

# STRATEGIC PLAN FOR THE COLLEGE OF ENGINEERING AND APPLIED SCIENCE



UNIVERSITY OF WYOMING

ENGINEERING HALL III







The College of Engineering and Applied Science (CEAS) was established to help fulfill the University of Wyoming's core land-grant mission: to serve Wyoming through outstanding undergraduate education, research in areas of economic importance to the state, and outreach to stakeholders across the state.

The Tier-1 Engineering Initiative, established by the Wyoming Legislature in 2012, represents a major reinvestment in engineering and computer science, and is a recognition of the importance of these jobs to Wyoming's economy. The college's newest strategic plan represents the next phase of the Tier-1 vision and operationalizes the initiative. In executing this plan, the college will attract, retain, and develop world-class human capital (faculty, staff, students), will produce high-value, economically relevant research, and will be recognized internationally for innovation in education and research.

**Mission:** The College of Engineering and Applied Science serves the citizens of Wyoming through engineering and technology-oriented educational and research programs, yielding graduates and technologies that significantly impact Wyoming's economic growth and diversification. We do this through our commitment to student success, community and industry engagement, and translational interdisciplinary research.

**Vision:** The College of Engineering & Applied Science will be recognized in Wyoming and internationally as a leader in education, stakeholder engagement, and the application of knowledge to the benefit of our economy and our citizens.

## STRATEGIC THEMES

The updated strategic plan will empower the college to achieve the following strategic themes.

1. Establish a premier academic culture
2. Foster innovative growth
3. Engage in productive economic development
4. Become a best-practices organization



# STRATEGIC THEME ONE

## ESTABLISH A PREMIER ACADEMIC CULTURE

### A Premier Academic Culture

| Performance Indicators                                                                            | Baseline                                    | 2022 Target                                   |
|---------------------------------------------------------------------------------------------------|---------------------------------------------|-----------------------------------------------|
| Launching new first-year seminar classes                                                          | Two new first-year seminar courses launched | Offer six new first-year seminar courses      |
| Students participating in research, internship, co-op, or study-abroad experience                 | 72% of CEAS students                        | 80% of CEAS students                          |
| Launch new degree programs in Computer Engineering Technology and Construction Management by AY19 | Construction Management launched in 2018    | 100 students enrolled in each program         |
| Provide matching funds for 10 additional undergraduate researchers per year.                      | 10 undergraduate researchers funded         | Continue to fund 10 undergraduate researchers |



**20:1**  
STUDENT-TO-FACULTY  
RATIO IN COLLEGE OF  
ENGINEERING



**87%**  
PERCENTAGE OF  
CLASSES TAUGHT  
BY ENGINEERING  
PROFESSORS

 **3.54**  
AVERAGE GPA OF  
INCOMING ENGINEERING  
FRESHMAN AT UW

- **National Recognition of Programs**

- o Develop and implement a targeted marketing plan.
  - Develop and track appropriate metrics focused on marketing plan targets: alumni and donors; prospective students and parents; academia; industry.

- **Invest in High Impact Practices**

- o Develop a repertoire of disruptive engineering and applied sciences specific first-year seminars.
  - Timeline: Develop three new first-year seminar courses by 5/1/18, offer during the FY19 academic year.
  - Status of offerings as of 2018:
    - Engineering Honors
    - Atmospheric Science: Weather, Climate, Global Change
    - Computer Science: Beauty of Computing
    - Electrical and Computer Engineering: Bits & Bytes
    - Chemical Engineering: Sustainability
    - Civil and Architectural Engineering: Engineering Earth's Water
    - Engineering: Introduction to Engineering Study

- o Provide a spectrum of accessible extracurricular experiences for all undergraduate students. Initial focus on undergraduate research, internships, co-op, and study abroad opportunities.

- Timeline: Survey of existing extracurricular experiences completed by Jan. 15, 2018. Identified new programs and developed implementation plans by April 1, 2018.
- Status:
  - ✓ Matching funds provided to support undergraduate research
  - ✓ Undergraduate research for credit approved
  - ✓ Co-op opportunities offered by each department

- ✓ Study abroad offered in Mexico, Costa Rica, Mannheim, Scotland, AE Europe Program
- ✓ In development: Ecuador, review Engineers without Borders summer program for credit
- International Minor approved and available college-wide.
- To do: Hire dedicated internship/co-op coordinator to drive student participation.

