Mathematics 331: Introduction to Modern Algebra

Fall 2007 Syllabus

Instructor: Dr. Patrick J. Morandi. My office is SH 237, inside the Department of Mathematical Sciences main office. My phone number is 646-3901, and my email address is pmorandi@nmsu.edu.

I check my email regularly, so feel free to contact me by email. If you need to turn in an assignment or leave me a message you can do so in the math office.

Office Hours: My regularly scheduled office hours are

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<tr>
<th>Day</th>
<th>Time</th>
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<tr>
<td>Monday</td>
<td>9:30-10:20</td>
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<tr>
<td>Tuesday</td>
<td>1:00-2:00</td>
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<tr>
<td>Friday</td>
<td>9:30-10:20</td>
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You do not need to make an appointment if you wish to come to office hours. If you need or want to see me outside these hours, you may make an appointment with me before or after class, by phone, message, or by e-mail. I understand that your schedule might not allow you to come to my office during the hours listed above; by all means talk to me if you wish to come to office hours but are unable to make the hours listed above.

Time and Location: Monday, Wednesday, and Friday from 10:30 to 11:20, Science Hall 111.

Textbook: The course textbook is *An Introduction to Abstract Algebra via Applications*, by Finston and Morandi. This book, which is in preliminary form, is available from the department office for $10. In addition, a good reference for writing proofs, *The Basic Ideas of Mathematics - Volume 1: Introduction to Logical Reasoning*, by Andrew Wohlgemuth, is available on the web site.

Course Web Page: sierra.nmsu.edu/morandi/math331. At this web site you will find the syllabus, homework assignments, and some course materials.

Prerequisites: Grade of C or better in Math 279 and Math 280.

Grading: The grade for the course will be based on your performance on homework assignments, projects, in-class exams, and a final exam.
• **Homework (25%).** Daily, or twice weekly, homework assignments will be due at the next class. After the assignments are graded and returned, you may revise your work once to improve your homework grade. The revised work must be handed in within one week of the day that homework is initially returned to the class, and must be accompanied by the original assignment.

• **Projects (25%).** There will be two group projects in this class, expected to last a week or so each. On the projects you will work in a group of two or three students. You may not work on the projects alone. Your explanation must be typed; the mathematics may be written by hand. Projects are due at the beginning of class. Daily homework assignments will not be assigned while a project is being worked.

• **Tests (25%).** There will be two in-class exams. Their dates will be announced in class at least a week in advance.

• **Final (25%).** The final exam will be held on Monday 10 December from 10:00 to 12:30.

**Goals of the Course:** One goal of this course is to learn fundamental ideas of abstract algebra and to see how these ideas play a key role in many practical applications in today's technological society. Another goal is to improve students' ability to read and internalize mathematical concepts and to improve their ability to communicate mathematics.

**Reading and writing mathematics:** It is important to read the textbook before coming to class and working homework problems. It is usually necessary to read mathematics repeatedly in order to understand the material. Do not expect to read a mathematics text like a novel. Often classroom lecture will be based on questions students have from the reading; it is therefore very important to read the text ahead of time and come to class with questions.

Writing clear and complete solutions to the homework will be crucial for you to learn the material. On all assignments, your work needs to be neat and legible, and your reasoning must be clear. Writing mathematics well takes practice, and you will improve your ability to communicate mathematics from this course. It will be important to rewrite assignments in order to better learn the mathematics and to improve your writing.

**Material and Style of the Course:** The topic of this course is the study of the fundamental structures of abstract algebra: groups, rings, fields, and vector spaces. You have seen one such structure when you studied vector spaces in a linear algebra course. We will investigate these structures by introducing them through important examples and applications. The applications we will discuss include identification numbers, coding theory, cryptography, and symmetry with
connections to art and geometry. We will discuss enough of the theory of abstract algebra to see how these structures are used in the applications listed above.

Class time will be spent on a combination of lecture and group work. In addition, we may spend some class time in one of the department’s computer labs. We will use the symbolic algebra program Maple for both in-class demonstrations and for homework. This program, which can handle the algebraic structures we will study, will allow us to investigate more realistic examples than we could do with pencil and paper calculations.

**Important Dates:**

- Last day to add a class: Friday 31 August
- Labor Day holiday: Monday 3 September
- Last day to drop with a W: Tuesday 16 October
- Thanksgiving holiday: 19-23 November
- Final Exam: Monday 10 December from 10:00 to 12:30

**Incomplete Grades:** Incomplete grades may be given only if a student passed the first half of the course and is precluded from successful completion of the course by a documented illness or family crisis which genuinely precluded successful completion of the course.

**Attendance:** You will need to attend regularly in order to do well in this course. If you miss a class, you are responsible for making up the material that was missed. Missing a class is not an excuse for handing in late work. You may check the course website or send me email to find out what assignment is due.

**ADA:** Feel free to call Jerry Nevarez, Director of Institutional Equity, at 505-646-3635 with any questions you may have about NMSU's Non-Discrimination Policy and complaints of discrimination, including sexual harassment.

Feel free to call Michael Armendariz, Coordinator of Services for Students with Disabilities, at 505-646-6840 with any questions you may have on student issues related to the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act of 1973. All medical information will be treated confidentially.