



Department of Computer Science and Mathematics

2011/2012 Academic Year - Fall 2011

**MATH 1036 – Calculus I
Course Outline**

COURSE TITLE: MATH 1036 - Calculus I

PREREQUISITE

MCV4U or MCB4U or OAC Calculus or MATH 1912.

IMPORTANT: A solid knowledge of high school math is essential for success in this course. If you feel you need a review of high school material, you are encouraged to use extra help mentioned in the “Additional resources” further in this outline. Also, please read remarks on “How to succeed in the Calculus course”, available at <http://www.nipissingu.ca/faculty/alexandk/teaching/m1036/m1036.html> (the course webpage).

SCHEDULE

Lectures: Monday and Wednesday, 8:30 – 10 AM. **Room:** F210

Tutorials:

Section	Schedule	Leader
1	Monday 3:30 PM - 5:20 PM Room: A223	Jon Heindl
2	Wednesday 3:30 PM - 5:20 PM Room: A223	Stephanie Lamb
3	Friday 9:30 AM -11:20AM Room: A227	Stephanie Hicks

INSTRUCTOR: Alexandre Karashev

Office: A124C

Phone: 474-3461 ext. 4140

E-mail: alexandk@nipissingu.ca

OFFICE HOURS:

Monday and Wednesday, 10-11 AM and

11:30 AM -12:30 PM (Drop-In Center)

Friday, 10:00 AM -12:30 PM

REQUIRED TEXTBOOK: *"Single Variable Calculus"* by James Stewart, 7th edition (available in the campus shop).

OTHER RECOMMENDED TEXTS:

"Calculus: Fear No More" by Miroslav Lovric and *"The Mathematics Survival Kit"* by Jack Weiner (both texts available in the campus shop).

THE STRUCTURE OF THE COURSE

The course consists of 3 hours per week (two 90-minute meetings) of lectures and 2 hours of tutorials (1 tutorial each week). There will be 3 sections of tutorials. Some weeks, a part of tutorial hours will be used for pop-up tests or midterm examinations. The tutorials will be conducted by tutorial leaders.

COURSE CONTENT

This is a standard first year level Calculus course, which covers a wide variety of topics.

The course content will be based on Chapters 1 - 3 and 6 of the textbook (Sections 1.1, 1.3 – 1.8, 2.1–2.6, 2.9, 3.1 – 3.5, 3.7, 3.9, 6.1–6.4, 6.6, 6.8). Topics include: the real number system; algebra of functions; limits and continuity; inverse functions; differentiation; the intermediate value theorem; the mean value theorem; differentiation of transcendental functions; L'Hospital's rule; curve sketching; and applications of the derivative.

IMPORTANT: Note that most of the topics of sections 1.1, 1.2, 1.3 are also contained in the high school curriculum and therefore should be known to students. In particular, it is assumed that students are familiar with the content of section 1.2. Should it be not the case, a student is encouraged to attend additional tutorials, as well as use extra sources of help, listed in the section “Additional resources” further in this outline.

COURSE OBJECTIVES

By the end of the course, students will:

- Understand the concepts of a function, its domain and range; use calculus to find domains and ranges of functions
- Know how to create new functions using arithmetic and algebraic operations, and compositions
- Understand the concept of a limit; calculate limits of functions using different techniques;
- Understand the concepts of continuity; apply the properties of continuous functions to solve practical problems
- Understand the concept of the derivative; understand the interpretation of derivatives in terms of slopes of tangent lines and rates of change; be able to compute derivative using its definition
- Know how to compute derivatives of complicated functions using various differentiation formulas and rules
- Use derivatives to sketch graphs of functions and solve optimization problems
- Understand the concept of a one-to-one function and inverse function, use properties of the inverse function in problem solving
- Develop an ability to work with transcendental functions (trigonometric and inverse trigonometric functions, exponential and logarithmic functions)
- Understand the concept of antiderivative and be able to find antiderivatives of simple functions
- Carry out simple mathematical proofs
- Develop problem-solving skills
- Use calculus to solve problems arising from real-life applications

GRADING

Essay	5%
Sample Exam preparation	5%
Two take-home test	10% (each at 5%)
Three 60-minutes tests	20% (each at 20/3 %)
Two 110-minutes Midterm Examinations	20 % (each at 10%)
Final Examination	40 %

IMPORTANT – READ CAREFULLY!

■ Tests and examinations

On tests and examinations students must show their work. **No marks** will be given for stating an answer without providing a detailed solution to the question.

