Faculty of Science
Department of Mathematics
MATH 1500, Introduction to Calculus, September, 2015
Course Syllabus

Textbook: James Stewart, Single Variable Calculus: Early Transcendentals (International Metric Edition), Chapters 1-5, Second Custom Edition (black cover, coil bound) w/Student Solutions Manual, **or**
James Stewart, Single Variable Calculus: Early Transcendentals (International Metric Edition), Volume 1, 7th Edition, Brooks/ Cole w/Student Solutions Manual
(or if you will be continuing to MATH 1700: James Stewart, Single Variable Calculus: Early Transcendentals combined Volumes 1 & 2, 7th Edition, Brooks/ Cole w/Student Solutions Manual ***or*** *if you will be continuing to Math 1700 and MATH 2720 or MATH 2730: James Stewart, Full Version Calculus (International Metric Edition), 7th Edition, Brooks/ Cole w/Student Solutions Manual)*

Instructor: Darja Kalajdzievska
Email: **kalajdzi@cc.umanitoba.ca**
Office: 427 Machray Hall
Office Hours: T/Th 1-2:30pm
Help Location: Math Help Center (500A Machray Hall, subject to change)
Phone: 204-272-1609
Website: server.math.umanitoba.ca/homepages/kalajdzi

Rough Course Outline

Section	Section Title	Page Numbers	Recommended Textbook Problems (odd #)
1.1	Four Ways to Represent a Function	9 – 22	1-15, 22-64, 69-70
1.3	New Functions from Old Functions	36 – 44	1-4, 28-46, 57
1.5	Exponential Functions	51 – 58	1-6, 11-16,19-20
2.2	The Limit of a Function	87 – 98	1-12, 15-18, 29-37
2.3	Using Limit Laws (include squeeze theorem)	99 – 108	1-32, 37-46, 49
2.5	Continuity	118 – 130	1-8, 12-31, 41-43, 51-54
2.6	Limits at Infinity: Horizontal Asymptotes	130– 143	1-10, 15-38, 41-46, 52-56, 60
2.7	Derivatives and Rates of Change	143 – 153	5-8, 12-15, 17, 33-40
2.8	The Derivative as a Function	154 – 165	1-11, 16-18, 21-31, 43-46
3.1	Derivatives of Polynomials & Exponential Functions	174 – 183	1-36, 47, 51-55, 60-63
3.2	The Product and Quotient Rules	184 – 191	1-34, 41-48
3.3	Derivatives of Trigonometric Functions	191 – 198	1-24, 31-34, 39-50
3.4	The Chain Rule	198 – 208	1-54, 61-64, 77-79
3.5	Implicit Differentiation (omit inverse trig. functions)	209 – 217	1-32
3.9	Related Rates	244 – 250	1-31
MIDTERM EXAM (1 hour): Locations and date TBA			
1.6	Inverse Functions and Logarithms	58 – 71	1-18, 35-41, 49-58
3.6	Derivatives of Logarithmic Functions	218 – 223	1-34, 39-54
4.1	Maximum and Minimum Values	274 – 282	1-44, 47-61
4.2	The Mean Value Theorem	284 – 289	9-12, 19-21
4.3	How Derivatives Affect the Shape of a Graph	290 – 301	1-29, 31-51
4.5	Curve Sketching (omit oblique asymptotes)	310 – 318	1-40, 42-53
4.7	Optimization Problems	325 – 337	1-21, 23-40
4.9	Antiderivatives	344 – 350	1-17, 20-22, 25-43, 45-52, 59-65
5.1	Areas and Distances	360 – 371	1-5
5.2	The Definite Integral	371 – 385	1-3, 33-40, 51
5.3	The Fundamental Theorem of Calculus	386 – 397	1-48, 55-63
FINAL EXAM (2 hours): Locations and date TBA			

Consult your individual instructor for possible changes to the recommended textbook problems.

There are a couple of regulations about lectures and tutorials of which you should be aware:

- You must **take and also attend** one of the tutorials **associated with the lecture section in which you are registered**. Consult the Registration Guide for the times of these tutorials.
- There will be **marks associated with your tutorial work**. If you change tutorial sections, it is **your responsibility** to make sure that a correct record of any marks accumulated up to the time of the change is passed on to the teaching assistant in your new tutorial section.

Evaluation: Your final grade in this course will be determined by the marks you earn on a final exam, a midterm exam and a series of bi-weekly tutorial tasks. The relative weightings of these components towards your final grade are:

Tutorials Tasks	10 %
Midterm Examination	30 %
Final Examination	60 %

Note: Calculators or any other electronic or mechanical aid are not allowed during tutorial tasks or exams.
Note: Deferments will be granted only on medical (with a doctor's note) or compassionate grounds.

Other Important Dates:
First Day of Classes: Thursday, Sept. 10th
First Day of Tutorials: Thursday, Sept. 17th
Last Day of Registration/withdrawal with full refund: Wednesday, Sept. 23rd
Last Day for Voluntary Withdrawal: Wednesday, Nov. 18th
Last Day of Classes: Wednesday, Dec. 9th
Final Exam Period: Dec. 11th to Dec. 23rd
Closure Dates: Monday, Oct. 12th and Wednesday, Nov. 11th

Proofs that are subject to examination:

2.8 If a function f is differentiable on (a,b), then it must be continuous on (a,b).
3.1 Prove: $(cf)' = cf'$ (by using the definition of derivative)
3.1 Prove: $(f \pm g)' = f' \pm g'$ (by using the definition of derivative)
3.2 Prove: $(fg)' = f'g+f g'$ (by using the definition of derivative)
3.3 Prove: $(\sin x)' = \cos x$ (by using the definition of derivative)
4.2 If $f' = 0$ on (a,b), then f is constant on (a,b). (by using the MVT)
4.3 If $f' > 0$ on (a,b), then f is increasing on (a,b). (by using the MVT)
4.3 If $f' < 0$ on (a,b), then f is decreasing on (a,b). (by using the MVT)

