change. The faculty voted according to our by-laws to change the program name from Program in Ecology to Program in Ecology and Evolution (>90% in favor). Program in Ecology and Evolution (PiE^2) more accurately reflects the curriculum, program faculty and training offered than Program in Ecology.

Logistics. The proposed change would be effective with students entering fall 2023, with catalog changes in the next update. No degree program changes will be implemented (name change only), so there will be no impact to current students. The student PiE group was very supportive of the name change (>80% in favor, ~15% indifferent) and the name change was passed through a vote of current faculty (>90% in favor). Other departments will not be impacted by the change, but home departments of faculty did not object. As our program is PhD only, Wyoming community colleges are not impacted. Proposed curriculum has not changed, only a name change to reflect current student and faculty foci. Faculty will continue to develop more graduate-level evolution courses, which are eligible for inclusion in PiE^2 programs of study.

AGENDA ITEM TITLE: **Notice of Intent, Master of Engineerin in Energy and Petroleum Engineering**, Carman/Ahern

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—refer to Supplemental Materials Report.*

EXECUTIVE SUMMARY:

The College of Engineering & Physical Sciences is proposing a new Master of Engineering degree in Energy and Petroleum Engineering. This program will be delivered primarily on campus with a distance education delivery (DED) option. Students can join the lectures, homework assignments, and tutorial sessions in person or remotely, both synchronously and asynchronously. The Department of Energy and Petroleum Engineering has a unique opportunity to expand education and equip its graduates with the critical expertise and leadership skills needed for the ongoing energy transition. The proposed new degree is consistent with the department's vision and aims to attract and retain a wider and more diverse pool of applicants. The recommendation of the Provost is that the Notice of Intent for a Master of Engineering degree in Energy and Petroleum Engineering be approved by the Board of Trustees.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
Not applicable.

WHY THIS ITEM IS BEFORE THE BOARD:
A Notice of Intent to the Board will allow the program proposers to complete review internally with the shared-governance bodies (Faculty Senate, ASUW, and Staff Senate), and Academic Forum (Deans and Directors). Academic Affairs and the School of Graduate Education support the degree proposal. The Request for Authorization will be submitted for the Board's consideration and approval later in the Spring of 2023.

ACTION REQUIRED AT THIS BOARD MEETING:
Approval of the Notice of Intent for the Master of Engineering in Energy and Petroleum Engineering.

PROPOSED MOTION:
I move to approve the Notice of Intent for the Master of Engineering in Energy and Petroleum Engineering.

PRESIDENT'S RECOMMENDATION:
The President recommends approval.

Notice of Intent for a New Master of Engineering (MEng) Degree in Energy and Petroleum Engineering

Name of the proposed Academic Program and the mode of delivery:
The Department of Petroleum Engineering has recently changed its name to Department of Energy and Petroleum Engineering to help the State of Wyoming and the U.S. meet the challenges of the energy transition. The department has a unique opportunity to expand education and equip its graduates with the critical expertise and leadership skills needed for the transition. This notice of intent is to propose a new Master of Engineering (MEng) degree in Energy and Petroleum Engineering that is consistent with the new Department's vision and aims to attract and retain a wider and more diverse pool of applicants. The MEng degree in Energy and Petroleum Engineering will be delivered primarily on campus, with a distance education delivery (DED) option. Students can join the lectures, homework assignments, and tutorial sessions in person or remotely, both synchronously and asynchronously. For the class projects, the on-campus and distance students will form mixed groups, and exams will run at the same time for both on-campus and distance students.

Description of the new Academic Program including an outline of the anticipated curriculum and learning outcomes:
The current faculty in the Department of Energy and Petroleum Engineering have diverse backgrounds and expertise in multiple aspects of subsurface resource exploitation with applications in specialized Energy-related disciplines including, but not limited to:

1. Oil and Gas Production from Conventional and Unconventional Reservoirs
2. Clean Energy Production and Storage (e.g., hydrogen and geothermal energy)
3. Carbon Capture, Utilization and Storage (CCUS)
4. Energy Engineering
5. Data Analytics in Energy and Oil and Gas
6. Blockchain in Energy

Students with a bachelor degree in Petroleum Engineering will select courses based on their interest to receive the MEng degree in Energy and Petroleum Engineering with a focus on any of the above specialized disciplines. Those with other Engineering or related Science backgrounds will be required to take core courses in Petroleum Engineering at the advanced level in addition to courses in their specific fields of interest. The DED option of the program is expected to attract mainly industry professionals due to the flexibility that it offers and the opportunity to learn high-demand skills that have an expected positive return on their career outcomes.

Anticipated Curriculum: Students will gain the knowledge and skills required to work in the Energy and Petroleum industries. The anticipated curriculum will require completion of 30 credits of courses including at least 3 credits of Design Project. The program of study (POS) will be defined during the first semester by the student's advisor based on the background and interest of the student. The curriculum is designed to provide the students with hands-on and practical knowledge required to join the Energy and Petroleum workforce after completion of the degree.

Student Learning Outcomes:

1. Advanced knowledge base for Energy and Petroleum Engineering.
2. Professional development in a broad range of Energy areas.
3. Sustainability in Energy production and storage.
4. Engineering problem solving encountered in the profession.
5. Modern approaches to computation, data, and artificial intelligence
6. Ethical and professional conduct of the engineering profession
7. Communication and collaboration skills to design innovative contributions to the professional practice.

Information about content and how the Academic Program may relate to other offerings:
The Department of Energy and Petroleum Engineering currently offers PhD and MS (MS Plan A & B, MS Quick Start for undergraduates, and MS-MBA) degrees in Petroleum Engineering. Some of the current challenges associated with the MS degree is that it is relatively long to complete (about 2 years), and is a research-focused program of study with fundamental courses and a research project or report. Furthermore, applicants with an MS degree in PETE from another institution currently cannot join the PETE MS program at UW. The addition of the course-based MEng degree, which can

be completed in a period as short as one year, will resolve the above-mentioned shortcomings and provide a pipeline of graduate students that meet the skill needs of the industry, while the number of undergraduate students in Petroleum Engineering continues to decline in the US and worldwide.

A plan for obtaining a market analysis of anticipated student demand and enrollment, and a plan for evaluation and analysis of post-graduation employment market demand:
The Department of Energy and Petroleum Engineering will use market analysis tools, such as Gray's Associates software which provides information on student demand, competition, job opportunities, and other important environmental and market factors. This critical program data help institutions with a number of strategic initiatives. In particular, Gray's Program Evaluation System (PES) integrates critical data on the markets for educational programs to enable customized analysis of an entire program portfolio at a local, regional, or national level. Gray's PES was designed specifically to support analysis of higher education programs, campuses, markets, and strategies. It is worth mentioning that the MEng program in Petroleum Engineering is not a new idea and several other PETE programs, including the University of North Dakota (UND), University of Texas A&M and Colorado School of Mines (CSM), are also offering it. UND started their MEng degree in Petroleum Engineering in 2017 and, in less than five years, they had more than 30 MEng students, mostly using the DED option. Some of these students were already working in oil and gas and related industries and needed the degree for their career development. The rest were taking the program to gain expertise in discipline in order to join the highly in-demand profession in the oil and gas industry. We expect to observe the same trend for the MEng program that is being proposed here. However, the broader energy focus of our program offers a wider range of specialized areas of interest, which makes it distinct from existing programs.

Preliminary budget, including potential funding sources, projected expenses and revenues, and potential faculty, academic professionals, lecturers, professors of practice, and staff:
The Department of Energy and Petroleum Engineering currently has enough faculty to teach the courses for the new MEng program in addition to their other teaching and research workload. Some of the courses will also be co-taught (dual-listed) with the undergraduate courses, which is beneficial in terms of keeping the undergraduate headcounts in each class above the minimum number required. Also, as the program is course-based, it does not require any other resources such as laboratories. With the large number of PhD students in the program, the addition of MEng students, may require a full time graduate student coordinator/advisor to hire in the future. This will be assessed after the first year of the program and looking at the enrolment numbers. This, however, will not be a major financial need to start the degree program.

Total projected additional revenues due to added course requirements for the MEng, assuming a minimum of 10 students per year is calculated below. We are not including any indirect costs due to the wide variability in graduate student needs.

- Per resident student in program at $311/graduate credit X 30 credits = $9,330
- Per non-resident students in program at $930/graduate credit X 30 credits = $27,900
- Estimate: 5 resident students and 5 non-resident each year = $186,150 additional tuition

Proposed timeline for staged implementation over five years, including campus and Board review:

- November 2022 – Proposal/Notice of Intent submitted for review to the Provost's office
- December 2022 – Proposal presented at the Board of Trustees meeting
- February 2022 – Feasibility study and pro forma budget submitted to Academic Affairs
- April 2022 – Present feasibility study for campus review
- May 2022 – Materials for the Request for Authorization and Letter of Commitment submitted for review to the Provost's Office
- June 2023 – Administrative staff position search initiated and complete
- July 2023 – Request for Authorization and Letter of Commitment submitted for review to the Board of Trustees
- August 2023 – CARFs submitted
- Fall 2023 – First year delivery of MEng degree
- Fall 2024 – Second year delivery of MEng degree
- Spring/Fall 2025 – First evaluation of the program and enrolment numbers

Information on other required approvals, such as accreditation bodies and the Higher Learning Commission:
No official accreditation is needed for this MEng program. However, we anticipate that we will review the details of the program content, delivery and progress with the Department's Industry Advisory Board (IAB) members every semester during regular IAB meetings and continue discussions with them on a frequent basis.

Evidence of how the new Academic Program aligns with the University's mission, strategic plan, and existing academic degree program array:
Alignment with UW's mission: The proposed MEng in Energy and Petroleum Engineering aligns well with UW's mission by preparing individuals to serve communities throughout Wyoming, other states within the US, and the globe. This education will not only create an environment of diversity and inclusion but will also foster the growth of Energy and Petroleum Engineers which are in high demand worldwide.

Alignment with UW's strategic plan: We believe this program aligns well with all four of the University of Wyoming's goals in the Five-Year Strategic Plan (Breaking Through) and with the current strategic goals of: institutional excellence, student success, and service to the community. With regards to Goal 1, which emphasizes the promotion of "academic programs that address workforce needs of the state and region", the MEng program will graduate a number of highly skilled petroleum engineers ready to join the oil & gas and energy industries. Goal 2 addresses the need to "engage and graduate well-rounded and creative thinkers, capable of meeting unpredictable and complex challenges". The complex nature of oil and gas and related disciplines will require students to think out of the box, consider risk and mitigation models in their designs, and propose contingency approaches. Goal 3 encourages programs to "build a statewide community of learners by collaborating with schools, community colleges and tribal nations to connect students and citizens". The proposed MEng program, with its DED option, supports these efforts through enrollment of students from diverse backgrounds and geographic locations with broader impacts on societies. Goal 4 focuses on the University as a whole through maintaining and strengthening its "marketing effectiveness, financial resources, and human capital." This program will supplement these efforts by offering a competitive and novel educational experience.

A rationale that clearly defines the need for the new Academic Program. The rationale should include evidence that the Academic Program will not produce unnecessary duplication of existing programs:
Given the expertise of the existing faculty, the primarily focus of the new MEng program would be on engineering aspects of the subsurface, such as the development of petroleum resources especially in unconventional plays, geothermal energy, underground energy production and storage, energy and carbon engineering, data analytics and blockchain. The new graduate program would have a number of synergies with existing undergraduate programs that educate students in various aspects of energy. For example, the Department of Mechanical Engineering in the College of Engineering and Physical Sciences has an undergraduate program in Energy Systems Engineering which is primarily focused on wind energy and energy systems associated with mechanical engineering. The School of Energy Resources has developed an undergraduate program focused on energy resource management, economics, and development from a non-engineering perspective. The HAUB School of Environment and Natural Resources provides a Sustainability Minor with Energy Track. The new MEng program in Energy and Petroleum Engineering would complement the management, economic and environmental aspects of these programs and provide a fast-track, graduate-level education that is unique within the University.

AGENDA ITEM TITLE: **Notice of Intent: Bachelor of Science in Ranch Management and Agricultural Leadership (RMAL),** Rasco, Barrett

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 Bachelor of Science in Ranch Management and Agricultural Leadership (RMAL) degree will be interdisciplinary, developing a practitioner level of competency in Agricultural Business, Animal and Veterinary Science, and Rangeland Ecology and Watershed Management. In addition, it will provide critical competencies in Leadership, Communications, Human Resources Management, and Technology, by using expertise in the College of Business, College of Arts and Sciences, Haub School of Environment and Natural Resources, the School of Computing, and appropriate industry practitioners. Opportunities for critical thinking, decision-making, and applied learning will be commensurate with the needs of ranch owners, managers, agency professionals, agricultural lending institutions, and agri-businesses throughout the livestock supply chain.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
None.

WHY THIS ITEM IS BEFORE THE BOARD:
University of Wyoming Regulation 2-119 requires that the Board approve all new certificates and lays out the process for that approval. The Academic and Student Affairs committee will report to the Board on recommended action for approval of the Notice of Intent.

ACTION REQUIRED AT THIS BOARD MEETING:
Consideration for approval of the Notice of Intent, BS in Ranch Management and Agricultural Leadership.

PROPOSED MOTION:
"I move to approve the Notice of Intent for the Bachelor of Science in Ranch Management and Agricultural Leadership."

PRESIDENT'S RECOMMENDATION:
The President recommends approval of the Notice of Intent.

Notice of Intent – Proposed College of Agriculture, Life Sciences and Natural Resources Bachelor of Science Degree

Name and Delivery

The name of the proposed Academic Program is Bachelor of Science in Ranch Management and Agricultural Leadership (RMAL), housed in the Dean's Office of the College of Agriculture, Life Sciences and Natural Resources. The mode of delivery will be on-campus classroom along with seminars, experiential learning, and internships. Individual courses may be delivered online. Future components of the degree (e.g., associated certificates) will be delivered in conjunction with the UW College of Agriculture, Life Sciences, and Natural Resources Faculty, UW Extension personnel, and industry professionals.

Program Description

The RMAL degree will be interdisciplinary, developing a practitioner level of competency in Agricultural Business, Animal and Veterinary Science, and Rangeland Ecology and Watershed Management. In addition, it will provide critical competencies in Leadership, Communications, Human Resources Management, and Technology, by using expertise in the College of Business, College of Arts and Sciences, Haub School of Environment and Natural Resources, the School of Computing, and appropriate industry practitioners. (See attached draft of degree plan.) Opportunities for critical thinking, decision-making, and applied learning will be commensurate with the needs of ranch owners, managers, agency professionals, agricultural lending institutions, and agri-businesses throughout the livestock supply chain.

Skill, Knowledge & Outcome Objectives

RMAL participants will: 1) develop the skills, knowledge, and practical experience to be successful in a wide variety of RMAL careers; 2) develop the behavioral skills and emotional intelligence to be valuable employees and leaders; 3) hone an interdisciplinary and collaborative approach to problem solving; 4) excel in innovative and critical thinking; 5) learn how to identify, evaluate, and use resources for effective decision-making; 6) develop leadership and communication skills that will benefit their employers and communities; and 7) develop mentorships and professional networks relevant to their career objectives.

Pedagogical Objectives

We will structure educational experiences to: 1) enable continuous, high-quality student-to-faculty, student-to-practitioner, and peer-to-peer learning; 2) provide experiential, hands on problem solving reflecting real world, contemporary, and emerging challenges; 3) provide program flexibility and learning opportunities to fulfil a diverse set of learning needs, contexts, and career aspirations; 4) create opportunities for practitioners, as well as faculty across UW, to participate in interdisciplinary educational opportunities.

