

SYLLABUS FOR GEOS F624 Katmai

INTERNATIONAL VOLCANOLOGICAL FIELD SCHOOL, KATMAI SESSION (3 CREDITS)

INSTRUCTORS

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A two-week backpacking field trip to the Katmai National Park, Alaska provides an opportunity to learn about volcanic processes through direct examination of volcanic products while exploring the Valley of Ten Thousand Smokes, the site of the largest volcanic eruption on Earth in the 20th century.

PREREQUISITES

Acceptance into the course is contingent upon: (1) A completed application, (2) a reference letter, (3) graduate standing, and (4) permission of the Instructor.

RESTRICTIONS

Students must be in good health, capable of hiking for at least 20 km per day carrying while carrying heavy backpacks, and willing to camp in remote, primitive, and potentially uncomfortable conditions. Basic conversational proficiency in English is required.

TEXTBOOK

Eichelberger, J.C. (2006). The Valley of Ten Thousand Smokes, Alaska. University of Alaska Fairbanks, 60 p. Additional required reading materials are listed below.

KEY CONCEPTS ADDRESSED

- Magma processes
- Subduction-related volcanism
- Products of volcanic activity
- Volcanic features and landforms
- Petrology of the Katmai group of volcanoes
- Volcano monitoring and public safety

STUDENT LEARNING OUTCOMES

- Students will learn to identify pyroclastic flow deposits, lava flows, and tephra fall deposits, as well as describe their characteristics and discuss the origins of these volcanic deposits.
- Students will gain the ability to make informed decisions while conducting scientific fieldwork in remote environments, adhering to safety requirements and communication protocols.
- Students will develop and improve their skills in effective communication with peers from diverse cultural backgrounds.
- Students will develop and refine their skills in presenting scientific concepts to peers.
- Students will be able to make informed decisions about research opportunities in the North Pacific subduction region and engage in discussions on current topics and controversies in volcanology.
- Students will build collegial relationships with peers from other countries, fostering future collaborative research opportunities.

COURSE STRUCTURE

The course consists of daylong hikes interspersed with lectures. During the hikes, students will examine lava flows, pyroclastic flows, air fall tephra, craters, fissures, faults, vents, crater lakes, and fumaroles spanning the common range of volcanic rock types from basalt to rhyolite. Field discussions and subsequent lectures will delve into the processes and mechanisms behind these volcanic phenomena.

COURSE SCHEDULE

The course will begin and end in Anchorage, Alaska. Students are responsible for arranging their own transportation to and from Anchorage, ensuring arrival by the late evening of Day 1 and departure in the late evening of Day 15. Please refer to the official course web page for the exact dates of the field trip: <https://www.uaf.edu/geosciences/academics/international-volcanology/index.php>

- Day 1 Students arrive in Anchorage
- Day 2 The morning is spent for orientation and acquiring food supplies. In the afternoon students will be briefed on the current state of volcanic activity in Katmai area and weather conditions. We will discuss safety requirements and communication protocols. We will practice installing tents, using camp stoves, and will prepare for departure.
- Day 3 Flying to Katmai National Park and spending night in cabins at Brooks lodge
- Day 4 Taking a bus ride to the Valley of Ten Thousand Smokes, hiking to Baked Mountain Huts, staying at huts
- Days 5-13 Day hikes as weather permits, studying in tents during inclement weather conditions. We may need to move our basecamp for better access to drinking water and specific landmarks.
- Novarupta Dome (effusive vs. explosive volcanism; eruption history)
 - Katmai Caldera (caldera formation; magma chamber; internal structure of arc volcanoes)
 - Trident Volcano lava flows and vent (cone building; normal arc volcanism; magma mixing)
 - Upper Lethe Valley (ignimbrite emplacement; welding; glacier/tephra interaction; glacier/lava interaction; glacial retreat; magma intrusion)
 - Upper Knife Creek Valley (more ignimbrite features; phreatic deposits; fumarolic systems)
 - Baked Mountain (pyroclastic surges; sedimentary basement; valley overview)
- Day 14 Hiking from Baked Mountain huts to trailhead; bus ride to lodge; spending night at lodge
- Day 15 Return to Anchorage