Academic Dishonesty: The Department of Mathematics, the Faculty of Science and the University of Manitoba regard acts of academic dishonesty in quizzes, tests, examinations, laboratory reports or assignments as serious offenses and may assess a variety of penalties depending on the nature of the offense. Acts of academic dishonesty include (but are not limited to) bringing unauthorized materials into a test or exam, copying from another student, plagiarism and examination personation. Students are advised to read section 7 (Academic Integrity) and section 4.2.8 (Examinations: Personations) in the "General Academic Regulations and Requirements" of the current Undergraduate Calendar.
Note, in particular that cell phones, pagers, PDA's, MP3 units or electronic translators are explicitly listed as unauthorized materials, and hence may not be present during tests or examinations.
Penalties for violation include being assigned a grade of zero on a test or assignment, being assigned a grade of "F" in a course, compulsory withdrawal from a course or program, suspension from a course/program/faculty or even expulsion from the University. For specific details about the nature of penalties that may be assessed upon conviction of an act of academic dishonesty, students are referred to University Policy 1202 (*Student Discipline Bylaw*) and to the Department of Mathematics policy concerning minimum penalties for acts of academic dishonesty.
The *Student Discipline Bylaw* is printed in its entirety in the Student Guide, and is also available on-line or through the Office of the University Secretary. Minimum penalties assessed by the Department of Mathematics for acts of academic dishonesty are available on the Department of Mathematics web page.

All Faculty members (and their teaching assistants) have been instructed to be vigilant and report incidents of academic dishonesty to the Head of the Department.

LIVING WITH MATHEMATICS – September 2015 - MATH 1500

Learning mathematics is a lot like building a house. A strong foundation is needed to produce a sturdy structure while a weak foundation will quickly expose any structural deficiencies. In much the same way, you will require a good grounding in your high school mathematics if your study of Calculus is to be successful. The pre-requisite for entering Math 1500 is a minimum grade of 60% in either Pre-Calculus Math 40S or 60% in the U of M Math Skills course. This minimum mark in no way predicts success in Math 1500; in fact, if you just meet the minimum requirement, you will have much work to do!

You can't learn Calculus by cramming at the end of term; it just isn't that kind of subject. Calculus involves ideas and computational methods which require practice in order to be learned. By way of an analogy, how many athletes do you know who do well by training for only a few days in advance of their competition date? Here are some hints on how to get the most out of the teaching system used for this course:

Lectures: During lecture periods professors present the course material to you. Because of the relatively large numbers of students in a lecture section and the necessity of presenting a certain amount of new material each day, lectures may seem rather formal. Almost certainly they will be quite different from your previous classroom experience. If you cannot attend a particular class, it is up to you to find out what you have missed.

Tutorials: Each lecture section is divided into a number of once-weekly tutorial sections, numbering from 30 to 36 students. There will be a tutorial task in each tutorial class, with approximately every second tutorial task being for marks. Some tasks will allow work in partners while others will be strictly individual assessments; make sure you know which one is which! Generally speaking, each tutorial task will examine the lecture content and textbook problems from the previous two week period; consult your individual instructor for specific cut-off dates. Your tutorial mark will be determined by the best 4 out of 5 tutorial task results. Be prepared to do group problem-solving if the situation presents itself during these question/answer sessions. You will have a teaching assistant (TA) available during tutorials to help facilitate your understanding of the concepts and procedures of Calculus. As with the lectures, you can greatly increase the effectiveness of the tutorials by preparing for them: if you have done the recommended textbook problems and are aware of specific questions and difficulties before you go into the tutorial, you are more likely to get them dealt with.

Questions: Don't be troubled if you have questions because everyone does. In any case you can bet that if you have a question, someone else probably has the same one. Because of the relatively large number of students involved and the pace of the course material, general discussion in lecture periods must be limited. There is a little more time available for questions in tutorials, but even with this you may find that you can't get all your difficulties settled in the scheduled teaching periods. So here are some ways to get answers to questions:

1. **Study your textbook.** This may seem pretty obvious but many people don't always think of this!
2. **Talk** the problem out **with another student**. In this sort of exchange, both parties usually benefit. If you can help someone else solve a problem, you will probably learn something in the process.
3. **Set up a study group** of 3 to 4 like-minded students and meet on a regular basis.
4. **Go to the Mathematics Help Centre**, presently located at 500A Machray Hall. Its purpose is to provide a place where students can get answers from graduate students to specific mathematical problems related to their course. The Math Help Centre hours of operation will be posted on the door of the MHC.
5. **Go to your professor** or possibly your tutorial teaching assistant. You'll probably find them most willing to help. Don't expect anyone to re-teach large parts of the course; it is **your responsibility** to stay up-to-date.

Homework: No teaching system can be effective without work. Do not expect to learn Calculus by simply listening to lectures or by just taking notes. Here are three ways to increase the effectiveness of the lecture system:

1. **Review the lecture material** as soon as possible, preferably the same day of the lecture. Use the textbook during this review and understand the material as completely as you can.
2. **Do** as many **recommended textbook problems** as you can; mathematics is a problem-solving discipline: you can't learn by watching other people solve problems - you have to solve them yourself.
3. **Refer to the course and/or chapter outlines**, and try to read through the material before it is covered in lectures. When working ahead, it is not necessary to completely understand concepts and procedures; if you have a vague notion about what is about to happen, the lectures will be easier to follow. Your individual instructor might have protocols in place to help in this regard.