CEM Women in ENGINEERING

MARCH 3, 2023 MEETING RECAP

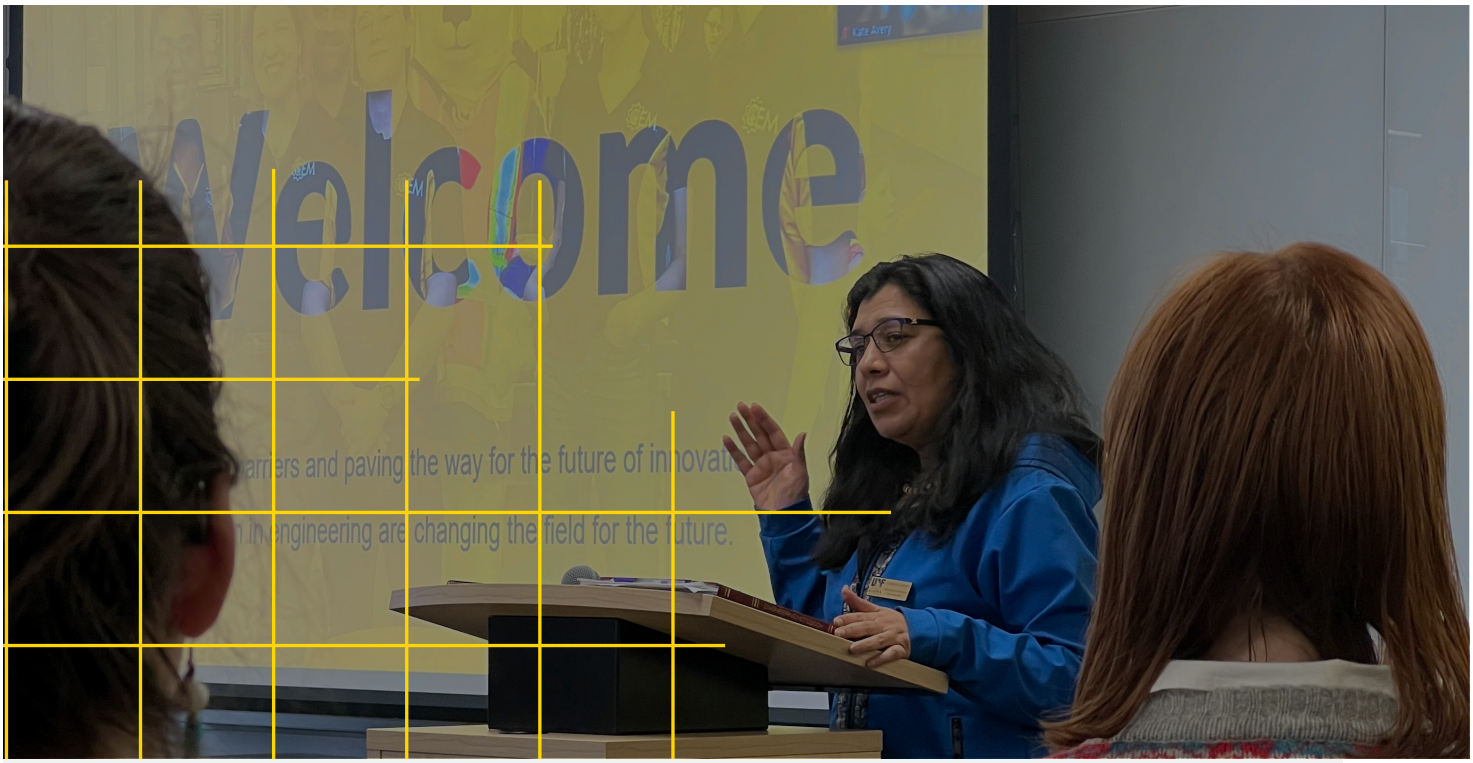
EXECUTIVE SUMMARY

UAF College of Engineering and Mines (CEM) convened a launch meeting on March 3, 2023 for its new Women in Engineering (WiE) Initiative. The purpose of the meeting was to initiate a joint effort between Alaska's engineering colleges and Alaska's engineering stakeholders to promote a higher number of, and a higher proportion of, women in Alaska's engineering workforce.

The meeting resulted in a list of potential activities that the university along with engineering-related industry/agency stakeholders could develop and deliver together.
The next steps are to:

1. initiate a joint task force charged with further developing this set of proposed activities, and
2. garner broader support for the initiative through professional networks and/or additional stakeholder workshops.

Photo above taken by Kate Avery at Women in Engineering Initiative Launch on March 3, 2023.



MEETING SUMMARY

The launch of the WiE Initiative successfully brought together university and industry stakeholders from different backgrounds to discuss the status of Alaska's women engineers and engineering students. The focus of the event was to develop and implement actions in the present, in order to accelerate change in the future.

Provost Prakash opened the meeting noting that women engineers are still few in number, but they have a great impact in the industry. She emphasized the importance of acknowledging gender gaps in bringing about change, and urged everyone to continue pushing for systemic changes to ensure that women engineers are represented equally in the profession.

