

Department of Mathematical Sciences
WORCESTER POLYTECHNIC INSTITUTE
MA 1021, Differential Calculus, Term B00, Sections: B01, B02
web page for the course: <http://www.wpi.edu/~bogdand/calc1/>

Differential Calculus SYLLABUS

Instructor: Bogdan Doytchinov, e-mail: bogdand@wpi.edu
Office: SH105D, Office hours: Mo 10:00-11:50am, Tu, Th 10:00-10:50am

Instructor's Associates:

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Office: SH205, Office hours: Tu 8:30-11:00am, We noon-1:00pm, Th 10:00-11:00am and 4:00-5:00pm

Remark: The IAs conduct the labs for the course. However, their office hours are not restricted to lab questions - any calculus questions can be brought to them.

TEXT. D. Varberg, E. J. Purcell, S. E. Rigdon. *Calculus*, Eighth Edition, Prentice Hall.

COURSE CONTENTS. The course consists of three main parts:

- **Functions, Limits, and Continuity.** Functions - domain, range, graphs. New functions from old - operations on functions. Trigonometric functions. Limits. Infinite limits and limits at infinity. Continuity. Chapter 2.
- **The Derivative.** The derivative - definition and properties. Techniques of differentiation. Chain rule. Leibniz notation. Higher order derivatives. Implicit differentiation and related rates. Differentials and linear approximation of functions. Chapter 3.
- **Extereme values and Optimization.** Monotonicity and concavity. Extreme values - first and second derivative tests. Optimization in one dimension, applications. The Mean Value Theorem. Chapter 4.

LECTURES and LABS. There are four lectures and one lab session per week. The lectures are conducted in SL105, on Mo, Tu, Th, and Fr, 2:00 - 2:50pm. The labs are conducted each Wednesday (except Nov 26), for a description and schedule, see <http://www.wpi.edu/~bogdand/calc1/maple/index.html>

You are supposed to attend all lectures and labs. If you miss a class, it is your responsibility to make a copy of the classnotes from another student and make sure you learn what you have missed. Labs will be graded and they bring 20% of your final grade. You should turn in the lab assignments in teams of two. In exceptional cases, with special permission, you can work on the labs individually. Teams of three or more students are **not** allowed. A missed lab cannot be made up. No late work will be accepted.

As an incentive to attend lectures, each lecture will start and end with a 3-minute mini-quiz. These will account for 10% of your grade. The mini-quiz at the beginning of the lecture will repeat verbatim one of the homework problems from the previous lecture. The mini-quiz at the end of the lecture will test your understanding of the new material, will be very elementary, and will be graded more leniently.

Each mini-quiz will be graded out of 2 points.

HOMEWORK. Homework is assigned for each section of the book covered. Homework is a required component of the course. Working the exercises will help you learn, and give you some perspective on your progress. You are encouraged to discuss homework problems with each other.

Homework will never be collected or graded, but if you don't do it on time, you will not get enough practice, and this will ultimately hurt your grade. As an incentive to do your homework, each lecture will start with a 3-minute mini-quiz, which will require solving one of the homework problems (see above). Also, on each test, one of the problems will be taken from the homework.

GRADING POLICY. There will be four in-class tests (25 minutes each) and a Final exam (50 minutes, during the regular class period on December 19). The lowest of the four test scores will be dropped. The grade will be calculated in the following way:

- 40% of the grade come from the three best Tests,
- 30% of the grade come from the Final Exam,
- 20% of the grade come from the Maple Labs,
- 10% of the grade come from the in-class activities (mini-quizzes).

These scores are combined to give a final number of points, between 0 and 100. Point ranges for the final grades are approximately given by:

- A: 100-90
- B: 89-80
- C: 79-65

These cutoffs might go down a bit due to curving, but not by much. They will not go up. (In other words, 90 points guarantee you an A, etc).

No makeup tests will be given - *ever*. If you miss a test, that will be the one dropped when computing the semester score. Anybody caught cheating on any of the tests or exams will be assigned a failing grade.

Ancillary materials. On tests and on the final exam, you may bring a standard 8 1/2 by 11" sheet with *handwritten* notes on one side - no photographic copies of material are allowed. No calculators will be allowed on tests and on the final.

SCHEDULE. The following schedule is tentative. It is expected that we will follow it rather closely, but there will be some minor deviations from time to time.

MA 1021, Differential Calculus

SCHEDULE

Day	Date	Topic	Section	Homework
Mo	10/30	Functions and their graphs	2.1	1,4,7,9
Tu	10/31	Operations on functions	2.2	3,5,29
Th	11/02	Trigonometric functions	2.3	1,2,9,10,25
Fr	11/03	Limits	2.4	5,13,15,29,31
		Rigorous study of limits	2.5	3,5,7,15,19,27
Mo	11/06	Limit theorems	2.6	3,5,11,13,19,25,27,39,43
Tu	11/07	Limits involving trig. functions	2.7	1,4,7,8,13
Th	11/09	Limits at infinity, infinite limits	2.8	3,7,11,13,17,21,23,39
Fr	11/10	Continuity of functions	2.9	1,3,5,9,11,15,17,19,33,43,45
Mo	11/13	Test 1		
Tu	11/14	The derivative - definition	3.1	9,11,15,29
We	11/16	The derivative - a closer look	3.2	3,7,13,19,23,27,37,39
Fr	11/17	Rules for finding derivatives	3.3	5,9,25,33,39,45,49,51
Mo	11/20	Derivatives of sines and cosines	3.4	3,5,9,19,23
Tu	11/21	The Chain Rule	3.5	7,11,17,23,29,33
Mo	11/27	Leibniz notation	3.6	1,7,11,15,25,31
Tu	11/28	Test 2		
Th	11/30	Higher order derivatives	3.7	1,5,7,13,15,19,31,41
Fr	12/01	Implicit differentiation	3.8	1,5,7,13,19,25,33
Mo	12/04	Related rates	3.9	9,11,17,21
Tu	12/05	Differentials and approximations	3.10	3,5,7,18,20,27
Th	12/07	Test 3		
Fr	12/08	Maxima and minima	4.1	1,7,8,9,17,27,31
Mo	12/11	Monotonicity and concavity	4.2	3,5,15,17,21,24,27,31,41
Tu	12/12	Local maxima and minima	4.3	1,3,5,11,13,15,17,27,29
Th	12/14	More max-min problems	4.4	5,17,19,23,25,33
Fr	12/15	Test 4		
Mo	12/18	The Mean Value Theorem	4.7	1,5,10,23,38,45,46,47
Tu	12/19	Final Exam		