GG-302 Igneous and Metamorphic Petrology

Instructor: Tom Shea, Earth Sciences Dept., POST 812, 956-9819, tshea@hawaii.edu
Schedule: Monday-Wednesday lectures (11:30-12:20) and Thursday lab (1:30-4:20pm)
Textbook: An Introduction to Igneous & Metamorphic Rocks (John Winter).
Field trips: Two short field trips during 3hr lab periods (Makapuu and Old Pali Rd.), and a weekend field trip to Maui to explore a variety of igneous rocks.
Grading: 15-16 Labs (60%), Semester Project (20%), Midterm exam (10%), Homework (10%).

Become a master of rocks: The main objective of this course is to get students acquainted with a wide range of igneous and metamorphic rocks and their corresponding geological settings. Deductive skills (identifying minerals and other phases, understanding why some often occur together or not, what can be inferred using the mineral assemblage, the rocks’ textures and their location of origin) will be emphasized over plain retention of nomenclature, although we will also examine why mineral and rock names are important and may convey great meaning. The petrogenesis of igneous and metamorphic rocks (the source ‘DNA’ of a given rock, its temperature, pressure, path through the earth’s crust, its interactions with other rocks and/or magmatic bodies) will be explored through different geodynamic contexts of the earth. The key importance of both chemistry and physics in understanding geological processes from handsamples will be underlined throughout the course.

Study rocks from a recent volcanic eruption: the recent astonishing events at Kilauea Volcano (the 2018 Leilani eruption) have provided us with an extraordinary opportunity to examine magmatic processes that generate igneous rocks. We will investigate samples and thin sections fresh from this eruption!

Get involved in the petrologist’s detective work: We will select samples/thin sections (e.g. from the 2018 eruption, or from other locations and remarkable samples from the Hawaiian Islands, or metamorphic rocks from the mainland) that will form the basis of each student’s semester project. The goal will be to recover as much information as possible from these samples through observations, identification of petrological clues, in order to reconstruct a ‘possible’ geological history.

SLOs - Student Learning Objectives (more general):
ES undergraduate courses have to consider how they address a number of SLOs, which the ES Department has decided are key attributes and/or abilities of any ES student:

1. Students can explain the relevance of rocks to human needs, including those appropriate to Hawaii, and be able to discuss issues related to geology and its impact on society and planet Earth.
2. Students can apply technical knowledge of relevant computer applications, laboratory methods, and field methods to solve real-world problems in earth sciences.
3. Students use the scientific method to define, critically analyze, and solve a problem in earth science.
4. Students can **reconstruct, clearly and ethically**, geological knowledge in both oral presentations and written reports.

5. Students can **evaluate, interpret, and summarize the basic principles** of geology and geophysics, including the fundamental tenets of the sub-disciplines, and their context in relationship to other core sciences, to explain complex phenomena in earth sciences.

**Disability access**: If you have a disability and related access needs the Department will make every effort to assist and support you. For confidential services, students are encouraged to contact the Office for Students with Disabilities (known as Kōkua) located on the ground floor (Room 013) of the Queen Lili‘uokalani Center for Student Services. URL: [www.hawaii.edu/kokua](http://www.hawaii.edu/kokua) and email: kokua@hawaii.edu

**Academic Dishonesty**: Academic dishonesty will be reported, and any exams or assignments affected by dishonesty will receive “0” credit and cannot not be retaken.

**Title IX**: The University of Hawaii is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. For more information regarding sex discrimination and gender-based violence, the University’s Title IX resources and the University’s Policy, go to: [http://www.hawaii.edu/titleix](http://www.hawaii.edu/titleix)