

# Course Objectives and Expectations

## Objectives:

- a thorough discussion of differentiation and its applications, and an introduction to integration;
- experience in writing well-organized and readable mathematical solutions, so that you will be able to communicate mathematical and technical ideas;
- experience in reading mathematics books (for example, the course text), so that you will be able to learn and use mathematics independently, whatever your field of endeavour.

## Resources:

The course textbook, *Calculus: Early Transcendentals Single Variable, 5<sup>th</sup> edition*, by James Stewart, will enhance your lectures and provide most of your assignment problems. Make a habit of reading the pages referenced weekly on your **Course Schedule** below before starting your Assignments. The CD-ROMs *Tools for Enhancing Calculus (TEC)* and *Interactive Video Skillbuilder*, which come with your text, may both prove useful. In particular, TEC contains a set of graduated hints for problems numbered in red in the text Exercises; these will help you with problem solving.

## Prerequisites:

Necessary background from high school includes:

- properties/graphs of polynomial, trigonometric, exponential, and logarithm functions;
- how to differentiate polynomial, exponential and rational functions, and use this information to sketch graphs;
- basic algebra and analytic geometry.

Some time will be spent reviewing this material at the start of the course. See also some basic algebra and geometry in the summary **High School Mathematics You Will Need** below.

If you need serious review on any of these topics, consult one of the following:

1. the Mathematics Preparation Manual for Post-Secondary Studies, available from MC 5181 for \$14.84;
2. the book *Calculus Solutions: How to Succeed in Calculus*, by Peter Schiavone, available at the Bookstore for \$26.95.

## Assignments:

Assignments will be posted on the  
by 8:20 a.m. in the drop boxes opposite MC 4066.

<http://www.student.math.uwaterloo.ca/~math137/>

They are due weekly on Friday

### Reading Mathematics:

Reading a mathematical textbook, course notes, or even reviewing your lectures, is different from other types of reading. Here are some suggestions:

- first, write down any new *definitions* – these provide the *vocabulary* for writing mathematics, and must be memorized;
- next, write out the statements of any *theorems/propositions* – these provide you with the *structure* of the relationships among the entities you've defined; to help remember the logic of this structure, write the statements in the form

$$\begin{array}{l} \text{If } H_1 : \\ \quad H_2 : \\ \quad \vdots \end{array} \left. \vphantom{\begin{array}{l} H_1 : \\ H_2 : \\ \vdots \end{array}} \right\} \text{hypotheses}$$
  

$$\begin{array}{l} \text{then } C_1 : \\ \quad C_2 : \\ \quad \vdots \end{array} \left. \vphantom{\begin{array}{l} C_1 : \\ C_2 : \\ \vdots \end{array}} \right\} \text{conclusions}$$

- go through the *proofs* of the theorems, both to convince yourself of *why the statements are true*, and to explore the *various methods of proof used in mathematics* (e.g., by deduction, by induction, by contradiction) ;
- finally, work through any *examples* given; for maximal benefit, try them yourself before looking at the solutions – this will help you to see *how the definitions and theorems are used* in applications .

Following these four steps will greatly enhance your comprehension, and will make most assignment problems straightforward.

### Writing Mathematics:

We often find that many students write mathematical solutions which contain only equations and algebraic manipulations, with no (or very few) words of explanation. In our mathematics courses we require that you write well-organized and readable solutions, using sentence form. By writing a well-organized solution, you will develop a better understanding of the method. There are certain components of a solution which are essential:

- an introductory statement: what you are given and what you have to calculate or prove;
- a concluding statement: summarize the conclusion briefly;
- justifications of the main steps: refer to definitions, rules and known properties;
- some sentences of guidance for the reader, e.g. how you are going to solve the problem.

### A Cautionary Word:

Mathematics is a *participatory* activity, not a game for the passive observer. You will only learn by *doing!* Students who fail courses in their first term usually do so because they fall behind in their work. In order to avoid falling into this trap, study your lecture notes after each lecture, (this can raise your retention by up to 80%); ask questions about the points that you do not understand, and start working on the assignments as soon as the material is covered in class. Don't get into the habit of skipping lectures.

In high school, mathematics is often learned by rote, i.e. by memory, without fully understanding the meaning. The purpose of studying mathematics, however, is to learn how to think logically, how to ask questions, and how to solve problems. Thus, while it is necessary to memorize some facts in mathematics, (most importantly, the definitions and statements of theorems), the emphasis should be on "*learning and understanding*". If you understand the basic concepts, you will be able to apply them in solving problems.

### Calculators:

The Faculty of Mathematics permits two types of calculators: the SHARP EL-531W, and the TI-30X II (solar or battery). (If you plan to pursue Actuarial Science, purchase the TI30X II, which is approved for Actuary Exams.) These are the ONLY electronic devices you may be allowed to bring to tests and exams. Be sure to have your calculator approved with an official 'pink tie' sticker, available in either MC 4023 or MC 3038.

(See also <http://www.math.uwaterloo.ca/navigation/Current/calculatorpolicy.shtml>)

### Honesty and Acknowledgements:

The reputation of the University and the integrity of the degrees it grants rests on the assumption that all work submitted is your own. To ensure that you do not inadvertently breach this implicit contract, examine carefully the details of UW Policy 71, the Student Academic Discipline Policy, at

<http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>.

In academia, it is customary to give credit to anyone who assisted you with your work. Thus, on the cover page of your assignments, you should acknowledge this help by stating "Acknowledgements: On this assignment, I was assisted by \_\_\_\_." and list the name(s) of any tutors or fellow students you consulted.

### Disabilities Assistance:

The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

## Course Organization

- Final Grade:** The final grade will be based on your performance on assignments and Maple labs, two tests, and the final examination, normally weighted as follows: Assignments and Labs 10%, Tests 30%, Final Exam 60%
- Tests:** There will be two tests, each 1 hour long, on Monday, February 12, from 7:00-8:00 p.m., and Wednesday, March 14, from 4:30-5:30 p.m., (rooms TBA).
- Assignments:** The assignments contain problems which deal with routine, algorithmic processes such as finding limits, derivatives and simple integrals, as well as applications and more thought-provoking problems. They will reflect our expectations as to the tests and final exam, but their primary purpose is to help you to understand calculus concepts and become more proficient in applying them. Help one another by all means, *but be sure to write out your solutions on your own*. Late assignments will not be accepted under any circumstances. There will also be no make-up dates for missed tests.
- Presentation:** Your solutions should be *legible, well-organized, and written in sentence form*, so that a person who is unfamiliar with the problem can read and follow the solution. Up to 10% of the marks may be assigned for presentation.
- Tutorials:** Your Tutorials on Wednesday afternoons will provide further examples to enhance your understanding of the concepts discussed in lectures. *Try to come to the tutorials well-prepared, having reviewed the topics on the current assignment, so as to maximize the benefit. (And to be able to ask good questions!)*
- Office Hours:** Wednesdays, 12:30-2:30 p.m. (only for those students who attend lectures and tutorials).
- Coordinator:** Sanjiv Gupta MC 5054 Ext. 33910 email: s6gupta@math.uwaterloo.ca