

## **Oil, Gas, and Energy**

### **Industry Overview**

The development of Alaska's vast oil and gas resources continues to be a vital contributor to the state's economy. As production in the large fields of Prudhoe Bay and Cook Inlet decline, new approaches are needed to safely explore and develop offshore and onshore resources, and to enhance recovery at existing fields, including the extraction of the state's heavy oil reserves. The North Slope's largely underutilized natural gas reserves also offer opportunities for energy production, including resolving technological challenges in delivering that gas to market. A changing Arctic poses new challenges for resource exploration, safe and sustainable development of onshore and off-shore resources, infrastructure construction and other areas. UA is positioned to conduct the research to develop these resources and train a workforce to support the industry in our unique climate and geography.

As recent events in Texas have shown, the disruption of an energy grid can have disastrous, life-threatening consequences. Alaska is highly dependent on small-scale electrical grids (microgrids) utilizing many production strategies including oil and gas, hydroelectric, biomass, wind and solar, and ensuring that all Alaskans have a safe and secure source of electricity is a must. UA, through its Alaska Center for Energy and Power (ACEP) and other programs, is engaged in research into new technologies and in training graduates to install, maintain and manage Alaska's many separate, small and large, energy grids in rural and urban settings. UAF is also home to the US Department of Energy's Arctic Energy Office, proving the potential for partnerships between UA and the DOE's many research facilities.

### **Workforce Training**

The Department of Labor and Workforce Development Research and Analysis office is projecting 3,624 jobs in the oil and gas industry by 2028 (e.g., industrial and mobile machinery mechanics, engineers, process technicians, welders, etc.). The projected annual gap between occupations that require some postsecondary education (new and replacement annual openings) and the completers that education and training providers are currently producing is 532.

### **Funding Impact**

250 additional students per year are estimated to enroll in oil, gas, and energy programs resulting in 625 additional trained and credential workers for this industry sector. (Assuming support for 2,000 COVID impacted Alaskans each year for three years.)

### **Current Program Offerings**

The following programs support the workforce needs of the oil and gas industry and can be completed in less than one or two years:

<b>Program</b>	<b>Program Offerings Total &amp; (100% distance)</b>	<b>Host Location</b>
Engineering	6	Anchorage, Fairbanks
Sustainable Energy	1	Dillingham
Welding	7	Anchorage, Fairbanks, Homer, Kenai, Kodiak, Ketchikan, Sitka
Geology and Geological Science	4	Anchorage, Fairbanks
Heavy Duty Equipment and Power Technology	6	Anchorage, Fairbanks, Ketchikan, Juneau
Occupational Health & Safety	1 (1)	Anchorage
Process and Instrumentation Technology	6	Fairbanks, Kenai

### **Industry Partnerships and Research**

The University of Alaska works closely with industry, landholders and state and federal agencies in a number of areas associated with the oil and gas industry and other energy sectors.

The University of Alaska Fairbanks (UAF) Institute of Northern Engineering and its Petroleum Development Laboratory (PDL) conduct research in viscous and heavy oil recovery and oilfield infrastructure. Oil recovery simulators for research and training to test new concepts in well injection technology will be developed in partnership with industry. Faculty at the University of Alaska Anchorage's (UAA) BP Asset Integrity and Corrosion Lab are studying at pipeline corrosion testing for both the oil and gas industry and water and wastewater utilities.

Thawing permafrost poses a unique threat for Alaska's oil industry. In partnership with industry and the state, engineering faculty at UAA and UAF are developing new construction strategies to stabilize existing facilities and design new roads, runways, gravel pads and building techniques to meet these challenges. As an example of this collaboration, the faculty and students in the UAA Civil Engineering program are working with ConocoPhillips to investigate the properties of thawing permafrost to design a mitigation strategy for casing in current wells, with an eye toward improving future well design.

Satellite remote sensing tools allow for better monitoring of changes to sea-ice and onshore environments to inform industry partners. The UAF Alaska Satellite Facility (ASF) is a world leader in collecting and analyzing satellite remote sensing data and is a part of ongoing research in using a number of different types of information to assist in resource exploration. These techniques are also used by UAF and UAA geologists and geophysicists to collaborate with the Alaska Division of Geological and Geophysical Surveys, the US Geological Survey and industry partners for geological exploration and resource assessment.

