Course Syllabus:

EESC 6700 – Magmatism and Volcanism, 3 credits
Fall 2016

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Office Hours: Lamont, by appointment  
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Class Meeting Time: Lamont, Monday and Wednesday mornings

Overview: This course explores the origin of magmas and their subsequent movements; their ascent, stalling and eruption; their transport of heat and mass through the earth; their formation of crust and creation of volcanoes. The course will explore magmatism itself - its chemical and physical underpinnings – and also develop magmatic tools used to understand other earth processes. Topics will be focused around Grand Questions. Example questions include: What do magmas tell us about the thermal structure of the earth? Why do magmas store and stall where they do? What drives the largest eruptions on Earth? Does continental extension drive melting or melting drive extension? Questions will evolve to reflect the state of the field and student interest. The course is designed to serve as an accessible breadth course for Earth Science graduate students in any discipline.

Course Structure: Each week will be devoted to a Grand Question, with a structured lecture providing fundamental background, and discussion of a key paper that articulates the question. Students will also research current papers on topic, and provide short pop-up talks on these. Problem sets will provide hands-on worked examples of magma principles and modeling tools for estimating pressure, temperature and other parameters of interest. The final research paper (≤ 10 pp of text) will be due at the end of the semester, on a topic of choice to the student.

Pre-requisites: graduate student status and coursework equivalent to admissions requirements to the Earth and Environmental Science Ph.D. program (one year each chemistry, calculus, physics) and at least two courses in geology/geophysics/geochemistry disciplines; or permission of instructor.

Required Textbook: There is no required textbook. Readings will be freely available from online resources.

Class Schedule and Other Events: Attached is a preliminary class schedule.

Late Work: Problem sets must be handed in on the date assigned in class. Ten points will be deducted (out of 100 total points) for each day late.

Grading Criteria:
Problem Sets (3): 30%
Final Paper: 30%
Class Participation: 40%
Total 100%

Academic Integrity: Students are expected to do their own work on all tests and assignments for this class and act in accordance with the Faculty Statement on Academic Integrity and Honor Code established by the students of Columbia College and the School of General Studies. Because any academic integrity violation undermines our intellectual community, students found to have cheated, plagiarized, or committed any other act of academic dishonesty can expect to [specify academic sanction: fail the class/receive a zero for the work in question] and may be referred to the Dean’s Discipline process.
## Magmatism and Volcanism

**EESC 6XXX Schedule, MW 11-12:15 pm, Fall 2016**

<table>
<thead>
<tr>
<th>Week of</th>
<th>Topic</th>
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<tbody>
<tr>
<td>5-Sep</td>
<td>(Labor Day Sept 5) Introduction</td>
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| 12-Sep  | **How do H2O and CO2 drive melting?**  
| 19-Sep  | **What is the role of heterogeneities in driving and focusing melting?**  
| 26-Sep  | **Do subducting slabs melt?**  
| 3-Oct   | **Does continental extension drive melting or melting drive extension?**  
| 10-Oct  | **What do magmas tell us about the thermal structure of the earth?**  
| 17-Oct  | **How hot are plumes?**  
| 24-Oct  | **Why do magmas stall and store where they do?**  
| 31-Oct  | **How do magmas form the oceanic crust?**  
| 7-Nov   | (Academic Holiday) **What drives the largest eruptions on Earth?** |
| 14-Nov  | **How do magmas form the continental crust?**  
| 21-Nov  | **What drives the most explosive volcanic eruptions?**  
| 28-Nov  | (Thanksgiving, Nov 24) **What controls the run-up to an eruption?** |
| 5-Dec   | **What volatiles do volcanoes convey to the atmosphere?**  
| 12-Dec  | (Last day of classes) **How have magmas driven differentiation of the earth?** |

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