

Math 1313

Liberal Arts Honors Mathematics

Instructor: Prof. Barbara Shipman
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Office Hours: Adjusted to the semester in which the course is taught
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Class Time: Monday, Wednesday 1:00 - 2:20
Place: Pickard Hall 308

Textbook: THE HEART OF MATHEMATICS: An Invitation to Effective Thinking, 2nd ed.,
by Edward Burger and Michael Starbird. ISBN: 1-931914-41-9

Learning Outcomes: Upon successful completion of this course, you will be able to think and strategize mathematically, communicate your solutions clearly, both orally and in writing, and explain the broader significance of mathematics, including its applications to other disciplines.

Course Description: In Math 1313, you will explore new areas of mathematics, both modern and classical, ranging from applications of modern topology in understanding the structure of DNA to geometric insights that were known centuries ago and are still used today, such as the Fibonacci sequence and the Pythagorean Theorem. The course will be highly interactive. During class and outside of class, you will work in small groups on mathematical puzzles and delve into questions that have taken mathematicians decades to resolve.

Fun and Games

Games from Chapter 1
Poison

Geometric Gems

4.1 The Pythagorean Theorem
4.3 The Golden Rectangle
• Tiling the plane
4.5 The Platonic Solids

Number Contemplation

2.1 The Pigeon-hole Principle
2.2 Fibonacci numbers/ Numerical patterns
2.3 Prime and composite numbers
2.4 Clock arithmetic/ Modular arithmetic/ Bar codes
• Arithmetic in other bases
2.6 Rational and irrational numbers
2.7 Real numbers/ Decimals

Infinity

3.1 Introduction
3.2 One-to-one correspondence
3.3 Higher orders of infinity
3.5 Comparing infinite geometric sets

Topology

- 5.3 Euler's formula
- 5.1 Rubber sheet geometry
- 5.2 Moebius bands
- 5.4 Knots and links and applications to DNA structure

Assignments, Quizzes and Exams: Some class time will be spent working on problems in groups. Sometimes the assignments will be collected at the end of the class period, and sometimes you will be asked to finish the work (or do a complete assignment) outside of class. A short quiz will be given each Wednesday, at the beginning of class. Attendance is very important; late homework is not accepted, and missed in-class assignments and quizzes cannot be made up, whether the absence is excused or not. Four lowest quiz/assignment scores will be dropped to help you with times when you may be sick or cannot come to class for any reason. There will be one Midterm Exam and a Final Exam.

Grading: Assignments/Quizzes:	50%
Midterm Exam:	20%
Final Exam:	30%

On all homework assignments, include clear and complete explanations of how you obtained your solutions and why they work. Homework will be graded on the clarity and completeness of the explanations as well as on the correctness of the solutions.

The A, B, C, and D grade cut-offs will be no lower than 90%, 80%, 70%, and 60%, respectively, of the cumulative course percentage.

Important dates:

(This is tailored to the specific semester in which the course is conducted.)