The Alaska Center for Unmanned Aircraft System Integration (ACUASI) at University of Alaska Fairbanks is partnering with the Federal Aviation Administration and Alyeska Pipeline Service Company to develop reliable, safe and cost-effective ways of monitoring the Trans-Alaska Pipeline using small unmanned aircraft (drones) that can not only conduct visual surveys, but also include sensors to monitor other changes to the pipeline.

ACEP is working with faculty at UAA, UAF and UAS, community partners and rural electric utilities to move our research from the laboratory directly into Alaska communities where novel technology testing can directly benefit residents. Alaska is well positioned to serve as a testing ground for new distributed energy technologies, particularly related to renewable energy and beneficial and equitable electrification. Rural Alaska was one of the last places in the U.S. to be electrified, but is now considered a global leader in incorporating different renewable energy sources using a variety of innovative strategies.

### **Funding Impact**

Support for 5-10 specialist/post-doc fellows, 10-15 graduate and undergraduate student assistants, focus on up to 10 applied and proof of concept projects in partnership with industry.

## **Mining and Strategic Minerals**

### **Industry Overview**

Alaska offers vast mining opportunities across the state and it plays an important role in sustaining Alaska's economy. Mining in Alaska includes exploration, development and production of gold, silver, copper, zinc, lead, coal and even construction materials. With all of these possibilities, mining provides thousands of jobs to Alaskans. Rare earth elements and other critical minerals (REE-CMs) are strategic components of many technologies that are now a part of daily life and having a secure source of these minerals is vital to the nation's security. Therefore, it is critical that the US develop Alaska's largely untapped resources to reduce dependence on imported REE-CMs. Accessing these REE-CM resources locked in our bedrock and coal deposits will require a highly skilled workforce and the development of new exploration, extraction and production technologies. Partnerships between UA, industry, the state and agencies such as the US Department of Energy will make Alaska the nation's REE-CM powerhouse.

### **Workforce Training**

According to the Department of Labor and Workforce Development Research and Analysis office, the mining sector is projected to grow by 28% for a total of 3,587 jobs by 2028 (e.g., mining and geological engineers, geoscientists, heavy tractor/truck drivers, etc.). The projected annual gap between occupations that require some postsecondary education (new and replacement annual openings) and the completers that education and training providers are currently producing is 314.

### **Funding Impact**

250 additional students per year are estimated to enroll in mining programs resulting in 625 additional trained and credential workers for this industry sector. (Assuming support for 2,000 COVID impacted Alaskans each year for three years.)

### **Current Program Offerings**

The following programs support the workforce needs of the mining industry and can be completed in less than one or two years:

<b>Program*</b>	<b>Program Offerings Total &amp; (100% distance)</b>	<b>Host Location</b>
Millwright	1	Valdez
Mining Mill Operations	1	Fairbanks
Mining Engineering	1	Fairbanks
Underground and Surface Mine Training (includes industry required safety training)	6 (1)	Delta Junction

\*Geological Sciences, Heavy Duty Equipment, Power Technology, Process Technology, and Welding are also directly linked to mining and previously mentioned in the oil and gas section.

### **Industry Partnerships and Research**

The University of Alaska has a long tradition of working with industry partners in basic research in the exploration, extraction and production of Alaska's mineral wealth. These strong partnerships and the development of new approaches to resource development make UA uniquely positioned to take advantage of the renewed national interest in Alaska's reserves of REE-CMs.

In partnership with the Department of Geological and Geophysical Surveys, the University of Alaska Fairbanks' (UAF) Institute of Northern Engineering and its Mineral Industry Research Laboratory (MIRL) and faculty at UAF and the University of Alaska Anchorage (UAA) are developing proposals to the US Department of Energy to expand UAs research capacity for studying Alaska's strategic mineral resources. Initially proposals center on conducting a broad assessment of Alaska's carbon ore, rare earth, and critical minerals found in several of Alaska's coal basins, but future work will extend to other geologic settings. Critical to the success of these initiatives and to the engagement of potential industry

partners will be the development of new equipment and technologies in MIRE that will provide opportunities for undergraduate and graduate research and training for post-doctoral researchers. As part of this project, faculty and students at UAA are conducting pioneering research in how microbes might assist in the extraction of REEs or other elements from coal.