- o Develop interdisciplinary education programs cutting across departments, units, and programs both inside and outside that fulfills market demand. Initial focus: Computer Engineering Technology (CET) and Construction Management (CM).
  - Timeline: Complete academic approval process by the end of 2018.
  - Status:
    - ✓ CET and CM under consideration by Faculty Senate in fall 2018. On track for approval by March 2019. Launch anticipated in Fall 2019.
    - ✓ Cybersecurity certificate approved by the UW Board of Trustees.
    - ✓ International minor approved.
    - ✓ In development: Entrepreneurship minor, design thinking, multi-disciplinary course combinations (cross-listed courses).

- o Provide matching funds for National Science Foundation Research Experiences for Undergraduates (REU) and REU-like awards.
  - Timeline: Immediately provide 1:1 matching funds for new REU awards.
  - Status: Program launched in spring 2018 and matching funds allocated to support undergraduate research.



# STRATEGIC THEME TWO

## FOSTER INNOVATIVE GROWTH

### Innovative Growth

| Performance Indicators                                           | Baseline                                           | 2022 Target                                                                  |
|------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|
| Develop models for industry-university engagement                | Four partnerships under way                        | Six partnerships in place                                                    |
| Develop and provide industry training and certification programs | Cybersecurity certificate approved                 | Launch two additional certificate programs, including one in process control |
| Establish a culture of stewardship                               | Training provided to all department heads annually | Continue yearly training                                                     |
| Increase engagement with 2-year institutions                     | 162 students enrolled from 2-year programs         | 25% increase on current number of students from 2-year institutions          |

# ENROLLMENT

1,730

UNDERGRADUATES

270

GRADUATE STUDENTS



\$60,600

AVERAGE STARTING

SALARY

FOR ENGINEERING GRADUATES

\$6,400

AVERAGE AMOUNT OF

SCHOLARSHIP DOLLARS

PER ENGINEERING STUDENT

## • Transformational Partnerships

- o Develop models for industry-university engagement and identify 1-2 partnerships to immediately pursue
  - Timeline: Completed April 1, 2018.
  - Status:
    - ✓ Launched: Drilling Systems partnership, produced water consortium, wind consortium, Industrial Affiliates program.
    - ✓ In development: process-control program initially funded by Genesis Alkali, blockchain initiative with Colleges of Business and Agriculture, Union Wireless scholarship/internship program.
- o Develop and provide industry training and certification programs
  - Timeline: Developed certificate programs in drilling and cybersecurity by June 2018 and launch for AY19.
  - Status: Cybersecurity certificate approved by the UW Board of Trustees in May 2018. Other certificates under consideration: process control, computing for K-12 teachers.

## • Expand College Fundraising Efforts

- o Establish a culture of stewardship
  - Timeline: Stewardship training provided to all department heads by May 1, 2018.
  - Status: launched in spring 2018 with department heads receiving development and stewardship training.
  - To do: develop donor stories, Thankathon in which students call and thank donors.
- o Develop new donors
  - “Tile” program in relation to the Engineering Education and Research Building.
  - Promote the annual giving program.

## • Pipelines for Enrollment Growth

- o Increase engagement with two-year institutions
  - Timeline: Completed articulation agreements with the Southern Alberta Institute of Technology (SAIT) in mechanical engineering and architectural engineering by May 15, 2018.
  - Status:
    - ✓ Mechanical engineering articulation agreement with SAIT is complete. Civil and architectural and chemical engineering agreements in process in fall 2018.
    - ✓ Existing articulation agreements:
      - ❖ Computer Science: Western Wyoming Community College, Casper College, Laramie County Community College
      - ❖ Architectural Engineering: Cabrillo College in San Jose, Calif.