"I SEE REPRESENTATION" PROVOST PRAKASH REMARKED LOOKING OVER THE ROOM AT THE MEETING LAUNCH OF THE WOMEN IN ENGINEERING INITIATIVE.

Photo above taken by Kate Avery at Women in Engineering Initiative Launch on March 3, 2023.

UNITED STATES REPRESENTATIVE
MARY PELTOLA

THE EVENT WAS MADE EVEN MORE SPECIAL WITH CONGRESSWOMAN MARY PELTOLA PROVIDING RECORDED REMARKS FOR THE ATTENDEES.

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Her remarks noted the importance of creating *"CULTURALLY FLUENT PROFESSIONALS TO CAPITALIZE ON OPPORTUNITIES AND HELP REVERSE THE TREND OF PEOPLE LEAVING ALASKA."*

She emphasized that supporting women in the engineering field is crucial and can make a significant difference. The current situation in Alaska was also discussed, with a 10-year out migration trend where many talented individuals are leaving the state for education opportunities elsewhere. She also remarked there is a unique opportunity for investment in infrastructure and built environment. In this context, supporting women in engineering can help address the talent gap and contribute to the state's development.

WATCH THE FULL REMARKS

Scan the QR code or use link www.vimeo.com/802774796/83d7f492d0

THE UNIVERSITY OF ALASKA FAIRBANKS HAS A LONG-STANDING HISTORY OF ENCOURAGING WOMEN TO PURSUE ENGINEERING CAREERS.

Dean Schnabel brought the conversation back to campus noting that UAF has a long-standing history of encouraging women to pursue engineering careers.

He talked about the need to "melt the ice ceiling," pointing out that individuals should not have to change themselves in order to break through professional barriers, but rather that professional communities should strive together to dismantle those barriers entirely.

MAKING THEIR MARK

Throughout our history, women faculty, staff and students at UAF have made lasting contributions to our state and the world. Even during our fledgling years as the Alaska Agricultural College and School of Mines, when only a small fraction of women pursued college degrees across the nation, UAF alumna were making their mark on history.

— CHANCELLOR DAN WHITE

PIONEER OF PROGRESS
HELEN ATKINSON

"I was really a tomboy, not a little girl... I wanted to work at something that would keep me outdoors."

In 1939, Helen Atkinson made Alaskan history by becoming the first woman civil engineer to graduate from the University of Alaska. She was known for her love of the outdoors and her desire to break away from the traditional gender roles of her time. Atkinson's pioneering work opened the door for future generations of women in engineering.

Since Atkinson's graduation nearly 90 years ago, the number of women in engineering has increased, and many of them have become leading members of the Tau Beta Pi Engineering Honor Society and Alaska's engineering workforce. These talented individuals are committed to pushing boundaries, promoting excellence, and driving innovation in the field of engineering.

By recognizing and celebrating the achievements of women in engineering, we can inspire future generations to break barriers and make their own contributions to the field.

PHOTO ABOVE LEFT

HELEN ATKINSON WORKING AS A CITY ENGINEER IN FAIRBANKS IN THE 1950'S

www.alaska.edu/uajourney/regents/1954-1963-helen-atkinson/

PHOTO ABOVE RIGHT

TAU BETA PI STUDENTS HELPING WITH THE 2023 ENGINEERING OPEN HOUSE.

Photo above taken by Kate Avery at CEM Open House on February 25, 2023.

BUSINESS CASE

SOLUTIONS AND OPPORTUNITIES

15%

GLOBAL ENGINEERING WORKFORCE

is made up of women.

THE MEETING PROVIDED A COMPELLING BUSINESS CASE FOR ENSURING THAT WOMEN ARE MORE FULLY REPRESENTED IN THE INDUSTRY with Jessica Schnabel from the World Bank Group, who discussed the potential solutions and economic opportunities that could be generated by targeting women as professionals and leaders in engineering. She also highlighted the importance of the university being a magnet for women engineers, so that it may educate and train a workforce with varied perspectives and approaches to engage in the challenges facing Alaska and ultimately accelerate state-wide economic growth and diversification.

Ms. Schnabel presented the demographics of the engineering industry, with data from the Society of Women Engineers (SWE), showing that only 15% of the global engineering workforce is made up of women. She emphasized the bottom-line benefits that gender diversity can bring to companies, such as making them more profitable and innovative, while at the same time helping to more effectively address critical issues such as CO2 emissions.

Ms. Schnabel discussed the potential impact of the US government's planned spending of over $500 billion dollars on climate technology and clean energy over the next ten years through commitments in the Infrastructure Investment and Jobs Act, the CHIPS and Science Act, and the Inflation Reduction Act. She also noted the importance of ensuring that women engineers are fully represented in these efforts to maximize the potential benefits.

PHOTO ABOVE
GUIDING THE WAY TOWARDS A MORE INCLUSIVE FUTURE IN ENGINEERING: JESSICA SCHNABEL LEADS THE CONVERSATION WITH PASSION AND EXPERTISE AT OUR WOMEN IN ENGINEERING MEETING.

Photo above taken by Kate Avery at Women in Engineering Initiative Launch on March 3, 2023.

