



The mission of the University of Alaska Fairbanks (UAF) office of Undergraduate Research and Scholarly Activity (URSA), which was established in 2011, is to support, develop, and institutionalize UAF's diverse and robust undergraduate research and scholarly activity programs. This activity refers to student-faculty collaboration in the creation of discipline-specific and interdisciplinary knowledge. The primary means by which URSA fulfills its mission are as follows:

1. Provide funding for undergraduate students and faculty who collaborate on research and creative projects and activities;
2. Serve as a clearinghouse for projects that offer undergraduate students and faculty opportunities to collaborate in research or creative projects and activities;
3. Assist UAF faculty and staff who strive to create or maintain undergraduate research and creative scholarly programs;
4. Create regular events that serve as venues for students to present their research and creative projects and activities;
5. Catalog and archive UAF undergraduate student participation in research and creative projects, as well as the outcomes and products of those projects; and
6. Facilitate UAF undergraduate student recruitment and retention initiatives through program-specific initiatives.

Through these programs and initiatives, URSA aims to improve skills in critical thinking, creative problem solving, communication, and methods of inquiry and to engender a culture of life-long learning for all students, as well as enhance preparation and education of undergraduates who will fill the needs of Alaska's 21<sup>st</sup> century workforce and society. URSA is UAF's resource for the development and promotion of experiential learning activities that engage undergraduate students, regardless of discipline, in support of UAF's goal to be a leading student-oriented research university. Based on the 2016 National Survey of Student Engagement (NSSE) for

1. URSA Administration
  - a. Trent Sutton, UAF Department of Fisheries, continues as the URSA Director (18% of time year-round).
  - b. Kate Pendleton continues to serve as the full-time URSA Coordinator during the academic year and half-time during the summer.
  - c. The URSA Faculty Advisory Board was expanded to include the following UAF faculty: Brian Hemphill and Charles Mason from College of Liberal Arts (CLA), Nicole Cundiff and Josh Lupinek from School of Management (SOM), Carie Green and JoAnne Healy from School of Education (SOE), Steffi Ickert-Bond and Kris Hundertmark from College of Natural Science and Mathematics (CNSM), Sunwoo Kim and Sveta Stuefer from College of Engineering and Mines (CEM), David Valentine and David Verbyla from School of Natural Resources and Extension (SNRE), Andrew Seitz from College of Fisheries and Ocean Sciences (CFOS), Anshul Pandaya from College of Rural and Community Development (CRCDD), and Alexandra Fitts, UAF Vice-Provost.
  - d. An URSA Student Advisory Board was created in 2017, which included the following UAF undergraduates: Pomi Chafin from School of Management (SOM), Luke Rogers from College of Natural Science and Mathematics (CNSM), Cynthia Nelson from College of Fisheries and Ocean Sciences (CFOS), Jessica Herzog from School of Natural Resources and Extension (SNRE), Maria Jacobson-Panozo from College of Rural and Community Development (CRCDD), Jessica Obermiller from College of Liberal Arts (CLA), Elizabeth Smith from School of Education (SOE), and Katie Aikens from College of Engineering and Mines (CEM).
  - e. The URSA Review Panel included the following UAF faculty: Andrea Bersamin, Wendy Croskrey, Elaine Drew, Devin Drown, Greg Finstad, Alexandra Fitts, Javier Fochessato, Jennifer Guerard, Brian Hemphill, Falk Huettman, Sun Woo Kim, Ilana Kingsley, Ellen Lopez, Charles Mason, Amy May, Ryan Oliver, Josh Reuther, Andrew Seitz, Dave Verbyla, Peter Webley, and Peter Westley.
  
