	Time	Location
Lecture	MW 1:50-3:05pm	Eng. 1 Bld. 027

Instructor: Robert Ellis, Assistant Professor of Applied Mathematics

Office Info: Eng. 1 Bldg. Rm. 105C, 567-5336, rellis"aht"math·iit·edu (with appropriate modification)

Office hours: M 3:15-4:15pm (Math 152 Priority)
T 1:15-2:15pm (Math 430 Priority)
W 3:15-4:15pm (General)
F 11:20am-12:20pm (General)

Appointments and emailed questions are also welcome. I encourage you to request joint appointments so that more people can benefit from the discussion, or simply bring others with you. Any changes to office hours will be posted on the course homepage.

Course Home Page: `http://math.iit.edu/~rellis/430F06/` **Assignments posted here, check often!**

Prerequisites: Math 230 or Math 332

Text: *Applied Algebra*, Joseph Gallian, 6th ed., Houghton Mifflin
Textbook supplements are posted at `http://www.d.umn.edu/~jgallian/`. We will employ supplementary online exercises including some with the program Group Explorer. The text is excellent, and each section covered must be fully read.

Description. This is a proofs-based course which treats the structure, properties, and relationships of groups, rings, and fields; a substantial amount of number theory is included along the way. Groups are motivated by the study of symmetry, and are employed in subjects such as polyhedral geometry, crystallography, quantum physics, and cryptography. Rings and fields are abstractions of the standard notions of addition and multiplication. This course is a critical bridge to further progress in cryptography, (linear) algebra, topology, and differential geometry, to name a few, as well as a prerequisite for most good graduate schools.

Grade Breakdown. There will be three in-class midterms worth 15% each, on September 27, October 30, and November 29. The final exam, taking place Thursday December 14, 10:30am-12:30pm in E1 Rm. 027, is worth 30%. Homework is worth 25%. Part of this homework may consist of a class project with presentation, to be determined. The grading scale will be no more strict than A:85-100, B:75-84, C: 65-74, D:55-64.

Exam Components. The exams and final exam will have the following 3-part structure: (i) examples, counterexamples, and definitions; (ii) algorithms, computations, and applications; and (iii) proofs. Typically there will be 1-2 routine proofs and 1-2 proofs of moderate difficulty. Notice will be given if this structure changes.

Class Attendance. The text is excellent, but prompt and regular class attendance is required, as the lectures and discussions are an indispensable means of mastering the material. The importance of proofs in this course makes it critical to practice and be exposed to good proof techniques in lecture. Attending every class is strongly expected, although absences are not penalized per se, except that they are virtually guaranteed to reduce your grades on exams and homeworks.

Topics. We will attempt to cover all material of Chapters 0–18 of the text. If optional material or outside material is included along the way, other material will be omitted. Course Outline:

0. Integers and Equivalence Relations
1. Properties of Integers
2. Introduction to Groups

3. Groups
4. Finite Groups
5. Cyclic Groups
6. Isomorphisms
7. External Direct Products
8. Cosets and Lagranges Theorem
9. Normal Subgroups and Factor Groups
10. Group Homomorphisms
11. Fundamental Theorem of Abelian Groups
12. Introduction to Rings
13. Integral Domains
14. Ideals and Factor Rings
15. Ring Homomorphisms
16. Polynomial Rings
17. Factorization of Polynomials
18. Divisibility in Integral Domains

Homework and objectives. Homework will serve to improve students' clarity of thought and language when writing or communicating mathematics. Each week there will be one or more assignments consisting of a number of problems each. Solutions should be presented carefully, and will be graded both on correctness of mathematics and on presentation. Write solutions so that a fellow student can understand – an un-annotated sequence of calculations is generally not well-communicated mathematics. Homework will be due at the beginning of class on the due date so as not to disrupt the lecture.

Homework collaboration. You are encouraged to discuss homework problems but **only** with another student in **this** class or the instructor. When you **write up** the solution, however, **you must not consult any notes or other aids from these discussions**. Then you may only use the textbook unless otherwise instructed. For example, if you start to write the solution, get stuck, and consult someone half-way, you must start the solution over without referring to the first attempt. You may not consult 3rd party resources such as the internet to find solutions to homework problems. Use your common sense to extrapolate from these guidelines or contact the instructor regarding uncertainties. You are recommended not to violate this policy both because of possible prosecution and because of the resulting ill-preparedness for exams.

Academic Integrity. The Code of Conduct and applicable penalties in the IIT Student Handbook apply.

Missed Work. Assignments and exams cannot be made up except as approved by the instructor (e.g., due to official IIT activity or documented emergency). An exam missed for an excused reason must be made up promptly upon the student's return, the time frame being at the discretion of the instructor.

Disability Assistance. IIT and this instructor are committed to accommodating students with disabilities. Students desiring such consideration must immediately contact the Center for Disability Resources and Educational Development at 567-5744. (Their approval must be had for any exceptions regarding exam guidelines.)