MATHEMATICS 142
CALCULUS II

BULLETIN INFORMATION
MATH 142 - Calculus II (4 credit hours)
Course Description:
Methods of integration, sequences and series, approximations
Prerequisites: qualification through placement or a grade of C or better in MATH 141
Note: Four classroom hours and one laboratory hour per week.

SAMPLE COURSE OVERVIEW
This is a continuation of Math 141 - Calculus I. A working understanding of all the major topics from Math 141: limits, differentiation, integration, extrema, Fundamental Theorem of Calculus, etc. is essential for success in this course. The major themes of Calculus II are:
1. Applications of integration (Chapter 6)
2. Techniques of integrations (Chapter 7)
3. Sequences and series including Taylor & MacLaurin series (Chapter 11)
4. Polar coordinates (Chapter 12)

This course emphasizes both learning and mastering specific methods and techniques and understanding the logical development of these ideas from previous results.

ITEMIZED LEARNING OUTCOMES
Upon successful completion of Math 142, students will be able to:
1. Demonstrate the ability to approach problems from a conceptual viewpoint
2. Demonstrate the ability to utilize more than one idea in a single problem
3. Demonstrate the ability to apply appropriate calculus skills to problems in context
4. Demonstrate mastery of concepts and skills needed to solve problems related to:
    a. techniques of integration
    b. improper integrals
    c. convergence of sequences and series
        1. sequences
        2. n-th term test
        3. integral test
        4. comparison test
        5. ratio test
        6. root test
        7. alternating series test
    d. power series' radius of convergence
    e. Taylor and Maclaurin series
    f. applications of Taylor polynomials

g. applications of integration
    1. area
    2. volume by disks, washers, and shells
h. polar coordinates
    1. graphing
    2. area and length

SAMPLE REQUIRED TEXTS/SUGGESTED READINGS/MATERIALS
1. *Calculus*, Early Transcendentals, 6th edition, by James Stewart.
2. Optional Textbook: *CalcLabs with Maple*, Single Variable Calculus, 4th edition, by Philip B. Yasskin, et. al.

SAMPLE ASSIGNMENTS AND/OR EXAM
1. **Maple Labs:**
   a. With the help of the TA, you will work through a weekly Maple Lab. There will also be assorted Maple Lab assignments. These Maple Labs were prepared by various USC math professors. The math department's homepage for the Maple Labs, by semester terms, is at: http://www.math.sc.edu/calclab/ .
2. **Recitation Quizzes:** (closed notes/books, no group quiz)
   a. Usually there will be a Recitation Quiz covering the homework sets due for the Recitation Class. You must take Recitation Quizzes by yourself (i.e. no group quizzes). Most of the time, the Recitation Quizzes are highly based on the corresponding homework sets so if you can do the homework sets without your notes/book you should be fine on the Recitation Quizzes.
   b. Note: In the Recitation Classes, the TA will answer your questions from the homework sets due for that Recitation Class. The first person arriving to the classroom should write-up on the chalkboard the sections to be covered for that day. Then students should write the homework problem numbers for those problems they would like the TA to discuss. The TA will handle as many problems for which there is time. Before each Recitation Class, give the homework sets a serious effort: have most problems finished and have your questions prepared.
3. **Exams:** Three equally-weighted Hourly Exams and a cumulative Final Exam

SAMPLE COURSE OUTLINE WITH TIMELINE OF TOPICS, READINGS/ASSIGNMENTS, EXAMS/PROJECTS
Main Lectures will include presentation of new material (over the next section(s)-to-be-covered), answering questions on the material, and working examples.
The course outline below indicates the order in which we will cover sections from the book. The Homework page contains course handouts by section. Homework is (usually) posted by section on the course homepage. The homework for each section is due at the next Recitation Class. These homework sets will usually consist of odd numbered problems, to which there are answers in the back of the book. Homework is not to be handed in for I believe this is your place to learn (and thus you may be making some small errors). However, often, quiz and exam problems will be a slight variant of (or maybe even exactly) these problems.

Most every Main Lecture *ends* with a short *easy* quiz. The purpose of these quizzes is to ensure you that are grasping the basics of the day's lecture before you tackle the next homework set that night (thus hints will be given on these quizzes but not on other quizzes or exams). Each student must hand in their own quiz paper; however, since you are strongly encouraged to work together on your homework sets, you are strongly encouraged to work together on these quizzes.

Weeks 1-3: A & B Techniques of integration
Improper Integrals
7.1-7.5, 7.8

Week 4: Exam 1

Weeks 5-8: C & D Convergence of sequences and series
Power series radius of convergence
11.1-11.7, 11.8-11.9

Week 9: Exam 2

Weeks 10-13: E-H, Taylor and Maclaurin series
Applications of Taylor polynomials
Applications of integration
Polar Coordinates
11.10-11.11, 6.1-6.3, 10.3-10.4

Week 13: Exam 3

Week 14: Review for Final Exam

Final Exam <u>**Final Exam according to University exam schedule**</u>