■ Attendance

- ▶ According to the **Academic Regulations**, “punctual and regular attendance is essential for the successful completion of a course. When absenteeism **exceeds 20%**, the student may be excluded from writing the final examination”. **The attendance of lectures and labs for this course will be monitored.**
- ▶ Students **must** write tests and midterm examinations with the tutorial section in which they are registered. If a student writes a test with a different section without Instructor’s permission the student gets **zero** on this test.

■ Missed tests and examinations

Students who are unable to write a midterm examination or test because of illness or other circumstances beyond their control **may be** granted permission to write a make-up exam by the instructor. In such circumstances, student must contact the instructor and fully support their case by a medical certificate in the case of illness or by appropriate documents in other cases.

■ Calculators

The use of **simple** scientific calculators is allowed during the examinations and tests. However **the use of graphic or programmable calculators will not be permitted.** Note also that the questions for the tests and exams will be set up in such way that the use of calculators is not required and sometimes misleading!

ESSAY

This assignment is a one-page long essay on a topic selected from the course. The topics of the essay will be distributed approximately in the middle of the term. Your task will be to explain, **without the use of formulas**, a definition, concept, or theorem. All essays **must be typed**; handwritten essays will not be accepted. The due date for the essay submission will be announced in class. Please note that this is an individual assignment and **not group work**, and **plagiarism will not be tolerated**.

SAMPLE EXAM PREPARATION

Approximately two weeks before the first midterm examination you will be asked to put together a sample exam, i.e. an exam that, in your opinion, could be given to you as a midterm (or a part of it). Your sample exam must consist of 5 questions **and their solutions**. The marking criteria for this assignment will be distributed in class and the due date will be announced. Please note that this is an individual assignment and **not group work**, and **plagiarism will not be tolerated**.

POP-UP TESTS

There will be three **Pop-Up Tests**

- **Tests** will be 60 minutes long and will be held during tutorials.
- Each test will consist of 5 questions.
- The questions for the tests will be selected from the exercises in the text book. For each section in the text, there is a list of suggested exercises. Some of these exercises will be chosen as the tests' questions.
- **IMPORTANT:** The tests will be **open book**. Students may use the textbook assigned for the course ("Single Variable Calculus" by James Stewart). However, no other materials (such as notes, formula sheets etc.) will be permitted. Students shall not communicate with each other during the tests. The dates for the tests will not be announced. Students should attend all the tutorials to make sure they do not miss a test.

EXAMINATIONS

There will be two **Midterm Examinations** and a **Final Examination** for this course.

- Midterm Examinations will be 110 minutes long and will be held during tutorials.
- Each midterm will consist of 10 questions.
- Tentative dates for **Midterm Examinations**:

Section 1: Mondays, October 24 and November 21

Section 2: Wednesday s, October 26 and November 23

Section 3: Fridays, October 28 and November 25

- The final examination will be a common exam for all tutorial sections.
- A **sample final exam** is attached and also can be found on the course web page.
- **Sample midterm examinations** (with solutions) can be found on the course web page.
- **IMPORTANT:** The examinations will be **closed book**. The use of the textbook, notes or formula sheets will not be permitted.

ADDITIONAL RESOURCES

1) Additional tutorials

There will be four additional tutorials scheduled outside of the class time (usually on Friday). The purpose of the tutorials is to review some topics from high school math. Each tutorial will be 2 hours long. The schedule of these tutorials will be announced in class.

2) Appendices A – F in the textbook

These appendices provide a brief review of high school math

3) Nipissing University Calculus Help Site

<http://www.nipissingu.ca/calculus>

It should be emphasized that this web site is *an essential ingredient of the learning process*. It provides an access to on-line tutorials, including those reviewing high-school mathematics, additional exercises, and tests. A very important part of the web-page is devoted to the diagnostic tests.

4) Course Webpage

<http://www.nipissingu.ca/faculty/alexandk/teaching/m1036/m1036.html>

The main purpose of this site is to provide you with the current information about the course. Links to videos and presentations, summarizing the most important concepts of the course, are posted there. Some of these videos provide a review of high school math.

5) Irln.Com: More Online Tests

The website <http://ilrn.com> is a source of additional self-assessment tests. The first group of tests are **placement-type tests** on high-school mathematics. These tests allow you to identify which topics you need to review. You are strongly recommended to take these tests. As the course progresses, you will be offered more tests on various topics of calculus. The tests are optional. However, it is very important that you attempt the tests.

Detailed information about the registration on ilrn.com can be found on the course webpage.

