MATH 332 Section 1

Abstract Algebra II

Spring 2009

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*While these are the official office hours, I am available at other times as well. If you want to meet at a time outside of office hours, the best option is to set up an appointment with me. You can also just drop by any time, but you may want to call/email/IM first to see if I'm there.
†You can also instant message me on AOL at JonathanCox1975—see the course web page. (Disclaimer: I am not at my computer 24 hours a day!)

Textbook. Joseph A. Gallian. *Contemporary Abstract Algebra*, **Sixth** Edition. Houghton Mifflin, 2006.

Prerequisite. MATH 331 (Abstract Algebra I).

Catalog Description. Continuation of the study of groups, rings, and fields, with applications to geometric symmetry, crystallography, switching networks, and error-correcting codes.

This course satisfies the Speaking Intensive requirement of the College Core Curriculum.

Course objectives. The purposes of this course for the student include (1) Becoming adept at using imagination to form conceptions of abstract mathematical objects and processes, (2) Further practicing and strengthening proof-reading and proof-writing skills, (3) Gaining an understanding of some fundamental concepts, theorems, and techniques of ring theory and field theory, (4) Being challenged with some deeper topics in group theory and field theory, (5) Improving reasoning, conjecturing, and problem-solving abilities, (6) Appreciating the beauty and power of the algebraic viewpoint, and (7) Learning to clearly communicate more advanced mathematical ideas, arguments, and results. **Strong communication skills are crucial in most mathematics-intensive vocations. We will place special emphasis on clear communication of mathematical ideas.**

Content and Methodology. In addition to covering the foundational material on rings, the primary content of the course involves a thorough treatment of polynomials. Hence the core material is found in Chapters 12-21 and 32 of the text. We will cover additional topics on groups and fields from Chapters 22-33 as time permits. The beginning of each class period will be reserved for discussion of the homework and other questions. Some of the remaining time will be used for presentation of new material via lecture and discussion. Students will also regularly present solutions to assigned problems. Students are encouraged to ask questions and make relevant comments at any time.

Readings and Homework. Assigned readings (AR's) from the text and homework assignments (HW's) will be assigned at almost every class meeting. The main goal of the AR's is to familiarize yourself with the terminology and definitions of each topic and get a rough idea of its basic concepts before we discuss the topic in class. AR's will not be graded. HW's will not be collected, but will often be discussed in class. The HW problems provide an opportunity to deepen your understanding of concepts as well as valuable practice for graded problems and exams. **In order to be successful, ask questions about homework problems that give you difficulty.**

Problem Assignments. Some assignments will be designated as *problem assignments* (PA's); work on these will be graded. One week after the PA is given, students will be called on (or volunteers taken) to present solutions to some of the PA problems in class. Naturally, you should have all PA problems completed by that time. Presented solutions will be graded on a scale of 10 points using criteria including mathematical correctness, completeness, clarity, and style. All PA problems not presented in class will be due the following class period. Feedback will be provided on all submitted PA problems, and grading will be as detailed as time permits.
Due dates for graded assignments will be specified, and no late work will receive full credit, except in the case of an excused absence on the due date. (See the **Attendance Policy** section below.) I define work to be *late* if it is handed in after the beginning of the class period following the due date. Late work can still be handed in and graded, but will receive credit for only 50% of the points earned. However, no late work may be handed in after the last day of class or more than two weeks after the original due date.

I recognize the importance of timely feedback on your work, and will endeavor to return all graded material to you within one week. **If it takes me longer that one week (excepting breaks) to return any item, I will add one point to the scores of everyone who submitted the item for each additional day that it takes me to return it.**

Projects. There will be two projects during the semester. For the first project, each student will choose a topic from among those chapters in the textbook that won't be covered in class. For the second project, each student will choose an article from a mathematical journal that is related to the class material. (A list of possible articles will be provided.) Each project will involve doing research on the chosen topic and giving a presentation on it to the class. The first presentations will be given in March. The second presentations will be given during the course's designated final exam period (4:00pm-6:00pm on Tuesday, May 12). More details will be provided in class.

Exams. There will be two take-home exams during the semester and a comprehensive final examination, which will also be a take-home exam. The first two take-home exams will be given approximately during the second week of March and during the third week of April. Exact dates will be announced at least a week in advance of each exam. You will receive the exam at the end of one class meeting, and you must submit it by the beginning of the next class meeting. The final exam will be distributed at the end of our last class meeting, and will be due at 5:00 pm on Thursday, May 14. Make-up exams will be given only in *serious* and *unavoidable* circumstances, or in the event of an excused absence, and only if your request to make up an exam is approved by the instructor *in advance or as soon as reasonably possible.*

Grading and Evaluation. Performance in this course will be evaluated on a percentage system. At the end of the course, your cumulative average (AVE) will be computed as follows.

