

The Class of 2024

DOCTOR OF PHILOSOPHY DEGREES

COLLEGE OF BUSINESS AND SECURITY MANAGEMENT

Dr. Cameron Carlson, Dean

Peace Afieroho

Ph.D. Business, Public Policy and Engineering Management: Interdisciplinary Studies

B.E., Enugu State University of Science and Technology, 1996; M.S., Newcastle University, 2007; M.S., University of Alaska Anchorage, 2010; MBA, University of Alaska Anchorage, 2013.

Thesis: Project Management by the People, for the People, and of the People:

Context, Challenges, and Prospects for Adoption of E-Government Tools to Monitor Execution of Public Infrastructure Projects in Nigeria

New models for public participation were contributed to knowledge in project stakeholder management. Key factors for effective public participation and the moderating effects of applying e-government tools to public participation were identified. The models will help practitioners to facilitate public participation and enhance success of public infrastructure projects in Nigeria.

Major professors: Dr. Xiyu Zhou and Dr. Robert Perkins

COLLEGE OF ENGINEERING AND MINES

Dr. William E. Schnabel, Dean

Kelsey Ann Frazier **

Ph.D. Engineering

B.A., Alaska Pacific University, 2006; B.S., University of Alaska Anchorage, 2019; M.S., University of Alaska Anchorage, 2020.

Thesis: Icy Insights: Decrypting the Depths with Novel Stochastic Techniques to Model and Mitigate Arctic Under-Ice Oil Spills

This research analyzed Arctic sea ice's subsurface to create models simulating oil slick movements under the ice. Results revealed significant subsurface variation in first-year ice, underscoring the need for precise, standardized definitions.

This research enhances oil-ice interaction models and emphasizes the critical role of international cooperation in Arctic response strategies.

Major professor: Dr. Rorik Peterson

Fayzul Kabir

Ph.D. Engineering

B.S., Shahjalal University of Science and Technology, 2011; M.S., King Fahd University of Petroleum and Minerals, 2018.

Thesis: Implications of Detachment Promoting Agents, Disinfectants and Flow Hydraulics on Growth and Dispersion of Bacterial Biofilms in Drinking Water Distribution Systems

Biofilms routinely form on drinking water pipes, where they can harbor pathogens and impair downstream water quality. This research examined biofilm formation and detachment, considering factors such as water flow rate, chlorine levels and temperature. The results inform policymakers and water operators to better manage biofilms and protect public health.

Major professor: Dr. Srijan Aggarwal

* Summer degree recipient

** Fall degree recipient

COLLEGE OF FISHERIES AND OCEAN SCIENCES

Dr. S. Bradley Moran, Dean

Lia Katherine Domke **

Ph.D. Fisheries

B.S., Dalhousie University, 2016.

Thesis: The Role of Apex Predators, Habitat, and Seascape Complexity on Nearshore Fish Assemblages in Southeast, Alaska

Nearshore marine ecosystems contain dynamic and complex habitats that offer shelter and prey for juvenile, migratory and residential fish species. These fish communities were structured by habitat type, presence of apex predators and seascape context. Understanding ecological dynamics is vital for evaluating how the nearshore supports robust fisheries.

Major professor: Dr. Ginny Eckert

Courtney Elizabeth Hart **

Ph.D. Fisheries

B.A., University of California, Berkeley, 2006; M.S., California Polytechnic State University, 2016.

Thesis: Uncovering Patterns and Mechanisms of Paralytic Shellfish Toxicity in Alaska's Geoduck Clam Fishery

This research explores the patterns and mechanisms of paralytic shellfish toxicity in commercially harvested geoduck clams caused by the toxin-producing dinoflagellate *Alexandrium catenella* in Southeast Alaska. The incidence of paralytic toxins in geoduck clams increased over the past two decades, and understanding distributions helps reduce deleterious impacts to this fishery.

Major professor: Dr. Ginny Eckert

Hannah Jean Myers **

Ph.D. Marine Biology

B.A., Middlebury College, 2014.

