University of Alaska Anchorage
College of Education
3211 Providence Drive
Anchorage, Alaska 99508-8269

ED 581 Professional Learning in Science Education:
Discovering Denali's Micro Wilderness: Insects and other Arthropods

1 Credit, Graded P/NP

Summer 2025

Course Sponsor:	Alaska Geographic, Murie Science and Learning Center, Denali National Park
Instructors:	Jessica Rykken and Adam Haberski
Educational Resource:	Paula Davis
Primary Grading Instructor:	Jessica Brillhart
Facilitating Instructor:	Jessica Brillhart
Contact Information	
Address:	Alaska Geographic, Murie Science and Learning Center P.O. Box 136, Denali Park, AK 99755
Telephone:	(907) 683-9632
Email address:	courses@akgeo.org
Course Meeting Information	
Location:	Murie Science and Learning Center, Denali National Park & Preserve entrance
Start and End Date:	July 18 - 20, 2025
Class Day(s) & Time(s):	July 18th 6:30pm through July 20th 4pm, continuous residential course
Final Project Due:	Last day of class.
Course Description:	Denali is well known for its large mammals and big mountain, but a closer look reveals a vast micro wilderness waiting to be discovered. Denali's insects, spiders, and other arthropods play a critical role in Denali's ecosystems and have only recently been the subject of more in depth research. Entomologists Jessica Rykken, former entomologist at Denali and now the Entomology Collections Manager at the Museum of the North, and Adam Haberski, former graduate student at UAF and currently Collection Manager at Mississippi Entomological Museum, will give participants a behind the scenes look at their 5 year arthropod study. This course will visit several sites along an elevational transect to learn about the different insects found there and the important roles they play in Denali. Participants will

consider how to integrate their learning from this fieldwork course into their teaching or educational environments.

Intended Audience: Teachers and other interested educators

Enrollment Restrictions: None

Course Prerequisite/Co-requisites: None

Course Design:

a. Requires 15 contact hours and approximately 30 hours of engaged learning.
b. Does not apply to any UAA certificate or degree program.
c. No UAA lab and/or materials fees beyond standard charges.
d. This Murie Science and Learning Center course will be entirely field-based. Learning will be achieved through lectures, group discussions, field observations, and field activities. This course is based upon the collegial sharing, collaboration, and support of the participants and facilitator as a community of learners. Course activities will include common readings and group discussions, collective learning processes, peer coaching/mentoring, and reflective practices.

Instructional Goals and Defined Outcomes:

RESEARCH BASED THEORY/PRINCIPLES/PRACTICES/TRENDS (CONTENT)

1.0 Instructional Goal:
Instructors will present their primary research questions—examining how arthropods are distributed across the landscape in various habitats, and discuss how these patterns may be affected by disturbance such as climate change, fire, and bark beetle outbreaks.

Defined Outcome:
Participants will learn about the motivation for these particular research questions, and how much there is still to learn about arthropod diversity, natural history, and ecology in Alaska. What kinds of questions might be appropriate for a school project with their students?

2.0 Instructional Goal:
Instructors explain how to design studies to answer their research questions. Discuss sampling design, selecting focal taxa, sampling methods for arthropods and other environmental parameters of interest.

Defined Outcome:
Participants discuss the pros and cons of various sampling strategies, and how suitable some of these techniques and designs may be for student projects.

3.0 Instructional Goal:
Instructors provide a brief overview of the major orders of arthropods found in Alaska, and then focus in on arthropod taxa included in their studies (beetles, ants, grasshoppers, spiders, bees, flower flies). Discuss the natural history of these taxa, which include predators, scavengers, pollinators, and herbivores.

Defined Outcome:
Participants will learn to recognize common arthropod taxa, the habitats they are found in, and the roles they play in ecosystems. They will integrate this knowledge into their own teaching curriculums.

THEORY INTO PRACTICE (APPLICATION)

4.0 Instructional Goal:
Instructors will take students out into different habitats in the park; discuss how relevant environmental data are collected; observe, collect, and photograph arthropods in their natural habitats.

Defined Outcomes:
Participants will learn good field techniques by actively participating in field trips and taking detailed field notes. They will gain practical experience in observing, collecting (and releasing), and photographing insects in various habitats.