Content & Other Programs

The nature of ranch management and agricultural leadership today requires professionals to have an integrated understanding across a broad array of disciplines, while demonstrating exemplary interpersonal skills that allow for effective teamwork, collaboration, and development and retention of talent. Broadly defined, RMAL will be characterized by interdisciplinary intersections of resource utilization, business operations, law and policy, leadership and management, and problem solving.

Disciplines

RMAL content will follow the core content of Agricultural Business, Animal and Veterinary Science, and Rangeland Ecology and Watershed Management. Topical areas will include collaboration and facilitation, communications, ethics, human resources management, civic learning, democratic engagement, advocacy, professional/personal development, research and decision analysis, and technology and computational applications in agriculture. The key component of the RMAL degree is the opportunity for students to weave a subset of disciplines and topics into applied practice, problem solving, and advancement of the industry.

Structure

We propose to develop multiple tracks for RMAL. First, a traditional bachelor's track focused on the interdisciplinary needs of those students with RMAL career objectives. Second, an advanced program track for a select group of students that will allow them to graduate with a master's degree. Third, certificate programs that will allow both existing practitioners and students the opportunity for credentialed, and/or non-formal learning experiences.

Relationships to Other Programs

We propose to maximize inclusivity by engaging with the wide-ranging expertise of UW faculty across schools, industry practitioners, and successful traditional and non-traditional ranch and agricultural enterprises. We propose that RMAL follow the interdisciplinary model in both coursework, experiential learning, and internships.

Market Analysis

The initial offerings of this program are in response to feedback collected during listening sessions conducted with ranch managers, absentee owners, family ranchers, legislators, representatives from agencies working with agriculture, and students. These sessions yielded a high level of engagement and feedback on a statewide scale.

In addition, a recent USDA report noted that available employment opportunities in the food, agriculture, renewable natural resources and the environment sector will remain steady and strong. Between 2020 and 2025, they expect an average of 7,900 annual job openings for new graduates. College graduates with degrees from institutions offering food, agriculture, renewable natural resources and environmental programs will fill 92% (7,300) of the annual openings, with the other 8% (600) filled by graduates from allied fields of study. The report also points out that **employers in this cluster value and seek graduates with practical experience.**

Market analysis has been completed using Gray Associates' data which suggests a fairly high student demand overall and a positive employment outlook. As the RMAL degree would be interdisciplinary and include important content from the aforementioned areas, multiple CIP codes were used to address the hybrid nature of this program. The percentiles for the related programs were as follows:

Program by CIP Code	Laramie 360 Market Percentiles		Total Percentile	National Market Percentiles		Total Percentile
	Student Demand	Employment Outlook	includes Competitive Intensity & Degree Fit percentiles	Student Demand	Employment Outlook	includes Competitive Intensity & Degree Fit percentiles
01.0000 Agriculture, General	74	96	92	84	91	89
01.0102 Agribusiness/Agricultural Business Operations	91	66	94	84	91	88
01.0901 Animal Science, General	97	13	92	97	16	96
01.9999 Agriculture, Agriculture Operations, and Related Sciences, Other	50	93	15	50	93	22
03.0201 Natural Resources Management and Policy	50	16	38	71	20	60
52.0201 Business Admin. and Mgmt, General	99	99	99	99	99	99

The interdisciplinary nature of the degree makes RMAL graduates eligible for a variety of jobs in each of these arenas. Data from Burning Glass's analysis of the following related occupations

- Farmers, Ranchers, and Other Agricultural Managers
- Buyers and Purchasing Agents
- First-Line Supervisors of Farming, Fishing, and Forestry
- Agricultural Inspectors
- Farm Labor Contractors

indicates growth (2021 – 2026) from 1.33% to 5.77% in these occupations with the exception of Buyers and Purchasing Agents, which shows a slight decline. Burning Glass data also supports the needs expressed by our stakeholders for graduates with developed skills in communications, management, negotiation, operations, and problem solving.

Funding, Preliminary Budget, and Proposed Timeline

The RMAL program has already received endowments of 1.5M from Farm Credit Services of America and 1.5M from the Y Cross Ranch Endowment, as well as 1.5M in Wyoming legislative match money for ranch and range management. Additional donors have expressed a keen interest in supporting this application-based program, including a pending signed pledge with match of $500K and another pending signed pledge with match of $100K.
See attached document for 5-yr plan/timeline, preliminary budget, and other related financial information.
Campus and Board review timeline:

- October 17, 2022 – Proposal submitted for review to the Provost's office

- November 16-18, 2022 – Proposal presented at Board of Trustees meeting
- November 23, 2022 – Notify Faculty Senate of pending feasibility study
- December 2022 – Feasibility study and pro forma budget submitted to Academic Affairs
- January 2023 – Present feasibility study for campus review
- April 2023 – Materials for the Request for Authorization and request for Letter of Commitment submitted for review to the Provost's Office
- May 10-12, 2023 – Request for Authorization and Letter of Commitment submitted for review to the Board of Trustees

As the program progresses, a steering committee made up of faculty, stakeholders, and program administration will review content and outcomes to ensure the degree program is adaptive and keeps pace with industry progress and needs. Also, the addition in year four of a Career Services & Job Placement Coordinator will allow for the tracking of post-grad employment placement that can also be used by the steering committee to ensure the program is meeting its desired outcomes.

Mission Alignment

This program is strongly aligned with the four strategic pillars: Interdisciplinary, Digital, Entrepreneurial, and Inclusive. Specifically, the success of the RMAL Program not only leverages, but will depend upon significant and impactful collaboration with the College of Business (COB), School of Computing (SOC), Center for Entrepreneurship and Innovation (CEI), and the Ellbogen Center for Teaching and Learning (ECTL), as well as with the CALSNR's disciplines of Agricultural Business, Animal and Veterinary Science, and Rangeland Ecology and Watershed Management.

Incorporating an understanding of computing and its applications, as well as exposing students to technological advances in the industry will support the development of innovative problem solving. This multifaceted approach to problem solving can also be a catalyst for entrepreneurial pursuits and connecting participants with the CEI's courses on entrepreneurial strategies, ideation, innovation, and implementation. It will also prepare students to be better intrapreneurs in their organizations, contributing to new products, approaches, services, and fostering growth and innovation for the industry overall.

In keeping with the Governor's Wyoming Innovation Network, the program will offer opportunities for developing advanced leadership and behavioral skills integrated with our core agricultural curriculum, better preparing participants to excel in the workforce, as well as supporting managers and businesses in creating cultures that will be able to retain a more competent workforce. These skills can be acquired through the BS degree as well as through certification offerings that can be earned by stakeholders, and UW and community college students.

There will also be an instructor development component that incentivizes and provides for professional development specifically geared towards collaboration, in-depth integration, experiential learning, and team teaching. This component hopes to leverage research and innovation coming out of the Trustees Education Initiative to improve RMAL pedagogy.

And finally, we take to heart the concept that The World Needs More Cowboys and its hallmarks of curiosity, boldness, authenticity, and outside thinking. We envision the program itself as a breakthrough in an interdisciplinary approach that takes the most passionate and knowledgeable in their fields, and provides them the tools to become amazing co-instructors, integrating topics with application and experience on a novel level.

Need for RMAL

This program represents the expressed explicit needs of students, employers, and stakeholders, and fulfills our mission of improving the lives of individuals, businesses, and communities within the state. The competencies identified for this program are increasingly valued throughout the agribusiness industry, and by NGOs, biotech, and state and federal agencies. Providing interdisciplinary content and essential skill development in the ranch and agribusiness arenas will add an essential dimension to UW's College of Agriculture, Life Sciences, and Natural Resources programs. RMAL will recruit and retain students that are seeking authentic real-world experience in an interdisciplinary setting.
Employers in these fields have been very candid in articulating the need for employees with essential skills in communication, collaboration, problem-solving, management, and leadership. The goal of this program is to meet the needs expressed by those employers, and our stakeholders and students, by moving beyond traditional single focused disciplines and being very intentional in combining disciplines with experiential and applied learning to produce solid and diverse practitioners.
One of the key themes from the statewide listening sessions was the disconnect between our disciplinary- focused graduates, and the interdisciplinary imperative to being a successful ranch manager, rangeland manager, or agribusiness professional. Another theme was the difficulty in hiring individuals with effective interpersonal and leadership skills. This program addresses the obvious need by producing better prepared students. But it also addresses the related need of retaining those good employees. The behavioral and leadership skills developed in both the BS curriculum and the credentialed seminars will support managers and employers in creating cultures that will contribute to retaining those more skilled employees.

Existing Program Alignment

We intend to design RMAL to avoid competition and redundancy with existing programs where possible. Our program as envisioned complements our current curriculum and takes what is most relevant from our existing disciplines and combines them with relevant disciplines outside the CALSNR. The interdisciplinary nature will allow for the target student to develop proficiency, not expertise, in the broad range of topics they will need as ranch managers, in agribusiness, and as leaders in the agricultural field. This will allow those students who historically had to select an area of expertise to work in the ranch and agricultural fields - but were left without a background in a number of other key topic areas - to have a broader range of knowledge and skills to take to market.
We plan to meet during spring semester with department chairs and faculty from units offering established degrees to understand potential concerns and structure RMAL to minimize enrollment impacts to those specialized programs.

Draft Overview of Degree Plan

Ranch Management & Agricultural Leadership, B.S. (RMAL)
This curriculum is for students intending to work in any sector of ranching and agriculture; including but not limited to ranches, agricultural producers, agricultural businesses (feed companies, banking, insurance, and other supporting industries), federal and state related agencies, and related associations (Stock and Wool Growers Associations, and the National Cattlemen's Beef Association, etc.). Students will not only obtain a working understanding of the three core programs; Agricultural & Applied Economics, Animal Science, and Range Management, but will take courses designed to help them be better people managers, leaders, problem solvers, and advocates for the industry.
Students will graduate with a broad understanding of both the business and science of the agricultural and livestock industries.

This degree will require a minimum of 128 credit hours and include a minimum of 3- 6 credit hours' worth of internships.

Course Content
In addition to their USP requirements, students will take a combination of courses from different departments to fulfill the following competencies:

ANIMAL SCIENCE
- ANSC
- FDSC
- LIFE

BUSINESS & MANAGEMENT
- AGEC
- ENTR
- LAW
- MGMT
- PHIL

COMMUNICATIONS
- AGRI
- COJO
- ENGL

LEADERSHIP
- AGRI
- LEAD
- MGMT

RANGELAND MANAGEMENT & PLANT SCIENCE
- BOT
- PLNT
- REWM
- SOIL

RMAL
- New courses developed in topics such as Sustainable Agriculture and Community Engagement
- Courses with significant experiential learning activities
- Courses with integration across disciplines
- Capstone with integration across disciplines
- A one CH course per semester that will be guided learning where core elements are added to the course project and are work towards the capstone. (The first semester's course will be an overview of how all the different components of the RMAL degree program fit together and support one another.)

Year 1	Year 2	Year 3	Year 4	Year 5
Offerings	**Offerings**	**Offerings**	**Offerings**	**Offerings**
Applied Learning Seminars	Applied Learning Seminars	Applied Learning Seminars	Applied Learning Seminars	Applied Learning Seminars
Non-C Certificate	Non-C Certificate	Non-C and Credit Certificates	Non-C and Credit Certificates	Non-C and Credit Certificates
BS in RMAL	BS in RMAL	BS in RMAL	BS in RMAL	BS in RMAL
	Internships	Internships	Internships	Internships
		RMAL Capstone Experience	RMAL Capstone Experience	RMAL Capstone Experience
			Masters in RMAL	Masters in RMAL

Staffing	Staffing	Staffing	Staffing	Staffing
Director, RMAL	Director, RMAL	Director, RMAL	Director, RMAL	Director, RMAL
Assoc Dir, RMAL	Assoc Dir, RMAL	Assoc Dir, RMAL	Assoc Dir, RMAL	Assoc Dir, RMAL
Office Associate	Office Associate	Office Associate	Office Associate	Office Associate
	Faculty	Faculty	Faculty	Faculty
	Faculty	Faculty	Faculty	Faculty
	Faculty	Faculty	Faculty	Faculty
	Internship Coordinator	Internship Coordinator	Internship Coordinator	Internship Coordinator
		Academics & Inter-Disciplinary Coordinator	Academics & Inter-Disciplinary Coordinator	Academics & Inter-Disciplinary Coordinator
			Career Svcs & Job Placmt Coord - PT	Career Svcs & Job Placmt Coord - PT

	Expenses	Expenses	Expenses	Expenses	Expenses
Staffing					
Salary & Benefits	165,600	884,464	915,979	952,618	990,722
Applied Learning Seminars	26,000	26,780	27,583	28,411	29,263
Faculty Development, Inter-D/ Team Teaching methods	45,000	45,000	45,000	35,000	35,000
Visiting Practitioner Instructors	0	100,000	100,000	100,000	100,000
Stipends/Incentives (UW Faculty)	125,000	165,000	165,000	165,000	165,000
Operating					
Operating - Program	50,000	51,500	53,045	54,636	56,275
Operating - Applied Learning Seminars	39,000	40,170	41,375	42,616	43,895
Other					
Internships (student wages)	0	54,000	66,096	77,112	88,128
Scholarships (in-state)	70,000	84,000	98,000	112,000	126,000
Scholarships (out-state)	88,000	88,000	88,000	88,000	88,000
Year 5 Scholarships					140,000
	608,600	**1,538,914**	**1,600,078**	**1,655,393**	**1,862,284**

Existing Endowments/Funds
Farm Credit Services Endowed Chair in Ranch Management & Agricultural Leadership
Farm Credit Services of America Agricultural Leadership Program
Lowham Family Ranch Mngt Exc. Fund
Lynch, Earl and Minnie Production Agriculture Graduate Assistantship
Y Cross Ranch Endowment
Pending signed pledge with match $500K
Pending signed pledge with match $100K
Legislative Match for Ranch and Range Management

AGENDA ITEM TITLE: <u>Request for Authorization: Carbon Capture Storage and Utilization (CCUS) UG Certificate</u>, Carman, Krutka

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:
Carbon capture, utilization, and storage (CCUS) have experienced growing interest over the past two decades due to the desire to reduce CO_2 emissions and the ability of CCUS to reduce emissions at large scales. The University of Wyoming is a recognized leader in several aspects of this growing field – it is natural then that UW would offer a multidisciplinary CCUS certificate. This certificate, covering the technology, economics, and policy of carbon capture, utilization and storage (CCUS), is designed for a broad, multidisciplinary audience with an interest in energy, sustainability, and climate change mitigation.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
The BOT approved the NOI for this program in May 2022.

WHY THIS ITEM IS BEFORE THE BOARD:
University of Wyoming Regulation 2-119 requires that the Board approve all new certificates and lays out the process for that approval. The proposal has been through appropriate approval channels. A letter of commitment for the certificate program is submitted for the Board of Trustees' approval.

ACTION REQUIRED AT THIS BOARD MEETING:
Consideration for approval of the request for the Carbon Capture Storage and Utilization Undergraduate Certificate.

PROPOSED MOTION:
"I move to approve the Undergraduate Certificate in Carbon Capture Storage and Utilization."

PRESIDENT'S RECOMMENDATION:
The President recommends approval.

New Degree or Certificate Proposal Feasibility Study

Feasibility Study for Carbon Capture Utilization and Storage (CCUS) Undergraduate Certificate

Executive Summary

Degree or Certificate Title: Carbon Capture Utilization and Storage (CCUS) Undergraduate Certificate

Level of Degree or Certificate: Undergraduate

Delivery Mode(s): Traditional, Hybrid, Online

Estimated Startup Cost of Degree: $1,000 for Marketing

Anticipated Launch Date: Fall 2023

Description: Students in this certificate could complete the coursework in a two-year cycle. Courses will be offered on a set rotation to accommodate completion in two years. Courses can be completed in any order, which allows for a student to enter the program at any time and not get 'off cycle'. If the courses become full SER/CEPS/CoB may look to expand the frequency in which the courses are offered. There are new courses proposed as part of this certificate, but all of the optional coursework is built on existing courses in the 22-23 Catalog. The list of optional coursework is wide-ranging and would accommodate professionals in a variety of careers or students in a variety of majors.