POLICIES

Students are expected to participate in all class activities including day hikes, discussions, and lectures. If physical conditions prevent a student from full participation in a day hike, they will be given an alternative writing assignment. Students are expected to record their field observations in their field notebooks, following guidelines and examples provided prior to the field trip. Students are required to give a presentation on their thesis research. As an alternative, they may choose to give a presentation on one of the aspects of Katmai volcanism, with the topic to be discussed with the instructor before the field trip. Hearing presentations by other students is often one of the most valued experiences in the course. All presentations will be conducted using a whiteboard, along with any handouts the presenter wishes to distribute.

The course is graded based on the following accomplishments:

- 60% on quality and completeness of field notes. Field notes may be interspersed with lecture notes in chronological order. Lecture notes will not be evaluated. Field notes will be evaluated based on the completeness of observations and quality of descriptions at each visited landmark and/or observation site using scores outlined below.

3 (Proficient)	2 (Competent)	1 (Novice)
Complete detailed description with annotated drawings; thoughtful discussion raising questions.	Good, intelligible description with some drawings; basic interpretation lacking in-depth discussion.	Unintelligible notes; primary observed features are not described; interpretation is either missing or incorrect.

- 20% on final test
- 20% on presentation. Presentation will be evaluated based on (1) organization and content, (2) subject knowledge, (3) effective use of whiteboard and handouts, and (4) presentation skills.

This percentage score is transformed into a plus-minus letter grade using these cutoffs:

F	D	D+	C	C+	B	B+	A-	A
<60%	≥60%	≥67%	≥70%	≥77%	≥80%	≥87%	≥90%	≥93%

The grades “B-”, “C-”, “D-”, “F+”, and “F-” will not be given. “A+” is reserved for truly extraordinary work.

Students are subject to the UAF Student Code of Conduct. University of Alaska is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual:

www.alaska.edu/nondiscrimination.

STUDENT PROTECTIONS AND SERVICES STATEMENT

Every qualified student is welcome in our classroom. We are happy to work with you, along with Disability Services, Veterans' Services, Rural Student Services, and others, to find reasonable accommodations as needed. Students at this university are protected against sexual harassment and discrimination under Title IX, and minors have additional protections. If we observe or are informed of certain types of misconduct, we are required by law to report it to the appropriate authorities. For more information on your rights as a student and the resources available to help resolve any issues, please visit: www.uaf.edu/handbook/

READING MATERIALS (bold = required)

Coombs, M., J. Eichelberger, and M. Rutherford, 2000, Magma storage and mixing conditions for the 1953-1968 eruption of Southwest Trident Volcano, Katmai National Park, Alaska, *Contr. to Mineral. and Petrol.*, 140: 99-118.

Eichelberger, J.C., 2006, The Valley of Ten Thousand Smokes, Alaska, University of Alaska Fairbanks, 60p. (Copy provided to students registered for Katmai session)

Eichelberger, J.C., and P.E. Izbekov, 2000, Eruption of andesite triggered by dyke injection: Contrasting cases at Karymsky Volcano, Kamchatka and Mt. Katmai, Alaska, *Phil. Trans. Royal Soc. of London*, 358: 1-21.

Eichelberger, J.C., P. Izbekov, and B. Browne, 2006, Bulk chemical trends at arc volcanoes are not liquid lines of descent, *Lithos*, 87: 135-154.

Hammer, J.E., M.J. Rutherford, and Wes Hildreth, 2002, Magma storage prior to the 1912 eruption at Novarupta, Alaska, *Contr. to Mineral. and Petrol.*, 144: 144-162.

Hildreth, W. and J. Fierstein, 2012, The Novarupta-Katmai eruption of 1912—largest eruption of the twentieth century; centennial perspectives: U.S. Geological Survey Professional Paper 1791, 259 p. (Available at <http://pubs.usgs.gov/pp/1791/>)

Volcanoes of Katmai and the Alaska Peninsula Alaska Park Science Series, Volume 11, Issue 1, <https://www.nps.gov/articles/aps-v11-i1-c3.htm>