As with many other resource assessments, the use of satellite-based remote sensing techniques and unmanned aircraft is becoming more widespread in the industry. The UAF Alaska Satellite Facility (ASF) is a world leader in collecting and analyzing satellite remote sensing data and is a part of ongoing research in using a number of different types of remote sensing information to assist in resource exploration. These techniques are also used by UAF and UAA geologists, geophysicists and engineers to collaborate with the Alaska Division of Geological and Geophysical Surveys, the US Geological Survey and industry partners for geological exploration, mapping and resource assessment.

UAF's Alaska Center for Unmanned Aircraft System Integration (ACUASI) at University of Alaska Fairbanks is using small unmanned aircraft (drones) that can be equipped with cameras and other sensors that can pick up unique signatures of many economically important minerals to aid in resource exploration.

While Alaska has great mineral wealth, one limitation to the extraction of that mineral wealth in places such as the Donlin Gold deposit in western Alaska has been in having a local economic supply of power and other infrastructure to support the mining and on-site processing operations. The Alaska Center for Energy and Power (ACEP) is working with industry and community partners to develop small local energy grids (microgrids) using a variety of power options to supply the electricity necessary to sustain these types of operations.

### **Funding Impact**

Support for 3-5 specialist/post-doc fellows, 7-10 graduate and undergraduate student assistants, focus on 5-10 applied and proof of concept projects in partnership with the mining industry.

## Construction and Infrastructure

### Industry Overview

Alaska's communities face many challenges including an aging infrastructure, a changing climate that threatens coastal communities and industries, the risks posed by being a seismically active state and the desire to develop new industries on land that poses unique construction challenges. Thus, there is a critical need to develop new technologies and approaches to construction in the Arctic and the need to develop or retrain a highly skilled workforce to meet Alaska's future infrastructure challenges.

Construction employment is divided into three major categories according to the type of work: construction of buildings, heavy construction, and specialty trade contractors. The buildings category is primarily for residential and commercial structures such as homes, hotels, schools, hospitals, and stores. Heavy construction firms handle large projects ranging from infrastructure such as roads and bridges to pipeline construction, other oil and gas work, power plants, and other heavy and civil and defense projects. The largest category, specialty contractors, focuses on jobs such as painting, plumbing, electrical work, concrete, framing, glass, and erecting structural steel. In many cases, a project involves all three categories.

### Workforce Training

According to the Department of Labor and Workforce Development Research and Analysis office, the construction sector is projected to grow by 10.7% for a total of 16,693 jobs by 2028 (e.g., construction managers, heating and refrigeration mechanics, carpenters, engineers, surveyors etc.). The projected annual gap between occupations that require some postsecondary education (new and replacement annual openings) and the completers that education and training providers are currently producing is 1,004.

### Funding Impact:

450 additional students per year are estimated to enroll in construction trades programs resulting in 1,125 additional trained and credential workers for this industry sector. (Assuming support for 2,000 COVID impacted Alaskans each year for three years.)

### Current Program Offerings

The following programs support the workforce needs of the construction industry and can be completed in one or two years:

Program	Program Offerings	Host Location
Apprenticeship Technology	2	Anchorage, Fairbanks
Architectural Technology	6	Anchorage, Fairbanks, Juneau
Construction Technology	9	Dillingham, Fairbanks, Juneau, Sitka
Construction Management	2	Anchorage, Fairbanks
Engineering, Civil & Interdisciplinary	3	Anchorage, Fairbanks
Project Management	1	Anchorage
Geomatics	1	Anchorage
Residential Heat/Vent Technology	4	Mat-Su

\*Heavy Duty Equipment, Power Technology, and Welding are also directly linked to construction and previously mentioned in the oil and gas section.

### Industry Partnerships and Research

Research in support of Arctic infrastructure innovation in the College of Engineering and Mines at the University of Alaska Fairbanks (UAF) and the College of Engineering at the University of Alaska Anchorage (UAA) focuses on developing techniques for Alaska's unique climate. For example, UAF's Arctic Infrastructure Development Center which had a focus on building northern roads, bridges and airports will now expand to study other elements of cold-region engineering. Those include the effect of thawing permafrost on communities and city services, techniques to address climate change impacts, and building design.

As the Arctic changes, stability of permafrost is of concern to many industries, but most notably to the oil and gas industry on Alaska's north slope. The continued stability of roads, gravel pads supporting infrastructure and the trans-Alaska pipeline are critical to Alaska's economy, and UAA and UAF researchers are working with industry to assess permafrost degradation and developing techniques to stabilize existing infrastructure while developing new construction methods.