E	=	Exam average
F	=	Final exam percentage
PJ	=	Project average
PA	=	Problem assignment (etc.) average
PT	=	Participation grade (includes problem presentations)
AVE	=	.30E + .20F + .20PJ + .20PA + .10PT

During the semester, averages will be posted and regularly updated on ANGEL. Letter grades will be assigned as follows based on a student's final percentage:

93 and above=A; 90-92=A–; 87-89=B+; 83-86=B; 80-82=B–;
77-79=C+; 73-76=C; 70-72=C–; 67-69=D+; 63-66=D; 60-62=D–; below 60=F.

The instructor reserves the right to lower the grade ranges. The grade ranges will not be raised.

Attendance Policy. We will follow the SUNY Fredonia attendance policy. (See p. 219 and p. 239 of the 2007–09 undergraduate catalog.) Attendance is crucial to success in this course. You probably won't be able to pass the course if you do not attend regularly. If you must be absent, please notify the instructor ahead of time. Attendance will be taken each time the class meets.

Work missed during an absence can be made up if the absence is determined by the instructor to be an *excused absence*. Your absence will be excused if you are participating in a university-sponsored program, exercising religious beliefs, hospitalized, or attending the funeral of a relative. Other absences due to unavoidable circumstances may also be excused at the discretion of the instructor. Appropriate documentation for an excused absence must be provided to the instructor within three days of returning to classes.

Withdrawal Policy. The last day to DROP this course is **Friday, January 30**. The last day to WITHDRAW from this course is **Friday, April 3**. The last day to completely withdraw from the university is **Monday, April 27**.

Academic Integrity. Each student is expected to "support and abide by all provisions of the ... Academic Integrity Policy" (pp. 236-239 in the 2007–09 SUNY Fredonia Catalog). While we will follow this policy, more details are given below regarding the conduct that is expected in this class. Please ask me whenever it is unclear whether something is or is not allowed.

You are encouraged to work together on homework and in learning the material. While working with another person or in study groups is permitted, **all written work submitted for individual assignments must be your own**. The principle here is simple: *Under no circumstances and in no way should you ever copy any part of anyone else's work and present it as your own.* Whether discussing hand-in homework with a group, comparing solutions with a friend, or getting help from a tutor, do not take any paper away with you—in other words, you can share your thoughts (say on a blackboard), but you have to walk away with only your understanding. In particular, write the solution up on your own. *In order to be successful in learning the material and preparing for the examinations, you need to try to work out assigned problems yourself as much as possible.* Otherwise you are cheating yourself.

Any changes to this syllabus will be communicated in class by the instructor.

Suggestions for Additional Reading and Reference

[1] M. Artin. *Algebra*. Prentice Hall, Englewood Cliffs, NJ, 1991.

[2] Robert B. Ash. *A Primer of Abstract Mathematics*. The Mathematical Association of America, Washington D.C., 1998.

[3] F. J. Budden. *The Fascination of Groups*. Cambridge University Press, London, 1972.

[4] D. S. Dummit and R. M. Foote. *Abstract Algebra*. John Wiley & Sons, Inc., 3rd edition, 2004.

[5] D. W. Farmer. *Groups and Symmetry: A Guide to Discovering Mathematics*, volume 5 of *Mathematical World*. American Mathematical Society, 1996.

[6] J. B. Fraleigh. *A First Course In Abstract Algebra*. Addison Wesley, 7th edition, 2003.

[7] M. Livio. *The Equation That Couldn't Be Solved: How Mathematical Genius Discovered the Language of Symmetry*. Simon & Schuster, New York, 2005.

[8] Diane Driscoll Schwartz. *Conjecture and Proof: An Introduction to Mathematical Thinking*. Saunders College Publishing/Harcourt Brace, 1997.

[9] Daniel Solow. *How to Read and Do Proofs: An Introduction to Mathematical Thought Processes*. John Wiley & Sons, 4th edition, 2005.

[10] Daniel J. Velleman. *How to Prove It: A Structured Approach*. Cambridge University Press, 1994.

[11] H. Wussing. *The Genesis of the Abstract Group Concept*. The MIT Press, Cambridge, MA, 1984.