Table of Contents

Feasibility Study Required Contents:

Overview and Description of Degree or Certificate, Purpose, Strategic Play Overlay

Carbon capture utilization and storage (CCUS) has experienced growing interest over the past two decades, due to the desire to reduce CO_2 emissions and the ability of CCUS to reduce emissions at large scales. The University of Wyoming is a recognized leader in several aspects of this growing field – it is a natural progression for SER, CEPS and CoB to offer a multidisciplinary CCUS certificate.

This certificate, covering the technology, economics and policy of CCUS, is designed for a broad, multidisciplinary audience with an interest in energy, sustainability and climate change mitigation. CCUS is an important component of climate change mitigation as the technology allows for the continued consumption of affordable, abundant and secure fossil fuels in a carbon-constrained world. In addition, CCUS allows for industrial processes with CO_2 as a byproduct (e.g., cement production, biofuels production, etc.) to mitigate their emissions. Ultimately, CCUS prevents CO_2 (carbon dioxide) emissions from entering the atmosphere by capturing and storing them permanently and safely underground. The courses in this certificate are taught by a team of leading academics at the University of Wyoming with decades of experience in this field. This certificate program aims to bridge the gap between the forefront of the latest developments in science, engineering, geology, policy and economics and the wider public.

To provide a more desirable certificate program for adult learners, it would be beneficial for School of Energy Resources (SER) and College of Engineering and Physical Sciences (CEPS), and the College of Business to offer this certificate in an online format. This proposed initiative helps UW shift to the forefront in the way nontraditional students learn, much like the recently proposed BAS OL degree at UW-Casper. There is an increasing number of nontraditional students and online program availability (Barbera et al., 2020). SER, CEPS and CoB are prepared to provide flexible and high-quality experiences for this unique educational certificate as only the second school in the country as well as the capacity for the significant enrollment growth this certificate may afford (Slover & Mandernach, 2018, p. 111). This program could both grow the Wyoming workforce and yield significant out of state revenue. This certificate is being designed with MOUs in mind, as industry partners seeking this credential for their employees may be inclined to cover the cost of the tuition.

Target Audience

Energy-sector employees, current UW students, city, county, and state natural resources/energy departments, open space departments, land trusts; Federal agencies such as the Bureau of Land Management, Environmental Protection Agency, and Natural Resources Conservation Service; Extension programs associated with land grant universities; Private consultant or contractor firms that work with managing public and private lands.

Relationship to Other Offerings/Demand

Based on research into other institutions offering a CCUS Certificate, there is only one school doing so, Colorado School of Mines (CSM). CSM is offering a graduate level certificate with only four courses and a narrow focus on the science and political aspects of CCUS. SER's proposed program will be an undergraduate certificate and, therefore, attract a wider audience as indicated above. Additionally, SER's proposed certificate will also provide more context on the legality of pore space ownership and

leases for CO_2 storage. There is reason to believe that there is significant demand for a CCUS certificate. For example, as SER researchers and faculty attend/present at conferences or community outreach, they are continually asked when a CCUS certificate will be offered on a regular basis. In addition, CSM reported their first class this academic year was comprised of 20 students.

Major state institutions such as Arizona State University have experienced a 50% or greater online enrollment increase per year over multiple years (Arizona State University, 2018). Given these enrollment numbers represent all online courses at ASU, SER is proposing a more conservative estimate. With proper marketing, this undergraduate certificate will be only the second CCUS Certificate and first undergraduate certificate in the US and differentiates itself by not only covering the scientific aspects, but also the policy and economic realms in CCUS. An initial enrollment of 20 students can be expected in year two, as is comparative to Colorado School of Mines' current certificate enrollment. Target growth is a year-over-year increase in new enrollment as legal regulations continue to trickle down to industry demand to create a net-zero economic reality.

Alignment with University Mission

This proposed certificate aligns with every aspect of the UW Mission, "We honor our heritage as the state's flagship and land-grant university by providing accessible and affordable higher education of the highest quality; rigorous scholarship; the communication and application of knowledge; economic and community development; and responsible stewardship of our cultural, historical and natural resources." This would be accessible as an online certificate, as affordable as any other UW credential, featuring the highest quality faculty in this area of research and practice. MOU's and SER's existing scholarships could support the students enrolled and aligns with the SER's mission and UW's mission to provide energy education, research, and outreach.

Fit

No new employees are needed to support this certificate program. Of the courses currently slated, all are already offered at UW, with one exception. The one new course to be created will also be adopted by our Bachelor of Science, Energy Resource Management and Development degree, and will be taught by SER Professor of Law, Tara Righetti. We have already made tentative adjustments in our curriculum planning to accommodate this course as part of Tara's teaching load- once the course goes through Curriculum processes at UW. SER and CEPS are able to continue offering existing courses, making this certificate program self-sustaining. The initial investment required to get the program started is minimal and comprises of the cost to create and disperse marketing materials.

Learning Outcomes

The CCUS Undergraduate Certificate is intended to provide students with an understanding of the complex role energy plays by meeting the following learning outcomes.

1. (Fundamentals of storage, capture, transport, and safety) Students will identify geological criteria for site selection, geophysical models of the subsurface for characterization and monitoring and minimizing risks related to transport and guaranteeing long-term storage of fluids in the subsurface.
2. (ESG, Policy, Regulations, and Business drivers) Define and navigate the legal and regulatory hurdles for energy development/environmental challenges on federal, state, and fee lands.

3. (Risk: Environmental, Technical, Financial/Monetary) Build techno-economic models capable of analyzing energy projects.
4. (Outreach and communications) Students will demonstrate the process necessary to effectively communicate with stakeholders, the general public, and stakeholders of a CCUS project to ensure concerns are explored and different communication methods considered based on the audience.

Curriculum Map and Program Structure

Students will complete 21 credit hours in this certificate. Outside of prerequisites the courses may have, these do not need to occur in a specific sequence.

Proposed Certificate – 21 credit hours

Required Core Courses – 15 credit hours (Based on 4 broad topics)

1 New course ERS 4*** Global Climate Governance (3cr.)

This course comprehensively examines the Paris Agreement and the various approaches being considered for countries to meet their nationally defined contributions. This course will provide students with a foundation on Carbon dioxide removal, current governance, how is it contemplated, economics, business drivers, regulations, ESG, etc.

1 New course ERS 2**** Fundamentals of storage, capture, and transport (3 cr.) *already offered in CEPS under special topics*
To stabilize global climate change, carbon capture and storage (CCS) is a key option for significantly reducing carbon dioxide (CO2) emissions from fossil fuel-fired power generation systems and industrial processes. The major objectives of this course are to offer a systematic view of CCS for decarbonizing fossil fuel-fired power plants and industrial processes and then address technical, economic and policy issues related to CCS.

1 New Course ERS 2*** Geological Carbon Sequestration: Policy, Models, and Engineering (3 cr.) *already offered in CEPS under special topics*

This course provides a background of various aspects of Carbon Capture, Utilization and Storage, including Geology, Geostatistics, and Engineering. The goal of this course is to provide the participants with familiarity and a working knowledge of geological concepts, models of the subsurface, engineering of fluids and flow, injection, monitoring and safety. This course will enable students to understand the complex nature of CCUS, its unique challenges, and its potential contribution to Energy Transition (ET) and the states' economies, while providing skills that are needed to advance and pursue careers related to CCUS and a sustainable energy portfolio.

1 New Course ERS 4*** Energy Finance (3 cr.) *already offered in CoB within graduate level courses*

This course introduces students to the key methods used to evaluate investments in energy industry projects from the perspective of the developer as well as the lender and other stakeholders. Topics include project finance modeling, techno-economic considerations, business structures, regulatory and legal issues, risk analysis, and deal terms.

ERS 2500 Energy Project Outreach and Communications (3 cr.- Currently *Communication Across Topics in Energy*)

Students will develop interdisciplinary communication skills from an Energy Resources perspective. Communication will include oral, digital, and written forms. Audiences for communication projects will often be live, and from a variety of backgrounds.

Elective Courses – Minimum 6 credit hours from any of the disciplines/courses below

Energy Economics

AGEC 4600- Community Economic Analysis (3 cr.)

Analysis of regions and rural communities; their problems, socioeconomic characteristics, land use and economic development. Provides training in regional economic analysis, fiscal impact analysis and benefit cost analysis. Dual listed with AGEC 5600. Prerequisites: ECON 3010, 3020, and MATH 1400.

ECON/ERS 3400 Energy Markets and Policy (3 cr.)

This course provides an economic analysis of recent developments in energy markets and policies. Cross listed with ECON 3400. Prerequisite: ECON 1000, ECON 1010, ECON 1020, ECON 1200, ECON 1300, ECON 1400, or ERS 1300.

AGEC 4890-Topics-Cooperative Business Model (1-3 cr.)

Accommodates seminar series or course offering by visiting faculty whose subject matter is not included in other courses. Prerequisites: junior standing and/or consent of instructor. (Offered based on sufficient demand and resources)

Energy Policy

NAIS 4340 Natural Resource Management on Western Reservations (3 cr.)

Examines natural resource management techniques on western reservations. Focus is on the management and planning of water, grazing, extractive industries, and forestry. Fieldwork on the Wind River Indian Reservation is included. Cross listed with GEOG 4340. Prerequisite: 6 hours of 2000-level NAIS courses or consent of instructor.

POLS 4052 Federal Land Politics (3 cr.)

Examines the political forces that have shaped and continue to shape federal land policy and management. Explores the interactions between democratic decision making and science in the management of federal lands. Surveys the sources of controversy over federal land management and methods for harmonizing public demands with technical expertise. Cross listed with POLS/ENR/GEOG/AMST 4052. *Prerequisite:* POLS 1000.

ENR 4040 Conservation of Natural Resources (3 cr.)

Geographically analyzes conservation of natural and human resources, as well as political, social and ethical ramifications of our environmental policy. Cross listed with BOT/GEOG 4040. Prerequisite: 6 hours of geography or ENR.

ENR 4900 Policy in Practice (3 cr.)

Encompasses student resolution in multidisciplinary teams of environmental and natural resource problems and issues; practice in formulating policy alternatives; case studies; planning, performing and coordinating multidisciplinary research. Dual listed with ENR 5900. Prerequisite: ENR 3000.

Energy Law and Land Management

ERS 4110 Law of Contracts (3 cr.)

The Law of Contracts addresses the formation of a contact and the meaning of agreements and the justification of non-performance and breach. Prerequisites: N/A

ERS 4120 Federal Public Lands Law (3 cr.)

Federal Public Land Law addresses public interest as the central principal of public land natural resource management. The course examines the acquisition and disposition of the public domain, federal and state regulatory authority, and the management of hard rock, energy, and range resources. Prerequisite: N/A

ERS 4100 Property I (3 cr.)

Property I addresses the nature of property ownership and the rights associated with property as well as the acquisition and transfer of ownership rights in property and the sharing of ownership rights over time, including estates, future interest, and concurrent estates. Prerequisites: N/A

ERS 4105 Property II (3 cr.)

Property II covers rights inherent to the ownership of property and public limitations on those rights. Prerequisite: ERS 4100.

ERS 4990 Topics in Energy Resource Development and Management (1-6 cr.)

Special topics in contemporary energy development and management will be offered in response to changing industry and academic demands. The specific subject matter is based on faculty requirements and workforce innovation.

Prerequisites: QA and one of the following: SB, SP or SE course.

Energy & Environment

ATSC 2100 Global Warming: The Science of Humankinds' Energy Consumption Impacting Climate- USP PN Physical and Natural World (3 cr.)

Introduces non-specialists to the fundamental scientific principles governing climate change. The underlying physics of both human and natural contributions to global warming is presented along with uncertainties in predicting climate. Potential strategies to mitigate global warming (alternative energy, carbon capture, and geoengineering) are also discussed.

BOT 4745 Terrestrial Ecosystem Ecology (3 cr.) Prerequisite: 1 course in ecology

Advanced course examines fundamental ecosystem functions and their relationship to ecosystem structure using a systems approach. We study cycles of carbon, water and nutrients through ecosystem

components with an emphasis on interactions among plants, soil, and the atmosphere. Current readings focus on responses of terrestrial ecosystems to global climate change and human disturbance.

ERS 3010 Air Quality Management (3 cr.)

Provides an overview of air quality management approaches. In this course an interdisciplinary approach is adopted that includes diverse information from physical, natural and socioeconomic systems. With consideration of global and local issues this class focuses upon the energy sector. *Prerequisites*: CHEM 1000 or CHEM 1020; WA or COM1.

ERS/ENR 1000 Energy and Society – USP PN Physical and Natural World (3 cr.)
Introduces humans' past, present, and future sources of energy and their advantages and limitations. Discusses society's current, non-sustainable pattern of energy use from a supply and environmental perspective. Investigates the technical, environmental, political, and societal problems associated with the eventual conversion to renewable energy resources.

ENR 2030 History and Environmental Science (3 cr.)

This course is designed as an introduction to both the historical work of environmental historians and the scientific work of environmental scientists. No previous background in either history or science is required. Cross listed with HIST 2030

ENR 4500 Risk Analysis (4 cr.)

Introduces basic concepts of risk analysis, including risk perception, identification, assessment, communication, management, and policy. Provides quantitative treatment of risk assessment procedures, fundamental mathematical models, and the concepts of variability and uncertainty; and practical experience in risk analyses conducted by teams of students. Emphasizes environment and natural resource examples. Laboratory. Dual listed with ENR 5500. Prerequisites: MATH 1000 or 1400, introductory statistics and familiarity with Excel spreadsheets.

Energy Science & Engineering

PETE 2050 Fundamentals of Petroleum Engineering (3 cr.)

General introduction to petroleum engineering, including petroleum geology, exploration, reservoir rocks, and fluid flow through porous media, drilling fundamentals, completion technology, well logging and testing, methods of production, stimulation methods, enhanced oil recovery, reserves and economics. Prerequisite: grade of C or better in both MATH 2205 and PETE 1060.

GEOL 1600 Global Sustainability: Managing Earth’s Resources (4 cr.)

Uses biology, chemistry, physics and Earth science to examine Global Sustainability and how this worldview might guide our future management of Earth resources. Case studies in different international settings place questions of resource exploitation (discovery, extraction, processing, use and disposal) and sustainability in a larger global context.

GEOL 3600 Earth and Mineral Resources – USP PN Physical and Natural World (4 cr.)

Explores the geologic formation, production, and use of Earth and mineral resources, including building materials, chemical minerals, industrial minerals and metals. For each resource, the geologic

environment and processes of formation are discussed. Exploration and mining techniques for each resources are also reviewed and associated environmental problems and regulations examined. Beneficial and detrimental aspects of the use of each resource are also discussed. *Prerequisites:* completion of USP QA and L.

GEOL 3650 Energy for Society: Addressing the Energy Grand Challenge – USP PN Physical and Natural World (4 cr.)

Examines the energy needs of a modern industrialized society. Looks at the types of energy, the natural laws that govern its use, transformation, and conservation. The different sources of energy available to modern societies are examined. Examination includes fossil fuels, nuclear power as well as alternative energy sources. The formation of the resource is discussed, how it is extracted, and any environmental consequences associated with its extraction and use. Prerequisites: completion of USP QA and L.

SOIL 2010 Introduction to Soil Science (4 cr.)

