

Mathematics 112L: Research Faculty Interaction (Lab)

for Math 112L sections 01, 02, and 03 (Victoria Akin and Chester Lian)

Spring 2019 Tuesdays 11:45 am – 1:00 pm Biological Sciences 111

Professor: Lenny Ng

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My office: Physics 216

Synopsis: We will explore a variety of topics in mathematics, with an emphasis on the creative process of discovering and analyzing patterns. We'll see how the golden ratio and the Fibonacci numbers appear in unexpected ways in nature; the mathematical reason why chromatic scales in music have 12 tones; how a brain teaser called the Monty Hall problem stumped many math professors but not a group of pigeons; and many other nontechnical ways that mathematical reasoning can appear in everyday life. We'll also plan to explore some "recreational" aspects of math, possibly including: how the ancient Greeks found order and symmetry in three-dimensional shapes; how to connect houses to utilities by pipes that don't cross, and what this has to do with Möbius strips and other geometric surfaces; a baby version of calculus called the calculus of finite differences, and what it has to do with slicing pancakes into pieces; and logic puzzles including the unexpected hanging and the blue-eyed islanders. The overarching theme of all of these topics is that they give different glimpses into how mathematicians think and hopefully show how fun it can be to think this way. Some of the topics may be related to calculus, but many will not, and they should be accessible regardless of how well you remember high school mathematics.

Meetings: Our Research Faculty Interaction (RFI) will meet each Tuesday during the semester, **except** for the Tuesday classes that are devoted to midterms: **February 12, March 26, and April 23.**

Quizzes: The first 10 minutes of each Tuesday class will be occupied by a quiz, except for the first meeting (January 15) as well as the three midterm dates. Each quiz will be closed-book and closed-notes, and will feature short questions related to the material we explored in the previous Tuesday's class. *Please arrive on time* to give yourself enough time to complete the quiz. Quizzes must be taken during the allotted time; *there are no makeups.* (See also the policy on excused absences below.) Your lowest quiz score will be dropped.

Grading: The RFI component of this course constitutes 20% of your overall grade. Your grade for this component is determined entirely by your quiz scores, with the lowest score dropped.

(There is a second page.)

Sakai: I will use Sakai to post information related to our RFI. This includes a rough schedule of class topics, to be updated as we go through the semester. (See under “Syllabus” on Sakai.) After each Tuesday class, I will also post a couple of problems related to that day’s material. *These are not to be turned in*; they are there for you to review your mastery of the topic and prepare for the next week’s quiz. (See under “Announcements” on Sakai.)

Office hours: Mondays 2:00–3:00 and Thursdays 2:45–3:45, or by appointment (please email me). These are in my office, Physics 216.

Class policies:

- Missed work: Per university policy, missed course work is officially accommodated only in certain specific circumstances, including short-term illness. See <http://trinity.duke.edu/undergraduate/academic-policies/class-attendance-and-missed-work> for the official policy, including the procedures you must follow for the missed work to be excused.
- In-class behavior: Please remember that you are sharing the classroom with other students, and avoid behavior that could be distracting to others. I am allowing laptop use for the specific purpose of taking notes only, but I may revisit this policy if it proves too distracting to the class as a whole.