**Funding Impact:**

Support for 1-3 specialist/post-doc fellows, 3-5 graduate and undergraduate student assistants, focus on up to 5 applied and proof of concept projects in partnership with the construction and infrastructure. Note much of Alaska's infrastructure focus is on Arctic environment. There will be crossover of projects in the Arctic section and construction and infrastructure.

## **Fisheries, Mariculture and Maritime Industries**

### **Industry Overview**

Alaska is a maritime state. The sectors that drive our economy are dependent on direct maritime activity and support. The waters off Alaska's shores produce more than 60 percent of the nation's seafood harvest. Ensuring that this resource is developed in a sustainable manner is also critical to Alaska's food security, especially in our rural communities. Communities and consumers depend upon marine lines for fuel, durable goods and consumer products. Ferries, cruise ships, and personal watercraft keep our waters filled with commuters, fishers, and sightseers, generating hundreds of millions of dollars annually to Alaska's economy. All of this requires a skilled and able workforce.

Alaska has all the qualities of an ideal environment for mariculture development: clean and abundant waters, hardy citizens with maritime experience, and an existing seafood industry and infrastructure. The state has research and development capacity at the University and industry level, as well as a sophisticated seafood marketing organization that effectively reaches consumers all over the nation and the world. Expanding the mariculture industry will bolster the economy of our state, in particular the coastal communities where much of the seafood infrastructure and experience already exist.

Alaska's substantial ocean economy—its "blue economy"—depends significantly on marine research, education and public engagement. Alaska's oceans, coasts and connecting inland waters are under increasing pressure from external forcing and environmental change. The rapidly changing Arctic is experiencing declining sea ice, increasing ocean acidification, and shifts in aquatic food-web dynamics. Changes to these aquatic ecosystems have far-ranging implications not only for the health, economy and security of Alaska, but for the entire nation.

### **Workforce Training**

According to the Department of Labor and Workforce Development Research and Analysis office, the seafood sector is projected to grow by 8.0% for a total of 9,482 jobs by 2028. The fisheries sector is a part of the agriculture, forestry, fishing, and hunter sector that is projected to grow by 37.2%, adding 490 jobs for a total of 1,808 by 2028. While they project water transportation to slightly decrease by 1%, there are still over 1,200 jobs projected by 2028.

### **Funding Impact**

400 additional students per year are estimated to enroll in fisheries, mariculture, and maritime programs resulting in 1,000 additional trained and credential workers for this industry sector. (Assuming support for 2,000 COVID impacted Alaskans each year for three years.)

### **Current Program Offerings**

The following programs support the workforce needs of the fisheries, mariculture, and maritime industries and can be completed in less than one or two years:

<b>Program*</b>	<b>Program Offerings Total &amp; (100% distance)</b>	<b>Host Location</b>
Fisheries Technology	2 (2)	Sitka
Fisheries	1	Fairbanks
Marine Biology	2	Fairbanks
Salmon Enhancement	1 (1)	Sitka
Scientific Diving	1	Sitka
Natural Resource Management	3	Fairbanks
Oceanography and Conservation	2 (1)	Fairbanks
Mariculture	1	Ketchikan, Kodiak, Sitka
Marine Transportation**	3	Homer, Ketchikan
Maritime Multi Skilled Worker**	5	Dillingham, Homer, Ketchikan, Kodiak, Valdez

\*Welding is also directly linked to maritime and previously mentioned in the oil and gas section.

\*\*Delivery is expanded through the Alaska Maritime Education Consortium, UA's partnership with the Dept. of Labor and Workforce Development that operates the Alaska Vocational Technical Center.

### **Industry Partnerships and Research**

The College of Fisheries and Ocean Science (CFOS) at the University of Alaska Fairbanks (UAF) conducts a broad range of research in fisheries, oceanography and marine biology in partnership with faculty at UAF, the University of Alaska Southeast (UAS) and the University of Alaska Anchorage (UAA). CFOS projects range from hypothesis-driven studies to long-term monitoring time series to large integrative projects such as ocean acidification and warming, migration of fish stocks, and climate change. Of note is a partnership between CFOS researchers and Alaska Native communities to bring a more traditional and culturally responsible approach to salmon resource management to the planning and resource allocation process. CFOS is home to the "Sikuliaq", a National Science Foundation research ship that serves as a platform for much of the oceanographic research in Alaska's waters.

