

Earth Science for Science Teachers Course Syllabus

Science Teacher Education Program (STEP)

Course Information:

Title: Earth Science for Science Teachers

Course Number: GEOS 595/ED 595

Credits: 3

Prerequisites: Participating educators must be from schools involved in the Science Teacher Education Program administered by the Geophysical Institute. Approved districts include: Alaska Gateway, Delta Greely, Fairbanks North Star Borough, Lower Kuskokwim, Northwest Arctic Borough, Tanana City, Yukon Flats, and Yukon-Koyukuk. Concurrent enrollment in STEP's Science Curriculum Development for Teachers is required.

Location: Geophysical Institute, Elvey Bld. Auditorium

Dates: Monday-Friday, June 8 – 19, 2009

Meeting Time: 8 AM - Noon

Instructor: Jeremy Nicoll

Phone: 474-1546

Office Location: Elvey 501C

E-mail: jbnicoll@alaska.edu

Course materials/textbooks: TBD

Course Description:

Earth Science for Science Teachers is a special topics course designed to introduce K-12 science teachers to current studies in Earth Science through lecture, modeling exercises and tactile demonstrations at research facilities. Within the context of Earth's system, the course builds a foundation of understanding in topics such as scientific processes, physics, geology, balance of Earth's systems, volcanoes, and earthquakes, all of which are included in the Alaska Grade Level Expectations (GLEs) for Science. The GLEs identify concepts Alaska K-12 students should master by graduation. Course lectures and experiences are presented for a collegiate audience, with in-class discussions to help participants simplify concepts for K-12 students. Modeling exercises and experiments demonstrated by course instructor are designed for easy duplication in (or modification for) elementary and secondary classrooms. Instruction also includes training in technology used in modern research, such as computer modeling and data interpretation with access to earth science data from the Internet.

Course Goals and Student Learning Outcomes:

The goal of this course is to provide participants with an understanding of earth science research and the scientific expertise needed to simplify this content knowledge for K-12 students. The instructor will model various earth science phenomena and concepts; demonstrate research methods and tools at research facilities and guide participants in writing simplified earth science activities for K-12 students, which address the Alaska Science GLEs.

Instructional Methods:

This course utilizes a variety of instructional methods including:

- Lecture-delivered by instructor and/or guest lecturers
- Large group discussion
- Scientific modeling demonstrations
- Instructor-led tactile demonstrations at research facilities

Tentative Course Calendar:

Each day will consist of lecture, discussion and hands-on activities on the following topics.

Week 1:

Day 1: Discussion of volcanic ash tracking methods by Dr. Peter Webley; discussion of volcanoes on other planets by Dr. Robert Herrick.

Day 2: Discussion of particulates in the atmosphere resulting from volcanic activity by Dr. Cathy Cahill

Day 3: Discussion of particulates in the atmosphere resulting from volcanic activity by Dr. Cathy Cahill - continued

Day 4: Discussion of the use of infrasound in the study of volcanoes by Curt Szuberla, Dr. Jon Dehn

Day 5: Field trip to Chena Hot Springs for thermal imaging lesson with Dr. Peter Webley and Dr. Jon Dehn

Week 2:

Day 6: Discussion of volcanic landslides, mudflows and floods resulting from volcanic activity by Dr. Jim Beget

Day 7: Discussion of volcanic landslides, mudflows and floods resulting from volcanic activity by Dr. Jim Beget - continued

Day 8: Discussion of remote sensing and the use of synthetic aperture radar (SAR) to study volcanic history and current activity by Jeremy Nicoll and Dr. Franz Meier

Day 9: Discussion of remote sensing and the use of synthetic aperture radar (SAR) to study volcanic history and current activity by Jeremy Nicoll and Dr. Franz Meier - continued

Day 10: Presentations of Group Lessons.

Assignments:

Each participant must complete two Earth Science Lesson Plans; one prepared individually, one prepared by a grade-level group, for K-12 students (assigned on Day 3 and due on Day 10). Lesson Plans should target a specific grade level or range. The instructor will evaluate each 3-5 page Lesson Plan for the following:

- Accuracy of earth science concepts presented
- Inclusion of hands-on, age-appropriate scientific models, experiments and/or demonstrations
- Understanding of the processes of science
- Clarity of writing
- Statement of goals, learning objectives, GLEs addressed, detailed procedure, and assessment plan

Each participant must present their group Earth Science Lesson Plans to the instructor and peers on Day 9 or 10. Presentations will be evaluated for scientific integrity, clarity, integration of stated GLEs, and applicability to the K-12 classroom.

Learning Cycle Model Individual Lesson Plan will be due on Day 7.
Revision to Lesson Plan due on Day 9.

Course Policies:

Attendance is essential due to the condensed nature of the course. Make up assignments may be arranged as necessary. Participation in class discussions is required. Transportation for trips beyond UAF will be provided.

Evaluation:

Grades will be based on the following:

1. Class attendance: 20%
2. Participation in class: 20%
3. Science Post-test: 60%

A grade of **A** will be given for an overall score of 90% or higher. A grade of **B** will be given for 80-89%, **C** for 70-79%, **D** for 60-69% and **F** for <60%.

Disabilities Services:

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and ensures that UAF students have equal access to the campus and course materials. We will work with the Office of Disability Services (203 WHIT, 474-7043) to provide reasonable accommodations to students with disabilities.