BUSINESS CASE FOR WOMEN IN ENGINEERING

WOMEN ARE AN ECONOMIC FORCE

ENROLLMENT TRENDS
GENDER PARITY IN GRADUATES

Dean Schnabel brought the meeting back to a focus on the enrollment trends within the CEM and compared them to national trends in engineering colleges. The data showed that, nationally, women represent approximately 20-25% of the graduates from engineering colleges, which is on par with CEM in 2022 (24%).

That number is significantly lower than the fraction of women graduates from other UAF STEM-focused colleges such as College of Natural Sciences and Mathmatics (CNSM) and College of Fisheries and Ocean Sciences (CFOS), however, which tend to hover around 50%. The data also speak to the importance of having women role models and leaders. The gender-parity success of CEM's geological engineering program for example, with women comprising an above-average 42% of its graduating classes over the past ten years, underscores the impact that strong, sustained female leadership can have upon student gender parity within an individual program.

BY THE NUMBERS

24%

As more women pursue their passion for engineering, the percentage of CEM women graduates has reached 24%, but we aim to do better.

CEM VS OTHER UAF STEM COLLEGES

%WOMEN GRADUATES OVER A 10-YEAR AVERAGE

GENDER DATA FOR GRADUATES BETWEEN 2013-2022

16%

COLLEGE OF ENGINEERING AND MINES
% WOMEN

UNDERGRADUATE 16%, GRADUATE 24%, DOCTORAL 30%

43%

COLLEGE OF FISHERIES AND OCEAN SCIENCES
% WOMEN

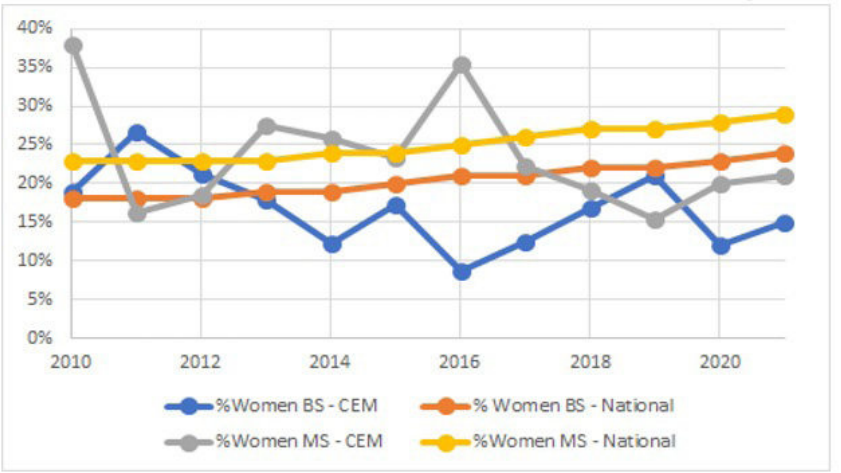
UNDERGRADUATE 43%, GRADUATE 64%, DOCTORAL 59%

57%

COLLEGE OF NATURAL SCIENCES AND MATHEMATICS
% WOMEN

UNDERGRADUATE 57%, GRADUATE 51%, DOCTORAL 48%

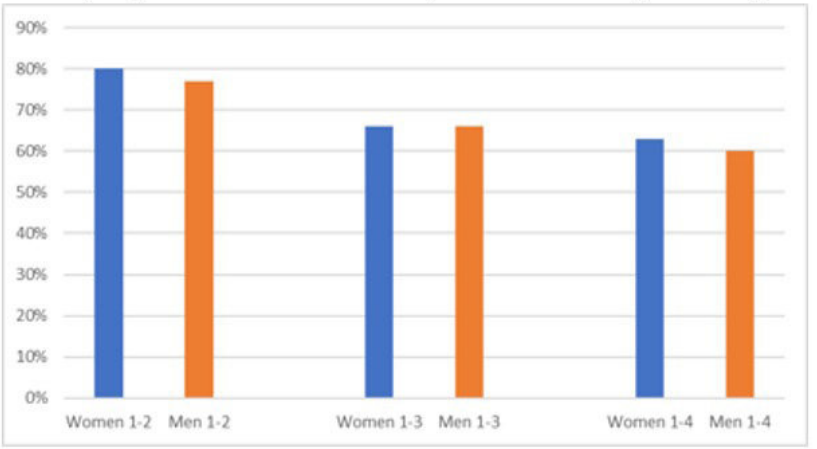
% Women CEM Graduates vs National Trends (2010-2021)



GRAPH 1

THIS CHART COMPARES THE PERCENTAGE OF WOMEN GRADUATES IN CEM TO NATIONAL TRENDS IN ENGINEERING COLLEGES (2010-2021). National data through 2021 were obtained from Engineering & Engineering Technology By the Numbers, by the American Society for Engineering Education.