Introduces soil ecological processes and management in terrestrial environments. Discusses interaction of soil, biological, chemical, morphological, and physical properties with land management in wild land and agricultural ecosystems. Emphasis is on plant response to soil conditions. Prerequisite: CHEM 1000 or CHEM 1020.

Assessment Plan

Learning outcomes play a key role in assessment and evaluation, making clear what knowledge learners should have upon completion of the learning activity. The learning outcomes identified will be assessed in the required courses as part of this certificate. They may also exist within the elective courses listed in this curriculum. The CCUS Undergraduate Certificate is intended to provide students with an understanding of the complex role energy plays by meeting the following learning outcomes.

1. (Fundamentals of storage, capture, transport, and safety) Students will identify geological criteria for site selection, geophysical models of the subsurface for characterization and monitoring and minimizing risks related to transport and guaranteeing long-term storage of fluids in the subsurface.
    a. 1 New course ERS 2**** Fundamentals of storage, capture, and transport (3 cr.) *already offered in CEPS under special topics*
        i. Students will complete a group-based term project, which requires five presentations (proposal, interim, 2 progress, and final) and three reports (proposal, interim, and final) over the semester
        ii. Students will demonstrate their understanding of this learning outcome through a final exam
    b. 1 New Course ERS 2*** Geological Carbon Sequestration: Policy, Models, and Engineering (3 cr.) *already offered in CEPS under special topics*
        i. The students will write papers on storage and recovery processes
        ii. The students will write a critical analysis of geologic storage
2. (ESG, Policy, Regulations, and Business drivers) Define and navigate the legal and regulatory hurdles for energy development/environmental challenges on federal, state, and fee lands.
    a. ERS 4*** Global Climate Governance

i. research applicable laws to a decarbonization technology in a jurisdiction of their choice;
ii. write a "regulatory analysis" paper that would describe the applicable legal framework, identify strengths and weaknesses for potential projects, and make suggestions for legal pathways to encourage decarbonization;
iii. present findings to the class in an oral presentation.

3. (Risk: Environmental, Technical, Financial/Monetary) Build techno-economic models capable of analyzing energy projects.
    a. 1 New Course ERS 4*** Energy Finance (3 cr.) *already offered in COB within graduate level courses*
        i. Students will undertake a project to build a techno-economic project finance model using Excel which must be capable of assessing capital structure, capital budgeting metrics such as IRR and NPV, and of performing scenario and sensitivity analysis around project assumptions.
4. (Outreach and communications) Students will demonstrate the process necessary to effectively communicate with stakeholders, the general public, and stakeholders of a CCUS project to ensure concerns are explored and different communication methods considered based on the audience.
    a. ERS 2500 Energy Project Outreach and Communications
        i. Students will design a Communication plan to include oral, digital, and written forms for a proposed energy project. The assessment rubric will incorporate five sections of a communication plan in all three communication channels:
            1. Overall Strategy: Define communications and engagement, connect this work to their mission, make communications and engagement a priority, use a strategic plan to guide the work
            2. Audience Segmentation: Identify priority audiences whose understanding and support is central to achieving their goals—and how effectively they communicate with them.
            3. Audience-Specific Messages and Diverse Tactics: Develop their core messages, select messengers for each audience, differentiate messages to meet the needs of different stakeholders, use diverse communications vehicles (including emerging social tools) and measure success .
            4. Stakeholder Engagement and Coalition Building: Involve important stakeholders in shaping policies and programs at the front end and/ or inquire about these policies and programs later in the process, build relationships with a variety of partners, engage other reform champions, ensure all messages are delivered accurately and solicit and use feedback .
            5. Communications Capacity: Allot staff to communications and engagement, train staff members, allocate funding to support their work and leverage partnerships.

Degree Program Evaluation

Program evaluation is the process of systematically collecting, analyzing, and using data to review the effectiveness and efficiency of an academic program offering. These are used to: identify methods of improving the quality of higher education; provide feedback to students, faculty, and administrators; and ensure that programs, policies, curriculum, departments, and/or institutions are functioning as intended and producing desirable outcomes.

Academic Affairs, in consultation with the professional advising centers, will collect detailed demographic and academic data on each student who declares this certificate. Analyzing these data will allow us to better understand the specific student populations drawn to the degree. This knowledge will inform potential curricular changes to the degree, assist in the projection of degree enrollment, and may also identify larger pockets of recruitment and targeted territory for this certificate.

The School of Energy Resources will assess student learning outcomes through their assessment process. This will require course data from the required courses listed as part of this certificate, as outlined above, and continued collaboration with CEPS. At the conclusion of the certificate, students will complete the first destination/ exit survey to measure students' perception of the certificate and gather information on economic benefits from the credential. Student reflections will be analyzed to address degree structure, learning outcomes, and the performance of this credential.

Substantive Change Determination

Higher Learning Commission (HLC), UW's regional accrediting agency, must approve all substantive changes to UW's offering. HLC considers substantive change as the addition of a program (degree or certificate/credential level) not previously included in the institution's accreditation, usually judged to be a program that is a significant departure from normal offerings, the addition of a program with 50%+ new coursework required, or the addition or change to an existing program which will be delivered 50%+ through alternative (hybrid, online) delivery. After working with Dr. Barrett, UW's HLC Accreditation Liaison Officer, and submitting the recommended form, this certificate does not constitute a substantive change and no further action is needed from HLC.

New Resources Required

- Faculty and instructional staffing-Most of these courses are all already being offered at UW and no additional faculty or instructional staffing is required. One new course will need to be created, and that will be taught by SER Professor Tara Righetti. We have already made alterations to our curriculum schedule that would allow for Tara to teach this course as part of her workload and this offering will not cost any additional money at this time. The caveat to this is that if enrollment does increase dramatically in these programs (CEPS, SER or the new proposed certificate), additional sections of these courses may be required. At this time CEPS and SER commit to offering the required and elective courses listed with regularity.
- Program administration and staff support- This program would be part of the SER Academic portfolio/catalog entry. Therefore, SER will serve as the primary advisor for this certificate. It is possible a current UW student would add this credential to Baccalaureate/Graduate degree, and if that is the case, their primary advisor could advise on this certificate.
- Technology- As this program is primarily built around existing courses, no other technology is needed outside of new catalog entries, once approved. That entry would be managed by SER's Academic Director in conjunction with the single catalog editor from the Registrar's office.

- Library and digital resources- As this program is built around existing courses, no other library or digital resources are needed outside of creating a new website about the credential, which SER would do once approved.
- Marketing- This certificate would be marketed for by SER and new brochures and pamphlets would be budgeted for at around $1,000. SER already has a College Relations Representative that would be able to discuss this certificate with multiple populations for recruitment. As this program is primarily built around existing courses, no other admin or staff support is needed outside of new marketing material costs.
- Support- As this program is primarily built around existing courses, no other support is needed outside of a website, catalog entry and marketing materials.

Executive Summary of Demand Statistics*

As has been noted in this study, CCUS is new in terms of formal academic offerings. Therefore, an analysis of the educational market, peer comparisons and employment trends post-graduation are almost impossible to obtain. Outside of Colorado School of Mines, SER's proposed certificate would be the second formal academic offering on CCUS in the United States. CSM has enrollment of 20 students in the first year but has yet to produce graduates with employment trends. To that end, we will focus on articles/data highlighting CCUS job growth in the coming years.

The transition to net zero brings substantial new opportunities for employment, with 14 million jobs created by 2030 (International Energy Agency, 2021). Most of those jobs are located close to fossil fuel resources, and many are well paid. The International Energy Agency notes that it will be vital to retraining workers in a new energy landscape- which this proposed certificate affords within CCUS.

According to the Department of Energy (2022), the total number of energy jobs increased, from 7.5 million in 2020 to more than 7.8 million in 2021. They report there are more than 3 million jobs, 40% of total energy jobs, that support reducing U.S. emissions to zero across several sectors—underscoring the pathway to success in reaching President Biden's goal of a net-zero emissions economy by 2050. The U.S. Energy and Employment Report demonstrates that achieving an equitable transition to a net-zero emissions economy-wide by 2050, with a diverse workforce, will require additional public and private investments in the clean energy sector. It will also require commitment from industry to support workers, by creating stable and secure good-paying jobs and investing in education and training programs to help workers, of all backgrounds, advance their clean energy careers (Department of Energy, 2022). This proposed certificate helps in this call to action to invest in education programs for the energy sector.

The White House (2022) reports that advancing carbon-based trade policies will result in more jobs and lower prices for Americans (para, 6). Additionally, they report guidance on CCUS technologies will create union jobs (para. 7).

An analysis of US industrial activity, emissions, and fuel combustion from Great Plains Institute (2022) shows the potential for CCUS to create hundreds of thousands of high-wage jobs. Up to 107,000 jobs can be created over a period of 15 years, and additional jobs would occur in the long term. They project that after 2035 there could be 131,000 jobs available to retrofit operations. The images below offer a snapshot from Great Plains Institute report about near- and medium-term jobs due to CCUS projects/activities as well as annual average job projections.

Near- and medium-term carbon capture jobs potential, 2021-2035

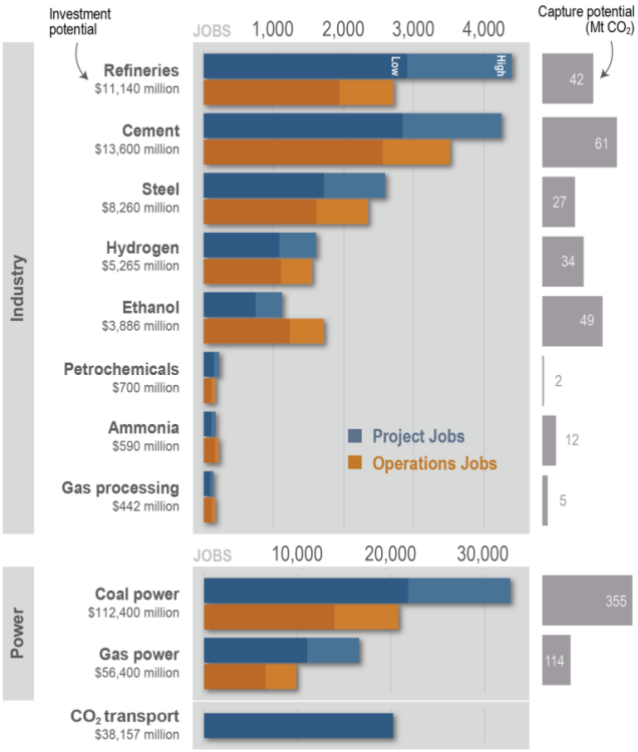

Figure authored by GPI based on Source: King, Herndon, Larsen, and Hiltbrand, *The Economic Benefits of Carbon Capture*.

Carbon capture jobs and economic impact study results, 2021-2035

Industry	Number of Facilities	Annual Average Project Jobs	Annual Operations Jobs	Private Investment billion dollars
Ammonia	10	112 - 167	165 - 210	$0.4 - $0.6
Cement	87	2,840 - 4,250	2,560 - 3,515	$9.1 - $13.6
Coal power plant	62	21,820 - 32,730	13,890 - 20,780	$75.6 - $112.4
Ethanol	174	741 - 1,118	1,229 - 1,714	$2.6 - $3.9
Gas power plant	67	11,030 - 16,570	6,550 - 9,850	$35.6 - $56.4
Gas processing	22	91 - 137	112 - 159	$0.3 - $0.4
Hydrogen	61	1,081 - 1,605	1,105 - 1,543	$3.6 - $5.3
Petrochemicals	2	150 - 220	110 - 160	$0.5 - $0.7
Refineries	59	2,905 - 4,400	1,935 - 2,705	$7.4 - $11.1
Steel	9	1,720 - 2,590	1,610 - 2,340	$5.5 - $8.3
CO_2 transport	-	19,853	-	$38.2

Source: King, Herndon, Larsen, and Hiltbrand, *The Economic Benefits of Carbon Capture*.

The bipartisan Infrastructure Investment and Jobs Act (IIJA) is also providing major dollars for carbon management (Great Plains Institute, 2022, p. 77). This funding is part of the first-ever financing and grants for deployment of large-scale commercial CO_2 transport and storage infrastructure. Included below is a look at the projected funding for this deployment.

Carbon management provisions in the Infrastructure Investment and Jobs Act

IIJA Carbon Management Provisions	Funding
Large-scale pilot projects	**$ 937 M** over four years
Demonstration programs	**$ 2.54 B** over four years
Direct air capture technologies prize competitions	**Pre-commercial: $15 M for FY2022** **Commercial: $100 M for FY2022**
Carbon Utilization Program	**$310 M** over five years
Carbon Capture Technology Program Front-end engineering and design program	**$100 M** over five years
SCALE Act Financing CO_2 transport and storage infrastructure	**$4.6 B** over five years
Direct air capture hubs Creates four regional hubs	**$3.5 B** over five years
Total funding for carbon management	**$12.1 B** over five years

Source: Infrastructure Investment and Jobs Act.

Based on these data, there is large growth capacity within the energy sector for CCUS in the foreseeable future. This proposed CCUS undergraduate certificate is a step toward offering the academic programming needed for this economic growth in the coming years. Offering this in traditional, hybrid, and online settings would also reach a wider population.

References

Arizona State University. (2018). Facts and figures. https://www.asu.edu/about/facts-and-figures

Barbera, S. A., Berkshire, S. D., Boronat, C. B., & Kennedy, M. H. (2020). Review of Undergraduate Student Retention and Graduation Since 2010: Patterns, Predictions, and Recommendations for 2020. *Journal of College Student Retention: Research, Theory & Practice*, *22*(2), 227–250. https://doi.org/10.1177/1521025117738233

Department of Energy. (2022). United States energy and employment report 2022. https://www.energy.gov/sites/default/files/2022-06/USEER%202022%20National%20Report_1.pdf

Great Plains Institute. (2022). An Atlas of Carbon and Hydrogen Hubs for US Decarbonization. https://scripts.betterenergy.org/CarbonCaptureReady/GPI_Carbon_and_Hydrogen_Hubs_Atlas.pdf

International Energy Agency. (2021, October). Net zero by 2050: A roadmap for the global energy sector. *Special Report https://www.iea.org/reports/net-zero-by-2050*.

Slover, E., & Mandernach, J. (2018). Beyond online versus face-to-face comparisons: The interaction of student age and mode of instruction on academic achievement. *Journal of Educators Online, 15*(1). https://eric.ed/gov/?id=EJ1168945

The White House. (2022). Fact sheet: Biden-Harris administration advances cleaner industrial sector to reduce emissions and reinvigorate American manufacturing. https://www.whitehouse.gov/briefing-room/statements-releases/2022/02/15/fact-sheet-biden-harris-administration-advances-cleaner-industrial-sector-to-reduce-emissions-and-reinvigorate-american-manufacturing/

This template is intended to be used as a basic guide to generate a projection of additional expenses and revenues at the University.

Cells in orange are variables which can be updated as needed. Please enter information in numerical tab order.