5.0 Instructional Goal:
Instructors will teach students the importance and techniques of preserving and preparing arthropods once collected, including sorting, pinning, labeling, and storing. The availability and use of regional taxonomic keys for assisting in arthropod identification will be discussed. The process of submitting insect photographs to online biodiversity platforms such as iNaturalist and BugGuide will also be covered.

Defined Outcomes:
Participants will see examples of properly curated insect collections and practice using dichotomous keys and other guides to identify insects. They will also practice photo documentation techniques. Participants will describe how they will integrate their experiences into their teaching or educational environments.

REFLECTION ON THEORY INTO PRACTICE (REFLECTION)

6.0 Instructional Goal:
Engage participants in discussions, reflective journaling and informal sharing about science instruction and how to incorporate gained knowledge and experience into their classrooms.

Defined Outcome:
Participants will review and reflect upon the scientific information covered. Participants will complete a journal, reflecting on how the information can be shared with their students.

RELATIONSHIP TO STANDARDS

7.0 Instructional Goal:
Familiarize participants with science content standards addressed by the strategies and concepts presented.

Defined Outcome:
Participants will identify the Science-Content standards applicable to their classroom.

Writing Style Requirements:
Participants' writing will reflect the clarity, conciseness, and creativity expected of post-baccalaureate certificated educators.

Attendance and Make-up Policy:
Participants are expected to actively participate in all classes as a contributing member of a learning community. Attendance is mandatory, and due to the ongoing field-based nature of this course, make-up work is not possible.

Course Assignments, Assessment of Learning, and Grading System:
Course grading will be Pass/No Pass based upon the following:

a. Participation 50%
Participants will be expected to actively and collegially participate in discussions, activities, and other process experiences during the seminar.

b. Final Project - Journal completion 50%
Participants will complete journal assignments to be turned in to MSLC field guide on the last day of class. Assignments will include thoughtful reflection based upon seminar experience and an application plan of how participants will integrate issues and content discussed into their own classroom setting.

Quality of Work

Grade of "Pass"
Passing work includes all components of the assignment and meets proficient criteria. It is focused, developed, supported, logical, and acceptable work with minimal errors. Work of this quality indicates understanding of key concepts and knowledge base.

Grade of "No Pass"
Work graded "No Pass" may lack key criteria/components of the task and show little or no evidence of conceptual understanding or knowledge utilization. Work may also show minimal or no organization/development and/or clear focus (may be difficult to follow) and may contain numerous errors. This grade indicates minimal or no knowledge or concept development. It may also mean that work was not attempted.

Course Calendar/Schedule:

Friday
- 6:00 p.m. – 6:30 p.m. Greeting and check in at MSLC
- 6:30 p.m. – 7:30 p.m. Introduction, orientation & overview
  - Instructor introductions
  - Alaskan arthropods: what we know and what we don't know
  - Research questions in Denali
  - Focal taxa for project
  - Course objectives, structure, and activities
- 7:30 p.m. – 9:00 p.m. Drive to MSLC Field Camp and settle in

Saturday
- 9:00 a.m. – 5:00 p.m. Exploration of Denali
  - Visit forest, tundra, and additional habitats of interest (e.g., gravel bars, wetlands)
  - Observe, collect (and release), photograph arthropods
  - Gain familiarity with regional field guides
- 6:00 p.m. – 8:00 p.m. Dinner and evening discussions
  - Discuss the value and examine examples of well-curated insect collections
  - Look over instructor and participant photographs, discuss various online biodiversity platforms
  - Use available field guides and taxonomic keys for identification of pinned specimens and/or insect photographs

- Teacher study group to discuss the day's activities and how the information can be shared with students
- Identify applicable science content standards addressed by course content

Sunday 9:00 a.m. – 3:00 p.m. Continued exploration of Denali
- Short morning presentation/discussion about Alaskan arthropods
- Continued collections in the park
- Visit one forest plot to discuss sampling design and trapping methods for spruce bark beetle project

3:00 p.m. – 4:00 p.m. Return drive to MSLC

Final Project Due: last day of course

Course Texts, Readings, Handouts, and Library Reserve:

Required text/materials:

National Park Service. (n.d.) *Invertebrates*. Retrieved from: https://www.nps.gov/dena/learn/nature/invertebrates.htm

National Park Service. (n.d.*) Surveying Denali's Pollinators: Bees & Flower Flies.* Retrieved from: https://www.nps.gov/articles/denali-pollinators.htm

National Park Service (n.d.) *Bumble Bees of Alaska: A Field Guide.* Retrieved from: https://www.nps.gov/articles/000/alaska-bees.htm

Suggested text/materials:

Collet, D.M. Insects of south-central Alaska. Kenai Watershed Forum, Soldotna, Alaska. 192 pp.