# COLLEGE OF ENGINEERING AND APPLIED SCIENCE YEAR-IN-REVIEW

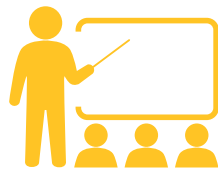


**Mechanical Engineering** Department Head Carl Frick was honored for his work to improve the safety of football players. He helped found Impressio, a start-up company, along with Chris Yakacki, a professor at the University of Colorado Denver. The team developed materials used as helmet padding to absorb force created during game play. Frick and Yakacki impressed a panel of medical experts and venture capitalists at “1st and Future,” a startup competition. It called for companies to pitch solutions for safety issues facing the game. Impressio won for its submission in the category of “Advancements in Protective Equipment.” It has developed liquid-crystal elastomers (LCEs) that can be put in helmet padding to absorb energy from hits. More than 100 sports-related startups applied to participate, and nine finalists were chosen to make stage presentations.

**Electrical and** Computer Engineering graduate student David Mohler was accepted into the Science, Mathematics and Research for Transformation (SMART) Scholarship for Service Program. The scholarship allows the Department of Defense (DOD) to recruit

and retain the next generation of science and technology leaders. Recipients work as summer interns during the academic degree program and subsequently are employed at a DOD organization following graduation. SMART funds the total cost of full-time tuition at UW and provides a yearly stipend. Mohler expects to graduate in spring 2019.

**UW’s American** Society of Civil Engineers student chapter received three distinguished honors for its exemplary work. The chapter received the 2018 Region 7 Distinguished Chapter Award, was named a finalist for the 2018 Robert Ridgway Student Chapter Award for Most Outstanding ASCE Student Chapter and earned a Letter of Recognition for Community Service. The distinguished chapter honor is given annually to the most outstanding student organization in the region.



**Associate Academic** Professional Lecturer Ryan Kobbe received UW’s John P. Ellbogen Meritorious Classroom Teaching Award. The honor was established in 1977 by Casper businessman John P. “Jack” Ellbogen to “foster, encourage, and reward excellence

in classroom teaching at UW.” In the nomination letters, one student said Kobbe was very demanding, but made sure students walked away with a greater understanding of engineering. Words such as “passion” and “commitment” were common in the nominations. Kobbe joins recent CEAS honorees including Paul Dellenback (2017), Cam Wright (2012) and Steve Barrett (2004).

**A new** paper in the Proceedings of the National Academy of Sciences (PNAS) reports how a cutting-edge artificial intelligence technique called deep learning can automatically identify, count, and describe animals in their natural habitats. The senior author on the paper is Jeff Clune, the Harris Associate Professor at UW and a Senior Research Manager at Uber’s Artificial Intelligence Labs. Photographs that are automatically collected by motion-sensor cameras can then be automatically described by deep neural networks. The result is a system that can automate animal identification for up to 99.3 percent of images while still performing at the same 96.6 percent accuracy rate of crowdsourced teams of human volunteers.

**Majid Karami**, a Ph.D. candidate in the Department of Civil and Architectural Engineering, was awarded the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

Grant-in-Aid award for \$10,000. Each year, only 10 to 25 applicants from all over the world receive the prestigious award. It is the first time the grant has been awarded to a UW student. His research focuses on developing online learning-based fault detection and diagnostics method in building HVAC systems, under the supervision of Assistant Professor Liping Wang.



**Brandon Wilde** of Worland, Wyo., has always embraced a challenge, and his tenacity led him to accomplish something historic for the CEAS. Wilde, who studied chemical engineering, became the inaugural graduate in May from the Engineering Honors Program. The program was established in fall 2017, and combines the same opportunities already offered by the University Honors Program with additional coursework in Engineering Honors curriculum, Engineering Honors independent study, Engineering Honors scholarship and Engineering Honors distinction upon graduation.

**Ph.D. candidate** Sherif Gaweesh received an award for his work in transportation research. Gaweesh was named as the Institute of Transportation Engineers (ITE) Colorado/Wyoming Section Student of the Year, the first time the award has been given.

