Properties of Lava, Eruption Dynamics, and Landforms

Classification and physical properties of volcanic rocks
Magma generation
Variations in eruptive style, vent types, and explosivity
Volcano types and explosivity
Eruption Mechanism and Principle Eruption Types
Volcano types: Scoria Cones and Shield volcanoes
Volcano types: Stratovolcanoes, Domes, and Calderas
Volcano types: Maars, Tuff Rings, and Tuff Cones

Eruption Dynamics - Controls
Eruption Dynamics - Variability
Eruption Dynamics - Variability
Eruption Types - all sub-sections
Volcanic Landforms
Volcanic Landforms
Eruption Types - Hydrovolcanic

Eruption Phenomena and the Products of Eruption

Lava Flows - general characteristics
Basaltic lavas
Basalt Volcanism: example = Hawaii
Basalt Volcanism: examples = Columbia River Basalt and Saudi Arabia
Andesitic and felsic lavas
Mt. St. Helens
Volcaniclastic terminology
Pyroclastic Falls
Pyroclastic Flows
Pyroclastic Surges
Post-depositional features (welding, etc.)
Ancient Volcanic Successions
Volcanic gases and their effect on climate

Eruption Products - Lava flows
Eruption Types - Fissure & Hawaiian
Eruption Types - Lava flows
Historical Eruptions - MSH
Eruption Products - Tephra
Eruption Products - Lava and water
Eruption Products - Tephra
Eruption Products - Pyro. Flows
Eruption Products - Gases, climate

Final Exam – Dec. 21; 1:00 - 3:00 P.M.

Final grades will be based on the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tr>
<td>Mid-term exam</td>
<td>100 pts.</td>
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<tr>
<td>Final exam</td>
<td>100</td>
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<tr>
<td>Project</td>
<td>50</td>
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<td>Two exercises:</td>
<td>50 (25 pts. each)</td>
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Course Project: This project will test your ability to read, understand, and decipher a peer-reviewed scientific publication. Choose a publication on any aspect of volcanology from one of the main-stream publications (examples: GSA Bulletin, Journal of Volcanology and Geothermal Research, Bulletin of Volcanology, Geosphere, Lithosphere, and many more). Run the paper by me for approval. Your project is to write a 3-4 page summary (single spaced) of the paper, and give a 15-minute oral presentation of the paper to the class.

Fieldtrip: Oct. 29-30
VOLCANO Listserver:

Everyone should sign up for the VOLCANO Listserver, which provides a means of rapid communication among members of volcanological community. It is used for announcements or inquiries about any aspect of volcanology. All subscription requests and postings must be approved by the moderator. Do not submit basic research questions to the server! It is not a suitable means for a literature/web search. To join the list, send the message:

‘SUBSCRIBE VOLCANO John E. Doe” (but of course use your full name) to: listserv@asu.edu
You will receive notification that you have joined from the listserver if you did it correctly.

Learning Outcomes:

This course has several overreaching goals to empower students in their ability to think critically, identify connections, and apply scientific principles to the understanding of volcanic processes, volcanic features, and the genesis of volcanic rocks. After completing the course, students should be able to meet a number of important objectives, the most salient of which are:

1. Employ rock whole-rock geochemistry and analyze data sets in classifying volcanic rocks, and be able to identify the gross tectonomagmatic environment of chemically distinct volcanic suites.

2. Articulate the physical properties of different magma and lava types and understand how these properties can influence fluid flow, crystallization, eruption dynamics, and explosivity.

3. Describe the variations in eruption style, vent types, and explosivity, have a general understanding of the physical and chemical controls on each.

4. Describe the mechanics of eruption and the principle eruption types, with classic examples of each.

5. Distinguish between the different types of volcanoes, their variable styles of eruption, and their tectonomagmatic environments, with classic examples of each.

6. Articulate the important role of meteoric water is controlling the style of eruption, the deposition of hydrovolcanic deposits, and the creation of hydrovolcanic landforms such as maars, tuff rings, and tuff cones.

6. Understand the usage of volcanioclastic terminology in the non-genetic classification of pyroclastic debris and pyroclastic rocks.

7. Define, describe and identify the field characteristics of volcanic phenomena and volcanic deposits associated with pyroclastic falls, pyroclastic surges, pyroclastic flows, and lahars.

8. Employ knowledge of volcanic process and recent volcanic deposits to ancient volcanic successions.

9. Understand, interpret and summarize in written and oral form the contents of peer-reviewed papers in the scientific literature.