

Course Syllabus
Math 4211/6211---Fall 2007

Instructor: Dr. Neal Smith

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Office Hours: How about 800-900 TR, 200-300 MW and by appointment. It is the responsibility of each student to seek help when necessary.

Text: A First Course in Abstract Algebra (8th ed.) by John Fraleigh. This semester, we will cover most of the material in sections 2-17 of the text. Sections 18-33, plus some topics here and there, will be the fodder for Math 4212/6212. Section 0 should be comprised largely of what you learned in Math 3030, and is the 'background' material for this course.

Grading: Your grade will be determined by your performance on 2 'mid-term' exams, homework*, class participation** and a final exam; each mid-term will count for 30% of your grade, the final 30%, and homework and class participation will count for the remaining 10%.

If your final percentage is in the interval...	Your course grade is...
[80%, 100%]	A
[70%, 80%)	B
[60%, 70%)	C
[40%, 60%)	D
[0%, 40%)	F

*---Homework will probably include a few problems a week to be turned in. See the list of problems that was distributed.

**---Each student will be expected to present the solution to at least four homework problems to the class over the course of the term. Details will follow with the first homework assignment.

Graduate credit: Students taking the course for graduate credit (as Math 6211) may be asked to do '6211-only' problems on exams, be asked to do extra presentations of homework exercises, and/or have their graded work subjected to somewhat greater scrutiny than those taking the course for undergraduate credit.

Other Policies:

Attendance: In the world of upper-division courses, frivolous absence is a very bad thing. You never know when you might want someone to write you a recommendation letter. If you are going to be absent on a given day for a legitimate purpose, you should notify me in advance.

Make-ups: I do not like to do make-ups. If you know you're going to be gone at some point (for a non-frivolous reason) when exam-time nears, let me know well in advance, so I can schedule the exam appropriately.

Grading philosophy: This is a theorem-proof course, and you should be getting advanced enough as a student to write clear, well-written, and coherent mathematical arguments. Homework and exams will be graded with this in mind; thus you should make things as clear, neat, and well-written as possible to ensure that you receive the proper credit for your work.

Grading philosophy, mark II: On homework and exams, problems will typically be evaluated with the following rubric in mind.

5-The problem is completely correct, beyond any reproach.

4-The problem is 'basically correct', but there may be some problems with a minor detail, the proof may be not as well articulated as it should be, etc.

3-The problem is almost complete. The key idea is there, but there may be some errors. Or, the problem is correct but the solution is poorly written.

2-Some headway has been made on the problem, but there is not a complete solution on the paper.

1-The problem reflects that the writer knows what the problem is asking for, and the writer seems to have some clue as to how to proceed, but little to no actual progress has been made towards a solution.

0-Speaks for itself. What is written down is of no value with regards to a solution to the problem.

Honor Statement: Each student is responsible for maintaining academic honesty as specified in the ASU catalog. You are free to work with others on homework assignments, but homework handed in should be your own and not simply a 'bad photocopy' of someone else's work. On any assignment which is designated as a 'take-home exam' or portion thereof, there shall be **no collaboration of any kind** between students.

Etiquette: Please be punctual and make sure your cell phone is turned off before coming to class.

Miscellany: If you decide for your own inscrutable reasons to drop the course you have the responsibility of making sure you have filled out the necessary forms and collected the necessary signatures by the withdrawal deadline. Extended non-attendance will not necessarily cause me to drop you from the class roll.

Advice: You will probably find that we will not be able to spend as much time in class answering questions as anyone (myself included) would like. Please take advantage of my office hours. Get to know your classmates; the semester will probably be more productive (and more fun) if you get to know some people that you can work with. When the exam rolls around, see if you can explain stuff to the people in your study group!

Course Outline:

I. Fundamental Concepts of Abstract Algebra

- a. Binary operations on a set
- b. Binary algebraic structures
- c. The concept of isomorphism

II. Basic group-theoretic concepts

- a. The group axioms: closure, associativity, identity, and the notion of the inverse
- b. Classification of groups up to isomorphism
- c. Subgroups of a group
- d. Special types of groups---cyclic and abelian groups
- e. Classification of all cyclic groups (up to isomorphism)

Insert Exam 1 somewhere around here.

III. More advanced group-theoretic concepts

- a. Permutation groups and Cayley's Theorem
- b. Alternating groups
- c. Cosets and Lagrange's Theorem
- d. Direct Products of groups
- e. Classification of all finitely generated abelian groups
- f. Group homomorphisms
- g. Normal subgroups and factor (quotient) groups
- h. The First Isomorphism Theorem

Insert Exam 2 somewhere around here.

IV. Potpourri

- a. More on quotient groups
- b. The center of a group and the commutator subgroup
- c. The action of a group on a set
- d. Application of group techniques to counting (Polya counting) and Burnside's Lemma

Final Exam

Math 4211/6211 Homework

How to write up homework problems:

0. Write up one problem per page, using only one side of the paper.
1. Write the statement of the problem.
2. Write up the solution to the problem. If the problem is computational, you should include enough detail so that a third party with a comparable level of knowledge of the subject could pick up the problem and be able to follow what you are doing. If the problem is a proof, you should use proper English grammar.

Section	Problems
0	Read section 0 and work any problems for review as needed; I would suggest that everyone do problems 11, 12, 30, 31, and 36; these will not be done in class nor handed in but they illustrate crucial ideas from Math 3030 that will be used often in this course.
Appendix	If you have had Linear Algebra (Math 3280), take 45 seconds of your life and read pp. 477-480 of the Appendix. If not, you might also want to work through a couple of the examples on pp. 480-481.
2	2, 4, 5, 6, 7, 8, 11, 14, 15, 23, 24, 34, 36, 37
3	2, 3, 4, 6, 8, 10, 26, 27, 29, 31, 32, 33
4	1, 2, 3, 8, 10, 12, 17, 25, 29, 30, 31, 32, 35
5	1, 2, 3, 4, 8, 11, 26, 36, 41, 42, 43, 51, 52, 53, 55, 57
6	13, 15, 17, 19, 22, 27, 29, 33, 34, 35, 36, 37, 45, 46, 48, 49

Exam 1 should happen around this time.

8	1, 2, 6, 7, 16, 20, 31, 33, 36, 46, 47
9	1, 3, 7, 11, 29, 31
10	1, 2, 3, 4, 5, 8, 26, 27, 34, 37, 40
11	1, 2, 3, 6, 9, 10, 20, 21, 23, 46, 47, 50, 51
13	1, 2, 3, 7, 8, 16, 17, 18, 20, 23, 25, 38, 40, 44, 45, 47, 49, 50, 52
14	1, 3, 5, 21, 22, 24, 25, 26, 31, 32, 33, 34
15	1, 9, 11, 14, 34, 35, 36, 37, 38, 40, 42

Exam 2 should happen around this time.

16	1, 2, 3
17	we'll see how much time is left.