

# MAT312-AMS351

Applied Algebra  
Fall, 2002

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**IK Office Hours:** Tuesdays 4-5 and Thursdays 10-11 in 4-111, Wednesdays 11-12 in Undergraduate Office, and by appointment.

**EG Office Hours:** Wednesdays 12-1 in MLC, Thursdays 3-4 in 4-110 and by appointment.

**Course meets:** Tuesdays and Thursdays 11:20-12:40 in Harriman 116.  
**Optional recitation meetings:** Fridays 9:25- 11:25 in ESS 079.

**Textbook:** J.F.Humphreys and M. Y. Prest. *Numbers, Groups and Codes*. Cambridge University Press.

**Course web page:** <http://www.math.sunysb.edu/~irwin/mat312/>

**Course Description:** This class is an introductory approach to algebraic structures and applications. We will study some of the algebraic properties of the integers. After a study congruences, we will examine the RSA public-key code. We will review the theory of sets, functions and relations, and complete a brief introduction to group theory. The last two topics to be covered are a study error correcting codes and a brief introduction to group homomorphisms concluding if time permits with the First Isomorphism Theorem for Groups.

**Relation to MAT 318 and MAT 313:** The department is currently studying the Sophomore/Junior level algebra courses. There is a strong possibility

that MAT 318 will not be offered in the future and that the content of MAT 312 might differ in the future from what will be covered this semester. Although students may take both MAT 312 and MAT 313, there is a nontrivial overlap in the material of these two courses. MAT 313 will proceed at a faster pace than MAT 312 and after the “Pretest” (We plan to have the same early examination in both courses.) students will be permitted to switch without penalty from one of these courses to the other.

### APPROXIMATE SCHEDULE

Topic	Sections in textbook	Number of Lectures
Number theory	1.1 – 1.6	6
Set theory	2.1 – 2.3	2
Groups	4.1 – 4.4	8
Error correcting codes	5.1 – 5.4	8
Group homomorphisms	to be handed out	3
	<b>TOTAL</b>	<b>27</b>

**Homework:** Homework is of extreme importance in all mathematics classes. Problems will be assigned periodically. You should try to solve them by yourself. You should also discuss them with your fellow students and you may work together on each problem set, but what you hand in must be your own writing and you should be able to answer questions about its content. The solutions of homework problems can be discussed (after the due date) in lectures and more appropriately in recitation sections. Some of the homework problems will be graded and solutions to all of them will be posted on the web. **LATE HOMEWORKS WILL NOT BE ACCEPTED.**

**Quizzes:** Beginning with 9/17, during the first lecture of each week without a scheduled examination (thus each week after the first two weeks of classes except for the weeks of 10/8 and 11/14) there will be a short (ten minutes) quiz. Each quiz will consist of two true or false questions and three other questions on precise definitions, statements of results or routine calculations. All the questions are to be based on the material of the previous week (except for the first quiz which will be based on all the preceding work) AND the material in the first section to be covered during the week. **MAKEUP QUIZZES WILL NOT BE AVAILABLE.** Quiz answers with explanations will be posted on the web

**Exams:** There will be two midterm examinations (on 10/8 and 11/14) and a final exam (on 12/19). All examinations are inclusive in the sense that they will cover all the material studied up to a specified date. The exact area of coverage of each examination will be posted on the web (in the course announcement section). After the graded papers are returned to the students, the midterm examinations with solutions will be posted on the web.

**Projects:** Students are encouraged to do an individual special project or participate in a group special project. These could involve a historical report on material of the course, including perhaps a brief oral presentation or learning some topic in algebra not discussed in the course or writing a computer program for some algorithm. The choice of topic and the exact scope of the special project are to be determined after consultation with either IK or EG and final form of a proposal *must* be presented in writing to IK or EG and approved by one of them.

**Grades:** The final grade will be maximum of A and B. The A grade will be based *only* on the two midterm examination (weighted 25% each) and the final examination (50%). The B grade will be based on all the work appropriately weighted: midterm examination (15% each), the final examination (25%), the pretest (5%), homework (10%), quizzes (15%), class participation (5%) and the special project (10%). In computing the homework and quiz grade components at least the one item in each category with the lowest grade will be dropped.

**Note:** If you have a physical, psychological, medical or learning disability that may affect your ability to carry out assigned course work, you are urged to contact the staff in the Disabled Student Services Office (DSS), Room 133 Humanities, 632-6748/TDD. DSS will review your concerns and determine, with you, what accommodations might be necessary and appropriate. The course instructor will use the recommendation of the Disabled Student Services Office to decide what special arrangements might be needed. All information and documentation of disability is confidential.

## CONTENT OF LECTURES

	<b>Day</b>	<b>Sections</b>
	Tu	9/03 1.1
	Th	9/05 1.2
	Tu	9/10 1.3
	Th	9/12 1.3 and Pretest
	Th	9/19 1.3, 1.4 and Quiz #1
	Tu	9/24 1.4 and 1.5
	Th	9/26 1.5
	Tu	10/01 1.6 and Quiz #2
	Th	10/03 1.6
	Tu	10/08 Midterm Examination #1
	Th	10/10 1.6 and 2.1
	Tu	10/15 2.2 and 2.3
	Th	10/17 2.3, 4.1 and Quiz #3
	Tu	10/22 4.1 and 4.2
	Th	10/24 4.2
	Tu	10/29 4.3 and Quiz #4
	Th	10/31 4.3
	Tu	11/05 4.3 and Quiz #5
	Th	11/07 4.3
	Tu	11/12 4.4
	Th	11/14 Midterm Examination #2
	Tu	11/19 5.1
	Th	11/21 5.1 and 5.2
	Tu	11/26 5.2 and Quiz #6
	Tu	12/03 5.3 and Quiz #7
	Th	12/05 5.4
	Tu	12/10 5.5 and Quiz #8
	Th	12/12 5.5
	Th	12/19 Final Examination