MATH 1500 Introduction to Calculus
Course Outline
September - December 2011

LECTURES

A01:	MWF 10:30 am - 11:20 am R 10:00 am - 10:50 am 305 St. Paul's College	**A04:**	MWF 12:30 pm - 1:20 pm 201 Armes
Instructor:	***Mr. William Korytowski***	**Instructor:**	***Mr. Robert Borgersen***
A02:	MWF 9:30 am - 10:20 am 100 St. Paul's College	**A05:**	TR 11:30 am - 1:15 pm 200 Armes
Instructor:	***Dr. Kirill Kopotun***	**Instructor:**	***Dr. Gábor Lukács***
A03:	MWF 11:30 am - 12:20 pm 205 Armes	**A06:**	T 7:00 pm - 10:00 pm 204 Armes
Instructor:	***Mr. Robert Borgersen***	**Instructor:**	***Dr. Jiri Sichler***
		A07:	MWF 12:30 pm - 1:20 pm 223 Wallace
		Instructor:	***Mr. Brian Corbett***

CALCULATORS: Calculators **cannot** be used during tests and exams.

IMPORTANT DATES	**Last day to register:**	September 7, 2011
	Last day for voluntary withdrawal:	November 16, 2011
	No classes on:	Oct 10 (Thanksgiving), Nov 11 (Remembrance Day)

GRADE COMPONENTS:	**FINAL EXAMINATION**	**60%**
	MIDTERM EXAMINATION	**30%**
	ASSIGNMENTS (A01 ONLY) / QUIZZES	**10%**
	(see your instructor for further details)	

MIDTERM EXAMINATION: The midterm exam will be held on **Wednesday, October 26, 2011 at 5:30 p.m - 6:30 p.m.** Its location will be announced later. Students who miss writing the midterm exam for valid medical or compassionate reasons may be granted permission to write a deferred exam by their instructor.

FINAL EXAMINATION: The date, time, and location of a 2-hour-long final examination will be set and published by the Registrar's Office. Students are reminded that they must remain available until all examination and test obligations have been fulfilled. The exam period is December 9 - December 21, 2011.

TUTORIALS: Each lecture section is divided into a number of tutorial sections. A tutorial section involves a smaller number of students, and is the place where you get a chance to see more examples worked out and to work on problems under the supervision of an instructor who knows the subject. As with the lectures, you can greatly increase the effectiveness of the tutorials by preparing for them: If you are aware of specific questions and difficulties before you go into the tutorial, you are more likely to get them solved. There will be five tests given in the tutorials, approximately one every two weeks. The tutorial grade will be calculated by discarding your worst mark (including absences) and averaging the rest. Make-up tests for missed tests are **not available**. Students who miss a test due to valid medical or compassionate reasons should contact their instructor.

Tutorials begin on Thursday, September 15, 2011

TEXT: James Stewart, *Single Variable Calculus: Early Transcendentals* (Metric), Volume 1, 6th edition, Brooks Cole, **OR**

James Stewart, *Single Variable Calculus: Early Transcendentals* (Metric), combined Volumes 1 & 2, 6th edition, Brooks Cole, **OR** (if you will be continuing to MATH 1700)

James Stewart, *Calculus* (Metric), full version, 6th edition, Brooks Cole (if you will also be continuing to MATH 2720 or MATH 2730)

Course Outline and Suggested Homework Exercises

Section	Title	Pages	Suggested Homework
1.1	Four Ways to Represent a Function	11 – 23	1, 5-11, 17-41, 45-53, 57-65
1.3	New Functions from Old Functions	37 – 45	31, 35, 39, 41, 45, 49, 55, 57
1.5	Exponential Functions	52 – 59	5, 7, 9, 11
2.2	Limit of a Function	88 – 99	1-9, 12, 13, 15, 21-29
2.3	Limit Laws	99 – 108	1-29, 35-47
2.5	Continuity	119 – 130	1-7, 11, 15-23, 31-49, 42
2.6	Limits at Infinity: Horizontal Asymptotes	130 – 143	1-7, 11-33, 37-53
2.7	Derivatives & Rates of Change	143 – 153	1-19
2.8	The Derivative as a Function	154 – 165	1-9, 13-25, 45, 47
3.1	Derivatives of Polynomials & Exponential Functions	173 – 183	1-35, 45-57
3.2	Product & Quotient Rules	183 – 189	1-33, 41-45
3.3	Derivatives of Trigonometric Functions	189 – 197	1-23, 29, 33, 35-47
3.4	The Chain Rule	197 – 207	1-45, 51-57
3.5	Implicit Differentiation (omit inverse trig. functions)	207 – 215	1-27
3.9	Related Rates	241 – 247	1-25, 31

MIDTERM EXAM (1 hour) = 30% on October 26, 2011 at 5:30 p.m.