Working with programs across the UA system and external partners including local communities, CFOS has created the Alaska Blue Economy Center (ABEC). This center aims to boost Alaska's blue economy by serving as a resource and support center for research, instruction, and outreach related to Alaska's vast aquatic resources and ecosystems.

Alaska Sea Grant, one of 34 Sea Grant programs nationwide with support from NOAA, is a statewide program headquartered at the University of Alaska Fairbanks that supports healthy coastal resources, strong economies, and vibrant communities through research, education, and outreach via Marine Advisory agents who live and work in eight coastal communities across Alaska.

Mariculture, the "farming" of aquatic plants and animals in salt water, is a major economic opportunity for many coastal communities in Alaska. UAS and UAF are leading a system-wide collaboration with local communities and the new industry to develop methods to better sustainably cultivate and market shellfish and seaweed (kelp) products to a national and international market.

### **Funding Impact**

Support for 5-10 specialist/post-doc fellows, 10-15 graduate and undergraduate student assistants, focus on 10 or more applied and proof of concept projects in partnership with the fishing and mariculture industry.



## **Arctic and National Defense**

### **Industry Overview**

The Arctic is changing, and with this change are challenges and opportunities that a more ice-free Arctic Ocean and changing climate present. With the possibility of northern shipping routes, on-shore and undersea resource development, ecological changes and threats to national security, Alaska and UA are poised to take advantage of our expertise and location to shape the nation's Arctic strategy. UA's research and academic programs with focus on the Arctic and its unique challenges are many and represent a valuable asset for the state. Areas of research with special focus on the Arctic, its environment and its people include Arctic security, telecommunications, ice and ocean research, indigenous knowledge, one health, oil recovery and spill response, energy, mining, fisheries, the impacts of permafrost on infrastructure, using remote sensing and unmanned aerial vehicles (UAVs) for mapping, and resource exploration.

Alaska is also a geologically active state, and the disruptions caused by earthquakes and volcanic eruptions have had and will have significant impacts on Alaska's economy.

Coupled with strong partnerships with industry, communities, native organizations and state and federal agencies, UA is poised to grow programs by conducting basic and applied research to address Alaska's emerging challenges to training a highly-skilled workforce to serve the state and nation.

Of note is the Alaska Satellite Facility (ASF) at the University of Alaska Fairbanks Geophysical Institute. ASF is a NASA funded facility that downlinks, processes, archives and distributes remote-sensing data to users around the world, promoting, facilitating, and participating in the advancement of scientific research, field operations and commercial remote-sensing applications that benefit society.

National Defense and Arctic Security: University of Alaska Anchorage is home to the Arctic Domain Awareness Center (ADAC) as part of the U.S. Department of Homeland Security Center of Excellence Network. ADAC's principal customer is the U.S. Coast Guard (USCG). ADAC investigates capability shortfalls and gaps, and orients research activity to support the USCG mission needs.

UAF's Geophysical Institute is home to the Geophysical Detection of Nuclear Proliferation (GDNP) University Affiliated Research Center (UARC) which was established to detect, locate, characterize, and assess the threat potential of nuclear activities worldwide through research, development, testing, and evaluation of scientific and technological capabilities. The UARC status also enables any federal agency to quickly issue a sole-source contract (task order) that falls under its core mission of the geophysical detection of nuclear proliferation.

UAF is also part of the GeoData Cooperative, a partnership with the National Geospatial-Intelligence Agency (NGA), providing the US Department of Defense with foundational data and geospatial intelligence on the Arctic.

### **Industry Partnerships and Research**

This changing environment impacts a wide range of industry sectors critical to Alaska's economy including oil and gas, mining, fisheries, and the health and wellbeing of communities in rural Alaska. University of Alaska researchers are world leaders in many disciplines of arctic research and in understanding the national security issues associated with a changing arctic.

Collaborations to bring the results of basic and applied research at the University of Alaska to industries and government agencies will be critical as new technologies are developed to meet challenges associated with declining sea-ice, arctic transportation, degrading permafrost, changing ecosystems, coastal erosion that impacts all Alaskans.

The "Fire and Ice" grant funded by the National Science Foundation Established Program to Stimulate Competitive Research (EPSCoR) involves researchers from all three universities to study the impacts of a

changing climate on forest fires and on the changing coastal environment. Partners include state agencies such as the Division of Forestry and the Alaska Department of Fish and Game, as well as industry partners who form an external advisory board to shape how the research can be translated to the private sector. Research done through the Arctic Domain Awareness Center (ADAC) in collaboration with the US Coast Guard seeks to bring an understanding of how the changing ocean system will impact ocean transportation and our national security.