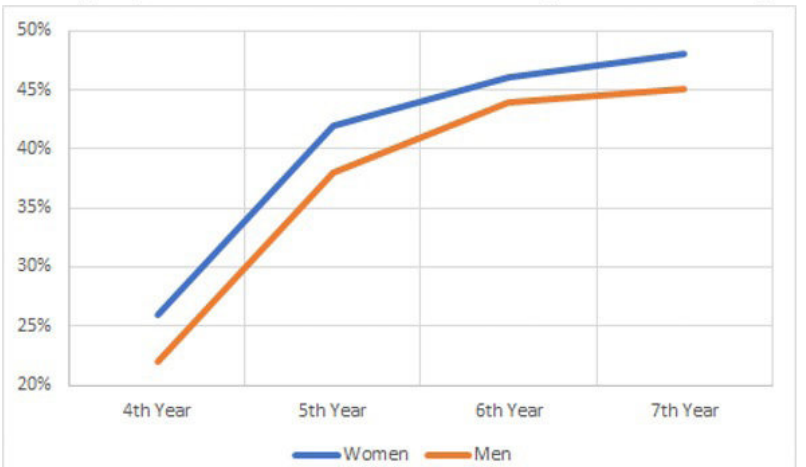
CEM (BS) Retention Rates (Cohorted 10-yr Data)



GRAPH 2

THIS CHART SHOWS THE RETENTION RATES FOR BACHELOR OF SCIENCE (BS) STUDENTS OVER A 10-YEAR PERIOD. Data were obtained by tracking retention of individusal students compared to their 1st year numbers as they transitioned into the 2nd, 3rd, and 4th years of their program.

CEM (BS) Cumulative Grad. Rates (Cohorted 10-yr Data)



GRAPH 3

THIS CHART SHOWS THE CUMULATIVE GRADUATION RATES OF BACHELOR OF SCIENCE (BS) STUDENTS OVER A 10-YEAR PERIOD. The data indicate that roughly 48% of CEM women in BS programs graduate within 7 years, compared to roughly 45% of men.

EMPOWERING WOMEN IN ENGINEERING
A LISTENING SESSION FOR STUDENTS

Listening to the lived experiences of women in engineering can provide valuable insights into the challenges they face. This can aid in the creation of an initiative that is better tailored to address the unique needs and experiences of Alaskan women in this field. We invited two women student engineers to tell us their story of how they came to engineering, how they made it through college and their hopes for the future.

CAITLYNN HANNA

MASTERS STUDENT
CIVIL ENGINEERING

Caitlynn's lived experience is shaped by her family's inspiration, her involvement in Alaska Native Science and Engineering Program (ANSEP), and joining engineering clubs. Growing up, Caitlynn was inspired by her grandfather's passion for education and his hard work in the fields of science and engineering. This passion for STEM continued to shape her life as she became involved in ANSEP, a program designed to support students in STEM fields.

Through CEM, Caitlynn found an opportunity to join and ultimately lead the Concrete Canoe team. This experience not only helped highlight the value of hands-on work in engineering education, but also the value of diversity in engineering. Additionally, she found a supportive community within the engineering club, which provided her with helpful advice and peer support. Caitlynn believes that it's important to be involved in many spaces in order to find a career path. She has taken a well-rounded approach to her education, working on a variety of projects that have allowed her to explore different areas of interest.

Caitlynn is also passionate about giving back to her community and has worked with indigenous communities dealing with climate change impacts upon infrastructure. She hopes to continue making a positive impact in her community and to inspire other students to pursue their passions in STEM.

ENIGMA SWAN ADAMS

SENIOR COMPUTER ENGINEERING

Enigma Swan Adams has had a unique experience as a first-generation student. From navigating the financial planning process to selecting courses, she had to blaze her own path through college. However, she found her passion for engineering through her high school engineering club, which inspired her to pursue higher education.

Enigma chose to attend UAF due to the opportunities it offered as a tight-knit community. Despite being one of the only women in some of her classes, she appreciated the chance to build a deeper relationship with her professors and the various activities available to her. While there were challenges in being a woman in a male-dominated field, Enigma persevered and became a trailblazer herself.

Throughout her time at UAF, Enigma has been inspired by the trailblazers and team players she encountered. These individuals were not afraid to take risks and push the boundaries to achieve success. Through working in teams, Enigma learned the importance of collaboration and the power of collective effort in achieving common goals. Despite facing obstacles, she remained dedicated to her passion for engineering and succeeded through her own determination and the support of her community.

YOU'RE LEARNING SOMETHING NEW, AND IF YOU HAVEN'T LEARNED ANYTHING NEW NOW, YOU STILL HAVE TIME TODAY TO LEARN SOMETHING NEW

