Elementary Abstract Algebra. AMAT 327-0001 (2137)
Spring 2016

Overview. Abstract algebra is concerned with the foundations of all of higher mathematics and many other fields. Its development was stimulated by certain concrete problems, such as: solving systems of linear equations, or general polynomial equations of higher degree, or diophantine equations (that is, equations over the integers), as well as studying symmetries of various geometric objects. Several abstract structures arose from these problems, such as: groups, rings, fields, vector spaces, modules, and lattices. For instance, groups are abstract manifestations of symmetry in nature. The language and basic results of abstract algebra are used in all areas of mathematics and beyond. For instance, algebraic geometry/topology study certain geometric objects (curves, surfaces, etc.) by associating certain algebraic structures with them. In physics and chemistry, groups are used to study the symmetry of physical systems and crystal structures, respectively. In modern programming languages, algebraic objects are used to describe data structures.

Prerequisites. AMAT 220, 326.

Instructor. Cristian Lenart, ES-116A, 2-4635, `clenart@albany.edu`

Class meets TuTh 2:45pm−4:05pm, ES-143.

Textbook. John B. Fraleigh, A First Course in Abstract Algebra, Seventh Edition, Addison Wesley, 2003, ISBN 0-201-76390-7

Syllabus. Basic concepts of groups, rings, integral domains, fields. The course will cover the following sections from the textbook: 0−19, 22, and tentatively 23.

Homework. Homework, selected from the textbook, is an essential part of this class. Homework assigned during one week will be collected the following week, on Thursday (for credit). Late homework is not accepted. Additional homework, not for credit, will also be assigned.

Important. This class will be taught in a different style than the calculus sequence or linear algebra 220. Computational problems, based on a given algorithm, are still an important part of this class. However, we will also cover many definitions (together with relevant examples, based on the prerequisite courses), as well as proofs.

You typically will have to spend twice as much time or more on studying outside of class than you spend class. In particular, it is very important to work regularly on problems in order to test your understanding and in order to master the required techniques. Reading the book is considered part of the homework. The homework for credit represents a bare minimum amount of work needed, so you are strongly advised to work on the additional problems, and possibly others in the book. Those of you having difficulty are urged to contact me as soon as possible (not just before the tests and exam), and to come to my office hours. You are also strongly encouraged to actively participate in class and exchange ideas.

Out of consideration for your fellow students' efforts to learn, and your instructor's efforts to teach, you are required to arrive on time for class and to remain seated (barring an emergency) until the class is finished. For the same reasons, please turn off cell phones, and do not send or receive text messages, play video games, read the newspaper, sing, or otherwise goof off and distract other people in the room. Loud eating or drinking, repeated talking while the instructor or other students are talking, or ringing cell-phones or pagers are not allowed during the class. Repeated violations of any of the above rules shall be grounds for sanction or dismissal from the class.

Grading, absences, and plagiarism. Your grade in this course is based on the final exam (25%), the tests (40%), and the homework (35%). There will be three tests, based on Chapters 1, 2, and 3, respectively (they will be announced in advance). The final exam is cumulative. The

overall score will be curved based on the class performance. Attendance is required as part of your grade; you may miss 3 classes with no effect on your grade, but any absence after that will make your grade drop by a "notch" (for instance, from B to B−). Students will not be excused from a class or an examination or completion of an assignment by the stated deadline except for emergencies, required appointments, or other comparable situations; for all of these, written documentation is required. Plagiarism during the tests or the final exam will result in failing the class; this includes the situation when two virtually identical papers are identified. Such violations may be also subject to penalties both outside the course. See

`http://www.albany.edu/undergraduate_bulletin/regulations.html`

for more information on the University's Standards of Academic Integrity and Attendance.

Final exam. Thursday, May 12, 8:00am−10:00am, ES-143.

Office hours. The office hours are in ES-116 as follows: on Tuesday between 9am−10am, 4:10pm−5:10pm, and on Thursday between 1:10pm−2:00pm. You need to make reasonable attempts at the homework problems before asking for any hints.