Syllabus for Math 222, Lecture 2 (Calculus II)

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Welcome to Calculus 222. This semester we will be building on our knowledge from first semester calculus to explore the following topics: formal integration, infinite sequences and series, differential equations, and analytic geometry.

Formal Integration : A Bag of Tricks (Weeks 1-3)
We know what integration is, but how do we actually compute integrals? Here we learn a variety of techniques to evaluate integrals formally.

- u substitutions (8.1-8.3)
- trig substitutions (8.3)
- rational functions (8.5)
- integration by parts (8.4)
- improper integrals (9.1-9.4)

Project: Write your own integration study guide.

Sequences, Series, and our Friend Taylor (Weeks 4-8)
What are the simplest functions to work with? Polynomials! Here, we try to make every function look like a polynomial. What we end up with is the Taylor series. Along the way, we will need to consider general sequences and series and how such ideas apply to functions.

- defining sequences and series, convergence and divergence (10.1-10.2)
- convergence tests (10.3-10.5)
- power series (10.6-10.7)
- Taylor series (10.8, 11.1)

Project 1: Getting familiar with sequences and series (computer lab)
Project 2: What are Taylor series all about? (an essay)

Differential Equations (Weeks 9-12)
Differential equations are a wonderful modeling tool. We will use them to model situations, as well as learn techniques for solving certain types of differential equations.

- What are differential equations?
- linear homogeneous equations (7.6, 18.1)
- linear nonhomogeneous equations (18.2-18.3)

Project: Using Differential Equations to Model Disease Epidemics

Analytic Geometry (Weeks 13-15)
Here we learn new ways to describe 2D and 3D space and then adapt calculus to this new description.

- conic sections (12.1-12.3)
- polar coordinates (12.6-12.7)
- parametric equations (13.1)
- vectors in two and three dimensions (13.2-13.3, 14.1-14.3)

Project: To be decided

Expectations
Grade distribution:

- Class Participation (10%)
- Quizzes (15%)
- Projects (15%)
- Midterm I (17.5%)
- Midterm II (17.5%)
- Final Exam (25%)

Class Participation: In order to learn, you must be actively involved in class. This means that you must come to class! In addition to attending class on a regular basis, you will be expected to participate in small group activities. Your class participation grade will be based on attendence, participation in classroom activities, and written work from these activities.

Quizzes: There will be a quiz on every Friday, based on material from the preceding week. There will be no make-up quizzes, but you will be allowed to drop the three lowest quiz scores.

Projects: There will be one or two projects associated with each of the four major topics. I have provided a quick description of the projects above. You will work on the projects primarily outside of class, sometimes individually and sometimes in groups. I will provide a more thorough description of what is expected of you as we get to the appropriate topics.

Midterm I: Mon., Feb. 24 7:15-9:15 PM

Midterm II: Mon., April 14 7:15-9:15 PM

Final: Sat., May 17 7:45-9:45 AM

Please note carefully the times of these exams. The final exam MAY NOT BE TAKEN EARLY. If you have a conflict with either of the two midterm exams, please see me as soon as possible.