### **Funding Impact**

Support for 8-12 specialist/post-doc fellows, up to 20 graduate and undergraduate student assistants, focus on 10-15 applied and proof of concept projects in partnership with the state, DOD, communities, and industry for leadership in the Arctic.

### **Current Program Offerings**

Most academic disciplines with a focus on the Arctic have one- and two-year graduate programs and certificates and research opportunities for undergraduate majors in baccalaureate programs. Of note is UAF School of Management's Arctic Security Graduate Certificate that provides students with the education and expertise to understand and better navigate the numerous concerns surrounding the Arctic region. With the transforming Arctic and its associated climate, security, geopolitical and resilience-related developments, a thorough understanding of the region will prove to be key to those who work within the fabric of local, state, national and international settings. An Arctic security Graduate Certificate represents an endorsement of advanced academic education and a more robust understanding of the operational context of the Arctic. There is no estimate for workforce training support in this area although it would not be excluded as an option for students receiving workforce training support.

## **Aviation Industry**

### **Industry Overview**

Aviation touches all aspects of life in Alaska. Ted Stevens International Airport is the second ranked airport in the U.S. for landed weight of cargo aircraft, serving as a gateway from Alaska to the world. For rural Alaska, aviation is the lifeblood for many communities as the basic mode of transportation due to the vastness of the state and lack of a rail or highway infrastructure. Approximately 82% of Alaskan communities are not served by roads and have no connection to the contiguous road system. The Alaska Department of Commerce, Community & Economic Development has 393 communities in their database, and the Federal Aviation Administration (FAA) has an additional 99 sites with Location IDs in Alaska. Of these 492 Alaska locations, only 90 sites, or 18%, are on the contiguous paved road system. The remaining 402 sites, or 82%, are off the paved road system and depend on aviation for year-around access.

Aviation programs at the University of Alaska Anchorage and Fairbanks (UAA and UAF) provide options for a complete education as well as offering courses that expand and enhance knowledge to improve career opportunities for students. Over the years, the programs have worked with industry partners who have provided equipment and other support for students. Of particular note, UAA is Alaska's sole provider of a special authorization for the FAA Restricted Airline Transport Pilot (R-ATP) certificate. This authorization provides graduates a fast track to careers with a commercial airline.

### **Workforce Demand**

While the Department of Labor and Workforce Development Research and Analysis office projects a slight decline of 1.9% in air transportation jobs, there will continue to be vacancies within the 6,343 jobs needed by 2028. These vacancies contribute to an annual gap of 561 employees needed to meet the workforce demand of this industry.

### **Funding Impact**

100 additional students per year are estimated to enroll in aviation programs resulting in 250 additional trained and credential workers for this industry sector. (Assuming support for 2,000 COVID impacted Alaskans each year for three years.)

### **Current Program Offerings**

The following programs support the workforce needs of the aviation industry and can be completed in less than one or two years:

<b>Program</b>	<b>Program Offerings</b>	<b>Host Location</b>
Professional Piloting	2	Anchorage, Fairbanks
Aviation Maintenance	6	Anchorage, Fairbanks
Aviation Administration	1	Anchorage
Air Traffic Control	1	Anchorage

## **Unmanned Aviation and Aerospace**

### **Industry Overview**

Unmanned Aviation: Unmanned aircraft systems (UAS) range from small racing drones used in Science, Technology, Engineering, and Mathematics (STEM) outreach to the large 300 lb or greater class of research platform aircraft ideally suited for research in the remote areas of Alaska. In 2013, the Alaska Center for Unmanned Aircraft System Integration (ACUASI) at University of Alaska Fairbanks (UAF), was selected by the Federal Aviation Administration (FAA) as one of six test sites to develop cutting edge technology and applications unmanned aircraft. ACUASI was the first test site to be approved for “beyond line of sight” testing, opening the door for future applications of these systems, and has developed industry and state partnerships to test new systems and to develop new applications.