— CAITLYNN HANNA WITH WORDS OF WISDOM FROM HER GRANDFATHER

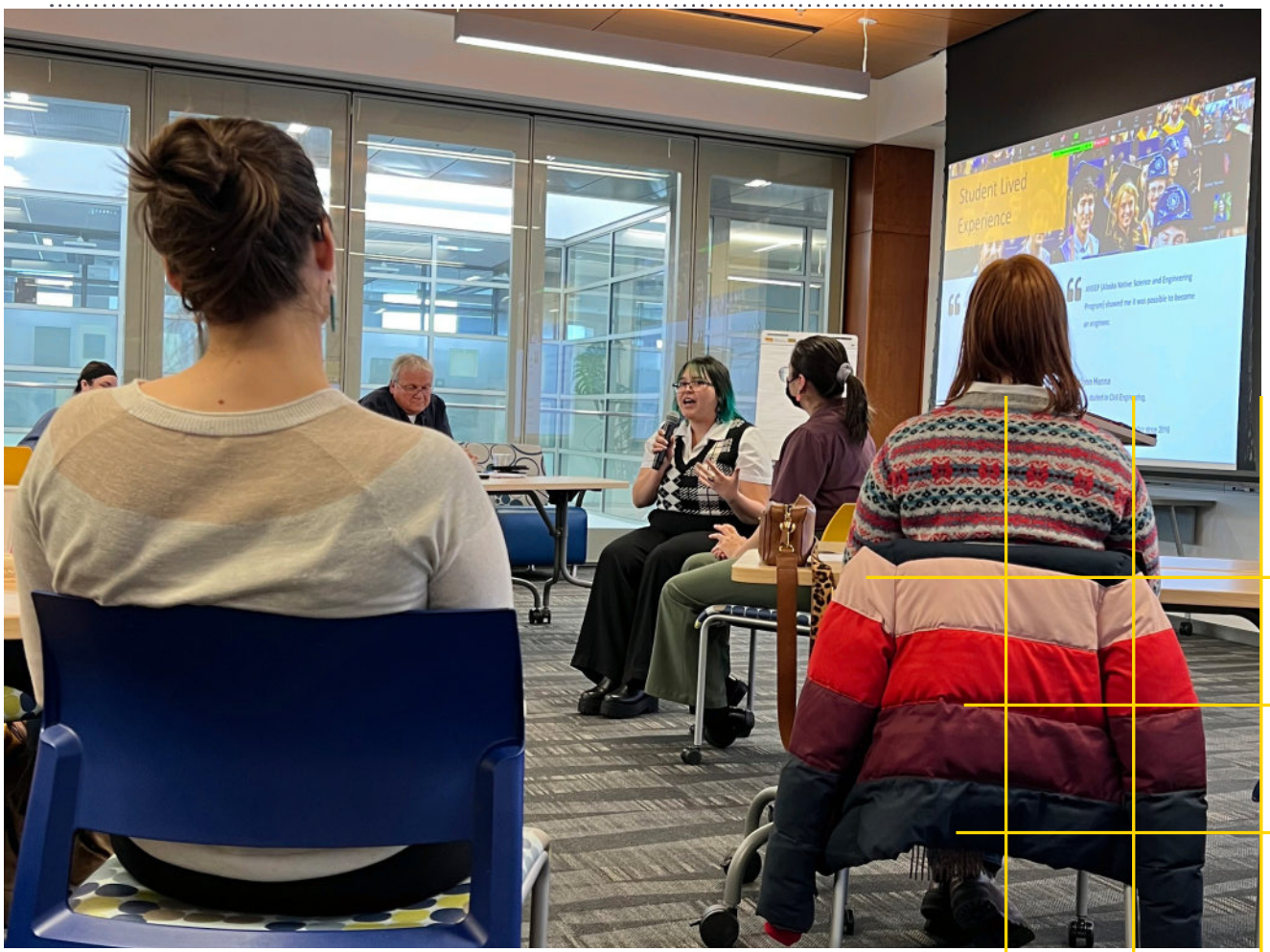


PHOTO ABOVE

CAITLYNN HANNA SPEAKS TO THE ATTENDEES OF THE WOMEN IN ENGINEERING MEETING.

Photo above taken by Kate Avery at Women in Engineering Initiative Launch on March 3, 2023.

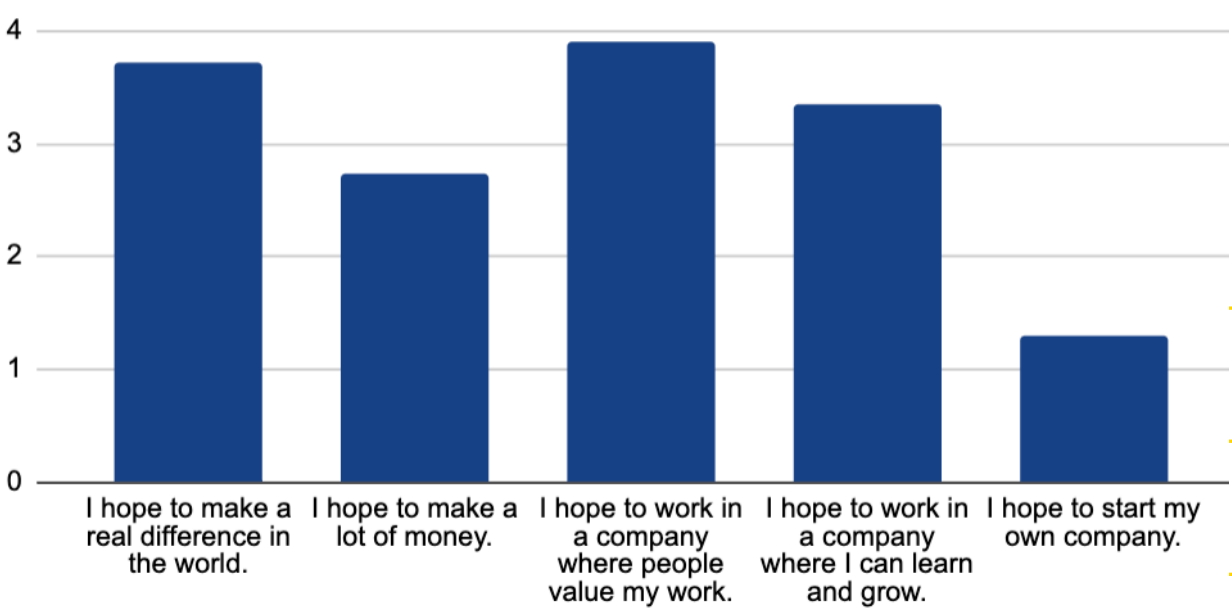
EXPLORING CAREER CONCERNS AND ASPIRATIONS

