

**ERS 499 Sec 0870**

6 CREDITS

**Juneau Icefield Research Program**

SUMMER 2022

**INSTRUCTOR INFORMATION**

Dr. Seth W. Campbell

[scampb64@maine.edu](mailto:scampb64@maine.edu)[seth@juneauicefield.org](mailto:seth@juneauicefield.org)

Cell #: 207-329-6014

Office: 207-581-3927

Location: 119 Sawyer Hall

Office Hours: By appointment

**COURSE LOCATION & TIME**

Juneau, Alaska

June 6, 2021 – August 5, 2021

**COURSE INFORMATION**

All Course Information will be provided to students via email or in paper form upon arrival in Juneau, Alaska. This includes:

- Syllabus
- Reading Material

**COURSE COMMUNICATION**

We will use email, zoom, and in person opportunities to communicate and share material with you.

**COURSE DESCRIPTION**

This is an 8-week field course in Earth system science, with emphasis on field science, glaciology, and integrated Earth systems of the northern Coast Mountains in Alaska and Canada. Students will conduct original research and learn safe expeditionary practices while traversing the extreme environment of the Juneau Icefield. This course emphasizes field observations and research-based learning. Students will learn through relevant demonstrations, problem sets, pertinent lectures and discussions at camps, and through conducting research with a range of instrumentation across the Juneau Icefield. Academic topics include glaciology, geophysics, geochemistry, alpine ecology, geomorphology, remote sensing, atmospheric science, hydrology, glacier travel, science communication, expedition planning, and leadership.

**INSTRUCTIONAL MATERIALS & METHODS**

No textbooks are required for this course. We rely on peer-reviewed literature instead of textbooks. However, there are numerous books available for students in the field for review. Students interested in learning more about glaciology, glacial geology, or Earth Systems Science within the academic curriculum are encouraged to consider the following textbooks after the summer:

- Glaciers & Glaciation, 2nd Ed. – Benn & Evans
- Physics of Glaciers, 4th Ed. – Cuffey & Patterson
- The Earth System, 3<sup>rd</sup> Ed. – Kump, Kasting, & Crane

**GENERAL FIELD COURSE SCHEDULE**

DATE	CLASS TOPIC	Location	Notes & Basic Curriculum
June 6	Student Arrival, Ice Breakers, & Introductions	Juneau, Alaska (University of Alaska, Southeast)	
June 7 – 26	Field Safety Training and Introduction to Earth Systems Field Sciences	Juneau, AK and Camp 17, Juneau Icefield	Topics: Wilderness First Aid, Glacier Mountaineering, General Field Safety on the Juneau Icefield; Field Sciences 101

June 27 – July 12	Polar Earth Systems Science – Lecture Series 2	Camp 10, Juneau Icefield	Topics: Glaciology, Geomorphology, Atmospheric Sciences, Polar Ecology
July 13-25	Polar Earth Systems Science – Lecture Series 3	Camp 18, Juneau Icefield	Topics: Advanced Glaciology, Advanced Geomorphology, Advanced Atmospheric Sciences; Advanced Polar Ecology; Student Research Projects
July 26 – August 4	Traverse from Juneau Icefield back to Juneau, Alaska	Camp 18 → Juneau, Alaska	Final Student Project Presentations
August 5	Course Completion	Juneau, Alaska	Students Depart

## GRADING AND COURSE EXPECTATIONS

### GRADING WILL BE BASED ON:

Paper Review	20 %
Science Journal/Notebook	20 %
Final Project Presentation	20 %
Final Exam	20 %
Participation	20 %

GRADING BREAKDOWN			
A	93-100	C	73-76
A-	90-92	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
C+	77-79	F	<60

### COURSE GOALS

The course ERS499 Section 0870: Juneau Icefield Research Program, will focus on the following:

- Glaciology (How do glaciers work?)
- Glaciers in Context (How do glaciers relate to their surrounding environment?)
- Methodologies (How do we study glaciers and surrounding environments?)
- Skills (What other skills are critical for polar research? )
- Perspectives (How do we contextualize the Icefield in society, around topics such as ‘Action’, sustainability, inclusivity, and more?)

With these questions in mind, through this course students will:

- Investigate the formation and architecture of glaciers, icefields, & ice sheets.
- Explore glacier energy and mass balance concepts.
- Examine glacier kinematics and dynamics concepts.
- Survey the interactions between glacier hydrology & dynamics.
- Explore links between glaciers, Earth’s surface, and atmospheric processes.
- Examine relationships between climate and glaciers/ice sheets.
- Learn methods to study glaciers and ice sheets including field observations, geophysics, remote sensing, geomatics, geochemistry, and modeling.
- Practice experimental design, data acquisition, interpretation, & uncertainty analysis.
- Develop evidence-based scientific argument skills using direct or remote observations & models.

