

Math 3910, Introduction to Research Methods

Course Information

Spring 2016

Professor: Edward Richmond

- ▷ Office: 427 MSCS
- ▷ Email: edward.richmond@okstate.edu,
- ▷ Course Times: MWF 11:30–12:20 PM in 514 MSCS.
- ▷ Instructor’s office hours: TBA and by appointment.

Course Description: A project-based introduction to the core methods used in mathematical research: computation, pattern recognition, conjecture, proof, and generalization. Students will conduct inquiries in various areas of mathematics to be selected from combinatorics, number theory, geometry, and others. Calculation and computer experimentation will be used to gather data and facilitate recognition of patterns. Students will read and write research papers and make presentations summarizing their methods and conclusions.

Prerequisites: Calculus II (Math 2153), Linear Algebra (Math 3013) are the course prerequisites. Some computer programming experience is recommended, but not required.

Course Objectives: The objectives of this course are to provide future mathematicians and mathematics teachers with the tools mathematicians use to solve problems. Students should develop the ability

- to ask questions in a mathematical way,
- to design computations which can be analyzed in the search for answers to these questions using mathematically powerful computational tools in a laboratory setting,
- to analyze computational results, make conjectures, and prove the validity of these conjectures,
- to communicate with each other as mathematicians do through the reading of peer-reviewed mathematical literature, through writing mathematical papers and giving presentations,
- and to enable students to understand how mathematicians develop the new knowledge and insights which eventually make their way into new understandings which change our world (and our future textbooks!).

Text: Notes and articles will be distributed to the class as needed.

Course Requirements: Students enrolled in this course will complete the following:

ITEM	WEIGHT
Homework and activities	20%
Project 1 (Game Strategy)	15%
Project 2 (Number Theory)	20%
Project 3 (Discrete Math)	20%
Final Project	25%
<hr/> TOTAL	<hr/> 100%

Grading: Preliminary grade cutoffs, which may be curved very slightly if circumstances warrant, are:

- 448 points (89.6%) guarantees an A in the course;
- 398 points (79.6%) guarantees a B;
- 348 points (69.6%) guarantees a C;
- 298 points (59.6%) guarantees a D.

Course Units: The course will be subdivided into four major units, as follows:

1. **Curiosity and Mathematical Inquiry:** 2 week
2. **Computational Design and Analysis:** 4 weeks
3. **Patterns, Conjecture and Proof:** 3 weeks
4. **Final Inquiry:** 5 weeks

Course Policies: The following policies will be followed in this course.

PROJECTS There will be four projects in this course. These must be typed up neatly using a mathematical typesetting system such as the equation editor in MS Word or using LaTeX.

PRESENTATIONS Students will present their results from some of the projects in class. Your project grade includes the score from the written paper and a score for your presentation.

HOMEWORK Homework on relevant material will be assigned every 1-2 weeks. The main focus will be on the reading and writing of mathematics. However, there may be more traditional problem set style assignments as well.

SAGEMATH Students are required to setup a SAGEMathCloud account at <https://cloud.sagemath.com>. SAGE is an open source (hence free) mathematics computing program. SageMathCloud also includes a Latex editor for writing professional reports. Students will be learning how to use both SAGE and Latex.

LATE WORK No late homework will be accepted. Missed in-class activities may not be made up. Turning in a major project late will be allowed only

for serious and unavoidable conflicts, otherwise a penalty of 10% of the grade may be imposed for each day a project is late. You must notify me before or as soon as possible after a missed exam.

WITHDRAWAL The last day to drop the course with no fees encumbered and no grade is Tuesday, January 19. The last day to drop with a partial refund is Friday, January 22. The last day to drop with an automatic grade of W is Friday, April 8. The last day to withdraw from all classes with a grade of W or F is Friday, April 22.

Special Accommodations: If you have a qualified disability and need special accommodations, you should notify me as soon as possible and request verification of eligibility for accommodations from the Office of Student Disability Services.

Academic Integrity: Oklahoma State University is committed to the maintenance of the highest standards of integrity and ethical conduct of its members. This level of ethical behavior and integrity will be maintained in this course. Participating in a behavior that violates academic integrity will result in your being sanctioned. These behaviors include, but are not limited to, unauthorized collaboration or plagiarism, cheating on examinations, or helping another person cheat. Violations may subject you to disciplinary action including the following: receiving a failing grade on an assignment, examination or course, receiving a notation of a violation of academic integrity on your transcript (F!), or being suspended from the University. Sanctions are much more severe for graduate students — see academicintegrity.okstate.edu.