VOICES IN ENGINEERING: HOPES AND FEARS FOR A SUCCESSFUL CAREER

As the push for diversity and inclusion in the field of engineering continues, it's important to hear directly from the voices of women who are considering or pursuing careers in the industry. One way to gain insight into the hopes and fears of undergraduate women engineers is through a straw poll.

We recently asked 113 enrolled CEM women student engineers to complete a survey about their hopes and fears for a career in engineering, to gain insight into their motivations and concerns. 31 undergraduate students completed the poll, revealing that the top-ranked aspiration was to be valued by their employer for their engineering work. The poll also revealed 5 broad themes encompassing common fears CEM's women engineering students have regarding their engineering careers.

TOP-RANKING CAREER ASPIRATIONS OF CEM WOMEN ENGINEERING STUDENTS



WHAT IS YOUR TOP FEAR ABOUT YOUR ENGINEERING CAREER?

THEMES THAT EMERGE FROM THE RESPONSES ARE:

1. **Imposter syndrome:** fears of not being smart or skilled enough, being perceived as a fake.
2. **Gender bias:** fears of being treated as less valuable or capable because of gender.
3. **Career satisfaction:** fears of not finding a career that aligns with personal passions, and/or being unable to contribute meaningfully to the field.
4. **Failure and liability:** fears not graduating, being in debt with no degree, and failures that cause harm to people or property.
5. **Work-life balance:** fears of not having the flexibility to balance work and family responsibilities.

NARRATIVE RESPONSES: PLEASE NOTE SOME OF THE RESPONSES OVERLAP WITH MULTIPLE THEMES.

Not being capable.

Being considered and treated as lesser than a male engineer because of my gender (less qualified, input less important, less respected, etc.)

I would say that I don't really have a personal fear about my engineering career. However one career fear would be if technological advancement slow down in the near future.

That I will fail all my classes and have to drop out and will be in debt with no degree to show for it

I'm afraid I won't really enjoy it.

I never realize my full potential and end up working a super steady, but well paying job that I hate.

That I won't be passionate about my work

Like probably every other person going into engineering I am a little scared of making a mistake that could cause a failure that hurts or kills people.

I'm afraid that I am not smart enough to succeed in this field!

My top fear is that I won't find an engineering career I enjoy. I don't want my career to become a lifelong chore. I'm worried that my community in Alaska won't have the opportunities and variety of work, or I'll have to commute long distances every day.

That I'll never feel experienced enough to make tough calls or manage others

I worry about not actually retaining any information from my schooling and just being a fraud in the workplace. I pretty much fear that I will either A, forget everything B, make a fool of myself or C, everyone will realize that I am a fake (as in, not smart enough) and do not belong there

Not having the correct skills and being compared to the opposite sex

My top fear is being seen as a less valuable and capable team member just because I am a woman.

Liability risk

I'm afraid that I won't be smart enough to do the tasks required of me.

Feeling like I am under prepared & under appreciated (both myself & my work)

Working in an environment where I don't feel supported or satisfied with the career choice I made.

I fear that I don't actually know as much as others in my field, that I don't have enough experience outside of classes in school.

I am a single mother who has to work around my children's lives. I want to gain a job that values my skills and dedication to the job and my team.

I fear that when I graduate, it will be hard to gain employment because I am a woman or that my work will not valued.

My top fear is my achievements being glossed over and my mistakes being highlighted.

Not having the flexibility to stay home and raise children.

I'm afraid of not having anything to contribute to my career field.

My top fear is in a male dominated industry not being taken seriously just because I am a woman

I fear that I will be doing boring work in my life and never touch the exciting stuff that engineering students often talk about being excited about.

Failing all my classes and not graduating and being in debt with no degree to show for it

ROUND TABLE DISCUSSION
THIS WILL TAKE ALL OF US.

INSIGHTS FROM WIE MEETING

During the latter portion of the WiE workshop, the facilitator solicited input from attendees regarding looming engineering challenges, issues that may impact women's participation in Alaska's engineering workforce, and potential actions that the university and stakeholders could undertake together to foster the growth of a more innovative, more gender-balanced engineering workforce. Participant responses are listed in the following bullet points below:

BIG CHALLENGES CALL FOR BIG SOLUTIONS:

Recap of the discussion about Alaska's major near-term engineering challenges. Responses were categorized as either technical/logistical or HR-related challenges.

