SYLLABUS FOR GEOS F695 Kamchatka
INTERNATIONAL VOLCANOLOGICAL FIELD SCHOOL, KAMCHATKA SESSION
(3 CREDITS)

INSTRUCTOR

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A two-week field trip to Mutnovsky and Gorely volcanoes in Kamchatka provides an opportunity to learn about volcanic processes through direct examination of ignimbrites, lava flows, cinder cones, extrusive domes, and active fumaroles. Mutnovsky geothermal power plant serves as an example to discuss utilization of the geothermal energy.

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

RESTRICTIONS
Students must be in good health, capable of hiking for at least 20 km per day carrying heavy backpacks, and be willing to camp under primitive, remote, and possibly uncomfortable conditions.

TEXTBOOK
Selyangin, O.B. (2006) Guide to Mutnovsky and Gorely Volcanoes. 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 Mutnovsky & Gorely Volcanic center
- Volcano monitoring and public safety
- Geothermal energy utilization

STUDENT LEARNING OUTCOMES
- Students will learn to identify ignimbrites, lava flows, and tephra fall deposits, as well as to describe characteristics and to discuss origin of aforementioned volcanic deposits
- Students will be able to make informed decisions conducting scientific field works in a remote environment while following safety requirements and communication protocols
- Students will develop / improve skills of effective communication with peers from different cultures
- Students will develop / improve skills of presentation of scientific concepts to peers
- Students will be able to make informed decisions on research opportunities in the North Pacific subduction region and discuss current topics and controversies in volcanology
- Students will establish collegial relationships with students from other countries for future collaborative research

COURSE STRUCTURE

The course consists of day-long hikes interspersed with lectures. Lectures occur on days of bad weather and rest days. During 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. Discussions in the field and following lectures will explore why and how these phenomena occur.

COURSE SCHEDULE

The course will begin and end in Petropavlovsk-Kamchatsky, Russia. Students are expected to arrange their own transportation to/from Petropavlovsk-Kamchatsky with arrival by late evening of day 1 and departure on the day 14. Please refer to the official course web page for actual dates of the field trip: http://www.uaf.edu/geology/academics/international-volcanology/

Day 1 Students arrive in Petropavlovsk-Kamchatsky; registration, preparation.
Day 2 Driving and hiking to the basecamp at Mutnovsky Volcano
Day 3 – 12 Day hikes as weather permits; lectures other days:

- Fumaroles of the Mutnovsky Crater
- Mutnovsky crater rim
- Opasny Creek cinder cone and lava flows
- Gorely summit craters
- Gorely caldera rim and ignimbrites
- Gorely lava flows
- Skalystaya rhyolitic extrusive dome
- High-magnesium basalts next to the Dvugorbaya Mountain

Day 13 Return to Petropavlovsk-Kamchatsky
Day 14 Flying back home

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, he/she will be given a writing assignment. Students are expected to record their field observations in their field notebooks following guidelines and examples given prior to the field trip. Students are required to give a presentation on their thesis research. Hearing presentations by other students from other countries is an experience that many students value most. All presentations will be via whiteboard and whatever 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 PowerPoint, whiteboard and handouts, as well as (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 my classroom. As needed, I am happy to work with you, disability services, veterans' services, rural student services, etc. to find reasonable accommodations. Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. For more information on your rights as a student and the resources available to you to resolve problems, please go the following site: www.uaf.edu/handbook/

READING MATERIALS (bold = required)

Aiuppa, A. et al., 2012, First volatile inventory for Gorely volcano, Kamchatka, *Geophysical Research Letters*, 39(6): L06307.

Gavrilenko, M., Ozerov, A., Kyle, P.R., Carr, M.J., Nikulin, A., Vidito, C. and Danyushevsky, L., 2016, Abrupt transition from fractional crystallization to magma mixing at Gorely volcano (Kamchatka) after caldera collapse. *Bulletin of Volcanology*, 78(7), p.47.

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

Kuznetsov, P.Y., Koulakov, I., Jakovlev, A., Abkadyrov, I., Deev, E., Gordeev, E.I., Senyukov, S., El Khrepy, S. and Al Arifi, N., 2017, Structure of volatile conduits beneath gorely volcano (Kamchatka) revealed by local earthquake tomography. *Geosciences*, 7(4), p.111.

Selyangin, O.B., 2006, Guide to Mutnovsky and Gorely Volcanoes (copy provided to students registered for Kamchatka session).

Simon, A., Yogodzinski, G.M., Robertson, K., Smith, E., Selyangin, O., Kiryukhin, A., Mulcahy, S.R. and Walker, J.D., 2014, Evolution and genesis of volcanic rocks from Mutnovsky Volcano, Kamchatka. *Journal of Volcanology and Geothermal Research*, 286, pp.116-137.

Zelenski, M. and Taran, Y., 2011, Geochemistry of volcanic and hydrothermal gases of Mutnovsky volcano, Kamchatka: evidence for mantle, slab and atmosphere contributions to fluids of a typical arc volcano, *Bulletin of Volcanology*, 73(4): 373-394.