INTRODUCTION TO UNDERGRADUATE RESEARCH IN MATHEMATICS (MATH 268)

SPRING 2011 SYLLABUS

Instructor information: Sunil Chebolu, Stevenson 303B, schebol@ilstu.edu, 309 438-3893.

Class time and place: TuTh, STV 436 11:30 AM - 12:45 PM

Class Homepage: http://www.math.ilstu.edu/schebol/teaching/268-11.html
Make sure you check the class homepage and your ISU email account on a daily basis.


Office hours: MW 3:00 - 4:00 PM and Th: 10:30 - 11:30 AM
You can also make an appointment or try dropping by my office.

Course content: This is an introductory research course in mathematics. We will explore several topics (mostly from algebra and number theory) like a researcher and not like a student. The concepts will be introduced via some simple examples. The students are then asked to generalize the concepts in order to arrive at a substantial question (or questions) or look for variations and analogues for exploration. The students will then play with examples to get an in depth understanding of the questions, and perhaps raise new questions. By accumulating information from these examples, students will observe regularities, real or accidental. They will then make conjectures based on these observations, testing their conjectures with further examples. Throughout, students will maintain a research journal in which they document their work - examples, ideas, and solutions. Working in groups, students will prepare a poster or presentation for the ISU Undergraduate Research Symposium and a topic module for presentation to their classmates. Finally, each group of students will write a clear, precise report describing their own investigations, and giving careful justification for their results. All reports will be typeset in LaTeX.

Goals of the course: The ultimate goal of this course is to give students an opportunity to walk in the shoes of a professional working mathematician. This involves the following:

1
• Learning how mathematics evolves! Working with examples, seeing patterns and structure, making conjectures, and trying to prove them to build a coherent theory.
• Reading relevant research papers to identify problems
• Doing actual research after identifying problems: working out special cases by analyzing simple examples, modifying old proofs and coming up with new ones.
• Writing a research paper in a professional manner using LaTeX.
• Using mathematical software such as Maple/Mathematica to do computations and to test conjectures in a range.
• Presenting independent or collaborative research work in undergraduate research seminars.

**Exams:** There are no conventional exams in this course such as midterms, class tests, quizzes, final. The mode of evaluation will be based on the following inputs of your work in various forms.

1. Homework Assignments (20%)
2. Algebra seminar or Undergraduate Research Symposium poster/presentation (10%)
3. Research Report (30%)
4. Module Presentation (20%)
5. Research Journal Evaluations (10%)

**Final note:** Please note that this is a research course. Unlike other regular courses, there will not be systematic lectures or exams given in this course. All the reading necessary will be done by you at home. I will tell you what to read and where to read. We will meet twice a week and discuss problems and do calculations. Your enthusiastic participation, hard work and contribution are the key factors for the successful completion of this research course.

GOOD LUCK!