2. Funding Awards
  - a. The total amount of funding awarded by URSA in FY2017-18 were \$338,770 (140 awards total).
  - b. A total of \$285,571 was allocated during AY2017-18 for undergraduate student projects (fall/spring projects and Summer Undergraduate Research projects), undergraduate student travel, Research and Creative Activity Day awards, and mentoring awards. The funding for these awards are derived from UAF's reinvestment of 1% ICR into undergraduate student research and creative activity. Funding was allocated as follows:
    - i. Fall and Spring Undergraduate Project Awards (28 awards [62 applicants] totaling \$65,069)
    - ii. Undergraduate Student Travel Awards (31 awards [59 applicants] totaling \$50,484)
    - iii. Summer Undergraduate Research Project Awards (15 awards [30 applicants] totaling \$71,137)
    - iv. Mentoring Awards (22 awards [59 applicants] totaling \$93,868)
    - v. Research and Creative Activity Day Awards (28 awards [142 applicants] totaling \$7,000)
  - c. Innovative Technology and Equipment (ITE) Awards (9 awards [31 applicants] totaling \$53,199). The ITE Awards represented a funding line (former UAF Technology Advisory Board [TAB] funds) through URSA starting in 2015, which was used to support equipment and associated software in support of undergraduate and graduate education and research at UAF. These funds are derived from 20% of the student technology fee.

3. Clearinghouse for Undergraduate Student Opportunities
  - a. URSA continues to serve as UAF's clearinghouse for undergraduate student opportunities to engage in unique projects conducting research or creative scholarly activities. However, the process is informal (reliant on passive communication) and thus quantifying URSA's role as clearinghouse or student-faculty matchmaker is difficult because URSA is not a student program; rather, URSA is an embodiment of UAF's institutional support for undergraduate student and faculty collaboration in research and creative projects.
  - b. Fourteen UAF students enrolled URSA and MRAP (Museum Research Apprenticeship Program) courses during AY2017-18 (see 5. Curriculum Development below).
  - c. One hundred thirty UAF students received URSA funding in support of research or creative scholarship during the fall, spring, and summer of AY2017-18, and an additional 265 students applied but did not receive funding (395 total applicants). Some of these students may have been matched with their project either directly by URSA or indirectly through URSA's request for proposals. In addition, walk-in students seeking advice with respect to identifying research opportunities and/or mentors are frequent in the URSA office (weekly at a minimum and daily in the weeks at the beginning of a semester and around an URSA application deadline date). URSA has not tracked or followed up with these ad hoc advisees because they do not all apply for funding and, as a result, are not entered into the database.
4. Student Tracking and Project Cataloging
  - a. The URSA database currently has 2,235 UAF undergraduates that have been involved in research and creative activity since its creation in 2012.
  - b. The 2013-2014 UAF accreditation report stated that 41% of UAF undergraduate students have participated in an academic research experience over the course of their baccalaureate studies. Further, the 2,235 students in the URSA database support that quantification of undergraduate student participation in research. Not included in the accreditation documents and not yet included in the URSA database are undergraduate students who are employed as research assistants. URSA has been working with UAF Human Resources and the UAF Office of Planning, Analysis, and Institutional Research (PAIR) to identify a means to include such students in the database.
  - c. An online version of UAF Research and Creative Activity Day has been created within the Institutional Repository, which is a joint effort of URSA and Library Sciences Staff.  
<https://scholarworks.alaska.edu/>.
  - d. Gary Hagestead in the Office of PAIR continued to work on streamlining the process of populating the URSA database to allow for more detailed and comprehensive tracking and reporting of undergraduate student research and creative scholarly activities. Gary retired as of May 1, 2018 and Derek Bastille of the Office of Management and Budget has taken over some of his duties. URSA worked with the UAF Deans to identify research-focused undergraduate courses in their respective academic programs to generate more accurate and comprehensive data on the involvement of undergraduates in research and creative activities at UAF.
5. Curriculum Development
  - a. URSA (Undergraduate Research and Scholarly Activity) courses offered in AY2017-18
    - i. URSA 388 Undergraduate Research and Scholarly Activity I (Instructor: Trent Sutton; Enrollment: 2 students)
    - ii. URSA 488 Undergraduate Research and Creative Scholarship II (Instructor: Trent Sutton; Enrollment: 2 students)
  - b. MRAP (Museum Research Apprentice Program) courses offered in AY2017-18
    - i. MRAP 288 Museum Research Apprenticeship I (Instructor: Joshua Reuther; Enrollment: 2 students, Kevin Winker: Enrollment: 4 students)