- Identify common themes and differences between glaciers and ice sheets in space and time with the aim of developing predictive skills about current and prior glacier environments.
- Develop critical thinking and analytical skills through data analysis and critique of peer-reviewed scientific literature.

## STUDENT LEARNING OUTCOMES

Upon successful completion of this course, students will be able to:

- Dissect glaciology and Polar Earth systems science literature to identify the scientific problem, method to study the problem, assumptions and limitations to the research, and significance of the research.
- Summarize major energy and mass balance components of glaciers and ice sheets and distinguish similarities or differences between dominant energy and mass balance components of ice sheets and mountain glaciers located in different regions of the planet.
- Qualitatively explain the driving and resistive forces to glacier ice flow and summarize glaciers from a conservation of mass perspective.
- Explain the hierarchy of numerical models used for studying glaciers as well as limitations and assumptions made with various model types.
- Qualitatively summarize satellite, airborne, ground-based remote sensing methods used to study glaciers, ice sheets, and their surrounding/related environments.
- Use science best practices to evaluate field observations, geospatial and remote sensing information, or other relevant data in Earth systems science.
- Distinguish important unsolved problems of Polar Earth systems science and Glaciology.
- Formulate a holistic understanding of Polar Earth systems science including underlying influences and feedbacks between glaciers, the atmosphere, oceans, biosphere, near-surface (critical zone), and lithosphere.
- Be able to discuss and communicate important Polar Earth systems science qualitative and quantitative concepts to a non-science audience with comfort.

## GRADING DETAILS

### ATTENDANCE

All students are expected to attend and participate in all parts of the summer program in person. If any student is unable to complete the summer program or is required to depart mid-program, reasonable accommodations will be made with the student to complete the required material, on a case-by-case basis at the discretion of the instructor (Seth Campbell).

### LEARNING ASSESSMENT

Assessment of course learning outcomes will be based on the following items:

#### Paper Review

Students will be required to read and write a summary about **one** peer-reviewed scientific paper of interest and ideally importance to their class project. The selected paper should be agreed upon by the student and instructor PRIOR to completing the paper summary. The summary should include the following details and be between **1 or 2 single-spaced** pages in length. The goal of this paper review is to help students become familiar with reading, interpreting, and critically assessing scientific glaciology or other related Earth sciences literature. The goal is NOT for students to

become an expert in all the methods or details explained within each paper. We expect students to become familiar with the general topic, limits of our current general knowledge on that topic, and the ability to distill dense scientific literature into a basic summary that is readable by non-science experts. I encourage students to discuss papers with others and to approach me with any questions that arise as they read.

The paper review grade will be based on the following metric:

- 1) Introduction to the problem of interest (20%)
- 2) Explanation of methods used to study the problem (20%)
- 3) Significant results from the paper (20%)
- 4) Importance of the results to the broader scientific community (20%)
- 5) Assumptions or limitations of the study (20%)

Total points: 200 points

### **Science Journal/Notebook**

Each student will maintain a science journal/notebook through the duration of the summer. Students will be graded upon one field notebook component that they select based on appropriate material recorded in the notebook for the given topic. Each field research topic requires different data records. Therefore, students will be provided instruction on field journaling for each of the science topics that JIRP focuses upon during the summer (i.e. glaciology, geomorphology/geology, atmospheric sciences, ecology). Notebooks will be graded based upon the students' integration of field note lectures into their own field journal.

Total points: 200 points

### **Science Project**

Students will be required to a group research project that is agreed upon by the student and faculty while on the icefield. Students will be provided a series of research experiences in glaciology, atmospheric sciences, geomorphology, Polar ecology, and Earth systems science, through the summer. Following the academic curriculum on these topics and research experiences, students will select one topic to prepare a group presentation on after one week of effort. Projects will be presented via a scientific lecture in class at the end of the semester as a 10-minute oral presentations with 5 additional minutes available for questions.

Total Points: 200

### **Final Exam**

A final exam will be conducted during the final week of JIRP covering material from the course. The exam question will vary depending on each students top three interests during the summer program. In other words, we will provide each student the opportunity to reflect on topics of most personal at the end of the course through the final exam. Additionally, every student starts at a different level of knowledge so the test will take your initial level of knowledge into consideration as opposed to having every student tested at the end of the course using the same exact metric. Our goal is for each student to learn the important concepts in this class but also not deter each

student from learning material that is interesting and useful for their careers. We have specifically integrated flexibility into both learning objectives of each student and testing of each student to facilitate learning.

Total Points: 200

### ***Class Participation***

***A for class participation*** is awarded when students regularly initiate discussion. This means being prepared to raise questions, to open discussion, to identify topics of interest from the weekly readings or course material, and to actively engage other students and faculty in discussion. (This does not mean monopolizing a discussion, shutting others out, or talking for its own sake rather than to make a point about the topic under discussion.). In other words, come to JIRP with specific questions and insight about the current topic of focus.