Currently, ACUASI is developing UAS Traffic Management (UTM) system testing, National Airspace System integration at airports, high altitude (92,000') launches, cargo delivery, critical infrastructure monitoring, marine and land mammal surveys, sea ice modeling, atmospheric sampling, wildfire surveillance, tidewater glacier mapping, and numerous other operations. The ACUASI team has flown true Beyond Visual Line of Sight (BVLOS) operations using satellite command and control over the Arctic Ocean and in Canada, and also flew the BVLOS mission in the National Airspace without having visual observers.

An Alaska team of 21 partners led by UAF has been selected as a participant in the U.S. Department of Transportation's Unmanned Aircraft Systems Integration Pilot Program (IPP). The program allows state, local and tribal governments to work with UAS operators and manufacturers to speed up the safe entry of unmanned vehicles into the nation's airspace.

Aerospace Research: The UAF Geophysical Institute (GI) has maintained the Poker Flat Research Range launch facility for over 50 years. It is the only university-owned rocket range in the U.S. and the largest land-based rocket research range in the world and the nation's only high-latitude rocket , making UAF a leader in space and auroral research. The GI is also a partner with the Alaska Aerospace Corporation, a consortium of private, government and university partners established by the State of Alaska to develop high technology aerospace industry in the state. UAF is also a Space Grant university and receives funding from NASA and NSF for aerospace teaching, research and outreach. Of note, the UAF College of Engineering and Mines offers a minor in Aerospace Engineering.

### **Industry Partnerships and Research**

The use of unmanned aircraft (drones) has applications that extend to many industries including oil and gas, mining, resource exploration and assessment, and fisheries and the applications continue to grow as the technology improves. The Alaska Center for Unmanned Aircraft System Integration (ACUASI) at University of Alaska Fairbanks is recognized as a leader in developing new technologies and uses of UAS and is conducting collaborative research in these and other areas. Working with its industry, state and community partners, ACUASI is developing field-based applications and training for UAS pilots and technicians to work throughout Alaska.

ACUASI is currently partnering with the FAA to develop technologies and applications for specialized UAS remote operations including Beyond Visual Line of Sight (BVLOS) operation which is of interest to industry. As an example, ACUASI is collaborating with Alyeska Pipeline Service Company to develop reliable, safe and cost-effective ways of monitoring the Trans-Alaska Pipeline using small unmanned aircraft that can not only conduct visual surveys, but also include sensors to monitor other changes to the pipeline.

Through its government and industry partners and the Alaska Aerospace Corporation, the University of Alaska Fairbanks Geophysical Institute provides an opportunity for faculty across the UA system to develop research partnerships for development of new technologies and research. Faculty from the GI, and the UAF College of Engineering and Mines and the University of Alaska Anchorage College of

Engineering work on projects in areas such as small single-function satellites designed and built by students (cubesats). Graduates from UA programs have begun to establish Alaska-based aerospace companies (e.g., the Launch Company based in Anchorage and founded by UAF graduate Ben Kelly) to support this growing industry. Through its Poker Flat Rocket Range, the GI is in a position to serve as a testbed for these technologies as well as conducting auroral and atmospheric research in partnership with NASA, NOAA and other federal organizations.

**Funding Impact**

Support for 3-5 specialist/post-doc fellows, 7-10 graduate and undergraduate student assistants, focus on 5-10 applied and proof of concept projects in partnership with the mining industry.

## **Health**

### **Industry Overview**

Alaska's healthcare industry continues to be recognized as the fastest growing industry sector in Alaska. Fifteen of the 25 occupations with the highest projected percent growth are healthcare practitioners or technicians, and five are in healthcare support. Three of the remaining five are also healthcare related: medical secretaries, personal care aides, and healthcare social workers. However, the industry is also experiencing major system wide changes. Complex factors such as the COVID-19 pandemic, the opioid epidemic, mental health, the economy, public policy decisions and the structure and capacity of the healthcare delivery system will impact our future health workforce.

The State of Alaska, the Department of Health and Social Services (DHSS) and Tribal Health organizations continue to move forward with the challenges of making healthcare reform a reality for Alaska, and a major portion of this reform effort has been DHSS's commitment to transformation of the State's system of behavioral healthcare. Significant investments in rural health facilities are expanding accessibility to healthcare as well as opportunity for healthcare professionals. To address the fast-paced growth in this workforce, UA health programs have developed innovative partnerships to fast-track new professionals into health jobs and careers including: stackable certifications, apprenticeships, and on-the-job training models.