- ii. MRAP 488 Museum Research Apprenticeship II (Instructors: Joshua Reuther; Enrollment: 2 students, Link Olson; Enrollment 1 student)
6. Research and Creative Activity Day
- a. The UAF Research and Creative Activity Day was held on 10 April 2018; a total of 142 UAF undergraduate students presented or hosted displays at the event.
  - b. Dean's Choice Awards (\$250 per student per school/college, up to five students per school/college) were given for each college or school; the awardees and their poster title for each college/school were as follows:
    - i. College of Engineering and Mines (CEM) – Kimber Harnar (Soil Freezing and Wetting Curves: Their Relationship to the Clausius-Clapeyron Equation); Brandt Lomen (Pseudo-Sun Instrument); Ryan Stonebraker, Collin Lasley, and Tristan VanCise (Calamine: A Virtual Reality Programming Language); Duncan Fisher, Levi Purdy, and Michael Radotich (UAF/AIAA Design/Build/Fly); Ross Boling, Evan Denty, Bong Chon, and Ryan Goldfuss (Design of an Isolating Aircraft Cabin Air Curtain for a Safer Air Environment).
    - ii. College of Liberal Arts (CLA) – Saran Manriquez (Bright Ideas: Professional Lighting Using Everyday Objects); Colleen Mertes (Challenging Male Sexual Dominance and Asserting Female Sexuality Through Rugby Songs); Kevin Huo, Jason Kells, and Fionna Fadum (Health and Wellness for UAF Students Living on Campus: Resources, Gaps, and Recommendations); Alexandra Brown-Ardnt, Sabrina Austin, and Didar Baumgartner (Attitude Matters: Unique Factors that Contribute to Healthy Aging in Residents of Central Alaska).
    - iii. College of Natural Science and Mathematics (CNSM) – Tracy Asicksik (Development of High Spatial Resolution Imagery for the Cities of Dillingham, Ekuk, and Naknek, Alaska Using Structure-From-Motion Software); Jeremy Thomas (Transient Activity Patterns in Coupled Neuron Networks); Elise Stacy (Exploring the Population Dynamics of American Marten in Interior Alaska); Mackenzie Jenkins (Neurochemical Pathways in the Brainstem Involved in A1 Adenosine Receptor Agonist-Induced Hibernation in the Arctic Ground Squirrel); Diane Murph (Dietary Associations With Carbon-13 in Breath).
    - iv. School of Education (SOE) – Shayle Liaban (Young Children's Drawings of Outdoor Adventures in Rural Alaska).
    - v. College of Fisheries and Ocean Sciences (CFOS) – Maximillian Erickson and Tibor Dorsaz (The Design and Construction of an Intermittent-Flow Respirometer); Alyx Hoover and Diedra Neeley (Viability of Using RADseq to Resolve Polychaete Phylogeny- A Pilot Study); Noah Khalsa (eDNA Mapping of Juvenile Chinook Salmon Overwintering Distributions); Cynthia Nelson (Alaska Juvenile Salmon Response to a Visual Stimuli); Joseph Spencer (Growth and Diet Characteristics of Northern Pike in Native and Invasive Habitats).
    - vi. School of Natural Resources and Extension (SNRE) – David Rhodes (Interpretive Trail of the T-Field Exotic Tree Plantation); Roger Ridenour (The Arctic Biosphere Container); Kimberly Diamond (Cost-Benefit Analysis of Commuting Methods in Alaska: Drive or Ride?); Hannah Gerrish and Max Newton (Mapping Dall Sheep Habitat Changes with NDVI in Gates of the Arctic National Park and Preserve).
    - vii. College of Community and Rural Development (CRCRD) – Maria Jacobsen-Panozo (Shifting Focus- Indigenous Land Claims in Bolivia).
    - viii. School of Management (SOM) Lufti Lena (University of Alaska Fairbanks Student Investment Fund); Corey LePore and Alex Springer (Ocean Acidification Fast Fact Research).

