Modern Algebra II - MA 542  
Spring 2002 Semester  
MWF 12:00 PM - 1:00 PM  
COM 212

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Office Hours: TBA


Remarks: The main prerequisite for this course is group theory, which was the primary content of MA 541. In this course we will study rings which are similar to groups, except that there are now two binary operations on a given set instead of one. This is not so exotic in that, for example, the integers naturally have two operations defined on them, addition and multiplication. We know, moreover, how these two operations interact to yield the usual laws of arithmetic, e.g. a(b+c) = ab+ac. In a similar fashion, one adds and multiplies two polynomials f(x) and g(x) according to certain rules. Indeed, the concept of a ring formalizes the notion of ‘arithmetic’ and expands on it. Progressing further into this topic, we will discuss fields (which are a type of ring) and explore the seemingly elementary question of whether polynomial equations have solutions. (Think ‘quadratic formula.’) This will lead us to the final topic, Galois theory, which establishes a correspondence between solutions of a given equation, if they exist, and properties of a group associated to that equation.

[This last topic is one of the most beautiful ideas in mathematics, in that it deals with questions about arithmetic (described by rings and fields) using symmetry, which is embodied in the group concept.]

Outline of topics to be covered:  
(Note: Not all sections in a given chapter are covered.)

Part 3 Rings - Chapters 12 - 18  
Part 4 Fields - Chapters 19 - 22  
Part 5 Special Topics - Chapters 32 - 33

Exams: During the semester, there will be two exams worth 100 points each, as well as a final exam worth 200 points. The two in-semester exams will be take-home format and will be due the following class meeting. The final exam will be in class. The schedule for these exams is given on the next page.
Homework: During the semester, I will generally assign homework on a daily basis. This homework is your primary means of learning the material, even more so than the lectures. Indeed, it is only by actually working out the solutions to problems that one really learns this material. Not doing homework is a bad idea and will result in a poor performance in the course.

Additionally, there will be, throughout the course of the semester, 10 turn-in homework assignments, each worth 10 points, for a total possible maximum of 100 points if you complete each perfectly. Each turn-in assignment will be due by the next class meeting after it was assigned.

[Note: On the take home exams and homework, you may discuss the material with each other, but plagiarism is not acceptable. Your written answers must be your own. I do not wish to see identically worded answers on the exams or homework.]

Grading: Your grade in the course will be based on the combined sum of the two exams, the 10 turn-ins, and the final exam, out of a possible total of 500 points.

Makeup Exams: Except in cases of illness, and then, only with a signed doctor’s note, exams will be given only at scheduled times.

Cheating: I consider cheating to be a very serious offense and any cases of it will merit action by the University Academic Standards Committee.

Important Dates:

Holidays: Monday January 21  
Monday February 18  
Spring Break: Monday March 4 – Friday March 8  
Monday April 15

Exam 1 – Friday February 22 (To be turned in Monday February 25)  
Exam 2 – Friday April 12 (To be turned in Wednesday April 17)  
Final – Friday May 10, 2:00-4:00 PM

Due to the day off on February 18, there will be a substitute Monday schedule on Tuesday February 19, that is, the class we would have had on the 18th will be held on the 19th.

The last lecture will be Wednesday, May 1.

Web Page: There is a web page for the course where you can find the homework assignment listings, as well as the syllabus and other materials that will be made available during the course. The URL is:  
http://math.bu.edu/people/tkohl/teaching/spring2002/MA542.html