Thesis: Eavesdropping on Killer Whales: Distribution, Calling Rates, and Acoustic Abundance of Fish-Eating and Mammal-Eating Killer Whales in the Gulf of Alaska

Killer whales are top predators and are federally protected in U.S. waters. Management policy is predicated on a species' distribution and abundance. Passive acoustic monitoring was used to uncover seasonal distribution patterns, estimate calling rates and model year-round abundance patterns for three killer whale populations in the Gulf of Alaska.

Major professor: Dr. Brenda Konar

Matthew James Smukall **

Ph.D. Fisheries

B.S., University of Florida, 2009.

Thesis: Relative Abundance and Movement Ecology of Tiger Sharks

(*Galeocerdo cuvier*) in the Waters Surrounding Bimini, The Bahamas

This study investigated the relative abundance and movement ecology for tiger sharks, *Galeocerdo cuvier*, in the waters around Bimini, The Bahamas. The local relative abundance remained stable from 1984 to 2019, but sharks readily moved across jurisdictional boundaries. Localized conservation measures offer some protection but regional management plans are important.

Major professor: Dr. Andrew Seitz

Jared David Weems

Ph.D. Fisheries

B.S., Iowa State University, 2008; M.S., University of Alaska Fairbanks, 2011.

Thesis: Early Life Biology and Ecology of King and Tanner Crabs in the Bering and Chukchi Seas

Several North Pacific crab stocks are in decline, and vulnerable early life stages could be a bottleneck in recruitment. Low abundances of settling Pribilof Islands blue king crabs appear to be limiting stock recruitment, while ubiquitous Bering and Chukchi seas larval snow crabs are typically associated with regional environmental conditions.

Major professors: Dr. Ginny Eckert and Dr. Franz Mueter

* Summer degree recipient

** Fall degree recipient

COLLEGE OF LIBERAL ARTS

Dr. Ellen D. S. Lopez, Dean

Alec Bennet

Ph.D. Climate Security: Interdisciplinary Program

B.S., University of Alaska Southeast, 2005; M.S.D.M., University of Alaska Fairbanks, 2018.

Thesis: Climate Security and Scale: Climate Change Risk and Security as an All-Scales, All-of-Society Challenge

Climate change poses all-of-society, all-scales challenges and requires new approaches toward a common understanding of risks. This dissertation explores issues of climate security through local, regional and global perspectives; computational modeling, security and risk frameworks; and methodological comparisons to explore an interdisciplinary conceptual approach toward climate security and risk.

Major professor: Dr. Brandon Boylan

Kimberly Frost

Ph.D. Educational Psychology and Instructional Design: Interdisciplinary Studies

B.A., University of Arizona, 1990; M.Ed., University of Alaska Anchorage, 2005.

Thesis: The Influence of Play as Positive Emotion on Engagement and Self-Regulated Learning in an Online Higher Education Classroom

This study explored the ability of play-infused learning design to impact student success in an online asynchronous course. Findings suggest that, through positive emotion, play boosts enjoyment, fosters social connections and reduces academic stress. Results indicate that play-infused learning design promotes student success by supporting self-regulated learning and student engagement.

Major professors: Dr. Daní Sheppard and Dr. Richard Webb

Angela Jean Linn **

Ph.D. Museology and Northern History: Interdisciplinary Studies

B.A., University of Iowa, 1994; M.A., University of Alaska Fairbanks, 1999.

Thesis: Preserving Reflections of Ourselves: The Past, Present, and Future of Alaska's Museums

Through diverse methods and an interdisciplinary approach, this study used critical museum theory to examine the past, present and future of Alaska's museums, with a focus on the "big three." It proposes an inclusive approach of truth-telling and shared authority to address past failures and future opportunities for Alaska's museums.

