

MATH 283

Honors Calculus I (4 units)

Course Outline

Sections	Topics	# of weeks
1.1–1.6	Functions and Models: Review as needed.	0.0
2.1–2.8	Limits and Derivatives: Limits and their properties; the definition of derivative. The ϵ - δ definition should be mentioned.	3.5
3.1–3.9	Differentiation Rules: Rules for differentiation; implicit differentiation; related rates.	4.0
4.1–4.9	Applications of Differentiation: Graph sketching; optimization problems. At most one hour should be spent on l'Hospital's rule (§4.4). Newton's method (§4.8) is to be covered in the <i>Mathematica</i> lab.	3.0
5.1–5.5	Integration: Definite and indefinite integrals; the Fundamental Theorem of Calculus; u -substitution.	2.5
	Tests	1.0

Textbook: *Calculus: Early Transcendentals*, 7th edition, by James Stewart.

OR

Calculus I, 2012 TU edition, by Stewart *et al.*

During the semester, several extended projects should be required of the students. The following texts are suggested as suitable resources in this regard:

- *Student Research Projects in Calculus*, by Cohen, Gaughen, Knoebel, Kurtz, and Pengalley.
- *Problems for Student Investigation*, by Jackson and Ramsey.
- *Applications of Calculus*, by Straffin.

Other Comments:

The interplay between algebra and geometry should be emphasized as early as possible. To this end, graphing calculators may be used at the discretion of the instructor.

It is important that instructors complete all sections of the course outline. Instructors in the subsequent courses will not reteach material from this course. Instructors must make sufficient allowances for unforeseen class cancellations (e.g., due to weather) so that the entire course outline will still be covered.

It should be emphasized that the *Mathematica* labs are an integral part of the course and that satisfactory participation in the labs is a required for the course. Students can download the laboratory material from the department home page. It is recommended that the *Mathematica* labs count for 15% of the course grade. It is also recommended that students who do not **attempt** at least 70% of the labs not receive a grade of C or higher.

In addition to the above text, a student solution manual (giving certain selected solutions) will be available for students from the bookstore.

This Core Curriculum course is designed to meet the following four learning goals and the instructor should keep these goals in mind as he/she teaches the course:

- Students will construct and evaluate logical arguments.
- Students will apply and adapt a variety of appropriate strategies to solve mathematical problems.
- Students will recognize and apply mathematics in contexts outside of mathematics.
- Students will organize and consolidate mathematical thinking through written and oral communication.