TECHNICAL/LOGISTICAL CHALLENGES:

- Aging infrastructure
- Lack of redundancy
- CO2 emissions compliance
- Permafrost conditions
- Melting sea ice
- Establishing an aerospace economy
- Adaptation to climate-driven threats
- Undersized construction industry
- Maintaining marine highway
- Cyber security
- Inadequate material supply chain
- Government funding/permitting
- Remote jobsites

HUMAN RESOURCE CHALLENGES:

- Inadequate number of engineering applicants
- Work/life balance
- Family care responsibilities
- Rising cost of living
- Affordable/resilient housing for new workers

PHOTO ABOVE
ATTENDEES IGNITE THE CONVERSATION, SHARING THEIR INSIGHTS AND EXPERIENCES.

Photo above taken by Kate Avery at Women in Engineering Initiative Launch on March 3, 2023.

BREAKING THE BARRIERS: Recap of the recruitment and retention challenges facing women in engineering today.

RECRUITMENT CHALLENGES:

- Competition from other employers
- Applicant confidence in their ability to apply for a challenging position/major
- Positions that require relocation
- Insufficient scholarships for students
- Long hiring process
- Limited diversity of employment options

RETENTION CHALLENGES:

- Low retention rates within the profession (after graduation)
- Lack of representation and/or role models in the workplace
- Management not aware/responsive to women's issues
- Inflexible, non family-friendly workplaces

EMPOWERING WOMEN IN ENGINEERING: Recap of the successful strategies for recruitment and retention in Alaska.

HR/BENEFIT STRATEGIES:

- Paid parental leave
- Increased child care options
- Salary transparency
- Salary parity

MANAGEMENT STRATEGIES:

- Provide options for remote work (work from home)
- Encourage/empower women to speak their minds
- Promote supportive organizational culture
- Encourage leaders to listen
- Promote diversity as a personal value in addition to a corporate value
- Communicate the social and community value of the work/business
- Establish role models and cohorts

UNITING FORCES: Recap of potential collaborative strategies for University and Industry Stakeholders.

ACTIVITIES IN THE COMMUNITY/WORKPLACE:

- Collect funding for bus service to shuttle k-12 students to university outreach activities
- Explain range of engineering career opportunities to k-12 students
- Conduct field trips/tours of industry sites with engineering students
- Encourage women professionals/industry to visit primary classrooms
- Promote job shadowing for women interested in engineering
- Engage with the Children's Museum
- Define/elucidate common engineering job ladders, as well as non-traditional engineering jobs
- Form a university/industry cooperative to coordinate local and rural outreach
- Promote safe workplaces through training and organizational culture
- Develop regional centers of engineering and remote work policies for rural residents
- Promote stable funding for the university/faculty

ACTIVITIES IN THE UNIVERSITY:

- Modify curricula to encourage more internships
- Design electives with more input from women engineers
- Create "Big Sister of Engineering" program
- Encourage internships in disciplines beyond engineering
- Develop class/workshop on interviewing/resumes
- Model/develop successful bridging programs utilizing holistic approach to STEM
- Seek women professors of practice (industry professionals) as university instructors
- Garner broader participation beyond the student clubs in co-curricular initiatives
- Pursue gender parity and broader gender representation in university engineering faculty and course curriculum
- Promote professional development/tenure opportunities for women at the university

CONCLUSION AND NEXT STEPS
A CALL TO ACTION FROM DEAN SCHNABEL

NAVIGATING THE MULTIFACETED CHALLENGE OF INCREASING WOMEN IN ALASKA'S ENGINEERING WORKFORCE

As evidenced by the stakeholder input in the preceding section, achieving a significantly higher number of, and a higher fraction of women in Alaska's engineering workforce is a multifaceted challenge that will require not only social/organizational evolution, but also time. However, we believe that goal can be hastened through the intentional and sustained efforts of a broadly-supported and well-coordinated body dedicated to promoting women in engineering. The list of potential joint activities generated in the workshop is broad, yet is by no means complete. There are more ideas waiting to be proposed, and more champions seeking to engage the challenge.

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At the conclusion of the meeting, we invited participants to consider joining a joint task force with the university to further develop the workshop ideas and engender broader support for the initiative. We envision that the task force will meet at least quarterly, will seek to broaden its membership through professional networks, and will ultimately develop and help sustainably deliver a set of actions promoting women in Alaska's engineering workforce. The task force will be scoped to focus on actions that are conducted jointly by university and industry stakeholders.

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We intend to continue inviting volunteers for the task force, and we invite readers to share this document with others who may be interested in joining. We anticipate that we will host a task force meeting via Zoom later this spring to collectively develop a plan of action. In addition, we envision the university will host one or more face-to-face events similar to the March 3rd event during fall 2023 in a different community. Thus, the task force membership is anticipated to grow over time. We appreciate the time and effort our attendees invested during the March 3rd workshop to launch the WiE Initiative. There was a palpable energy in the room that day, and we are enthusiastic to discover where that energy may lead us.