Major professors: Dr. Mary Ehrlander and Dr. Michael Koskey

COLLEGE OF NATURAL SCIENCE AND MATHEMATICS

Dr. Karsten Hueffer, Dean

Derek Arnold **

Ph.D. Biological Sciences

B.S., University of Montana, 2012; M.S., University of Alaska Fairbanks, 2023.

Thesis: Movement Ecology, Survival, and Territorial Dynamics in Canada Lynx (*Lynx canadensis*) Over a Cyclic Population Decline

Population dynamics of lynx cycles are not clearly understood. This research indicated that although physical connectivity is high, population declines are driven by reduced survival in dispersing lynx, which manifests in a population wave traveling eastward. Territorial placement is driven by first open space, with boundaries defined based on landscape characteristics.

Major professor: Dr. Knut Kielland

Anushree Badola *

Ph.D. Geoscience

B.S., Govind Ballabh Pant University of Agriculture and Technology Pantnagar, 2015; M.S., University of Twente, 2019.

Thesis: Improved Boreal Vegetation Mapping Using Imaging Spectroscopy to Aid Wildfire Management, Interior Alaska

Traditionally used vegetation/fuel maps in Alaska are inadequate due to a lack of detailed information, as they are primarily generated using coarser resolution (30-meter) multispectral data. Hyperspectral data were simulated and used to generate high-resolution fuel maps, as well as sub-pixel level needleleaf maps, to aid wildfire management in Alaska.

Major professors: Dr. Santosh Panda and Dr. Uma Bhatt

Nathan Paul Barnes

Ph.D. Physics

B.A., Coe College, 2014.

Thesis: Obstacles to Plasma Flow in an Ion Kinetic Regime: Application to a Terrestrial Ionospheric Active Plasma Experiment and New Horizons Observations of the Pluto System

This dissertation uses global simulations to contextualize data from an active plasma experiment and Pluto's interaction with the solar wind. The relevant scale size is one where the particulars of ion motion are important, but electrons may be treated as a continuous fluid.

Major professor: Dr. Peter Delamere

* Summer degree recipient

** Fall degree recipient

Richard Buzard *

Ph.D. Geoscience

B.S., University of Washington, 2015; M.S., University of Alaska Fairbanks, 2017.

Thesis: Coastal Hazard Analyses and Projections for Arctic Alaska Communities

Alaska coastal communities have experienced decades of frequent flooding and erosion. This dissertation maps areas prone to erosion and flooding to provide decision-making products for adaptation planning. These results will help communities develop outside of hazard-prone areas.

Major professor: Dr. Christopher Maio

Meeta Victoria Cesler-Maloney **

Ph.D. Environmental Chemistry

B.A., Indiana University, 2018.

Thesis: Pollution Trapping by Strong Temperature Inversions in Fairbanks, Alaska

We measured differences of PM_{2.5} and O₃ across a shallow 20-meter vertical scale in Fairbanks during winter. We modeled SO₂ across a ~200-meter vertical scale with excellent correlation to observations and showed that ground-based emissions dominate Fairbanks pollution. We showed that Fairbanks pollution has trended down over nine years.

Major professor: Dr. William Simpson

Margaret Hope Cysewski Rudolf **

Ph.D. Co-Production of Knowledge: Interdisciplinary Studies

B.S., University of Alaska Fairbanks, 2007; M.S., University of Alaska Fairbanks, 2013.

Thesis: Indigenous Self-Determination in Co-Production of Knowledge

Co-production of knowledge, a research methodological approach, had challenges when applied to partnering with Arctic Indigenous communities. Critical analyses of the challenges from an Indigenous standpoint deepened understanding. Solutions researched included roles of boundary spanners, factors and perspectives toward success, and methods to co-develop goals.

Major professor: Dr. Sarah Trainor

Jackson William Drew **

Ph.D. Biological Sciences

B.S., University of Alaska Fairbanks, 2016.

