Math 100A Fall 2009: Abstract Algebra I
MWF 10-10:50am, Warren Lecture Hall 2111
Professor D. Rogalski

1. CONTACT INFORMATION

Prof. Rogalski's Office: 5131 AP&M

E-mail: drogalsk@math.ucsd.edu

Class web site: *www.math.ucsd.edu/~drogalsk/100a.html*. Check here for announcements, homework assignments, schedule of lectures, and other information.

Office hours: TBA, will be posted on website

Section Leader: Amy Irwin (6331 AP&M)

E-mail: airwin@math.ucsd.edu

Meeting Times: Tu 5-5:50pm, 6-6:50pm HSS 1315

Office hours: TBA, will be posted on website

2. BASIC COURSE INFORMATION

• Course description and placement information

This is a first class in the theory of abstract algebra. The 3 quarter sequence Math 100a-c, together with Math 140a-c (real analysis), is intended to provide a rigorous preparation for graduate study in mathematics. A plan to do graduate work in mathematics is certainly not a prerequisite to take this course, but it is important that you have a strong interest in theoretical, pure mathematics. You should be prepared to spend more time and energy on this course than you would spend on most other undergraduate math courses offered at UCSD (with the exception of Math 140.)

Math 103a-b also gives an introduction to abstract algebra, but it covers significantly less material than Math 100a-b, moves more slowly, and typically has less challenging homework problems and exams. Note that for most variations of the math major which require a course in algebra, Math 103 suffices. Math 103 is also more than sufficient preparation for a mathematically-oriented career in business or industry.

• Prerequisites

The formal prerequisite is Math 109. Math 20f is also important because we will occasionally use matrices in examples; note that currently Math 20f is a prerequisite for Math 109.

The prerequisite Math 109 will generally be relaxed only in very limited circumstances, for example if you have taken courses equivalent to Math 20f and Math 109 elsewhere. Please see me if you have not met the prerequisite but you have a strong argument that you are prepared to take this course.

In Math 100 you will be expected from day one to have a certain comfort level with writing proofs, as you were taught in math 109. (Though I am aware that learning to write effective proofs is an ongoing process, and in fact part of the goal of math 100 is to continue to improve at this.) Thus even if you passed Math 109, but did not get a good grade in that course (got a C or lower), you are probably not prepared for Math 100. Here is a partial list of topics that ought to be included in any math 109 course which I will assume you know well: proof by induction, sets, functions, and equivalence relations.

- **Placement quiz**

Given that current enrollment for Math 100a far exceeds enrollment for Math 103a, and recent history of how many math majors take each class, I surmise that some number of those enrolled in math 100 would be better off in math 103. (by the way, you should be aware that there is also the option of taking Math 103a-b in the winter-spring instead of the fall-winter.)

For this reason, on Monday September 28 I will give a short in-class placement quiz. It will have a few questions related to the topics from 109 mentioned above: proof by induction, sets, functions, and equivalence relations. All of these topics are reviewed in your textbook Beachy and Blair, in sections 2.1, 2.2, A.1, and A.4.

Based on this placement test, I may recommend to some students that they transfer out of Math 100. This is up to each student to decide for themselves. The purpose of the quiz is just to help me advise each student on what course seems best for him or her.

Please note that there is no midterm exam in this class before the drop deadline. You cannot wait to see how you do on the midterm before deciding whether to stay in the course.

- **Textbook**

The textbook is *Abstract Algebra* by Beachy and Blair, 3rd Edition. I think both reading the textbook and attending lecture are important. With material at this level, it is very helpful for you to see difficult concepts (at least) twice, once in class and once in your reading. Sometimes I may also omit from the lectures some less important details or proofs and leave it to you to learn them from your reading. I will let you know what sections of the book you should read by when.

One copy of the textbook will be placed on reserve in the Science and Engineering Library, but I strongly recommend that everyone buy a copy of the textbook.

- **Schedule**

This quarter, I plan (time permitting) to cover Chapters 1, 2, 3, and most of 7 (Sections 7.1-7.5). Most of Sections 2.1 and 2.2 will be assumed background from Math 109 though I may review some of that material as we need it. Chapter 1 will also be covered quickly because it is more elementary material which I hope you have some familiarity with already. So the core material of the course is Chapters 3 and 7 about groups.

A tentative schedule of what we will cover when is posted on the course calendar on the class website. This is subject to change; I will make frequent announcements in class about what we will cover when, and will update the website calendar as necessary.

The online calendar is also a good place to look to remind yourself when we have holidays, exams, etc.

- **Homework**

Homework will be assigned weekly. It will be handed out as well as posted on the class website on Fridays. It will also be due in class on Fridays. The first homework set will be due on Friday October 2. Late homework will not be accepted, but the lowest homework score will be dropped. Thus if a short illness or other commitment causes you to miss one homework, it is not a problem since that will just be your dropped score.

Many of the homework problems will be very challenging; this course is designed to stretch you. You should expect to spend a lot of time thinking about some of these exercises before the solution is clear to you (start the homework early!), and the write-ups you submit should be *clear, neat, and well-organized.*

Here is my suggested strategy for producing good homework write-ups (I still do something like this myself when I write papers.) Once you think you have figured out how to do a problem, first write out a draft

solution. Often in the process of doing this, you will realize there may be minor gaps in your idea you have to fix. In the draft solution, you can cross things out, start again, insert paragraphs, etc. Once you are satisfied, you can create a neat, organized write-up of your final solution.

Remember that the idea of writing a proof is to convince someone else that what you claim is true really is; understanding why it is true yourself is only part of the process. *A wandering, disorganized proof, even if it seems to contain some of the right ideas, will receive no credit if the argument cannot be followed.*

- **Exams**

There will be 1 in-class midterm on Wednesday October 28, 2009, and a final exam on Friday December 11, 2009 from 8am-11am. Bluebooks will not be needed; adequate room will be provided on the exam paper for your answers. No books, notes, calculators or other aides are allowed during exams. The final exam will be cumulative.

- **Collaboration and Academic Honesty**

You are welcome to discuss the homework problems with other students at the stage when you are still formulating ideas. This may be especially useful if, for example, you are confused about definitions or what the problem is asking. The write-up you hand in should be your work alone in your own words, however, and should be written while you are by yourself. While it is also OK to seek hints from classmates that have figured out problems where you have a mental block, you will learn the most if you think about these problems hard on your own first and don't give up too quickly.

The following will not be tolerated in this class: copying from or talking with a classmate during an exam; using books, notes, calculators, phones or any other aids during an exam; or copying or paraphrasing the writeup of a homework problem in whole or in part from a classmate or from any other source such as the internet. I will not hesitate to bring charges of academic dishonesty as appropriate in such cases.

- **Office Hours**

Both I and your TA will have several office hours a week where we will be available for your questions. These will be announced later and posted on the website. If on an occasional basis you need to see one of us and can not make a scheduled office hour, please e-mail one of us to set up an appointment.

- **Grading**

Your final average will be calculated as follows: Homework 25%, Midterm 25%, Final Exam 50%. Then your grade will be at least as good as the grade given by the following standard scale:

97	93	90	87	83	80	77	73	70	60
A+	A	A-	B+	B	B-	C+	C	C-	D

The final grading scale may be more lenient ("curved") depending on the class average.