Cells in gray calculate automatically

	Fiscal Year			
	1	2	3	4
Revenue				
Cumulative Total NEW headcount enrollment	10	20	30	40
NEW Resident enrollment (# of new students entering the program each year)	5	10	15	20
NEW Non Resident Enrollment (# of new students entering the program each year)	5	10	15	20
Resident (credit hours delivered outside of NEW Program)	#N/A	#N/A	#N/A	#N/A
Resident (credit hours delivered in NEW Program)	0	15	30	45
Non Resident (credit hours delivered outside of NEW Program)	#N/A	#N/A	#N/A	#N/A
Non Resident (credit hours delivered in NEW Program)	0	15	30	45
Total Resident credit hours generated**	#N/A	#N/A	#N/A	#N/A
Total Non Resident credit hours generated**	#N/A	#N/A	#N/A	#N/A
Per Credit Tuition*				
Resident (Posted Tuition Rate)	$134	$139	$145	$151
Nonresident (Posted Tuition Rate)	$537	$558	$581	$604
Prior Year's Non Resident Discount Rate (updated annually by the budget office)	30%	30%	30%	30%
Estimated Actual Non Resident Per Credit Tuition	$376	$391	$407	$423
Total Resident Tuition generated outside of NEW Program	#N/A	#N/A	#N/A	#N/A
Total Resident Tuition in NEW Program	$0	$2,090	$4,348	$6,783
Total Non Resident Tuition outside of NEW Program	#N/A	#N/A	#N/A	#N/A
Total Non Resident Tuition in NEW Program	$0	$5,864	$12,197	$19,028
Total Tuition from NEW Enrollment	#N/A	#N/A	#N/A	#N/A
Fees				
Program Per Credit Hour	$0	$0	$0	$0

* note that this program does not have a college "home," and program fee will vary by focus area and accrue to the appropriate college. Thus, to

					simplify and keep the budget conservative, the fee has been set to $0 for the pro forma
Program Fee Revenue	#N/A	#N/A	#N/A	#N/A	
Advising Fee Per Credit Hour	$6.00	$6.00	$6.00	$6.00	
Advising Fee Revenue	#N/A	#N/A	#N/A	#N/A	
Mandatory Fee (Per Full Time Student)	$690.00	$690.00	$690.00	$690.00	
Mandatory Fee Revenue	$6,900	$13,800	$20,700	$27,600	
Total New Revenue Generated Within New Program	#N/A	#N/A	#N/A	#N/A	
Total New Revenue Generated Outside of the Program	#N/A	#N/A	#N/A	#N/A	
Total New Revenue Generated	#N/A	#N/A	#N/A	#N/A	
New Program Expense Assumptions					
Compensation and benefits					
Faculty	$15,000	$10,000	$10,000	$10,000	
Other administrative staff	440	880	1320	1760	
Graduate Assistants	0	0	0	0	
Supplies	$ -	$ -	$ -	$ -	
Travel	$ -	$ -	$ -	$ -	
Marketing	$50,000	$5,000	$5,000	$5,000	
Capital expense	0	0	0	0	
Other (specify)	0	0	0	0	

Projected Financial Results for New Program	**FY1**	**FY2**	**FY3**	**FY4**
Total Expenses	$65,440	$15,880	$16,320	$16,760
Total New Revenues Remaining with Program	#N/A	#N/A	#N/A	#N/A
New Program's Total Surplus or Deficit	**#N/A**	**#N/A**	**#N/A**	**#N/A**
Operating margin (surplus or deficit / revenues)	No Value	No Value	No Value	No Value

* UW's Board of Trustees' current working policy is to raise tuition by 4% each year

Last updated 2/27/19

Enter Course of Study, Credit Hours, indicate if the course is new and if the course will be offered through distance education			
First Semester	6	NEW Course	Distance Option
ERS 2*** Fundamentals of storage, capture, and transport	3		
ERS 2500 Energy Project Outreach and Communications	3		
Second Semester	6		
ERS 2*** Geological Carbon Sequestration	3		
Elective Course	3		
Third Semester	6		
ERS 4*** Global Climate Governance	3		
Elective Course	3		
Last Semester	3		
ERS 4*** Energy Finance	3		
Junior Fall	0		
Junior Spring	0		
Senior Fall	0		
Senior Spring	0		
Total Hours	21		

				NEW CREDIT HOURS OFFERED BY ACADEMIC YEAR							
				1		2		3		4	
Freshman Fall		New Course	hours	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
ERS 2*** Fundamentals of storage, capture, and transport		FALSE	3	0		0		0		0	
ERS 2500 Energy Project Outreach and Communications		FALSE	3	0		0		0		0	
	0	FALSE	#N/A	0		0		0		0	
	0	FALSE	#N/A	0		0		0		0	
	0	FALSE	#N/A	0		0		0		0	
Second Semester											
ERS 2*** Geological Carbon Sequestration		FALSE	3		0		0		0		0
Elective Course		FALSE	3		0		0		0		0
	0	FALSE	#N/A		0		0		0		0
	0	FALSE	#N/A		0		0		0		0
	0	FALSE	#N/A		0		0		0		0
			#N/A	0	0	0	0	0	0	0	0
Third Semester							0		0		0
ERS 4*** Global Climate Governance		TRUE	3				3		3		3
Elective Course		FALSE	3				0		0		0
	0	FALSE	#N/A				0		0		0
	0	FALSE	#N/A				0		0		0
	0	FALSE	#N/A				0		0		0
Last Semester								0		0	
ERS 4*** Energy Finance		FALSE	3					0		0	
	0	FALSE	#N/A					0		0	
	0	FALSE	#N/A					0		0	
	0	FALSE	#N/A					0		0	
	0	FALSE	#N/A					0		0	
			#N/A	0	0	3	0	3	0	3	0
Junior Fall											
	0	FALSE	#N/A					0		0	
	0	FALSE	#N/A					0		0	
	0	FALSE	#N/A					0		0	
	0	FALSE	#N/A					0		0	
	0	FALSE	#N/A					0		0	
Junior Spring									0		0
	0	FALSE	#N/A						0		0
	0	FALSE	#N/A						0		0
	0	FALSE	#N/A						0		0
	0	FALSE	#N/A						0		0
	0	FALSE	#N/A						0		0
			#N/A	0	0	0	0	0	0	0	0
Senior Fall										0	
	0	FALSE	#N/A							0	
	0	FALSE	#N/A							0	
	0	FALSE	#N/A							0	
	0	FALSE	#N/A							0	
	0	FALSE	#N/A							0	
Senior Spring											0
	0	FALSE	#N/A								0
	0	FALSE	#N/A								0
	0	FALSE	#N/A								0
	0	FALSE	#N/A								0
			#N/A	0	0	0	0	0	0	0	0
Total Hours			#N/A	0	0	3	0	3	0	3	0
Teaching load		fall	spring								
faculty line 1		9	6	0	0	1	0	1	0	1	0
faculty line 2		9	6	0	0	0	0	0	0	0	0

faculty line 3	9	6	0	0	0	0	0	0	0	0	0	0
faculty line 4	9	6	0	0	0	0	0	0	0	0	0	0

		0.43						
Compensation	Salary	Benefits	1		2		3	4
faculty line 1		$0	0	$0			$0	$0
faculty line 2		$0	0	$0			$0	$0
faculty line 3		$0	0	$0			$0	$0
faculty line 4		$0	0	$0			$0	$0
			0		$0		$0	$0

For more specific salary and benefit data please contact the Budget Office at 766-9028

Office of Academic Affairs
Dept. 3302 1000 E. University Avenue
Laramie, WY 82701
(307) 766-4286 – (307) 766-6476 – fax (307) 766-2606
www.uwyoedu/acadaffairs

November 3, 2022

To: Board of Trustees

From: Kevin R. Carman, Provost
Re: Letter of Commitment: Carbon Capture Utilization and Storage (CCUS) Certificate

This letter serves as a Letter of Commitment for a new undergraduate certificate in Carbon Capture Utilization and Storage (CCUS) offered by the School of Energy Resources. As described in the accompanying feasibility study: "This certificate, covering the technology, economics and policy of CCUS, is designed for a broad, multidisciplinary audience with an interest in energy, sustainability and climate change mitigation. CCUS is an important component of climate change mitigation as the technology allows for the continued consumption of affordable, abundant, and secure fossil fuels in a carbon-constrained world. In addition, CCUS allows for industrial processes with CO2 as a byproduct (e.g., cement production, biofuels production, etc.) to mitigate their emissions. Ultimately, CCUS prevents CO2 (carbon dioxide) emissions from entering the atmosphere by capturing and storing them permanently and safely underground. The courses in this certificate are taught by a team of leading academics at the University of Wyoming with decades of experience in this field. This certificate program aims to bridge the gap between the forefront of the latest developments in science, engineering, geology, policy, and economics, and the wider public."

Needs
"Carbon capture utilization and storage (CCUS) has experienced growing interest over the past two decades due to the desire to reduce CO_2 emissions and the ability of CCUS to reduce emissions at large scales. The University of Wyoming is a recognized leader in several aspects of this growing field – it is a natural progression for SER, CEPS and CoB to offer a multidisciplinary CCUS certificate."[1]

Requirements
Students will complete 21 credit hours in this certificate. Outside of prerequisites the courses may have, these do not need to occur in a specific sequence. Please reference CCUS Feasibility Study for additional details.

- Required Core Courses – 15 credit hours (Based on 4 broad topics)
- Elective Courses – Minimum 6 credit hours from any of the disciplines/courses below

[1] CCUS Feasibility Study, School of Energy Resources, Sep 2022.

Resources
Since this certificate program is a packaging of already existing coursework, the certificate program will not require any additional resources to implement.
Total resources requested: $0.

Timeline
The implementation timeline is designed to enable students to enroll in this certificate program in Fall 2023.

Campus Review
I affirm that the university community, including the Executive Team, Deans and Directors, Faculty Senate, Staff Senate, and ASUW, have been provided the opportunity to review and present feedback on the proposed certificate program.

Regards,

Kevin R. Carman, PhD
Provost and Executive Vice President

AGENDA ITEM TITLE: <u>Undergraduate Land Administration Certificate</u>, Krutka, Carman

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:
To solve today's complex land management issues, professionals need a broad understanding of key elements affecting environments and the relationships between land, agriculture, energy, and people. This Land Administration Certificate prepares students with the tools, methods, theories, and action steps that help identify land administration problems and the means to develop, implement, and evaluate proposed solutions. Certificate holders will be able to critically explore root cause analysis and recommend desired outcomes. Solving natural resource and land challenges requires a multi-disciplinary approach, which this certificate offers in a collaboration between SER, CANR, Haub and COL. Students become knowledgeable leaders in land management as it relates to energy and natural resources with this certificate program. The curriculum offers both a philosophical and functional view that applies to a wide range of careers. These careers range from land management to public affairs to rights of way.

PRIOR RELATED BOARD DISCUSSIONS/ACTIONS:
The BOT approved the NOI for this program in May 2022.

WHY THIS ITEM IS BEFORE THE BOARD:
University of Wyoming Regulation 2-119 requires that the Board approve all new certificates and lays out the process for that approval. The proposal has been through appropriate approval channels. A letter of commitment for the certificate program is submitted for Board of Trustees approval.

ACTION REQUIRED AT THIS BOARD MEETING:
Consideration for approval of the Land Administration Undergraduate Certificate.

PROPOSED MOTION:
“I move to move the Undergraduate Certificate in Land Administration.”

PRESIDENT’S RECOMMENDATION:
The President recommends approval.

New Degree or Certificate Proposal Feasibility Study

Feasibility Study for Land Administration Undergraduate Certificate

Executive Summary

Degree or Certificate Title: Land Administration Undergraduate Certificate

Level of Degree or Certificate: Undergraduate

Delivery Mode(s): Traditional, Hybrid, Online

Estimated Startup Cost of Degree: $1,000 for Marketing

Anticipated Launch Date: Fall 2023

Description: Students in this certificate could complete the coursework in a two-year cycle. Courses will be offered on a set rotation to accommodate completion in two years. Courses can be completed in any order, which allows for a student to enter the program at any time and not get 'off cycle'. If the courses become popular/full SER, Haub, and CALSNR are prepared to expand the frequency in which the courses are offered. There are no new courses needed for this credential, all required and optional courses listed already exist in the 22-23 Catalog. The list of optional coursework is wide-ranging and would accommodate professionals in a variety of careers or students in a variety of majors.

Table of Contents

Feasibility Study Required Contents:

Overview and Description of Degree or Certificate, Purpose, Strategic Play Overlay

This certificate is built upon existing curriculum and meant to provide a way for working professionals to obtain continuing education credits, as well as for current UW students to diversify their academic portfolio prior to graduation. This certificate is a micro credential, which are short, focused credentials designed to provide in-demand skills, know-how and experience. Stackable micro credentials can also provide a pathway to a certificate or full degree, now or when prospects are ready. The large draw for this credential is that many professions (state natural resources departments, open space departments, land trusts, fish and wildlife management agencies, lease and title analysts, division order analysts, land techs, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Environmental Protection Agency, Natural Resources Conservation Service, and AAPL) require continuing education credits, and the coursework as part of this proposed credential would count for many professions. Not only could someone progress through the courses for their continuing education credits, but they could also work towards this credential at the same time. Current UW students, UW alumni, anyone seeking to advance their career or increase their earning potential, those needing to upskill or make a career change, those looking to come back to the job market, and yes, those looking for fun, engaging, learning to support a hobby or interest could all find this proposed credential could meet their needs.

Context and Rationale

To solve today's complex land management issues, professionals need a broad understanding of key elements affecting environments and the relationships between land, agriculture, energy and people. This Land Administration Certificate prepares students with the tools, methods, theories, and action steps that help identify land administration problems and the means to develop, implement, and evaluate proposed solutions. Certificate holders will be able to critically explore root cause analysis and recommend desired outcomes. Solving natural resource and land challenges requires a multi-disciplinary approach, which this certificate offers in a collaboration between SER, CALSNR, and Haub. Students become a knowledgeable leader in land management as it relates to energy, agriculture and natural resources with this certificate program. The curriculum offers both a philosophical and functional view that is applicable to a wide range of careers.

SER, CALSNR, and Haub are prepared to provide flexible and high-quality experiences for this unique educational certificate. If approved, this proposed certificate would be one of a handful of land management certificates in the United States currently being offered. This proposed certificate has three key areas of education as well as the capacity for the enrollment growth this certificate may afford. This program could grow and educate Wyoming’s workforce to develop a variety of energy, natural resource and tourism projects.

Target Audience

Current UW students, city, county, and state natural resources departments, open space departments, land trusts, and fish and wildlife management agencies, lease and title analysts, division order analysts, land techs; Federal agencies such as the U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Environmental Protection Agency, and Natural Resources Conservation Service;

Extension programs associated with land grant universities; Private consultant or contractor firms that work with managing public and private lands, oil, gas, and energy lawyers.

Relationship to Other Offerings/Demand

Based on research into other institutions offering various land administration certificates, there are less than 30 worldwide, and approximately 9 undergraduate certificate programs in the US. Many existing credentials have a focus in either agriculture, natural resources, conservation, or energy. Our proposed undergraduate certificate includes coursework on all these topics, which is necessary as active projects are typically competing for the same land. Given enrollment numbers in somewhat comparable programs, SER, CALSNR and Haub are proposing a conservative estimate. An initial enrollment of 20 students can be expected in year two. Target growth is a year-over-year increase in new enrollment as legal regulations continue to impact active projects and land administration issues.

Alignment with University Mission

This proposed certificate aligns with every aspect of the UW Mission, "We honor our heritage as the state's flagship and land-grant university by providing accessible and affordable higher education of the highest quality; rigorous scholarship; the communication and application of knowledge; economic and community development; and responsible stewardship of our cultural, historical and natural resources." This undergraduate certificate focuses on agriculture, natural resources and energy projects which aligns with the mission of UW and SER of impacting the application of knowledge and economic development for Wyoming. This undergraduate certificate is as affordable as any other UW credential and featuring quality faculty in this area of research and practice. SER's existing scholarships could support the students enrolled.

Fit

No new employees are needed to support this certificate program. Of the courses currently slated, all are already offered at UW. SER, Haub, and CALSNR are able to continue offering these courses, making this certificate program self-sustaining. The initial investment required to get the program started is minimal and comprises of the cost to create and disperse marketing materials.

