

SYLLABUS FOR MATH 1220

FALL 2009

Text: Hass, Weir, and Thomas, *University Calculus Elements with Early Transcendentals*

General:

It is departmental policy that graphing calculators are required of all students in Math 1220. However, the department has agreed that the symbolic calculation of basic derivatives, limits, and integrals is part of the language of mathematics, and students should be proficient in this language. In order to test the material on symbolic calculation, you may wish, for example, to exclude the use of calculators in the exam over Chapter 2 (which is heavily symbolic). Or you may wish to break an exam (such as the final exam) into two parts, with the first part not allowing calculators. Generally, however, calculators should be permitted in most testing situations.

Warning: the students have access to Student Solutions Manual containing worked-out solutions to all odd-numbered problems. Please take this into account when assigning odd-numbered problems for credit.

Course Prerequisites: A passing grade (C or better) in Math 1180 or a satisfactory score on an appropriate placement exam (ACT, SAT, WMU math placement exam).

Objectives:

1. Understanding the concept of limit and how it relates average and instantaneous quantities.
2. Understanding the concept of derivative, interpreting it geometrically, physically and using it in optimization and linear approximation.
3. Understanding integration and its relationship with differentiation and applying integration in geometrical and physical problems.
4. Learning the proper use of mathematical notation.
5. Developing sufficient computational skills in differential and integral operations for subsequent calculus courses and for applications in other areas.

6. Developing abilities to tackle multi-step problems and to explain the process.
7. Understanding the possibilities of modern computer algebra systems in assisting the analysis of problems in calculus and the visualization of their solutions.
8. Developing skills in mathematical reasoning.
9. Developing a broad perspective of how various different topics in this course fit together.

The schedule below allows for covering 33 sections in 12 weeks, leaving about 1.5 weeks for review and testing. The first two sections of Chapter 1 (1.1 and 1.2) are omitted since this material is covered in Precalculus (Math 1180). Ask students to review this material on their own.

Schedule

<u>Section</u>	<u>Topics</u>	<u># Days</u>
Chapter 1: Limits and Continuity		
1.3	Rates of Change and Tangents to Curves	1
1.4	Limit of a Function and Limit Laws	2
1.5	The Precise Definition of a Limit	1.5
1.6	One-Sided Limits	1
1.7	Continuity	2
1.8	Limits Involving Infinity	1.5
Chapter 2: Differentiation		
2.1	Tangents and Derivatives at a Point	1
2.2	The Derivative as a Function	2
2.3	Differentiation Rules	2
2.4	The Derivative as a Rate of Change	2
2.5	Derivatives of Trigonometric Functions	1
2.6	Exponential Functions	1
2.7	The Chain Rule	2
2.8	Implicit Differentiation	1.5
2.9	Inverse Functions and Their Derivatives	0
2.10	Logarithmic Functions	1.5
2.11	Inverse Trigonometric Functions	1

	(Since we omit section 2.9, use implicit differentiation to find derivatives of inverse trig. functions)	
2.12	Related Rates	2
2.13	Linearization and Differentials	1

Chapter 3: Applications of Derivatives

3.1	Extreme Values of Functions	1.5
3.2	The Mean Value Theorem	1.5
3.3	Monotonic Functions and the First Derivative Test	1
3.4	Concavity and Curve Sketching	2
3.5	Parametrizations of Plane Curves	1.5
3.6	Applied Optimization	2
3.7	Indeterminate Forms and L'Hopital's Rule (will be covered in math 1230)	0
3.8	Newton's Method (Use the TI calculators to generate Newton iterates)	1
3.9	Hyperbolic Functions	0

Chapter 4: Integration

4.1	Antiderivatives	1.5
4.2	Area and Estimating with Finite Sums	1.5
4.3	Sigma Notation and Limits of Finite Sums	1
4.4	The Definite Integral	2
4.5	The Fundamental Theorem of Calculus	1.5
4.6	Indefinite Integrals and the Substitution Rule	1.5
4.7	Substitution and Area Between Curves	1.5

The TI calculators can be used to quickly obtain left sums, right sums, and the midpoint rule, using **sum seq** (expression, variable, start, stop, increment). For example, the right sum for the integral of $\sin x$ between 0 and 2, using $n = 10$ subintervals, is **sum seq** ($\sin x, x, 0.2, 2, 0.2$)(0.2).