New Course Proposals to DEES:
EESC 6XXX Magmatism and Volcanism

Rationale for a New Course:

What instructional need is being filled?
A graduate level course on the role of magmas and volcanoes in earth processes.

What will students gain from this course?
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?

Expected enrollments/audience – who will take this course?
The course is designed to serve as an accessible breadth course for Earth Science graduate students in any discipline. The course will also serve as a depth course for the Geochemistry Discipline. The expected enrollment is 5-15 students, drawn primarily from Geology, Geophysics, Geochemistry Disciplines.

Justify level –graduate (≥ 6000)
This is intended as a graduate course, to strengthen offerings in several Disciplines. The topics and discussion require a depth of understanding of physics, chemistry and plate tectonics. Pre-requisites are such that they require graduate preparation and status. Undergraduates with appropriate background may take the course with permission.

Related Courses
No existing courses cover this span of topics, from magma generation, movement and eruption as expressed in the recent literature with focus on Grand Questions.

EESC 4009 – Chemical Geology
This course is a development of thermodynamics, focused on high pressure and temperature equilibria. It does not focus on magmatic problems that bear on tectonic processes.

EESC 4701 – Igneous Petrology
This course is a development of phase equilibrium as applied to the microscopic study of igneous rocks. It does not focus on topical questions from the recent literature.

Seminar Courses do not provide the fundamental background, nor hands-on problem solving, provided in this course. Such background in necessary to enable in-depth understanding and

discussion from graduate students with a wide range of interests and preparation, including geologists, geophysicists, geodynamicists and geochemists.

Course Funneling – this is a stand-alone course in the graduate curriculum.

Instructor commitments - Plank has yet to teach at the graduate level, except seminars. And yet, when she has offered topical seminars, like "Volcano Petrology" (2008), "Volcanic Eruptions" (2010), "Volcanism Associated with Continental Extension" (2011) there has been good attendance (5-15) and interest across divisions. By broadening the scope of topics, providing structured background, and offering alternate years, Plank hopes to strengthen the topical approach to provide graduate students background in magmatism and volcanism.

Scheduling – There are currently very few Geochemistry Graduate-Level Courses in odd-year Falls. See attached plan. So the plan would be to offer this course regularly in Fall 2017, 2019, etc. Nonetheless, there is a standing cohort of more senior students who are primed for taking this course in Fall 2016, and so the goal would be to offer it in Fall 2016 and thereafter odd-year Falls: 2017 and 2019, etc. Plank already teaches an undergraduate majors course regularly each Fall, EESC 3101 Geochemistry for a Habitable Planet, and plans to develop a new Introductory course to alternate even-year Springs, starting in 2018.

Special Items – please consult CIM Guide
e.g., other kinds of Class Meetings, Fees, Multiple Sections, etc
http://www.college.columbia.edu/coi-procedures