Learning Outcomes

The Land Administration Undergraduate Certificate is intended to provide students with an understanding of the complex role energy, natural resources, and agriculture play in land administration by meeting the following learning outcomes.

1. Identify and navigate a valid real property transaction from contract to transfer of title.
2. Explain energy, natural resources, or agricultural regulation and management.
3. Describe content and implications of past and current ENR, Ag, and property policies/laws.

Curriculum Map and Program Structure

Students will complete 16 credit hours in this certificate. Outside of prerequisites the courses may have, these do not need to occur in a specific sequence. It is recommended students take ERS 2010 prior to Property I, but this is not required.

Proposed Certificate – 16 credit hours

Core Courses – 9-10 credit hours

ERS 2010 Introduction to Land Management (3 cr.)

Provides an introduction to land management. Covers the knowledge and skills needed by land professionals including survey systems, land descriptions, mineral ownership, title examination, leases, surface use agreements, and contracts frequently used in the industry. *Prerequisites*: N/A

ERS 4100 Property I (3 cr.)

Property I addresses the nature of property ownership and the rights associated with property as well as the acquisition and transfer of ownership rights in property and the sharing of ownership rights over time, including estates, future interest, and concurrent estates. *Prerequisites*: N/A

Select ONE of the following (ENR 1200 or AGEC 3400)

ENR 1200-Environment (4 cr.)

Introductory environmental science course appropriate for science and non-science majors. Uses cases studies and applied laboratories to explore core biological principles such as nutrient flow and cycling, population and community ecology, and ecosystem structure and function, as well as the non-science dimensions of ENR issues. Early-semester, weekend field trips/ labs required.

AGEC 3400-Agricultural Law (3 cr.)

Surveys legal issues and principles of practical concern to agriculture and examines legal institutions authorized to carry out laws affecting agriculture.

Elective Courses – Minimum 6 credit hours from 34 identified courses at UW.

Energy Economics

AGEC 3420 Applied Equity Investing (3 cr.)

Introduces the fundamentals of understanding how the stock market works, what types of investment products are available, how to purchase them and what to look out for in making investment decisions. Students will make investment decisions on a simulated portfolio and write justifications for their purchases. *Prerequisite*: COM2 and MATH 1400. (Normally offered spring semester)

AGEC/ENR 3750 Natural Resource Planning and Economics (3 cr.)

Economic concepts and rudimentary analytical tools are applied to federal, state and local natural resource planning and management programs. The value of economic input into natural resource policy is examined. Evaluating tradeoffs and resolving conflicts play a particularly important role in the course content. Cross listed with ENR 3750. *Prerequisites:* QA/Q, WA/COM1 and junior standing.

AGEC 4500 Agricultural Finance (3 cr.)

Principles of financial management; compounding and discounting; leverage and capital budgeting and alternatives in resource control. *Prerequisite*: AGEC 1020 or equivalent. (Normally offered spring semester)

AGEC 4600- Community Economic Analysis (3 cr.)

Analysis of regions and rural communities; their problems, socioeconomic characteristics, land use and economic development. Provides training in regional economic analysis, fiscal impact analysis and benefit cost analysis. Dual listed with AGEC 5600. *Prerequisites*: ECON 3010, 3020, and MATH 1400.

AGEC 4700-Economics of Range Resources (3 cr.)

Applies economic and decision theory to management and allocation of public and private range resources. *Prerequisite*: AGEC 1020 or equivalent. (Normally offered spring semester)

AGEC 4720- Water Resource Economics (3 cr.)

Presents principles and procedures appropriate to water resource allocation and development decisions. Studies agricultural, recreational, industrial and other uses of water. *Prerequisite*: AGEC 1020 or equivalent; QB course, WB course; senior standing.

AGEC 4890-Topics-Cooperative Business Model (1-3 cr.)

Accommodates seminar series or course offering by visiting faculty whose subject matter is not included in other courses. *Prerequisites*: junior standing and/or consent of instructor. (Offered based on sufficient demand and resources)

ECON/ERS 3400 Energy Markets and Policy (3 cr.)

This course provides an economic analysis of recent developments in energy markets and policies. Cross listed with ECON 3400. *Prerequisite*: ECON 1000, ECON 1010, ECON 1020, ECON 1200, ECON 1300, ECON 1400, or ERS 1300.

ECON/ERS 1300 Oil: Business Culture Power – USP H Human Culture (3 cr.)

A multi-disciplinary approach to understanding how oil affects the international relations and commerce. The relationships between oil technology, social and political institutions, the unique cultures in oil-producing regions will be investigated in case studies.

Energy Policy

NAIS 4340 Natural Resource Management on Western Reservations (3 cr.)

Examines natural resource management techniques on western reservations. Focus is on the management and planning of water, grazing, extractive industries, and forestry. Fieldwork on the Wind River Indian Reservation is included. Cross listed with GEOG 4340. *Prerequisite*: 6 hours of 2000-level NAIS courses or consent of instructor.

POLS 4052 Federal Land Politics (3 cr.)

Examines the political forces that have shaped and continue to shape federal land policy and management. Explores the interactions between democratic decision making and science in the management of federal lands. Surveys the sources of controversy over federal land management and methods for harmonizing public demands with technical expertise. Cross listed with POLS/ENR/GEOG/AMST 4052. *Prerequisite:* POLS 1000.

ENR 3300 Environmental Policy, Conservation and Development in India (3 cr.)

This course will focus on India's environmental policies pertaining to conservation and development. Case studies will be used to understand how these policies were developed, put in place, and their intended and actual outcomes. Students are required to select a suitable topic and conduct research and submit a research report. *Prerequisite*: WA/ COM1 course.

ENR 4040 Conservation of Natural Resources (3 cr.)

Geographically analyzes conservation of natural and human resources, as well as political, social and ethical ramifications of our environmental policy. Cross listed with BOT/GEOG 4040. *Prerequisite*: 6 hours of geography or ENR.

ENR 4900 Policy in Practice (3 cr.)

Encompasses student resolution in multidisciplinary teams of environmental and natural resource problems and issues; practice in formulating policy alternatives; case studies; planning, performing and coordinating multidisciplinary research. Dual listed with ENR 5900. *Prerequisite*: ENR 3000.

Energy Law and Land Management

ENR 4750 ENR Law and Policy (3 cr.)

Explores the policy underpinnings of environmental and natural resource issues and the legal responses to these problems. Students will gain a basic understanding of: (1) the causes of environmental problems, including energy, water, wildlife, and other western land use issues; (2) the range of policy and instrument choices; and (3) the approaches actually taken in current laws. Students also will apply the law in an interdisciplinary, problem-based learning context. *Prerequisites*: Permission of instructor

ERS 4110 Law of Contracts (3 cr.)

The Law of Contracts addresses the formation of a contact and the meaning of agreements and the justification of non-performance and breach. *Prerequisites*: N/A

ERS 4120 Federal Public Lands Law (3 cr.)

Federal Public Land Law addresses public interest as the central principal of public land natural resource management. The course examines the acquisition and disposition of the public domain, federal and state regulatory authority, and the management of hard rock, energy, and range resources. *Prerequisite*: N/A

ERS 4130 Oil and Gas Law (3 cr.)

Focuses on the basis legal rules and principles governing the ownership and development of oil and gas, derived from a combination of property, contract, administrative, tort, and constitutional law. *Prerequisites*: ERS 2010 or PETE 3200 and WB/COM2.

ERS 4105 Property II (3 cr.)

Property II covers rights inherent to the ownership of property and public limitations on those rights. *Prerequisite*: ERS 4100.

ERS 4990 Topics in Energy Resource Development and Management (1-6 cr.)

Special topics in contemporary energy development and management will be offered in response to changing industry and academic demands. The specific subject matter is based on faculty requirements and workforce innovation. *Prerequisites*: QA and one of the following: SB, SP or SE course.

Energy & Environment

ERS 3010 Air Quality Management (3 cr.)

Provides an overview of air quality management approaches. In this course an interdisciplinary approach is adopted that includes diverse information from physical, natural and socioeconomic systems. With consideration of global and local issues this class focuses upon the energy sector. *Prerequisites*: CHEM 1000 or CHEM 1020; WA or COM1.

ERS/ENR 1000 Energy and Society – USP PN Physical and Natural World (3 cr.)
Introduces humans' past, present, and future sources of energy and their advantages and limitations. Discusses society's current, non-sustainable pattern of energy use from a supply and environmental perspective. Investigates the technical, environmental, political, and societal problems associated with the eventual conversion to renewable energy resources.

ENR 2345 Natural Resource Ethics (3 cr.)

Introduces students to ethics in context of natural resource extraction, use, conservation, preservation, and distribution. Ethical frameworks include teleological and deontological theories primarily applied to human needs and wants. Concepts and applications of environmental justice are addressed, including private property, sustainability, and obligations to future generations. Cross listed with PHIL/RNEW 2345.

ENR 2030 History and Environmental Science (3 cr.)

This course is designed as an introduction to both the historical work of environmental historians and the scientific work of environmental scientists. No previous background in either history or science is required. Cross listed with HIST 2030

ENR 4500 Risk Analysis (4 cr.)

Introduces basic concepts of risk analysis, including risk perception, identification, assessment, communication, management, and policy. Provides quantitative treatment of risk assessment procedures, fundamental mathematical models, and the concepts of variability and uncertainty; and practical experience in risk analyses conducted by teams of students. Emphasizes environment and natural resource examples. Laboratory. Dual listed with ENR 5500. *Prerequisites*: MATH 1000 or 1400, introductory statistics and familiarity with Excel spreadsheets.

ENR 4950 Leadership in Natural Resources Management (2 cr.)

Provides Crew Leaders in the Wyoming Conservation Corps with an understanding of the complex dynamics of natural resources management while also equipping students with the tools to confidently lead groups of students on conservation-oriented service-learning projects on Wyoming’s public lands during the summer months. Dual listed with ENR 5950; cross listed with ERS 4950. *Prerequisites*: ENR 3700 and consent of instructor.

Energy Science & Engineering

GEOL 1600 Global Sustainability: Managing Earth's Resources (4 cr.)

Uses biology, chemistry, physics and Earth science to examine Global Sustainability and how this worldview might guide our future management of Earth resources. Case studies in different international settings place questions of resource exploitation (discovery, extraction, processing, use and disposal) and sustainability in a larger global context.

GEOL/ERS 1650 Grand Challenges: Water-Energy-Climate Nexus – USP PN Physical and Natural World (3 cr.)

Among the grand challenges facing humanity, arguably the most significant are water, energy, and climate. These issues are, however not isolated but intimately connected, i.e. water-energy-climate (WEC) nexus. Using critical thinking and problem-solving skills, the significance of the WEC nexus to humanity will be explored from STEM and non-STEM perspectives.

GEOL 3600 Earth and Mineral Resources – USP PN Physical and Natural World (4 cr.)

Explores the geologic formation, production, and use of Earth and mineral resources, including building materials, chemical minerals, industrial minerals and metals. For each resource, the geologic environment and processes of formation are discussed. Exploration and mining techniques for each resources are also reviewed and associated environmental problems and regulations examined. Beneficial and detrimental aspects of the use of each resource are also discussed. *Prerequisites:* completion of USP QA and L.

GEOL 3650 Energy for Society: Addressing the Energy Grand Challenge – USP PN Physical and Natural World (4 cr.)

Examines the energy needs of a modern industrialized society. Looks at the types of energy, the natural laws that govern its use, transformation, and conservation. The different sources of energy available to modern societies are examined. Examination includes fossil fuels, nuclear power as well as alternative energy sources. The formation of the resource is discussed, how it is extracted, and any environmental consequences associated with its extraction and use. *Prerequisites*: completion of USP QA and L.

REWM 3500 Rangeland Plant Ecophysiology (3 cr.)

Examines plant physiological processes that have application to ecological and land management issues. Topics include carbon assimilation, water relations, mineral nutrition as applied to plant distributions, plant and system responses to grazing, as well as plant tolerance of extreme conditions including drought, excessive temperatures and changes in climate. *Prerequisite*: LIFE 2022 or LIFE 2023.

REWM 4850 Rangeland Vegetation Management Techniques (3 cr.)

Uses applied ecological principles in restoration of degraded rangeland ecosystems to introduce methods for manipulating rangeland vegetation that satisfy land management objectives. Provides ecologically-sound practices to maintain optimal and sustained yield of rangeland products. *Prerequisite*: C or better in REWM 2000 and SB.

SOIL 2010 Introduction to Soil Science (4 cr.)

Introduces soil ecological processes and management in terrestrial environments. Discusses interaction of soil, biological, chemical, morphological, and physical properties with land management in wild land and agricultural ecosystems. Emphasis is on plant response to soil conditions. *Prerequisite*: CHEM 1000 or CHEM 1020.

ENR 4420 Conservation Biology (3 cr.)

Addresses the broadest environmental issues facing society (habitat loss, invasion, over exploitation) and the mechanisms driving them, with particular attention to the Intermountain West. Through computer exercises, students also learn how to evaluate conservation efforts and make management recommendations. Cross listed with BOT/ZOO 4420. *Prerequisites*: LIFE 3400 and one of the following: ENR 3500, STAT 2050, or STAT 2070.

Assessment Plan

Learning outcomes play a key role in assessment and evaluation, making clear what knowledge learners should have upon completion of the learning activity. The learning outcomes identified will be assessed in the required courses as part of this certificate. They may also exist within the elective courses listed in this curriculum.

1. Identify and navigate a valid real property transaction from contract to transfer of title.
    a. ERS 2010-Students are assessed on their demonstration and ability to review title records by completing a full runsheet of all documents impacting title as part of the title project.
    b. ERS 4100-Students are assessed through questions on a final exam on their ability to identify valid property transactions and transfer of title.
2. Explain energy, natural resources, or agricultural regulation and management.
    a. ERS 2010-Students will identify on quizzes and exams various recordable legal instruments such as deeds, assignments, mineral leases, easements, mortgages, liens, pooling agreements, and surface use agreements.
    b. ENR 1200-Students will identify on the midterm exam questions on all forms of energy, laws, regulations, and management.
    c. AGEC 3400-Students will identify on exams and extensive writing assignments how various legal precedents affect land management and regulation.
3. Describe content and implications of past and current ENR, Ag, and property policies/laws.
    a. ERS 4100-Students will identify on quizzes and exams real or personal property interests and identify various types of ownership of property for purchase and sale of real property.
    b. ENR 1200- Students read two papers; one at the global scale and one at the Wyoming scale. Each paper discusses the trajectory of different land uses, and the historical context underpinning those trajectories. Students are tasked with reading both documents, and comparing/contrasting the different trajectories and explaining their understanding on why trajectories are similar or different.
    c. AGEC 3400-Students will identify on exams and extensive writing assignments the fundamentals of law, contracts, torts, and property rights, as well as key aspects of environmental and natural resource law.

Degree Program Evaluation

Program evaluation is the process of systematically collecting, analyzing, and using data to review the effectiveness and efficiency of an academic program offering. These are used to: identify methods of improving the quality of higher education; provide feedback to students, faculty, and administrators; and ensure that programs, policies, curriculum, departments, and/or institutions are functioning as intended and producing desirable outcomes.

Academic Affairs, in consultation with the professional advising centers, will collect detailed demographic and academic data on each student who declares this certificate. Analyzing these data will allow us to better understand the specific student populations drawn to the degree. This knowledge will inform potential curricular changes to the degree, assist in the projection of degree enrollment, and may also identify larger pockets of recruitment and targeted territory for this certificate.

The School of Energy Resources will assess student learning outcomes through their assessment process. This will require course data from four different courses and continued collaboration with Haub and CALSNR. At the conclusion of the certificate, students will complete the first destination/ exit survey to measure students' perception of the certificate and gather information on economic benefits from the credential. Student reflections will be analyzed to address degree structure, learning outcomes, and the performance of this credential.