Haberski, A., Rykken, J., & Sikes, D. S. (2023). Arthropod communities along an elevation gradient in Denali National Park and Preserve, Alaska: Rapidly shrinking tundra hosts a unique assemblage of specialists. *Arctic, Antarctic, and Alpine Research*, 55(1). Retrieved from: https://doi.org/10.1080/15230430.2023.2178149

Haberski, A., Woller, D.A., and Sikes, D.S. (2021). Orthoptera of Alaska: A photographic key, new records, and synonym of *Melanoplus gordonae*. Canadian Journal of Arthropod Identification 44: 51 pp. doi:10.3752/cjai.2021.44 https://cjai.biologicalsurvey.ca/articles/hws-44/

Philip, K.W., and C.D. Ferris. (2016). Butterflies of Alaska: a field guide, Second Edition. 110 pp.

Rykken, J., and J. Holmes. Bee Observer Cards. An educational tool from Encyclopedia of Life about native bees. Retrieved from: https://eddev.eol.org/observer_cards

Rykken, J. (2020). Boreal insects. Senior Hiker magazine. https://www.nps.gov/dena/learn/nature/upload/Boreal-Insects.pdf

University of Alaska Museum of the North (n.d.) *Entomology links*. Retrieved from: https://www.uaf.edu/museum/collections/ento/links/

Williams, P., R. Thorp, L. Richardson, S. Colla. (2014). Bumble bees of North America. Princeton University Press, Princeton, New Jersey. 208 pp.

Wilson, J.S., and O. Messinger Carril. (2016). The bees in your backyard. Princeton University Press, Princeton, New Jersey. 288 pp.

Content references:

Berg, E. (2015). Warm summers prepare for spruce bark beetle return. Refuge Notebook. USFWS Kenai National Wildlife Refuge 17:71-72.

Inouye, D.W. (2020). Effects of climate change on alpine plants and their pollinators. Annals of the New York Academy of Sciences 1469:26-37. doi: 10.1111/nyas.14104

Kerr, J. T., A. Pindar, P. Galpern, L. Packer, S. G. Potts, L. L. Richardson, D. L. Wagner, L. F. Gall, D. S. Sikes, and A. Pantoja. (2015). Climate change impacts on bumblebees converge across continents. Science 349:177-180.

Rykken, J. (2015). Insect pollinators of Denali National Park and Preserve: A survey of bees (Hymenoptera: Anthophila) and flower flies (Diptera: Syrphidae). Natural Resource Report NPS/DENA/NRR—2015/952. National Park Service, Fort Collins, Colorado.

Sikes, D.S., Bowser, M., Daly, K., Hoye, T.T., Meierotto, S., Mullen, L., Slowik, J., Stockbridge, J. (2017) The value of museums in the production, sharing, and use of entomological data to document hyperdiversity of the changing North. Arctic Science. Retrieved from: http://www.nrcresearchpress.com/doi/pdf/10.1139/AS-2016-0038

Standards References:

Alaska Comprehensive Center. (2012). *Guide to Implementing the Alaska Cultural Standards for Educators.* Juneau, AK: Alaska Department of Education and Early Development. Retrieved from: https://education.alaska.gov/standards/cultural and https://www.asdn.org/wp-content/uploads/Implementing-AK-cultural-standards-1.pdf

Alaska Native Knowledge Network. (1998). *Alaska standards for culturally responsive schools.* Fairbanks, AK: University of Alaska Press. Retrieved from: http://www.ankn.uaf.edu/publications/culturalstandards.pdf

National Research Council, the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve. (2013). *The next generation*

science standards. Retrieved from http://www.nextgenscience.org/next-generation-science-standards.