Thesis: *Alnus viridis* ssp. *fruticosa* Modulates Local Conditions to Influence Intra and Interspecies Growth

An investigation on climate sensitivity and plant-plant interactions between three Arctic shrubs using dendrochronology showed all shrubs have become more sensitive to spring air temperatures, and that *Betula nana* ssp. *exilis* growth is promoted by *Alnus viridis* ssp. *fruticosa* but reduced in *Salix pulchra*.

Major professors: Dr. Syndonia Bret-Harte and Dr. Roger Ruess

Nathan Arrow Graham

Ph.D. Geoscience

B.S., Humboldt State University, 2015.

Thesis: Mechanisms of Magmatic Degassing and Eruption Triggering at Alaska Volcanoes: Experimental Controls and Natural System Analogues

Understanding the magmatic processes that drive volcanic eruptions is integral to monitoring volcanic unrest and mitigating hazards. The main goals of this dissertation were to investigate parameters that influence eruption style and triggering. The results can be used to aid in modeling of volcanic systems and assist in monitoring volcanoes worldwide.

Major professor: Dr. Jessica Larsen

Rajan Itani **

Ph.D. Physics

B.S., Tribhuvan University, 2006; M.S., Tribhuvan University, 2013.

Thesis: Dynamics of the Earth's Thermosphere Across a Range of Spatial and Temporal Scales

Aspects of the dynamics of Earth's thermosphere that do not harmonize with the current understanding were investigated. Results suggest significant shortcomings in our current paradigm for understanding the behavior of the thermosphere. These discoveries have implications for spacecraft orbit predictions and mitigation of the risk of collision between orbiting satellites.

Major professor: Dr. Mark Conde

Michelle Marie Johannsen **

Ph.D. Biological Sciences

B.S., Winona State University, 2013; M.S., The University of Montana, 2016.

Thesis: The Effect of Cold Exposure and Activity on Skeletal Muscle Physiology: A Study of Human and Animal Models

Cold exposure and endurance exercise may improve aerobic capacity and atrophy resistance. Skeletal muscle is highly plastic, and perturbations such as cold, fasting and endurance training result in cellular remodeling and changes in protein expression that improve aerobic capacity and conserve skeletal muscle mass across species.

Major professors: Dr. Kristin O'Brien and Dr. Vadim Fedorov

Jessica Jean Johnson *

Ph.D. Biological Sciences

B.S. Tufts University, 2011; M.S., Louisiana State University and A&M College, 2017.

Thesis: Evaluating Amino Acid Isotopic Biomarkers of Added Sugar and Animal Protein Intakes

Diet is an important risk factor for disease but is difficult to measure. Amino acid stable isotope ratios were evaluated as objective measures of diet using two controlled feeding studies. Amino acid carbon isotope ratios performed well as measures of sugar-sweetened beverage and animal protein intakes.

Major professor: Dr. Diane O'Brien

* Summer degree recipient

** Fall degree recipient

Joshua Knicely *

Ph.D. Geophysics

B.A. Texas A&M University, 2011; M.S. Texas A&M University, 2015.

Thesis: Examination of Volcanism and Impact Cratering on Terrestrial Bodies

The planet Venus holds clues to the Earth's habitability. Remote sensing allows us to use volcanism and impact cratering to peer into the depths of planets and understand their history. We can use this information to better understand our sister planet and thereby better understand the myriad other worlds.

Major professor: Dr. Robert Herrick

David Skye Kushner **

Ph.D. Geoscience

B.S., University of Manitoba, 2016; M.S., University of Manitoba, 2019.

Thesis: Volcanic Gas Quantification Under Suboptimal Conditions

Quantifying volcanic gas can be challenging due to logistical barriers and atmospheric conditions. Two methods were developed to better characterize volcanic mercury and sulfur dioxide emissions, and a model was used to understand sulfur dioxide measurements in cloudy weather. Confidence in emission rate estimates under these conditions has been improved.

Major professor: Dr. Taryn Lopez

Scott S. Leorna *

Ph.D. Biological Sciences

B.S. University of Alaska Fairbanks, 2016; M.S. University of Alaska Fairbanks, 2019.