Substantive Change Determination

Higher Learning Commission (HLC), UW's regional accrediting agency, must approve all substantive changes to UW's offering. HLC considers substantive change as the addition of a program (degree or certificate/credential level) not previously included in the institution's accreditation, usually judged to be a program that is a significant departure from normal offerings, the addition of a program with 50%+ new coursework required, or the addition or change to an existing program which will be delivered 50%+ through alternative (hybrid, online) delivery. After working with Dr. Barrett, UW's HLC Accreditation Liaison Officer, and submitting the recommended form, this certificate does not constitute a substantive change and no further action is needed from HLC.

New Resources Required

- Faculty and instructional staffing-These courses are all already being offered at UW and no additional faculty, or instructional staffing is required. The caveat to this is that if enrollment does increase dramatically, additional sections of these courses may be required. At this time Haub, CALSNR, and SER commit to offering the required and elective courses listed with regularity.
- Program administration and staff support- This program would be part of the SER Academic portfolio/catalog entry. Therefore, SER will serve as the primary advisory for this certificate. It is possible a current UW student would add this credential to Baccalaureate degree, and if that is the case, their primary advisor could advise on this certificate.
- Technology- As this program is built around existing courses, no other technology is needed outside of new catalog entries once approved. That entry would be managed by SER's Academic Director in conjunction with the single catalog editor from the Registrar's office.
- Library and digital resources- As this program is built around existing courses, no other library or digital resources are needed outside of creating a new website about the credential, which SER would do once approved.

- Marketing- This certificate would be marketed for by SER and new brochures and pamphlets would be budgeted for at around $1,000. SER already has a College Relations Representative that would be able to discuss this certificate with multiple populations for recruitment. As this program is built around existing courses, no other admin or staff support is needed outside of new marketing material costs.
- Support- As this program is built around existing courses, no other support is needed outside of a website, catalog entry and marketing materials.

Executive Summary of Demand Statistics*

The U.S. Energy and Employment Report demonstrates that achieving an equitable transition to a net-zero emissions economy-wide by 2050, will require additional public and private investments in the clean energy sector. It will also require commitment from industry to support workers, by creating stable and secure good-paying jobs and investing in education and training programs to help workers, of all backgrounds, advance their clean energy careers (Department of Energy, 2022). This proposed certificate helps in this call to action to invest in education programs for the energy sector.

According to the Department of Energy, the total number of energy jobs increased, from 7.5 million in 2020 to more than 7.8 million in 2021 (DOE, 2022). To demonstrate just one example of a profession that could be an opportunity for someone with this proposed credential, the mining required to make batteries will soon dominate the production of many minerals. Lithium battery production today already accounts for about 40% and 25%, respectively, of all lithium and cobalt mining (Azevedo, et al., 2018). In an all-battery future, global mining would have to expand by more than 200% for copper, by at least 500% for minerals like lithium, graphite, and rare earths, and far more than that for cobalt (Sanderson et al, 2017). Expanding mining opportunities are land intensive projects, and a Land Administration credential would be recommended. Provided below is a table with information on median salaries, level of education currently required (though many have higher levels preferred and land certificates and/or PLM degrees preferred), the number of jobs in that profession in 2020, and the expected growth in that profession form 2020-2030. These numbers are all from data provided from the Bureau of Labor Statistics: https://www.bls.gov

Profession	2021 Median Pay	Level of Education Required	Number of Jobs 2020	Job Outlook 2020-2030
Property, Real Estate, And Community Association Managers	$59,230	HS	364,100	3% growth
Farmers, Ranchers, Other Ag Managers	$73,060	HS	888,300	Little or no change
Conservation Scientist	$63,750	BS	39,000	7% growth
Fishing and Hunting Workers	*varies widely	HS	32,300	11% growth
Conservation Workers	$30,550	HS	12,600	8% decline
Surveyors	$61,600	BS	46,000	2% growth
Urban and Regional Planners	$78,500	MS	39,100	7% growth
Environmental Scientist	$73,530	BS	87,100	8% growth

Environmental Remediation	$60,370	BS	96,710	6% growth
Leasing Specialist	$59,950	HS	1,016,200	4% growth
Public Land Manager	$55,300	HS	41,225	15% growth
Land Use Planners	$78,500	BS	39,100	7% growth
Land Broker	$120,000	HS	46,100	8% growth
Land Abstractor	$53,130	HS	39,000	8% growth
Title Agent	$46,650	HS	17,150	3% growth
Title Researcher	$55,000	HS	20,810	2% growth
Title Insurance Agent	$58,000	HS	51,040	1% growth
Policy Analysis and Planning	$63,000	AA or AS	3558	25% growth

This demonstrates the expected growth through a variety of professions that could utilize this certificate in the next 8 years. This credential is not widely available in the U.S., so it is difficult to predict graduation salary/trends based on such small data sets. Using the projected growth of these professions is a better predictor of this certificate's potential success.

There are nine schools currently offering versions of certificates in land management. We reached out to these nine schools through phone calls and emails over a two-month period to collect/request enrollment, graduation, and job placement data. Three schools responded to these requests 1) Colorado Mesa University 2) Midland College 3) Stephen F. Augustin State University.

Colorado Mesa University reported having two students enroll/complete the Energy Management/Landman Professional Certificate, but this is proving to be a primary recruiting certificate for their Energy Management/Landman Bachelor of Business Administration, rather than students completing the Certificate. Of the two students who have completed this certificate in the past three years, both reported getting a job or promotion due to the credential through an exit/graduation survey.

Midland College offers an Online Petroleum Land Management Certificate Program and from September 2018-present has had 622 students enroll. This institution did not provide data regarding graduation rates or job placement as part of these 622 unique enrollments.

Stephen F. Austin State University offers a Petroleum Land Management Certificate and confirmed having graduates in 2019, 2020, and 2021. They did not supply a total number of enrollment, graduates, or job placement data, but confirmed they had conferred degree.

Attached in an excel spreadsheet is more data on the need for this certificate.

References

Azevedo, M., et al (2018). Lithium and Cobalt: A Tale of Two Commodities. *McKinsey & Co.*

U.S. Bureau of Labor Statistics. (2022). https://www.bls.gov/

Department of Energy. (2022). DOE Report Finds Energy Jobs Grew Faster Than Overall U.S. Employment in 2021. https://www.energy.gov/articles/doe-report-finds-energy-jobs-grew-faster-overall-us-employment-2021

Sanderson, H., et al. (2017). Electric Cars: China's Battle for the Battery Market. *Financial Times*.

This template is intended to be used as a basic guide to generate a projection of additional expenses and revenues at the University.

Cells in orange are variables which can be updated as needed. Please enter information in numerical tab order.

Cells in gray calculate automatically

	Fiscal Year			
	1	2	3	4
Revenue				
Cumulative Total NEW headcount enrollment	10	20	30	40
NEW Resident enrollment (# of new students entering the program each year)	5	10	15	20
NEW Non Resident Enrollment (# of new students entering the program each year)	5	10	15	20
Resident (credit hours delivered outside of NEW Program)	#N/A	#N/A	#N/A	#N/A
Resident (credit hours delivered in NEW Program)	0	0	0	0
Non Resident (credit hours delivered outside of NEW Program)	#N/A	#N/A	#N/A	#N/A
Non Resident (credit hours delivered in NEW Program)	0	0	0	0
Total Resident credit hours generated**	#N/A	#N/A	#N/A	#N/A
Total Non Resident credit hours generated**	#N/A	#N/A	#N/A	#N/A
Per Credit Tuition*				
Resident (Posted Tuition Rate)	$134	$139	$145	$151
Nonresident (Posted Tuition Rate)	$537	$558	$581	$604
Prior Year's Non Resident Discount Rate (updated annually by the budget office)	30%	30%	30%	30%
Estimated Actual Non Resident Per Credit Tuition	$376	$391	$407	$423
Total Resident Tuition generated outside of NEW Program	#N/A	#N/A	#N/A	#N/A
Total Resident Tuition in NEW Program	$0	$0	$0	$0
Total Non Resident Tuition outside of NEW Program	#N/A	#N/A	#N/A	#N/A
Total Non Resident Tuition in NEW Program	$0	$0	$0	$0
Total Tuition from NEW Enrollment	#N/A	#N/A	#N/A	#N/A
Fees				
Program Per Credit Hour	$0	$0	$0	$0

* note that this program does not have a college "home," and program fee will vary by focus area and accrue to the appropriate college. Thus, to simplify and keep the budget conservative, the fee has been set to $0 for the pro forma

Program Fee Revenue	#N/A	#N/A	#N/A	#N/A
Advising Fee Per Credit Hour	$6.00	$6.00	$6.00	$6.00
Advising Fee Revenue	#N/A	#N/A	#N/A	#N/A
Mandatory Fee (Per Full Time Student)	$690.00	$690.00	$690.00	$690.00
Mandatory Fee Revenue	$6,900	$13,800	$20,700	$27,600
Total New Revenue Generated Within New Program	#N/A	#N/A	#N/A	#N/A
Total New Revenue Generated Outside of the Program	#N/A	#N/A	#N/A	#N/A
Total New Revenue Generated	#N/A	#N/A	#N/A	#N/A
New Program Expense Assumptions				
Compensation and benefits				
Faculty	$15,000	$10,000	$10,000	$10,000
Other administrative staff				
Graduate Assistants				
Supplies				
Travel				
Marketing	$50,000	$5,000	$5,000	$5,000
Capital expense	0	0	0	0
Other (specify)	0	0	0	0

Projected Financial Results for New Program	**FY1**	**FY2**	**FY3**	**FY4**
Total Expenses	$65,000	$15,000	$15,000	$15,000
Total New Revenues Remaining with Program	#N/A	#N/A	#N/A	#N/A
New Program's Total Surplus or Deficit	**#N/A**	**#N/A**	**#N/A**	**#N/A**
Operating margin (surplus or deficit / revenues)	No Value	No Value	No Value	No Value

* UW's Board of Trustees' current working policy is to raise tuition by 4% each year

Last updated 2/27/19

Enter Course of Study, Credit Hours, indicate if the course is new and if the course will be offered through distance education			
First Semester	7	NEW Course	Distance Option
ERS 2010 Intro to Land Management	3		
ENR 1200 OR AGEC 3400	4		
Second Semester	6		
Elective Course	3		
Elective Course	3		
Third Semester	3		
ERS 4100 Property I	3		
Sophomore Spring	0		
Junior Fall	0		
Junior Spring	0		
Senior Fall	0		
Senior Spring	0		
Total Hours	16		

				NEW CREDIT HOURS OFFERED BY ACADEMIC YEAR							
				1		2		3		4	
Freshman Fall	New Course	hours		Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
ERS 2010 Intro to Land Management	FALSE		3	0		0		0		0	
ENR 1200 OR AGEC 3400	FALSE		4	0		0		0		0	
0	FALSE	#N/A		0		0		0		0	
0	FALSE	#N/A		0		0		0		0	
0	FALSE	#N/A		0		0		0		0	
Second Semester											
Elective Course	FALSE		3		0		0		0		0
Elective Course	FALSE		3		0		0		0		0
0	FALSE	#N/A			0		0		0		0
0	FALSE	#N/A			0		0		0		0
0	FALSE	#N/A			0		0		0		0
		#N/A		0	0	0	0	0	0	0	0
Third Semester						0		0		0	
ERS 4100 Property I	FALSE		3			0		0		0	
0	FALSE	#N/A				0		0		0	
0	FALSE	#N/A				0		0		0	
0	FALSE	#N/A				0		0		0	
0	FALSE	#N/A				0		0		0	
Sophomore Spring							0		0		0
0	FALSE	#N/A					0		0		0
0	FALSE	#N/A					0		0		0
0	FALSE	#N/A					0		0		0
0	FALSE	#N/A					0		0		0
0	FALSE	#N/A					0		0		0
		#N/A		0	0	0	0	0	0	0	0
Junior Fall								0		0	
0	FALSE	#N/A						0		0	
0	FALSE	#N/A						0		0	
0	FALSE	#N/A						0		0	
0	FALSE	#N/A						0		0	
0	FALSE	#N/A						0		0	
Junior Spring									0		0
0	FALSE	#N/A							0		0
0	FALSE	#N/A							0		0
0	FALSE	#N/A							0		0
0	FALSE	#N/A							0		0
0	FALSE	#N/A							0		0
		#N/A		0	0	0	0	0	0	0	0
Senior Fall										0	
0	FALSE	#N/A								0	
0	FALSE	#N/A								0	
0	FALSE	#N/A								0	
0	FALSE	#N/A								0	
0	FALSE	#N/A								0	
Senior Spring											0
0	FALSE	#N/A									0
0	FALSE	#N/A									0

	0	FALSE	#N/A									0
	0	FALSE	#N/A									0
			#N/A	0	0	0	0	0	0	0		0
Total Hours			#N/A	0	0	0	0	0	0	0		0

Teaching load	fall	spring								
faculty line 1	9	6	0	0	0	0	0	0	0	0
faculty line 2	9	6	0	0	0	0	0	0	0	0
faculty line 3	9	6	0	0	0	0	0	0	0	0
faculty line 4	9	6	0	0	0	0	0	0	0	0

		0.43				
Compensation	Salary	Benefits	1	2	3	4
faculty line 1		$0	0	$0	$0	$0
faculty line 2		$0	0	$0	$0	$0
faculty line 3		$0	0	$0	$0	$0
faculty line 4		$0	0	$0	$0	$0
			0	$0	$0	$0

For more specific salary and benefit data please contact the Budget Office at 766-9028

CIP Code	Title	Market	Delivery	Award Level	Student Demand	Employment Demand	Degree Fit	Competitive Intensity	Overall Score
03.0206	Land Use Planning & Management / Development	Wyoming	F2F	Certificate	-2	-2	2	2	0
			Online	Certificate	-4	-2	2	4	0
		Laramie 360	F2F	Certificate	0	-2	2	-7	-7
			Online	Certificate	-2	-2	2	4	2
		National	F2F	Certificate	-4	-2	2	-3	-7
			Online	Certificate	-4	-2	2	4	0
03.0206	Land Use Planning & Management / Development	Wyoming	F2F	Bachelor	-2	-2	2	2	0
			Online	Bachelor	-2	-2	2	5	3
		Laramie 360	F2F	Bachelor	-6	-2	2	-6	-12
			Online	Bachelor	-4	-2	2	3	-1
		National	F2F	Bachelor	-6	-2	2	-2	-8
			Online	Bachelor	-2	-2	2	-3	-5
03.0206	Land Use Planning & Management / Development	Wyoming	F2F	Master	-2	-2	2	2	0
			Online	Master	-2	-2	2	3	1
		Laramie 360	F2F	Master	2	-2	2	-4	-2
			Online	Master	-5	-2	2	2	-3
		National	F2F	Master	-1	-2	2	0	-1
			Online	Master	-2	-2	2	0	-2

CIP Description 03.0206

A program that focuses on how public and/or private land and associated resources can be preserved, developed, and used for maximum social, economic, and environmental benefit. Includes instruction in natural resource management, natural resource economics, public policy, regional and land use planning, environmental impact assessment, applicable law and regulations, government & politics, principles of business and real estate land use, statistical and analytical tools, computer applications, mapping and report preparation, site analysis, cost analysis and communication skills.

