

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

**ED 581 Professional Learning in Science Education:  
Denali's Micro Wilderness: Insects and Spiders**

**1 Credit, Graded P/NP**

**Summer 2017**

**Course Sponsor:** Alaska Geographic, Murie Science and Learning Center, Denali National Park

**Instructors:** Jessica Rykken and Derek Sikes

**Education Instructor:** Sarah Warnock

**Facilitating Instructor:** David Tomeo

**Contact Information Address:** Alaska Geographic, Murie Science and Learning Center, P.O. Box 136, Denali Park, AK 99755

**Telephone:** (907) 683-6432

**Email address:** courses@alaskageographic.org

**Course Meeting Information**

**Location:** Murie Science and Learning Center, Denali National Park & Preserve entrance

**Start and End Date:** July 28, 2017 to July 30, 2017

**Class Day(s) & Time(s):** July 28th 6:30pm through July 30<sup>th</sup> 4pm, continuous residential course

**Final Project Due:** Last day of class.

**Course Description:** 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 from the National Park Service and Derek Sikes from the University of Alaska Fairbanks will give participants a behind the scenes look at their 5 year arthropod study. This course will visit several research sites to learn about the different insects found there and the important roles they play in Denali. The group will help collect some of these species to add to the current study and learn more about what this research has revealed so far. 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 discuss their primary research question—examining patterns of arthropod diversity along elevational gradients in Denali. Are there distinct arthropod assemblages associated with different habitats/elevations? How may these patterns be affected by climate change?

Defined Outcome:

Participants will learn about the motivation for this particular research question, 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 a study to answer their research question. 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 study (beetles, ants, spiders, bees, flower flies, butterflies). 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 the field to look at sampling plots; observe 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 and collecting 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. Regional taxonomic keys for assisting in arthropod identification will be discussed.

Defined Outcomes:

Participants will practice various curation techniques to the extent possible in the field, and also learn to use dichotomous keys to identify some of the insects they have collected. 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 and collegially participate in all classes as a contributing member of a learning community. Attendance at every session is mandatory.

**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 <ul style="list-style-type: none"><li>○ Instructor introductions</li><li>○ Alaskan arthropods: what we know and what we don't know</li><li>○ Research question in Denali</li><li>○ Focal taxa for project</li><li>○ Course objectives, structure, and activities</li></ul>  |
|          | 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 <ul style="list-style-type: none"><li>○ Visit one or more plots and discuss sampling design, habitat/environmental measurements, trapping methods</li><li>○ Visit additional habitats of interest (e.g., gravel bars, wetlands)</li><li>○ Observe, collect, photograph arthropods</li></ul>  |
|          | 6:00 p.m. – 8:00 p.m. | Dinner and evening discussions <ul style="list-style-type: none"><li>○ Sort through specimens; prepare and identify a subset</li><li>○ Short presentation about Denali pollinators</li><li>○ Teacher study group to discuss the day's activities and how the information can be shared with students</li><li>○ Identify applicable science content standards addressed by course content</li></ul> |
|          |                       |  |
| Sunday   | 9:00 a.m. – 3:00 p.m. | Continued exploration of Denali <ul style="list-style-type: none"><li>○ Short morning presentation/discussion about Alaskan arthropods</li><li>○ Continued collections in the park</li><li>○ Deposit specimens with instructors</li></ul>  |
|          | 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.) *Denali's pollinators*. Retrieved from:  
<https://www.nps.gov/rlc/murie/virtual-tours.htm>

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

### Suggested text/materials:

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

Pampell, R. 2013. Color guide to Alaskan bumble bees. Alaska Entomological Society Newsletter (6): 7-10. [http://www.akentsoc.org/doc/AKES\\_newsletter\\_2013\\_I.pdf](http://www.akentsoc.org/doc/AKES_newsletter_2013_I.pdf)

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: [http://eol.org/info/disc\\_observer#bees](http://eol.org/info/disc_observer#bees)

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:

Franzén, M., and E. Öckinger. 2012. Climate-driven changes in pollinator assemblages during the last 60 years in an Arctic mountain region in northern Scandinavia. *Journal of Insect Conservation* 16:227-238.

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., Hoyer, T.T., Meierotto, S., Mullen, L., Slowik, J., Stockbridge, J. (in press) 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:  
[http://www.eed.state.ak.us/standards/pdf/cultural\\_standards.pdf](http://www.eed.state.ak.us/standards/pdf/cultural_standards.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>.

National Research Council (NRC) of the National Academies and Board on Science Education. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press. Free download retrieved from:  
<http://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts>

State of Alaska Department of Education and Early Development. (1997). *Standards for Alaska teachers*. Juneau, AK: Author. Retrieved from:  
<http://www.eed.state.ak.us/standards/pdf/teacher.pdf>

State of Alaska Department of Education and Early Development. (2006). *Content and performance standards for Alaska students*. Juneau, AK: Author. Retrieved from:  
<http://education.alaska.gov/akstandards/standards/standards.pdf>

### **Alignment with College 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 College of Education as we encourage lifelong learning to meet the challenges of a rapidly changing world.

### **Link to Standards for Alaska Teachers:**

This professional development effort is firmly rooted in the fundamentals of the standards for Alaska Teachers. It is offered to encourage and support practicing educators in attaining, maintaining, or surpassing the standards that, as stated in *Standards for Alaska's Teachers*, "define the skills and abilities our teachers and administrators need to possess to effectively prepare today's students for successful lives and productive careers." (Roger Sampson, <http://www.eed.state.ak.us/standards/pdf/teacher.pdf>)

### **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 Business Education Building (BEB105) or on-line at [www.uaa.alaska.edu/dss](http://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 College 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 College 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 in the Alaska Geographic Acknowledgement of Risk form and by the course instructors. The Acknowledgement of Risk form will be provided at the time of registration and a signed copy is required in order to attend.