Mechanical Engineering Assistant Professor Dillpuneet Aidhy met with lawmakers to provide perspective as to why research funding for science research and education is so important. As part of a trip organized by the Materials Research Society, faculty members from a variety of institutions visited Washington, D.C. Aidhy and the members of his travel group met with the respective representatives from their home states. The trip included a visit with Wyoming’s Congressional delegation, including Rep. Liz Cheney and Sens. Mike Enzi and John Barrasso.



**The Female** Mentor Program will continue its work in the CEAS, thanks to a successful debut and positive feedback from those involved. The program, initiated in 2017 by K-14 Outreach Coordinator Teddi Freedman, formed connections between experienced female engineers and student counterparts. This year’s program has nearly tripled in terms of membership and plans for future years include involving even more mentors and mentees.



**UW successfully** hosted its first-ever hackathon event in September. The blockchain-based event attracted more

than 400 attendees to the War Memorial Fieldhouse. UW alumnae and event chairman Caitlin Long was a driving force behind the event, which included more than \$100,000 in sponsor donations for the Department of Computer Science.

**Petroleum Engineering** Ph.D. candidate Vahideh Mirchi won first place in the international student paper contest competition at an annual Society of Petroleum Engineers event. It is the first time that a student from UW has won the award, and Mirchi beat out competitors from 14 world regions.

**Chemical engineering** student Emily Lynch and Assistant Professor Saman Aryana each were presented with awards for their work in promoting diversity at the Diversity, Equity and Inclusion Awards at UW.

**UW graduate** Kendra Heimbuck received a community service award for her efforts in a Wyoming town. Heimbuck, who earned bachelor’s and master’s degrees in architectural engineering from UW in 2011, was awarded the “Rising Star” distinction at the Jackson Hole Chamber of Commerce’s 53rd annual awards celebration Oct. 19. Heimbuck is the executive director of Habitat for Humanity in Jackson, Wyo. The event recognizes community members and businesses who made an impact in the town. The “Rising Star” award honors an individual under the age of 40 who is “blazing the streets of Jackson with their innovation and service—both professionally and personally.”



# STRATEGIC THEME THREE

## ENGAGE IN PRODUCTIVE ECONOMIC DEVELOPMENT

### Productive Economic Development

| Performance Indicators                                                                                                      | Baseline                                            | 2022 Target                                                    |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------|
| Develop a front door for industry engagement highlighting college capabilities and technologies                             | Capabilities inventory complete                     | Institute of Innovation and Entrepreneurship fully established |
| Institute a program of industrial graduate fellowships, supported by industry with matching from the Engineering Initiative | One fellowship funded, target of 5 fellows for FY19 | 5 fellowships supported annually                               |
| Provide seed funding to promote new research centers of excellence with economic development potential                      | Two centers of excellence funded for 2018-19        | Continue to fund two centers of excellence annually            |
| Revise college tenure and promotion guidelines to reward economic development activity                                      | Guidelines reviewed in June 2018                    | New guidelines published and implemented across college        |



# 11



NUMBER OF PROGRAMS IN  
COLLEGE OF ENGINEERING  
AND APPLIED SCIENCE

## TWO RESEARCH CENTERS OF EXCELLENCE



ARTIFICIALLY INTELLIGENT  
MANUFACTURING  
•  
MULTISCALE BIOMATERIALS

- **Pipelines from Science to Technology**

- o Develop a one-stop shop for industry engagement highlighting college capabilities and technologies
  - Timeline: Inventory taken of assets and capabilities by April 1, 2018.
  - Status: part of the mission of the newly launched Institute of Innovation and Entrepreneurship. Jack Mason, COO, hired to serve as point of contact for industry engagement. Peter Scott hired as Entrepreneur-in-Residence.