## 7. Student Highlights:

- a. Evan Denty, Bong Chon, Ross Boling, and Ryan Goldfuss (CEM – Mechanical Engineering) researched the design of a novel aircraft passenger-seat ventilation system that uses an innovative air curtain to aid in isolating breathing air between passengers to significantly reduce the potential spread of airborne pathogens and thereby reducing the potential for a pandemic.
- b. Tristan Van Cise, Ryan Stonebraker, and Collin Lasley (CEM - Computer science) worked on a program called Calamine, a platform centered on motion-based programming using virtual reality. Traditionally, programming adopts a static nature; one sits in a chair and types. With Calamine, the goal is to remedy this inherent lack of physical activity and usher in a new development medium for those interested in learning code.
- c. Tibor Dorsaz (CFOS - Fisheries) reared juvenile Broad Whitefish under multiple water temperatures to quantify physiological parameters such as length or metabolic rate to predict growth responses of this crucial subsistence fish species in the face of climate change.
- d. Rose Crelli (CLA - Music) attended the 14-day intensive Marrowstone Festival to better understand the preparation process for a career with a major Symphony Orchestra by participating in rehearsals and concerts, observing masterclasses, and receiving private lessons.
- e. Krystina Stobinski's (CLA - Psychology) designed a project to qualitatively explore the relationship between students with math anxiety, their professors, and university math programs. Outcomes will include betterment of University math programs as well as increased student confidence and academic success.
- f. Emily Dreher's (CLA - Anthropology) project used critical discourse analysis to compare representations of two sporting events in which human and animal athletes compete together: dog mushing and horse racing. Social and mass media coverage of significant horse and sled dog races was examined to see how sport enthusiasts and critics constitute animals-as-athletes.
- g. Colleen Mertes's (CLA - Linguistics) project analyzed rugby songs. The songs, notable for bawdy lyrics, are sung at “socials.” Her aim was to understand how women rugby players negotiate singing phallogocentric and misogynistic lyrics. She drew from linguistic anthropology research on swearing, stereotypes about gendered speech, and linguistic meaning in communities of practice.
- h. Trevor Grams's (CNSM - Geoscience) project involved the creation of an unmanned aerial system which was used to develop a 3-D model of snow depth variability across micro-terrain features after snow and wind events in Thompson Pass, Alaska. The model was displayed in EPSCoR’s virtual reality and assisted with avalanche education efforts by the Eastern Alaska Range Avalanche Center.
- i. Elise Stacy (CNSM - Biology) presented her research at the New Mexico National Wildlife Society Meeting. Stacy said, “Presenting my research in front of a broader audience will push me out of my comfort zone when it comes to presenting my research. Presenting to a larger, unfamiliar and more critical audience was good practice and will push me to work on my presenting skills and feel confident in my research.”
- j. James Campbell's (CNSM - Chemistry) project involved iron and copper aerosols which pose serious health risks. Using air samples collected every hour throughout the summer, he analyzed the concentrations for trends which were compared to other data collected during the winter.
- k. Jeremy Thomas's (CNSM - Physics) project involved spontaneous switching between differently ordered activity patterns is observed in coupled neuron networks. Transient activity at the network and system level has underlying mechanisms that are relatively unknown. Numerical simulations and statistical methods determined the types of pattern switching, the associated time scales, sensitivity, and dependence on network coupling.
- l. Cole Berner's (SOM - Business Administration) project “Conduct Secondary Data Analysis Research Using the Pareto Principle examined whether an NBA team’s top 20% of players, in terms of salary, usage percentage, and simple game score, produced 80% of the team’s production, as well as if approaching the 80/20 rule correlates with regular season win percentage.

## 8. Mentor Highlights:

Elaine Drew (CLA – Anthropology) mentored three undergraduate students in a socio-behavioral health study about student health and wellness on UAF campus. The funding supported materials for student training, data collection, and analysis as well as student stipends.

Claudia Ihl (Northwest Campus – Science) and a student investigated the foraging and habitat choices of urban Muskoxen during summer to better understanding why they are in Nome and how their presence near houses and dog yards could be discouraged. Muskoxen within Nome city limits have killed many dogs and their presence is causing much anxiety to local residents.

Andres Lopez (CFOS – Fisheries) mentored three undergraduate students as they conducted the first genome-wide survey of genetic diversity for Alaskan populations of Lake Trout. Activities included training and direct experience with advanced molecular biology techniques.

Brandon Boylan (CLA – Political Science) mentored the UAF Model UN team, which was comprised of undergraduate students from diverse disciplines across UAF, as they competed in the National Model United Nations (NMUN) conference in New York in March 2018.

Abel Bult-Ito (CNSM – Biology) mentored undergraduate students in his study of spontaneously compulsive-like Mice. This funded allowed the group to confirm dFBr effects in females and strengthen their full patent application which was submitted in March 2017.