1.6	Inverse & Logarithmic Functions	59 – 72	1-13, 17-27, 31-43, 47-51
3.6	Derivatives of Logarithmic Functions	215 – 220	1-49, 48
4.1	Maximum & Minimum Values	271 – 280	1-25, 31-61, 45
4.2	Mean Value Theorem	280 – 286	11-15
4.3	How Derivatives Affect the Shape of a Graph	287 – 298	1-29, 33-53, 67
4.5	Curve Sketching (omit oblique asymptotes)	307 – 315	1-23, 31, 33, 43-49
4.7	Optimization Problems	322 – 334	1-19, 29, 31, 33
4.9	Antiderivatives	340 – 347	1-49, 61, 63, 69, 75
5.1	Areas and Distances	355 – 366	3, 5, 11
5.2	Definite Integral	366 – 379	1-7, 29-45
5.3	Fundamental Theorem of Calculus	379 – 390	1-11, 15-35, 39, 41, 49, 51

FINAL EXAM (2 hours) = 60%

Theorems whose proofs you must know:

2.8	*differentiable* $\Longrightarrow$ *continuous*	3.3	$(\sin x)' = \cos x$
3.1	$(cf)' = cf'$	4.2	$f' = 0$ *on* $I \Longrightarrow f$ *is constant on* I
3,1	$(f+g)' = f' + g'$	4.3	$f' > 0$ *on* $I \Longrightarrow f$ *is increasing on* I
3.2	$(fg)' = f'g + fg'$	4.3	$f' < 0$ *on* $I \Longrightarrow f$ *is decreasing on* I

Living with Mathematics: September 2011

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 high school mathematics if your study of MATH 1500 is to be successful.

DIAGNOSTIC TEST: As a means of assessing your readiness for MATH 1500, there is a self-administered diagnostic test available on ANGEL (http://www.umanitoba.ca/angel). **Do this test as soon as possible** to determine whether additional steps will be required on your part.

- Experience shows that even students who do relatively well in high school mathematics ($> 75\%$) may run into difficulties with university math. Thus, **high school mathematics grades are not an indicator of proficiency**.
- If you score less than 40 out of 50 on the Diagnostic Test, you are **strongly urged** to take MATH 0500 ("Preparing for University Mathematics") in order to succeed in MATH 1500. You can take it in parallel with MATH 1500.
- If you score less than 30 out of 50 on the Diagnostic Test, you are advised not to take MATH 1500, or any other university level mathematics course. Take MATH 0500 ("Preparing for University Mathematics") first, and then take the Diagnostic Test again to see where you stand.

YOU CANNOT LEARN MATHEMATICS BY CRAMMING AT THE END OF TERM. It is just not that kind of subject; it involves ideas and computational methods which cannot be learned without practice. By way of an analogy, how many athletes do you know who do well in contests by training for only a few days in advance?

These notes attempt to provide some hints about how to get the most out of the teaching system used for this course (**lectures and tutorials**), and also to provide some concrete information of a more or less useful nature (**Help Centre, marks**). Before you consider particular items, there are a couple of **regulations** about lectures and tutorials that you should be aware of:

1. 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.
2. There are marks associated with your tutorial work (as explained earlier). You must write the quiz in the tutorial section in which you are registered.

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.

No teaching system can be effective without work: Do not expect to learn mathematics simply by listening to lectures (or even taking notes). Here are a couple of ways to increase the effectiveness of the lecture system:

1. **Review** the lecture material as soon as possible, preferably the same day. Use the text during this review, and understand the material as completely as you can. Do as many textbook problems as you can; mathematics is a problem solving discipline. You cannot learn by watching other people solve problems - you have to solve them yourself. (See comments on tutorials as well).
2. **Refer to the course outline**, and try to read through the material before it is covered in lectures. In such a process, it is not necessary to completely understand; if you have even a vague notion about what is going on from reading ahead, the lectures will be easier to follow.

QUESTIONS: Do not be troubled if you have questions, because everyone does. Some have less, some have more, but in any case you can bet that if you have a question, someone else probably has the same one. Thus, while it may require taking a deep breath to ask a question in class, you will likely do a service to your classmates.