- **Interdisciplinary Centers of Research Excellence**

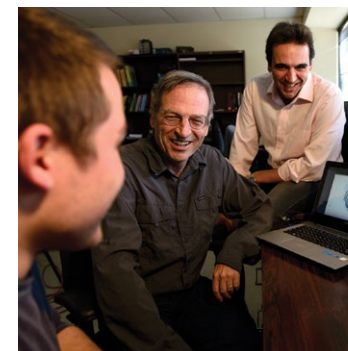
- o Institute a program of industrial graduate fellowships, supported by industry with matching from the Engineering Initiative.
- o Timeline: Developed a model for fellowships by May 1, 2018 and began industry recruiting efforts. Launch fellowship project in FY19.
  - Status: Several faculty have requested this, one has been funded. Funds earmarked to support five fellows per year.
- o Develop high-impact research centers that have sufficient resources for long-duration success.
  - Timeline: Surveyed existing research centers of excellence by Oct. 1, 2018. Develop a research road map for the college by May 1, 2019.

- **Invest in Faculty**

- o Provide seed funding to promote new research centers of excellence with economic development potential.
  - Timeline: Identify opportunities for seed funding based on the research road map.
  - Status: Two centers of excellence funded in summer 2018. Fund the next group in the next biennium.

- **Incentivize and Reward Faculty Engagement**

- o Revise college tenure and promotion guidelines to reward economic development activity.
  - Timeline: Reviewed and revised guidelines by June 1, 2018.
  - Status: Awaiting modification of university regulations and policies to be considered by the Faculty Senate and Board of Trustees in fall 2018.





# STRATEGIC THEME FOUR

BECOME  
A BEST-  
PRACTICES  
ORGANIZATION

## A Best Practices Organization

| Performance Indicators                                                                                                                                                          | Baseline                             | 2022 Target                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------|
| Implement skip-level meetings and strategic rounding to improve internal communication, team building and morale and establish an IOI communication style and promote its usage | Implemented in spring 2018           | Continue to increase communication efforts in the college |
| Develop a Reward and Recognition Program                                                                                                                                        | Surveyed existing programs           | Develop programs as necessary                             |
| Training and mentoring workshops for faculty and departmental leadership                                                                                                        | Yearly leadership training under way | Continue training programs annually                       |



# 100,000- SQUARE-FOOT



APPROXIMATE SIZE OF  
THE NEW ENGINEERING  
EDUCATION AND  
RESEARCH BUILDING

UPON GRADUATION  
ABOUT

## 55 PERCENT

OF CEAS GRADUATES HAVE A  
JOB IN THEIR CHOSEN FIELD,

75 PERCENT AT 3 MONTHS  
AND

90 PERCENT AT 6 MONTHS



- **Become a High-Functioning Organization**

- o Skip-level meetings and strategic rounding to improve internal communication, team building and morale.
  - Timeline: Instituted skip level and rounding meetings in spring 2018.
  - Status: Implemented in spring 2018.
- o Establish an IOI communication style and promote its usage.
  - Timeline: Worked with market personnel to institute IOI internal communications by Jan. 15, 2018.
  - Status: Implemented in spring 2018.

- **Invest in People**

- o Establish Performance Improvement Plans (PIP) as part of the annual review process and address LEPs (Less Effective Performers) through this mechanism.
  - Timeline: Revised internal annual review procedures by May 1, 2018.
  - Status: Launched as per new UW policies.
- o Develop a Reward and Recognition Program
  - Timeline: Survey existing programs for rewarding and recognizing faculty and staff and identify gaps.

- Status: currently offer two staff awards, one undergraduate teaching award, one graduate teaching award.
- To be developed:
  - ✓ Graduate student teaching award
  - ✓ Graduate student research award based on best paper or best thesis
  - ✓ Undergraduate research award
  - ✓ Undergraduate/graduate student research award on economic development potential
  - ✓ Student organization award: establish criteria for award, grant to the recognized student organization
  - ✓ Additional undergraduate teaching award
  - ✓ Faculty/staff external service award

- **Organize for Success**

- o Training and mentoring workshops for faculty and departmental leadership
  - Timeline: Identify existing on-campus and off-campus leadership training opportunities for faculty and staff.
- Status: Implemented in spring 2018





# \$2.5 MILLION GIFT ADVANCES UW PETROLEUM ENGINEERING, TIER-1 ENGINEERING INITIATIVE

Alumnus David D. Le Norman's transformational \$2.5 million gift to the University of Wyoming will support engineering, energy and STEM programs, and the future of Wyoming's economy.