Angela Gastaldi (CFOS – Fisheries) and her two mentored students performed a pilot study to test the viability of using RADseq, a form of next-generation sequencing, on polychaete worms.

Duncan Green (CFOS – Fisheries) and two undergraduate students designed, built, and tested a respirometer used for measuring oxygen consumption rates of fishes. In addition to exposure to the design and fabrication process, the undergraduate students gained experience in laboratory methods. Daisy Huang (CEM – Mechanical Engineering) mentored two undergraduate students who tested the frictional properties of sled runners under varying controlled conditions. Iditarod musher Ken Anderson provided guidance. Testing was both in a laboratory setting and on actual sleds on natural snow, under different loading and speeds.

Lawrence Itela (CNSM – Chemistry) mentored an undergraduate student who studied the degradation of the antiretroviral compounds (nevirapine, lamivudine, and zidovudine) via photolysis under ambient environmental conditions. The project provided a training model for the introduction of photochemical research while helping elucidate on the kinetics and mechanisms of photo-degradation of these drugs in nature.

Sunwoo Kim (CEM – Mechanical Engineering) mentored two undergraduate students to develop phase-changing heat transfer devices to make it possible to utilize renewable or waste energy and to minimize carbon footprint from the existing carbon-based energy systems in Alaska. The goal was to develop a device for dry cabin dwellers. The heat transfer device was tested and the results showed that a cabin dweller can save about 35% of heating wood by storing the heat from the stove during the evening time and locally using the stored heat during the night.

Kendall Mills (CNSM – Biology) mentored an undergraduate student that identified the genes responsible for melanistic pelage color in two species of Marmots to determine if microbial degradation is selecting for darker pelage in either species. This will help us understand if endangered Vancouver Island Marmots can be genetically rescued by melanistic Hoary Marmots.

Elisabeth Nadin (CNSM – Geology) recruited an undergraduate student to help build structure sandboxes that are used to show how faults form and develop over time. These were used in Structural Geology labs and to develop undergraduate research projects that are relevant to Alaskan geology.

Scott Oliver (CNSM – Chemistry) mentored an undergraduate student to establish a baseline of muscle contractile function, protein expression, and mRNA expression of Rat muscle exposed to normal and hypothermic conditions.







identify additional funding via private donors and grantsmanship as funding resources potentially begin to decline during the current UAF budget crisis.

6. : URSA 388 Undergraduate Research and Creative Scholarship I, URSA 488 Undergraduate Research and Creative Scholarship II 488, and MRAP (Museum Research Apprenticeship Program) 288 and 488. Historically, enrollment in these courses has been low (5-20 students per year), which is in large part due to a general lack of awareness that these opportunities exist. There is tremendous opportunity here to have more students participate in these courses.
7. to help them prepare for research and scholarly projects at UAF, which will include how to identify project ideas and mentors, write competitive proposals, and prepare posters for presentation purposes.
8. at UAF by developing and adopting guidelines, policies, and expectations for both students and mentors. This could result in the development of a student-mentor contract with clear expectations for both individuals (the student and mentor) engaged in research and creative activities. Along with this would be the development of a workshop/expert panel of successful mentors at UAF who would provide the panel audience an opportunity to ask questions and receive feedback on mentoring practices that have and have not worked for them. An outcome of this workshop/panel would be a “best practices” document that URSA can then provide to faculty mentors for guiding their mentoring experience. Another aspect of enhancing the student-mentor experience will be to continue to solicit feedback from students regarding interactions/experiences with their mentor and from mentors regarding their interactions/experiences with their student(s). This feedback will be used to help URSA identify and address potential problem areas as well as highlight positive aspects of the student-mentor relationship.
9. associated with URSA relative to student’s success at UAF. Although URSA has been in place since 2012, a comprehensive outcomes assessment has not been completed on this program. During 2018, the Director and Coordinator of URSA examined metrics used by undergraduate research programs at other universities to identify the appropriate measures for

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	Geosciences	23		\$28,060	\$21,610	\$1,236	\$5,000	\$0	\$250
	Math & Stats.	3	1	\$7,460	\$0	\$0	\$0	\$7,460	\$0
	Physics		4	\$12,241	\$4,100	\$2,000	\$5,000	\$0	\$250