State of Alaska Department of Education and Early Development. (2019). *Content and performance standards for Alaska students.* Juneau, AK: Author. Retrieved from: https://education.alaska.gov/akstandards/standards/Content_and_Performance_Standards_edited.pdf

State of Alaska Department of Education and Early Development. (2019). *K-12 Science Standards for Alaska*. Juneau, AK. Author. Retrieved from: https://education.alaska.gov/akstandards/science/science-standards-for-alaska.pdf?v=1

State of Alaska Department of Education and Early Development. (2012). *Alaska English/Language Arts and Math Standards.* Juneau, AK: Author. Retrieved from: https://education.alaska.gov/akstandards/standards/ELA_and_Math.pdf

Informed by the School of Education Vision, Mission, and Conceptual Framework:
We believe that the preparation and support of professional educators is the shared responsibility of the University of Alaska Anchorage and our partners, and that our programs must evolve dynamically in response to unique community needs, research, and continuous program assessment. This PACE course is designed to meet a professional development need in response to our partner school districts and professional organizations. The course fits within the mission of the UAA School of Education as we encourage lifelong learning to meet the challenges of a rapidly changing world.

Link to Alaska Educator Content and Performance Standards:
This professional development is rooted in the fundamentals of Alaska's standards for teachers, administrators, and beginning teachers in Alaska's Administrative Code, 4 AAC 04.200. It is offered to encourage and support practicing educators attain, maintain, or surpass the standards for effectively preparing today's students for successful lives and productive careers. (https://education.alaska.gov/standards/other-standards)

Learning Forward Standards for Professional Learning:
This course is further informed by the Learning Forward Standards for Professional Learning which outline the "characteristics of professional learning that leads to effective teaching practices, supportive leadership, and improved student results." As explicit in the standards, "professional learning is for educators to develop the knowledge, skills, practices and dispositions they need to help student perform at a higher levels." (https://standards.learningforward.org)

Course Policies:

Incomplete Grades
Due to the nature of this course, grades of incomplete will not be permitted.

ADA Policy
The provision of equal opportunities for students who experience disabilities is a campus-wide responsibility and commitment. Disabilities Support Services (DSS) is the designated UAA department responsible for coordinating academic support services for students who experience disabilities. To access support services, students must contact DSS (786-4530 or 786-4536 TTY) and provide current disability documentation that supports the requested services. Disability support services are mandated by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990. Additional information may be accessed at the DSS Office in RH 105 or on-line at www.uaa.alaska.edu/dss.

Academic Dishonesty Policy
Academic integrity is a basic principle that requires all students to take credit only for the ideas and efforts that are their own. Cheating, plagiarism, and other forms of academic dishonesty are defined as the submission of materials in assignments, exams, or other academic work that is based on sources prohibited by the faculty member. Academic dishonesty is defined further in the "student Code of Conduct." In addition to any adverse academic action that may result from the academically dishonest behavior, the University specifically reserves the right to address and sanction the conduct involved through student judicial review procedures and the Academic Dispute Resolution Procedure specified in the University catalog.

Professional and Ethical Behavior
University of Alaska Anchorage School of Education students are expected to abide by the State of Alaska Code of Ethics of the Education Profession and professional teaching standards as they concern students, the public, and the profession. The standards, adopted by the Professional Teaching Practices Commission, govern all members of the teaching profession. A violation of the code of ethics and professional teaching standards are grounds for revocation or suspension of teaching certification.

Technology Integration
University of Alaska Anchorage School of Education students are expected to (a) demonstrate sound understanding of technology operations and concepts; (b) plan and design effective learning environments and experiences supported by technology; (c) implement curriculum plans that include technology applications in methods and strategies to maximize student learning; (d) facilitate a variety of effective assessment and evaluation strategies; (e) use technology to enhance productivity and professional practice; and (f) understand the social, ethical, and human issues surrounding use of technology in PreK-12 schools and apply those principles in practice.

Course Safety and Risk
This course is sponsored by Alaska Geographic and the Murie Science and Learning Center. The University of Alaska Anchorage provides the credit option for interested participants. This course takes place entirely outdoors and within a remote area of Alaska. Field courses, such as this, do have inherent risks. These risks will be outlined by the course instructors and in the Alaska Geographic Participant Release of Liability, Waiver of Claims, Assumption of Risks, and Indemnity Agreement form. This form will be provided at the time of registration and a signed copy is required in order to attend.

Non-Discrimination Policy
The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at www.alaska.edu/nondiscrimination