### **Workforce Training**

According to the Department of Labor and Workforce Development Research and Analysis office, the healthcare sector is set to grow at twice the rate of the economy overall. By 2028, they project it will grow by 10.3%, adding 5,049 jobs for a total of 54,267. The projected annual gap between the top medical and behavioral health occupations that require some postsecondary education (new and replacement annual openings) and the completers that education and training providers are currently producing is 1,145.

### **Funding Impact**

450 additional students per year are estimated to enroll in one- and two-year health programs resulting in 1125 additional trained and credential workers for this industry sector. (Assuming support for 2,000 COVID impacted Alaskans each year for three years.)

### **Current Program Offerings**

The following programs support the workforce needs of the health industry and can be completed in less than one or two years:

<b>Program</b>	<b>Program Offerings Total &amp; (100% distance)</b>	<b>Host Location</b>
Nursing	3	Anchorage, Bethel, Dillingham, Fairbanks, Homer, Juneau, Kenai, Ketchikan, Kotzebue, Mat-Su, Nome, Petersburg, Sitka, Valdez
Nursing Assisting	3	Anchorage, Fairbanks, Juneau, Sitka
Medical Assisting	4	Anchorage, Fairbanks, Sitka
Medical Billing and Coding	6 (6)	Anchorage, Fairbanks, Sitka
Dental Assisting	4	Anchorage, Fairbanks
Health Information Management	1 (1)	Sitka
Radiologic Technology	4 (4)	Anchorage, Juneau, Ketchikan, Sitka
Medical Laboratory Technology	1	Anchorage
Paramedicine	2	Fairbanks, Kenai, Mat-Su

Social Work	1 (1)	Anchorage
Clinical Psychology	1	Anchorage
Human Services	4	Anchorage, Bethel, Dillingham, Fairbanks, Kotzebue, Mat-Su, Nome
Community and Public Health	3 (3)	Anchorage, Fairbanks
Counseling	3	Anchorage, Fairbanks

Although there are opportunities for industry partnered applied research, the initial focus for health is on the workforce training. If there is a desire to expand, applied research can be added for this sector.

## **Teacher Education**

### **Industry Overview**

Alaska's children are Alaska's future. Having more qualified teachers in classrooms from pre-kindergarten through high school to meet district needs should be the state's highest priority. The recruitment of Alaskans into education careers, preparing them for the classroom in both rural and urban settings and retaining them as professionals in the state will take a collaborative effort from all stakeholders including UA, DEED, communities and native organizations. The first coordinated approach will be starting to reach students while they themselves are in high school, building on existing programs such as Educators Rising, PITAAS (Preparing Indigenous Teachers & Administrators for Alaska's Schools) and dual enrollment or Middle College options. UA already provides pathways for students to enter the profession from a variety of backgrounds with 2- and 4-year pathways to licensure, and working with partners, is developing recruitment strategies and identifying additional programmatic areas of need and opportunity for growth. Working with the school districts, UA's academic programs will need to change to prepare teachers to take advantage of new technologies including distance teaching modalities and to use local context to drive culturally responsive instruction. Finally, there is a need to make the teaching profession more attractive to students by lowering the cost of their university education through grants or stipends or debt relief, and by providing incentives to keep them in the profession.

### **Workforce Training**

Due to reductions in state education funding and a decline in school-age population growth, the Department of Labor and Workforce Development Research and Analysis office is projecting a slight decline of 1.9% in public and private education jobs by 2028. Even so, there will continue to be vacancies within the 20,777 jobs needed annually. These vacancies contribute to an annual gap of 1,283 employees needed to meet the workforce demand of this industry.

### **Funding Impact**

100 additional students per year are estimated to enroll in education programs resulting in 250 additional trained and credential workers for this industry sector. (Assuming support for 2,000 COVID impacted Alaskans each year for three years.)

### **Current Program Offerings**

The following programs support Alaska's teacher education workforce needs and can be completed in one or two years:

<b>Program</b>	<b>Program Offerings Total &amp; (100% distance)</b>	<b>Host Location</b>
Early Childhood	3 (2)	Anchorage, Fairbanks, Statewide
Elementary	3 (2)	Fairbanks, Juneau
Secondary	5 (2)	Fairbanks, Juneau
K-12	12 (4)	Anchorage, Fairbanks, Juneau
Special Education	8 (7)	Anchorage, Fairbanks, Juneau
Speech Language Pathology	1	Anchorage
Counseling	2	Fairbanks
Educational Leadership	3 (2)	Anchorage, Juneau