***B for class participation*** is awarded to students who participate regularly and productively in class discussion, who are prepared, and who are willing to engage. B discussants differ from A students in that the latter are self-starters who do not rely on the instructor's questions to set the agenda for discussion.

***C for class participation*** is awarded to those who participate on a regular, but less frequent basis than the B student. C discussants will be prepared for class, but their contributions will indicate that less thought has been given to assigned materials.

***D for class participation*** is given to those who contribute infrequently to the discussion and whose contributions do not appear to arise from thoughtful consideration of the assignments.

***F for non-participation*** in class discussion. Of course, participation is impossible if you don't attend class. Frequent absences mandate F grades.

Total Points: 200

## **COURSE POLICIES**

### ***Respectful Conduct***

This course involves regular discussions where you will be listening and responding to questions and opinions, as well as peer-review where you will be expected to review another student's work and provide feedback. Please keep in mind that we are in an academic environment and we are *all* trying to learn and improve! Please:

- Ensure all dialog remains academic, professional, and respectful in nature.
- Be careful with humor and sarcasm. One person's humorous comment can be offensive to another.
- Always speak or write in a courteous and constructive manner.
- Remember each of us should be trying to help each other and it is an active process to learn the best way to do that.

***Inclusivity and Diversity***

I endeavor to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.) To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official UMaine record, please let us know.
- If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with a faculty or staff member. We want to be a resource for you. Remember that you can also submit anonymous feedback (which may lead to me making a general announcement to the class, if necessary and requested, to address your concerns).
- If you prefer to speak with someone outside of the course, Anila Karunakar, the director of the Office for Diversity and Inclusion ([anila.karunakar@maine.edu](mailto:anila.karunakar@maine.edu); (207-581-1437) is an excellent resource.
- Many of us are still in the process of learning about diverse perspectives and identities. If something was said during JIRP (by anyone) that made you feel uncomfortable, please talk to me or one of the other faculty members about it. (Again, anonymous feedback is always an option).

**UNIVERSITY POLICIES*****Academic Honesty Statement***

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University. Please see the University of Maine System's Academic Integrity Policy listed in the Board Policy Manual as Policy 314: <https://www.maine.edu/board-of-trustees/policy-manual/section-314/>

***Students Accessibility Services Statement***

[This should be customized to include the instructor's name]: If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581.2319, as early as possible in the term. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me (the instructor of the course) privately as soon as possible.

***Course Schedule Disclaimer (Disruption Clause)***

In the event of an extended disruption of normal classroom activities (due to COVID-19 or other long-term disruptions), the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

***Observance of Religious Holidays/Events***

The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student's grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

**SEXUAL VIOLENCE POLICY*****Sexual Discrimination Reporting***

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a faculty or staff member who is deemed a "responsible employee" about sexual discrimination, they are required to report this information to Title IX Student Services or the Office of Equal Opportunity.

Behaviors that can be "sexual discrimination" include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. Therefore, all of these behaviors must be reported.

***Why do teachers have to report sexual discrimination?***

The University can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise – for example, if more than one person reports having been assaulted or harassed by the same individual.

***What will happen to a student if a teacher reports?***

An employee from Title IX Student Services or the Office of Equal Opportunity will reach out to you and offer support, resources, and information. You will be invited to meet with the employee to discuss the situation and the various options available to you.

If you have requested confidentiality, the University will weigh your request that no action be taken against the institution's obligation to provide a safe, nondiscriminatory environment for all students. If the University determines that it can maintain confidentiality, you must understand that the institution's ability to meaningfully investigate the incident and pursue disciplinary action, if warranted, may be limited. There are times when the University may not be able to honor a request for confidentiality because doing so would pose a risk to its ability to provide a safe, nondiscriminatory environment for everyone. If the University determines that it cannot maintain confidentiality, the University will advise you, prior to starting an investigation and, to the extent possible, will share information only with those responsible for handling the institution's response.

The University is committed to the well-being of all students and will take steps to protect all involved from retaliation or harm.

**If you want to talk in confidence** to someone about an experience of sexual discrimination, please contact these resources:

For *confidential resources on campus*: **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000**.

For *confidential resources off campus*: **Rape Response Services: 1-800-871-7741** or **Partners for Peace: 1-800-863-9909**.

**Other resources:** The resources listed below can offer support but may have to report the incident to others who can help:

For *support services on campus*: **Title IX Student Services: 207-581-1406**, **Office of Community Standards: 207-581-1406**, **University of Maine Police: 207-581-4040** or **911**.

[Visit the Title IX Student Services website at umaine.edu/titleix/ for more information.](http://umaine.edu/titleix/)