

## *The Beauty of Mathematics* Course Syllabus

**I. Introduction:** This course will provide a conceptual understanding of mathematics, especially to those who have struggled with math in the past. Many students do not get to experience the conceptual and artistic beauty of math for a variety of reasons, but some aspects of theoretical mathematics are truly accessible to everyone. This course will give students the opportunity to hear lectures at their level, participate in engaging problems, and explore a variety of mathematical subjects.

**II. Course Info:**

Course Facilitators: Sander Mack-Crane and Marissa Mihin, with guest lectures by Rockford Foster.

Faculty Sponsor: Ken Ribet

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Location and Time: 219 Dwinelle Tuesdays 5-6PM

Office Hours: TBD

Administrative info: Upper division, P/NP, and will meet once a week. Only 50 students will be allowed to enroll in the course. If there are not enough spots, we will require students to apply to earn a spot in the course. Details to follow.

There are no prerequisites, but students will have an easier time in the course if they are familiar with basic algebra and pre-calculus.

Students of *all majors* are encouraged to check out the course; the goal of the course is not to teach math in the traditional sense, but to give students outside the major a chance to see what theoretical mathematics looks like.

**III. Lectures:** There are 50 minute class periods with 40 minutes of lecture followed by 10 minutes of collaborative problem-solving. Each problem will be related to the lecture material and you are expected to work in groups of two or three each week. Collaboration is a big part of Mathematics and we encourage you to ask questions and work together. This will be graded on effort, not correctness. We will go over the answer to the problem together as a class.

**IV. Assignments:**

- A.** There will be weekly reading assignments posted on Bcourses. They will be sections of articles, online books, papers, or web pages that have substantial mathematical content. *Your assignment is to do the required reading and turn in a typed 1-page double spaced response to the reading.* It is not meant to be a summary. The assignment is meant to give you familiarity with a subject, either new or covered in lecture. You are encouraged to ask questions or talk about what you found confusing/interesting in your response.
- B.** For students taking the course for 2 units, in addition to the weekly reading assignments, there will be weekly problem sets. They will contain 1-3 challenging but doable, conceptual problems based on the material from the preceding lecture. Each problem set should take about 4 hours of work a week. You will be given handouts in class and links will be posted online to assist in your assignments. Everyone is encouraged to come to office hour, and for 2 unit students, you are required to attend at least 3 office hour sessions in order to receive a full participation grade.

*You are encouraged to work with other students but each student must turn in their own work.*

- V. **Grading:** 40% attendance, 30% participation, 30% assignments. For 2 unit students, participation is split into class participation and office hours, and assignments are split into the weekly reading assignments and problem sets. There is no final exam.

VI. **Course outline:**

<b>Date</b>	<b>Topic</b>	<b>Lecturer</b>
TBD	Introduction to Mathematical Thinking	Sander and Marissa
TBD	Basic Set Theory/Equivalence Classes	Marissa
TBD	Different Sizes of Infinities	Sander
TBD	Introduction to Group Theory	Marissa
TBD	Basic Knot Theory	Marissa
TBD	Applied Math pt. 1	Rockford
TBD	Graph Theory and the 4-Color Theorem	Sander
TBD	Introduction to Visual Topology	Marissa
TBD	Applied Math pt. 2	Rockford
TBD	Prime Numbers and Modular Equivalence	Sander
TBD	Basic Game Theory	Sander
TBD	Applied Math pt. 3	Rocky
TBD	Mathematical Paradoxes, Curiosities, and Dimensional Thinking pt. 1	Marissa
TBD	Mathematical Paradoxes, Curiosities, and Dimensional thinking pt. 2	Sander

Handouts will be given out in the beginning of each lecture. Readings and problem sets will be posted on Bcourses. If you have questions about the course, feel free to contact one of the course facilitators via email.