

A CLOSER LOOK AT INFINITY

SUMMER 2019

GENERAL INFORMATION AND COURSE SYLLABUS

Instructor: Anna Grim
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Class Location: Sayles Hall, Room 306
Class Time: MTWRF ~ 3:30-6:20PM
Office Hours: MTWRF ~ 10-11:30AM

Objective. The goal of this class is to learn how to solve the 100 Rooms Problem. When you first hear the problem, it sounds impossible and feels unsettling that there's a solution. In order to solve this problem, you only need three concepts from higher level math concepts. In this class, students will build the mathematical tools to solve this problem and along the way use these tools to solve simpler problems that lead up to the 100 Rooms Problem.

Prerequisites. This course is self contained and there are no prerequisites.

Syllabus. This one week course will cover the following topics:

- Brief overview of basic set theory
- Cardinality of finite and infinite sets.
- Equivalence relations
- Axiom of Choice
- Brief overview of metric spaces
- Sequences
- Convergence

Course Materials. There is a course pack which is also available on Canvas. At the end of the course, the notes will be posted on my website www.annamgrim.com under teaching. I'll include solutions to the 100 Rooms Problem, group problems, and daily problems.

Attendance and Course Etiquette.

- Regular attendance and completion of homework is expected of all students and is the key to success in this course.
- Cell phones should be turned off during class; no e-mails or communication on social media should take place during class.
- Students are encouraged to ask questions during class, contact the instructor by email with any concerns, and attend office hours.

Homework and Assignments. There will be homework assigned after each class that will be due the next day at the beginning of class. In math, every problem starts with knowing and understanding the definitions of concepts related to the problem. At the start of each class, there will be a short quiz on definitions from the previous day. In addition, students will be divided into groups and each group will be assigned a logic problem. On the last day of class, each group will present their problem and solution.

Grading Policy.

- Homeworks — 50 %
- Group Presentation — 40 %
- Quizzes — 10 %

Honor Code. Students are encouraged to work together on homework assignments, but each student must write up their solutions individually.

Week 1	Theoretical Topic	Homework
Monday	<ul style="list-style-type: none"> - Course introductions - Set theory - Equivalence relations - Induction 	Exercises 2-8, 11,12 in Section 2.5
Tuesday	<ul style="list-style-type: none"> - Finite sets - Countable Sets - Hilbert Hotel 	Exercise 9, 10, 14, 16, 17b , 20 in Section 2.5
Wednesday	<ul style="list-style-type: none"> - Uncountable sets - Axiom of Choice - Big Numbers - Metric spaces 	Exercises 18, 23, 24 in Section 2.5 Exercises 2, 3, 5, 9 in Section 3.4
Thursday	<ul style="list-style-type: none"> - Sequences - Convergence - Metric on set of real valued sequences 	Exercises 11, 12, 14, 16-18 in Section 3.4
Friday	- Group presentations	Submit a written solution of the group problem