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

ED 581 Professional Learning in Science Education:
Climate Change in Denali and Beyond

1 Credit, Graded P/NP

Summer 2023

Course Sponsor:	Alaska Geographic, Murie Science and Learning Center, Denali National Park
Instructor:	David Arnold, Ph.D.
Educational Resource:	Paula Davis
Primary Grading Instructor:	Madeleine Morimoto
Facilitating Instructor:	Jessica Brillhart
Contact Information	
Address:	Alaska Geographic, Murie Science and Learning Center P.O. Box 136, Denali Park, AK 99755
Telephone:	(907) 683-6432
Email address:	courses@akgeo.org
Course Meeting Information	
Location:	Murie Science and Learning Center, Denali National Park & Preserve entrance
Start and End Date:	August 11 - 13, 2023
Class Day(s) & Time(s):	August 11th 6:30pm through August 13th, 4pm, continuous residential course
Final Project Due:	Final day of course
Course Description:	Although recent climate change has been attributed to human influences, the earth's climate has exhibited a great deal of variability throughout its modern 400 million year history. The geographic site and situation of Denali National Park and Preserve provide a unique opportunity to visually interpret 120,000 years of climate change. By exploring evidence of these astronomical and earth driven changes, participants will gain a better understanding of how human impacts can reach a magnitude significant enough to also impact the global climate system. 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 an average of approximately 30 hours of engaged learning outside of class.
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:
- 1.1 Instructor will provide an effective framework for the comprehension of basic climate dynamics.
- 1.2 Provide context for understanding the true magnitude of geologic/climatic time-scales.

Defined Outcomes:
- 1.1 Develop the ability to understand and explain the manifestation of climate variation from a process perspective.
- 1.2 Improve the ability to mentally conceptualize large time scales from a more realistic perspective.

2.0 Instructional Goal:
- 2.1 Instructor will describe major components of the global climate system, their interactions, and the resulting impacts on local-scale biophysical systems.

Defined Outcome:
- 2.1 Students will be able to describe, explain and provide examples of the linkages between the primary components of the global climate system.

THEORY INTO PRACTICE (APPLICATION)

3.0 Instructional Goals:
- 3.1 Provide basic observational tools to facilitate the assessment of spatial variation within the biophysical environment.
- 3.2 Provide examples of ways in which large time scales can be described and explained.

Defined Outcomes:
- 3.1 Participants will be able to pass along a basic set of skills which can begin as a starting point for others to build their own biophysical observation tools.
- 3.2 Students will be able to help others improve their mental models of geologic/climatic time scales.
- 3.3 Students will describe how they will integrate their experiences into their teaching or educational environments.

REFLECTION ON THEORY INTO PRACTICE (REFLECTION)

4.0 Instructional Goal:
Instructor will 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

5.0 Instructional Goal:
Instructor will 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 • What is Science? What isn't science. • Brief Global Climatic Overview of the past 400 million years
	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 • Nenana River Valley Glaciation (Denali fault to Healy) • Lignite/Dry Creek Terminal Moraine (Healy; Park Road Mile 8.3 • Savage River • Sanctuary River • Teklanika River Glaciation
	6:00 p.m. – 8:00 p.m.	Dinner and evening discussions o Teacher study group to discuss the day's activities and how the information can be shared with students o Identify applicable science content standards addressed by course content
Sunday	9:00 a.m. – 3:00 p.m.	Continued exploration of Denali • East Fork River/Alpine Tundra Ecosystem • Igloo Canyon Subapline Ecosystem • Boreal Forest Ecosystem
	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:
World Ocean Review (n.d.) *Climate System*. Retrieved from:
https://worldoceanreview.com/en/wor-1/climate-system/earth-climate-system

Suggested Text/Material:
F.S. Chapin, III et al. (2011) *Earth's climate system.* Springer Science+Business Media, LLC
Retrieved from:
https://www.montana.edu/hansenlab/documents/bio491/Chpt2EarthsClimateSystem.pdf

University of Houston (n.d.) *Paleoclimate*. Retrieved from:
https://uhlibraries.pressbooks.pub/historicalgeologylab/chapter/paleoclimate

Supplemental information can be found in the following sources:

National Oceanic and Atmospheric Administration (NOAA)
National Aeronautics and Space Administration (NASA)
National Snow and Ice Data Center (NSIDC)

Content References:

Barry, R.G. & R.J. Chorley, 2009: *Atmosphere, Weather & Climate* (9 ed.). Routledge, New York, New York. 536 pp. ISBN 978-0415465700.

Fagan, B., 2008: *The Great Warming – Climate Change & the Rise & Fall of Civilizations.* Bloomsbury Press, New York, New York. 304 pp. ISBN 978-1596913929.

Fagan, B., 2019: *The Little Ice Age – How Climate Made History 1300-1850.* Basic Books, New York, New York. 288 pp. ISBN 978-1541618596.

Macdougall, D., 2013: *Frozen Earth - The Once & Future Story of the Ice Ages.* University of California Press, Berkley and Los Angeles, California. 278 pp. ISBN 978-0520275928.

Pielou, E.C., 1991: *After the Ice Age - The Return of Life to Glaciated North America.* University of Chicago Press, Chicago, Illinois. 376 pp. ISBN 978-0226668123.

Roberts, N., 2014: *The Holocene – An Environmental History* (3 ed.). Wiley-Blackwell, Malden, Massachusetts. 384 pp. ISBN 978-1405155212.

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 in the Alaska Geographic Acknowledgement of Risk form and by the course instructors. Acknowledgement of Risk 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