University of Massachusetts at Amherst,
Department of Mathematics and Statistics

MATH 411.1 INTRODUCTION TO ABSTRACT ALGEBRA I
FALL 2016

Text :	Dan Saracino, Abstract Algebra, A First Course; Second Edition (Waveland Press. Inc.)
Instructor :	Ivan Mirković
Homepage :	google me or: http://people.math.umass.edu/~mirkovic/411/0.html
Office :	1235I Lederle GR Tower
Phone :	545-6023
Email :	mirkovic@math.umass.edu
Office Hours :	See the web page.
Homework :	Weekly. Assigned, collected and returned a week later.

The grade is formed according to:

- The first midterm exam is worth **25%**,
- The second midterm exam is worth **25%**,
- the final exam is worth **30%**,
- the homework is worth **20%**

Midterm exams will be announced on the web page. *Sample exams* will appear a week before the exam, and these problems will be discussed at the *review sessions* before the exam, check the web page for the times.

Course policies. The **final exam** will be cumulative, with an emphases on the material covered after the second exam

Please note that the **homework deadlines** will be strictly enforced. This means that the assignments will be due in class on the day I've requested them, and the late homework will not be accepted. Help each other out and discuss difficulties, but do **your own** work. If your solution of a problem uses someone else's work, you should acknowledge this explicitly. You are expected to know the (very serious) difference between shared and copied work.

It is expected that you will **attend** virtually all class meetings. Though I may not control this, any absence is likely to cause difficulties in the course. You should also complete the reading and other assignments on time so that you can participate in class discussions and problem-solving. I will answer *some* questions on homework problems in class, however <u>this may not be very helpful</u> if you have not already tried to solve these problems.

Topics

We will cover material from chapters 0-14 and hopefully someof chapter 15. For an additional topic, the *Actions of groups on sets*, there are notes on the web page as this is not covered in the book.

- 0. Sets and induction, 1.Binary Operations, 2. Groups
- 3. Theorems about groups, 4. Powers of elements and cyclic groups, 5. Subgroups,
- 6. Products, 7. Functions, 8. Symmetric groups,
- 9. Cosets and equivalence relations, 10. Finite groups: size, 11. Normal subgroups,
- 12. Homomorphisms, 13. Normal subgroups, 14, Structure of finite abelian groups,
- 15. Syllow theorems (?)

The nature of the course

This is likely to be your first course in mathematics where concepts will seriously outweigh algorithmic procedures and computations. This actually **forces** new modes of work:

- A careful and critical reading of the text.
- Developing precise understanding of the definitions and concepts.
- **Reading Assignments** It will be especially helpful for you to have read (carefully) the discussion in the textbook before that material is discussed in class. A reading assignment will consist of a reading in the textbook. I will not check your reading assignments but I expect you to make a *sincere effort* to understand what the next lecture is about.

HOW TO LEARN abstract MATHEMATICS

The procedure. (Learning mathematics at the conceptual level.)

(1) You start by hearing (or reading) of a new idea, new procedure, new trick.
(2) To make sense of it you check what it means in sufficiently many examples. You discuss it with teachers and friends.
(3) After you see enough examples you get to the point where you think that you more or less get it. Now you attempt the last (and critical) step:
(4) retell this idea or procedure, theorem, proof or whatever it is, to yourself in YOUR OWN words.[(1)]

[1]**More on step (4)** Trying to memorize someone else's formulation, is a beginning but it is far from what you really need – you should get to the stage where you can tell it as a story, as if you are teaching someone else. When you can do this, and your story makes sense to you, you are done. You own it now.

However, if at some point you find a piece that does not make sense, then you have to return to one of the earlier steps (1–3) above. Repeat this process as many times as necessary.