Three (3) CIP Code Descriptions that may require further consideration

There are three (3) other CIP Codes that are somewhat in the ballpark to the proposed program. They have not been analyzed, let me please let know if there is interest: a) *45.0604 Development Economics & International Development*--Description: A program that focuses on the systematic study of the economic development process and its application to the problems of specific countries & regions. Includes instruction in economic development theory, industrialization, land reform, infrastructural development, investment policy, the role of governments and business in development, international development organizations, and the study of social, health, and environmental influences on economic development; b) *22.0207 Energy, Environment & Natural Resource Law*--Description: An advanced, professional study of the law, policies, and regulations governing the energy industry, environmental protection, natural resources and land use, and related topics.; and c) *03.0204 Environmental/Natural Resource Economics*--Description: A program that focuses on the application of economic concepts and methods to the analysis of issues such as air and water pollution, land use planning, waste disposal, invasive species and pest control, conservation policies, and related environmental problems. Includes instruction in cost-benefit analysis, environmental impact assessment, evaluation and assessment of alternative resource management strategies, policy evaluation and monitoring, and descriptive and analytic tools for studying how environmental developments affect the economic system.

Quick analysis of all scores

I widened the scope by adding bachelor and master award levels to assist with data collection and analysis. I would consider this to be an emerging program. At first glance the finding would suggest this is not a fit or a path UW should consider but I don't believe that to be the case. Solid programs evaluation requires attention to Mission, Margin, and Marketability. In this specific case Mission is met, Margin could be achieved with proper tuition rates and marketibity is also achievable with potential private partnerships, great program design, attention to student needs... Importantly, there is room for program entry, program competition is low. To be one of the first to offer, the potential for a winner take all position is increased. Online program delivery is preferred. Currently,

student demand for this online or face to face certificate program is low, but once explained, marketed, and with time demand will emerge. Same with employment demand. Once demand is realized, once regional private industry becomes aware that UW is offering this type of program then job posting will reflect degree attainment.

CERTIFICATE Deeper Dive into Student Demand (student demand adjusts based on market, delivery modality, and award level. Green highlighted areas are positive indicators.) Student demand indicates an increased inquiry and completion rate, indicating a potential emerging program. Program growth is increasing. Program entry is NOW! This program has more regional appeal when compared to the national market.

Student Demand	Wyoming		Laramie 360		National	
Program size	F2F	Online	F2F	Online	F2F	Online
Inquiry size (12 months) Changes may reflect institutional marketing efforts. **Gray inquiry database**	0%	0%	0%	0%	0%	0%
On ground completions at in-market institutions. Total # of conferred degrees for students who attend on ground at institutions located in the selected market. **IPEDS**	0%	0%	84%	0%	41%	0%
Online completions by in-market students. Total number of in-market completions regardless of the location of the institution. 2020, slightly lagging indicator. **NC SARA**	0%	0%	0%	0%	0%	0%
Sum on online and on ground completions 2020, slightly lagging indicator. **IPEDS & geographic allocations NC SARA**	0%	0%	84%	0%	41%	0%
Growth potential						
Inquiry volume YoY change (units) **Gray inquiry database**	50%	97%	99%	98%	85%	87%
Completion volume YoY change (units) 2020/2019 **IPEDS & geographic allocations NC SARA**	97%	50%	94%	94%	30%	82%
Inquiry volume YoY change (%) **Gray inquiry database**	_	_	_	0%	_	0
Google searches YoY change (%)	_	_	_	0%	_	0%
Completion volume YoY change (%) 2020/2019 **IPEDS & geographic allocations NC SARA**	_	_	_	0%	22%	0%

BACHELOR Deeper Dive into Student Demand (student demand adjusts based on market, delivery modality, and award level. Green highlighted areas are positive indicators.) Bachelor award level indicators are similar to certificate award level indicators-potentially again indicating emerging program market. Student demand indicates an increased inquiry and completion rate, indicating a potential emerging program. Program growth is increasing. Program entry is NOW! This program has more regional appeal when compared to the national market.

Student Demand	Wyoming		Laramie 360		National	
Program size	F2F	Online	F2F	Online	F2F	Online
Inquiry size (12 months) Changes may reflect institutional marketing efforts. **Gray inquiry database**	0%	0%	0%	0%	0%	0%
On ground completions at in-market institutions. Total # of conferred degrees for students who attend on ground at institutions located in the selected market. **IPEDS**	0%	0%	75%	0%	50%	64%
Online completions by in-market students. Total number of in-market completions regardless of the location of the institution. 2020, slightly lagging indicator. **NC SARA**	0%	0%	0%	0%	_	66%
Sum on online and on ground completions 2020, slightly lagging indicator. **IPEDS & geographic allocations NC SARA**	9%	9%	75%	9%	50%	62%
Growth potential						
Inquiry volume YoY change (units) **Gray inquiry database**	96%	94%	95%	94%	85%	85%

Completion volume YoY change (units) 2020/2019 **IPEDS & geographic allocations NC SARA**	96%	96%	4%	96%	15%	82%
Inquiry volume YoY change (%) **Gray inquiry database**	–	–	–	–	–	–
Google searches YoY change (%)	–	–	–	–	–	–
Completion volume YoY change (%) 2020/2019 **IPEDS & geographic allocations NC SARA**	–	–	9%	–	–	–

Master Deeper Dive into Student Demand (student demand adjusts based on market, delivery modality, and award level. Green highlighted areas are positive indicators.) Master award level indicators are similar to certificate and bachelor award level indicators-potentially again indicating emerging program market. Student demand indicates an increased inquiry and completion rate, indicating a potential emerging program. Program growth is increasing. Program entry is NOW! This program has more regional appeal when compared to the national market.

Student Demand	Wyoming		Laramie 360		National	
Program size	F2F	Online	F2F	Online	F2F	Online
Inquiry size (12 months) Changes may reflect institutional marketing efforts. **Gray inquiry database**	0%	0%	0%	0%	0%	0%
On ground completions at in-market institutions. Total # of conferred degrees for students who attend on ground at institutions located in the selected market. **IPEDS**	0%	0%	87%	0%	56%	65%
Online completions by in-market students. Total number of in-market completions regardless of the location of the institution. 2020, slightly lagging indicator. **NC SARA**	0%	0%	0%	85%	0%	67%
Sum on online and on ground completions 2020, slightly lagging indicator. **IPEDS & geographic allocations NC SARA**	0%	9%	87%	83%	56%	64%
Growth potential						
Inquiry volume YoY change (units) **Gray inquiry database**	97%	96%	97%	97%	85%	87%
Completion volume YoY change (units) 2020/2019 **IPEDS & geographic allocations NC SARA**	98%	96%	96%	8%	76%	77%
Inquiry volume YoY change (%) **Gray inquiry database**	–	–	–	–	–	–
Google searches YoY change (%)	–	–	–	–	–	–
Completion volume YoY change (%) 2020/2019 **IPEDS & geographic allocations NC SARA**	–	–	97%	32%	73%	67%

Deeper Dive Employment Demand (Employment demand adjusts based on market, not award level or delivery modality. Green highlighted areas are positive indicators.) Sadly there is NO data available in the Gray database at the certificate, bachelor, and master award level. Thankfully, the American Community Survey provided some information albeit specific to the bachelor award level.

Employment Demand	Wyoming	Laramie 360	National
Employment size-Direct preparation			
Job postings total, previous 12 months. Total number of new job postings in occupations directly related to the program found online at employer sites over the past year. Size of employment opportunity for graduates	NA	NA	NA
Bureau of Labor Statistics (BLS)-current employment estimate of the total number of people currently employed in occupations for which the academic program *directly* prepares graduates	NA	NA	NA
BLS-annual job openings in relevant occupations including growth and turnover. Sizes up *directly* related employment opportunities for graduates.	NA	NA	NA

Employment size-Generalist			
BLS-2020 share of generalist employment-BLS estimates total # of jobs in *general* occupations that a graduate could obtain	NA	NA	NA
BLS-2020 share of generalist openings in *general* fields including growth & re-employment	NA	NA	NA
Employment growth Direct preparation			
BLS One-year historic growth. Identify emerging & declining career fields from 2020-2021. Assess trend in employment	NA	NA	NA
BLS Three-year historic growth 2017-2020. Compound annual growth rate (CAGR) Assessment of employment trend	NA	NA	NA
Growth **BLS** 10-year future growth 2019-2029. ***Limited predictive accuracy when assessing future employment market size. (Not highlighted green as predictability is limited)***	NA	NA	NA
Saturation Direct Preparation			
Job postings per graduate-new job postings divided by the # of **IPEDS** completions for an academic program. Job postings **(BGT)** vs 2020 completions **(IPEDS)**. Job postings are the most current information available on employment opportunities. Evaluates the balance of supply & demand for graduates and jobs	NA	NA	NA
BLS job openings per graduate. Estimates annual job openings in relevant occupations including growth & re-employment divided by the number of **IPEDS** completions for 2020 . Intended to size up *directly* related employment opportunities for graduates	NA	NA	NA
Pay-Wages Direct Preparation			
BLS 10th percentile wages. Identifies academic programs with good student ROI (Return on Investment) to meet general education standards.	NA	NA	NA
BLS Mean wages for program related occupations by geography as reported to BLS, 2020. Identifies academic programs with good student ROI to meet general education standards.	NA	NA	NA

Outcomes: American Community Survey (ACS) over 2 million records examined, 2015-2019 best available data on actual wage outcomes, particularly for programs that could lead to a wide range of occupational fields at the ***BACHELOR* level. The below information is the same for online or face to face programs as well as award levels**

	%	score	value
Nat'l **ACS** wages age < 30. Wage outcomes are useful for academic programs with a wide range of occupational fields	16%	$36,142	-2
Nat'l **ACS** wages age 30-60. Wage outcomes are useful for academic programs with a wide range of occupational fields	38%	$79,327	0
Nat'l **ACS** % with any graduate degree that move on to attain bachelor, doc, or professional degree	35%	31%	0
Nat'l **ACS** % with Masters identify the % of bachelor's graduates that move on to earn a masters degree	43%	25%	NS
Nat'l **ACS** % with Doc/Professional degree identify the % of bachelor's graduates that move on to earn a doc or professional degree	40%	6%	NS
Nat'l **ACS** unemployment age < 30 evaluation of the moderate term ability to find a job for those with bachelor degree	49%	3%	0
Nat'l **ACS** unemployment age 30-60 evaluation of long term ability to find a job with a bachelor degree	32%	2%	0
Nat'l **ACS** Direct prep jobs, identifies % of graduates that are employed in fields *directly* related to their academic program (major)	0%	0%	NS

NATIONAL Program Completion Information 2020. 46% of students completing a program in Land Use Planning Management /Development have a bachelor degree, while 40% have a master degree.

Undergraduate Certificates	5%
Associate Degree	0%
Bachelor Degree	46%
Post Baccalaureate Certificate	7%
Master	40%
Post Master Certificate	0%
Doctoral	2%
Unknown	0%

National Workforce Education Attainment (data from BLS).

No College	NA/NS
Some College	NA/NS
Associates Degree	NA/NS
Bachelor Degree	NA/NS
Master Degree	NA/NS
Doctoral Degree	NA/NS

Deeper Dive Completion Numbers--Below is also our starting point to create a student recruitment/enrollment profile by checking tuition and fee rates, advising models, recruitment, accreditation, curriculum, internship opportunities, what bachelor degree might accompany the certificate, and additional certificates. It also allows UW to get a look at the competition and what they are offering. Importantly, this is a very small program nationally.

Higher Education Institutions, **Certificate** Programs	2018		2019		2020	
	Online Only	Total F2F + Online	Online Only	Total F2F + Online	Online Only	Total F2F + Online
Colorado Mesa University	0	0	0	0	0	1
Kentucky State University	0	1	0	0	0	0
Metropolitan State University Denver	0	0	0	2	0	3
University of Wisconsin, Stevens Point	0	3	0	1	0	1
TOTAL	**0**	**4**	**0**	**3**	**0**	**5**

Higher Education Institutions, **Bachelor** Programs	2018		2019		2020	
	Online Only	Total F2F + Online	Online Only	Total F2F + Online	Online Only	Total F2F + Online
West Virginia University	0	42	0	35	0	32
Central Michigan University	0	4	0	8	0	5
Marietta College, Ohio	0	8	0	6	0	5
Metropolitan State University of Denver	0	13	0	3	0	2
Everglades University, FL	0	0	2	3	1	1
Montana State University	0	0	0	1	0	0
University of Wisconsin, River Falls	0	1	0	0	0	0
TOTAL	**0**	**68**	**2**	**56**	**1**	**45**

Higher Education Institutions, **Master** Programs	2018		2019		2020	
	Online Only	Total F2F + Online	Online Only	Total F2F + Online	Online Only	Total F2F + Online
Montana State University	15	18	13	20	4	22
University of Maryland, College Park	0	25	0	22	0	17
Utah State University	0	1	0	7	0	0
TOTAL	**15**	**44**	**13**	**49**	**4**	**39**

Skills Engine

Abilities	Deductive reasoning; Oral expression
Detailed work activities	Research impact of environmental conservation initiatives; Conduct field research; Collect statistical data
General work activities	Getting information; Analyzing data or information
Intermediate work activities	Gathering information from physical or electronic sources
Knowledge	Administration & management
Occupations	Environmental engineers; Urban & regional planners; Environmental scientists; Soil & water conservationists; Range managers; Environmental Compliance Inspectors

Skills	Critical thinking; Complex problem solving
Tools	Microsoft suite; ESRI ArcGIS software; ESRI ArcView software; GPS software; SAS software; Mass spectrometers
Work place essentials	Attention to detail; Information gathering

Prepared by Jayne Pearce; Gray Database materials; 7/14/2022

Office of Academic Affairs
Dept. 3302 1000 E. University Avenue
Laramie, WY 82701
(307) 766-4286 – (307) 766-6476 – fax (307) 766-2606
www.uwyoedu/acadaffairs

November 3, 2022

To: Board of Trustees

From: Kevin R. Carman, Provost
Re: Letter of Commitment Land Administration Undergraduate Certificate

This letter serves as a Letter of Commitment for a new undergraduate certificate in Land Administration Undergraduate Certificate offered by the School of Energy Resources. As described in the accompanying feasibility study: "This certificate is built upon existing curriculum and meant to provide a way for working professionals to obtain continuing education credits, as well as for current UW students to diversify their academic portfolio prior to graduation. The large draw for this credential is that many professions (state natural resources departments, open space departments, land trusts, fish and wildlife management agencies, lease and title analysts, division order analysts, land techs, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Environmental Protection Agency, Natural Resources Conservation Service, and AAPL) require continuing education credits, and the coursework as part of this proposed credential would count for many professions."

Needs
"To solve today's complex land management issues, professionals need a broad understanding of key elements affecting environments and the relationships between land, agriculture, energy and people. This Land Administration Certificate prepares students with the tools, methods, theories, and action steps that help identify land administration problems and the means to develop, implement, and evaluate proposed solutions. Certificate holders will be able to critically explore root cause analysis and recommend desired outcomes. Solving natural resource and land challenges requires a multi-disciplinary approach, which this certificate offers in a collaboration between SER, CALSNR, and Haub. Students become a knowledgeable leader in land management as it relates to energy, agriculture and natural resources with this certificate program. The curriculum offers both a philosophical and functional view that is applicable to a wide range of careers."[1]

Requirements
Students will complete 16 credit hours in this certificate.
- Core Courses – 9-10 credit hours
- Elective Courses – Minimum 6 credit hours from 34 identified courses at UW.

[1] Land Administration Feasibility, School of Energy Resources, Sep 2022

Resources
Since this certificate program is a packaging of already existing coursework, the certificate program will not require any additional resources to implement.
Total resources requested: $0.

Timeline
The implementation timeline is designed to enable students to enroll in this certificate program in Fall 2023.

Campus Review
I affirm that the university community, including the Executive Team, Deans and Directors, Faculty Senate, Staff Senate, and ASUW, have been provided the opportunity to review and present feedback on the proposed certificate program.

Regards,

Kevin R. Carman, PhD
Provost and Executive Vice President