The \$2.5 million gift, doubled to \$5 million through state matching funds, will support the Le Norman Endowed Leadership Chair in Petroleum Engineering for the head of the Department of Petroleum Engineering in the UW College of Engineering and Applied Science. It also creates an excellence fund – the Le Norman Family Excellence Fund in Petroleum Engineering.

"My wife, Cory, and I are pleased with the result of the many people who worked on the project at the University of Wyoming," Le Norman says. "We are especially proud of the state of Wyoming's efforts to advance these programs with matching funds, supporting generations of future students focusing on the STEM-related fields of study. Our hopes are that the acknowledgment of these programs and this gift will stimulate future alumni investment across the board in many focus areas of study and research at the University of Wyoming."

STEM stands for science, technology, engineering and mathematics.

"The University of Wyoming has made tremendous strides in advancing its STEM programs," Gov. Matt Mead says. "UW has become known as a world-class university for engineering, energy, technology and science. This generous gift will help to continue producing excellent engineers and scientists that will go on to do great things. I want to thank David and Cory for the opportunity this gift will provide to the university and Wyoming."

As president, CEO and dedicated philanthropist, Le Norman followed in his father's and grandfather's footsteps, both of whom were in the oil and gas industry. He earned his bachelor's degree in petroleum engineering from UW, as well as earning an MBA and working toward a master's degree in chemical engineering, both from universities in Oklahoma.

After 30 years' experience in the industry, including Texaco, he founded Le Norman Energy and a number of other successful companies.

The generous gift of Le Norman and his wife is part of the ambitious UW Tier-1 Engineering Initiative – a vision to fundamentally transform the College of Engineering and Applied Science into a nationally recognized institution of academic excellence and world-class research institution.

"The Le Normans' support of petroleum engineering at the University of Wyoming is remarkable," UW President Laurie Nichols says. "I would like to thank them for their investment in the future of UW and Wyoming in this field that Dave knows so well. Securing strong leadership and providing excellence funds are so important for faculty and students as we offer an enhanced STEM education and pursue cutting-edge oil and gas research."

"On behalf of our students, we'd like to thank Dave and his wife, Cory, for their generosity," says Michael Pishko, dean of the College of Engineering and Applied Science. "Dave has had a really remarkable career in the oil and gas industry. Not only has Dave been generous with his financial resources, he's also been generous with his time and has devoted a lot of his energy toward working the college and the university to the next level."

The Tier-1 Engineering Initiative is the result of Mead's Energy, Engineering, STEM Integration Task Force. Formed in 2012, the task force was created by the governor to underscore the synergy that can be developed across the fields of energy and STEM.

The Engineering Education and Research Building, across Lewis Street from the existing Engineering Building, will provide space for modern instruction and research; a new shop; student project areas; teaching and computer labs in active-learning configurations; reconfigurable research labs with associated office and collaborative spaces; meeting and conference rooms; and an expanded drilling simulator facility. The engineering facility is the largest capital facilities project in university history.

The goals of the Tier-1 Engineering Initiative include excellence in undergraduate education; world-class research and graduate education; productive economic development through partnerships; and K-14 STEM education.

Tier-1 funding supports student scholarships and promotes student success through student services, such as career placement, internship programs, co-op programs and other experiential programs. It supports K-12 outreach programs for middle school and high school students and their teachers.

Tier-1 funding also supports multidisciplinary research clusters; partnerships with industry, faculty and research scientists; graduate student fellowships; and postdoctoral positions. It supports research centers of excellence of economic importance to Wyoming, including unconventional reservoirs, enhanced oil recovery, wind energy, water and artificial intelligence.

The support of the governor, the Legislature and the state has been vital in the development of the Tier-1 Engineering Initiative, which impacts not only the future of Wyoming, but Wyoming's way of life, according to UW officials. Corporate partnerships have and will continue to play a key role in funding these facilities. UW extends its utmost gratitude for this support, officials add.







THE WORLD NEEDS  
MORE COWBOYS.



UNIVERSITY  
OF WYOMING

College of  
Engineering and  
Applied Science