Thesis: Using Camera Traps to Advance Wildlife Monitoring in the Arctic

The utility of camera traps (i.e., remotely triggered cameras) for monitoring wildlife in the Arctic was advanced through a landscape-level study focused on informing new techniques specifically tailored to open landscapes and by evaluating their capacity to assess seasonal caribou (*Rangifer tarandus*) distribution and habitat use in Arctic Alaska.

Major professor: Dr. Todd Brinkman

Xi Lu

Ph.D. Space Physics

B.S., Shandong University, 2018.

Thesis: Foreshock Density Holes and Their Connection with Other Foreshock Transients

Characteristics and occurrence preferences of foreshock density holes on the upstream of the Earth's bow shock are investigated. The role of the low-density structures in the formation of hot flow anomalies through the magnetohydrodynamics process are unveiled by the comparison between the two-dimensional simulations and the spacecraft observations.

Major professor: Dr. Peter Delamere

Kendall Mills

Ph.D. Biological Sciences

B.S., University of Houston, 2014; M.E.S.M., University of California, Santa Barbara, 2016.

Thesis: Biogeographic History of the World's Marmots and the Genetic Basis of Melanism in an Alaskan Population of Hoary Marmots

This dissertation addresses questions related to the phylogenetics, molting phenology and genetic basis of melanism in marmots.

Major professor: Dr. Link Olson

Emilie Morrell *

Ph.D. Biochemistry & Neuroscience

B.S. Brigham Young University, 2014.

Thesis: Impacts of Sex, Biomaterials Homeostasis, and Dietary Fructose on Non-Alcoholic Fatty Liver Disease Pathogenesis

Worldwide, one in three people have nonalcoholic fatty liver disease (NAFLD); however, treatment options for this disease are limited. The impacts of biomaterials homeostasis, dietary fructose intake and sex on NAFLD pathogenesis were examined to identify potential mechanisms and pathways that could be targeted for the development of future therapies.

Major professors: Dr. Lawrence Duffy and Dr. Jason Burkhead

Tsermaa Nyamdavaa

Ph.D. Natural Resources and Sustainability

B.P.A., National University of Mongolia, 2015; M.B.A., National University of Mongolia, 2017.

Thesis: Implementation of Community-Based Natural Resource Management at Hustai National Park, Mongolia

The study examined community-based natural resources management (CBNRM) principles used to protect the buffer zone rangelands at Hustai National Park, Mongolia. Findings showed that CBNRM principles were not fully implemented due to incomplete implementation of CBNRM principles, the use of a top-down approach and conflicts with interpretations of Mongolia's constitution.

Major professors: Dr. Jenifer McBeath and Dr. John Duffy

Liam Toney *

Ph.D. Geophysics

B.A. Pomona College, 2017.

Thesis: Characterization of Geohazards via Seismic and Acoustic Waves

Earth processes occur globally, and some events are hazardous to life and property. These geohazards can be monitored with geophysics, facilitating rapid response. Geophysical analysis of seismic and low-frequency sound waves was used to characterize large avalanches, volcanic eruptions and the nature of how sound travels in the atmosphere.

Major professor: Dr. David Fee

* Summer degree recipient

** Fall degree recipient

SCHOOL OF EDUCATION

Dr. Amy Vinlove, Dean

Karen Martin

Ph.D. *Teacher Agency in Teacher Research: Interdisciplinary Studies*

B.S., Eastern Washington University, 1998; M.S., Oregon State University, 2004; M.A.T., University of Alaska Southeast, 2005.

Thesis: Nurturing Teacher Agency to Influence Teacher Professionalism Through Teacher Action Research

This research investigated teacher agency as a component of teacher professionalism. Studying the lived experience of rural Alaska teachers, it explored how engaging teachers in action research-based professional development influenced teacher agency. Teachers experienced increased engagement, capacity to know their impact on learning, feeling empowered by trust, and critical consciousness.

Major professor: Dr. Ute Kaden