Because of the relatively large number of students involved and the necessity of presenting course material, general discussion in lecture periods has to be somewhat controlled. There is a little more time available for questions in tutorials, but even with this you may find that you cannot 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 people do not always think of it.)
2. **Go to your professor** or possibly your tutorial instructor during their office hours, or if that is not possible, arrange another time you can meet with them. You will find them quite willing to help.
3. **Talk** the problem out with other students. In this sort of exchange, both parties usually benefit. So, if someone asks you a question, do not brush them off because it might waste your time. If you can solve their problem, you may well learn in the process.
4. **Form** study groups by identifying 3-5 classmates with whom you can study weekly.
5. **Go to the Mathematics Help Centre** by yourself or collectively, with your study group. This is located in Room 318 Machray Hall. Its purpose is to provide a place where students can get answers to specific mathematical problems related to their course. The Help Centre will open on **Monday, September 12, 2011**, and the hours of operation will be posted on the door of Room 318.

ONE CAUTION: DO NOT EXPECT ANYONE TO RE-TEACH LARGE CHUNKS OF THE COURSE. It is **your responsibility** to keep up with course material.

Faculty of Science Statement on Academic Dishonesty

The Faculty of Science and The University of Manitoba regard acts of academic dishonesty in quizzes, tests, examinations, laboratory reports or assignments as serious offences and may assess a variety of penalties depending on the nature of the offence. Acts of academic dishonesty include, but are not limited to bringing unauthorized materials into a test or exam, copying from another individual, using answers provided by tutors, plagiarism, and examination personation.

Note: cell phones, pagers, PDAs, MP3 units or electronic translators are explicitly listed as unauthorized materials, and must not be present during tests or examinations.

Penalties that may apply, as provided for under the University of Manitoba's Student Discipline By-Law, range from a grade of zero for the assignment or examination, failure in the course, to expulsion from the University. The Student Discipline By-Law may be accessed at:

`http://umanitoba.ca/admin/governance/governing_documents/students/868.htm`

Suggested minimum penalties assessed by the Faculty of Science for acts of academic dishonesty are available on the Faculty of Science web-page:

`http://umanitoba.ca/faculties/science/resources/Discipline__Penalties_Table_Jul09.pdf`

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

Information concerning the Mathematics Diagnostic Test and the course MATH 0500 – Preparing for University Mathematics

The Department of Mathematics has developed two programs available on a voluntary basis to all students registered in the Mathematics courses 1200, 1210, 1300, 1310, 1500, 1510, 1520, 1700 and 1710.

The Mathematics Diagnostic Test is a voluntary online 50-question test, whose purpose is to measure your potential for success in the above-mentioned Mathematics courses. The questions test your knowledge and skill in topics contained in the high school mathematics curriculum, principally Pre-Calculus 40S. The test provides you with an assessment of your knowledge and skill level, and provides advice about actions you should take in order to increase your chances of success in mathematical courses.

Access to the Mathematics Diagnostic Test is obtained through ANGEL at

http://www.umanitoba.ca/angel

where you can log on using your University of Manitoba username (UMnetID) and password. (If you have not done so already, you may claim your UMnetID at the **http://www.umanitoba.ca/claimid** page.) Once you are logged on to ANGEL:

- Click on the **Math Diagnostic Test 2.xx** link.
- Follow the instructions in order to complete the test. Click on **Submit** at the end of the test. This will show your score, your answers, and the correct answers.
- At the bottom of the answers page, click on **Continue**. This will bring you back to the Instructions page, where you can view the score of each of your attempts as well as their average.
- Finally, click on the **I took the test. What do I do now?** link. It will provide you with advice on how to interpret the results of the test.

If your results on the diagnostic test indicate that you would benefit by improving your mathematical skills, you are recommended to purchase a copy of the notes prepared for this purpose, entitled "Preparing for University Mathematics." The notes are available at the Bookstore. There are two methods by which you could use these notes to improve your mathematical skills and knowledge:

1. Self-study: carefully work through those sections of the notes in which weaknesses have been identified by the diagnostic test.
2. Enroll in the non-credit course **MATH 0500 – Preparing for University Mathematics** ($50 Course Fee): During the course, an instructor from the Department of Mathematics will serve as a tutor, helping you and the other students registered in that section to work your way through the course material.

It is very important to note that in order for either of these options to be of any benefit, students must complete it as thoroughly and as quickly as possible, whether by self-study or tutor-guided study.