MATH DROP-IN CENTER (ROOM A223 – “MATH ROOM”)

Math Drop-In Center is a place where you can come if you need help with your math classes. Student assistants and faculty members will be there to help you. In the Math Drop-In Center you can study, ask questions, work on your assignments etc. It will operate during the academic year. The schedule for the fall term is as follows:

Monday	11:30 AM – 12:30 PM, 2:00 PM – 3:30 PM
Tuesday	9:00 AM – 10:00 AM, 2:00 PM – 3:30 PM
Wednesday	11:30 AM – 12:30 PM, 2:00 PM – 3:30 PM
Thursday	9:00 AM – 10:00 AM, 2:00 PM – 3:30 PM
Friday	9:00 AM – 11:00 PM

DATES TO REMEMBER

Sunday, September 25 – Last day to register for FA or FW courses. Students withdrawing from FA or FW courses after this date but before the respective withdrawal dates will receive a WDR on their academic record.

Sunday, November 13 - Last date for withdrawing from a FA course.

October 10 – 14 – Study week

REVIEW EXERCISES – HIGH SCHOOL MATHEMATICS

Text: *"Single Variable Calculus"* by James Stewart, 7th edition

Appendix A: 4,5,6,11,12,16,21,26,32,34,36,38,42,43,46,51,56,62

Appendix B: 4,10,11,15,19,20,22,25,28,31,34,36,42,45,48,52,57,58,59

Appendix C: 1,4,6,9, 12, 14, 16, 23, 24,30,32 - 35, 39, 40

Appendix D: 4,5,7,9,12,14,16,20,24,26,29,30,31, 37,46, 52, 60,63,68,69,72,73,76

SUGGESTED EXERCISES

Text: *"Single Variable Calculus"* by James Stewart, 7th edition

Chapter 1

Section 1.1: 2,7,8,25-67, 73-78

Section 1.2: 1-5,6,8,9,13,14,16,17,25

Section 1.3: 9-24, 27-36, 41-46, 54-56, 59-64

Section 1.4: 3,6,7

Section 1.5: 4,6,7,8,11,12,16,18, 29-37, 38a

Section 1.6: 1, 3-9, 11-32, 38-46, 48, 49, 57-63

Section 1.7: 11,13,16,18,21,23,26,28,30,31,32,36,37,39,41,42,44

Section 1.8: 25,30,31,36,38,39,40,42,45,46,49-60,63,64,65,67,69

Chapter 2

Section 2.1: 5-10,15-17,22,23,24,27-32,33,34,38,46,47,48,54

Section 2.2: 20, 22-26,28,29,35,36,41,44,49,53,55

Section 2.3: 2,5,8,9,12,14,16-22,25,27,28,29,32,33,36,38,42,44,45,51,52,55-62,64,67-70,73-84,86,87,93,95-106

Section 2.4: 2,5,6,10,12,13,18,21,22,29,31,33,34,37,39,40,43,45,46,48,50,52

Section 2.5: 3,6,7,8,10,14,17,20,21,22,31,33,34,40,41,51,52,59-62,73,74,80,86,87

Section 2.6: 1-8,12,16,17,18,23,25,28

Section 2.8: 1-46

Section 2.9: 1,4,8,10,13,18,21-28,31-34,36,42

Chapter 3

Section 3.1: 3,5,8,10,12,13,16-21,26,28,29-42,45-57,68-70,72

Section 3.2: 1-6,10-12,15,17-20,23,24,26,27,29,33,34

Section 3.3: 8-17,20,22,23,29-40,42,52-54,57-59,61,62,66,69

Section 3.4: 8,11-15,18,19,20,22,23,27,29,33,36,38,44-47,54,68,70,71,72

Section 3.5: 1-40

Section 3.7: 3-5,12,14,15,16,20,21,27,33,35,37,38,40,44,46,49,52,67,70,72

Section 3.9: 2,5,7,9,12,13,15,18,22,24,26,28,29,35,36,40,42,47,54,56,60,61

Chapter 6

Section 6.1: 9,11,13,17-19,23-28,33,35-42,45

Section 6.2: 7-12,15,16, 23-25,27,29,31,33,36,45,46,49,52,53,54,59,60,65-73

Section 6.3: 3-8,10,12,14,17,23-36,39,40,47,51,52,55,56,62,64,65,66,68,69

Section 6.4: 2,3,6,8,11,13,16,17,25,26,34,38,45,46,49,54,55,58,61-66

Section 6.6: 1-14,22,23,27-30,38,44,45,52

Section 6.8: 12,14,17,22,24,30,31,34,42,44,45,46,49,52,53,54,56,57,61,66,73,75-80,100