William E. Schnabel, PhD, PE
Dean, UAF College of Engineering and Mines
University of Alaska Fairbanks

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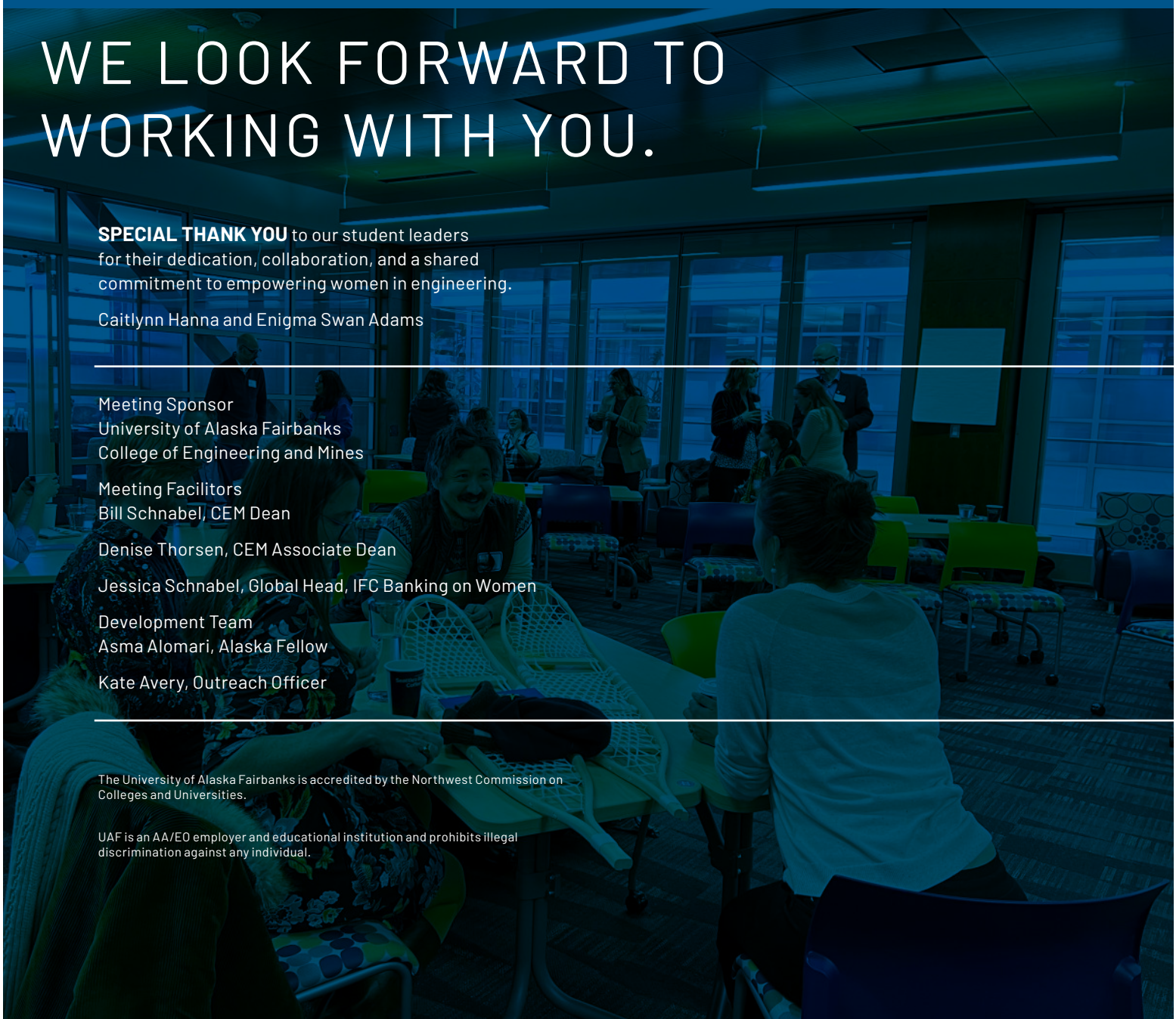
IF YOU ARE INTERESTED IN LEARNING ABOUT OR JOINING OUR ALASKA WOMEN IN ENGINEERING TASK FORCE, PLEASE CONTACT KATE AVERY AT KTAVERY@ALASKA.EDU.

BREAKING BARRIERS, BUILDING RESILIENCE:
WOMEN ENGINEERS POWERING THE ARCTIC'S FUTURE.

THANK YOU FOR SUPPORTING ALASKAN WOMEN IN ENGINEERING.



WE LOOK FORWARD TO WORKING WITH YOU.

SPECIAL THANK YOU to our student leaders for their dedication, collaboration, and a shared commitment to empowering women in engineering.

Caitlynn Hanna and Enigma Swan Adams

Meeting Sponsor
University of Alaska Fairbanks
College of Engineering and Mines

Meeting Facilitors
Bill Schnabel, CEM Dean

Denise Thorsen, CEM Associate Dean

Jessica Schnabel, Global Head, IFC Banking on Women

Development Team
Asma Alomari, Alaska Fellow

Kate Avery, Outreach Officer

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