MATH 101 - Calculus II

Summer 2017, Sections A01 (CRN: 30517) and A02 (CRN:30518)

Welcome to Math 101: Calculus II. The objective of this course is to acquire more tools from calculus that will be useful in your future careers in math, engineering, economics, physics, or any other science. We want to train you to become competent and confident experts in the art of problem solving. It may seem like there are a lot of formulae to remember, but it is easy to do if you **understand** how they work, and have sufficient practice in applying them. Thank you, and we wish you a productive and rewarding term.

Instructor

Lecturer: Laura Teshima   **Office:** DTB A557   **Email:** LTeshima@uvic.ca
Office Hours: As posted on CourseSpaces or by appointment

Course Information

Lectures: MWR 2:30pm - 3:20pm, in DTB A120 (May 1 - July 28)

Prerequisites: Math 100

Course Material and Online Resources

Textbook *Thomas' Calculus Early Transcendentals, 13th Edition*, Weir and Hass, published by Pearson/Prentice Hall, accompanied by **MyMathLab** (MML) on line course (required), which also includes the Student's Solution Manual. The cost of the textbook and MML packaged together at the UVic bookstore is about $195. The MML stand alone code comes with e-book form of the textbook, and costs about $100. If you already have the 12th edition of this textbook, you can use it, however, you must obtain the MML access code separately. **If you have purchased the MML access code for Math 100 less than 15 month ago, it still works and can be used in Math 101, and Math 200**.

Instructor's Solution Manual contains full solutions to almost all problems in the textbook, even and odd. Copies of the manual are available in the Math and Stats Assistance Centres.

Calculator: Only the Sharp EL-510R, RN, or RNB hand calculator is permitted during quizzes and tests in this course. It may be purchased at the UVic Bookstore or elsewhere for about $13.

Course web page Go to http://coursespaces.uvic.ca and sign in with your Netlink ID. The site for the course is called 201705 MATH 101 A01 (30517). All course announcements, including your grades and instructions for the exams (midterms and final), will be posted there. You will need to check the site regularly. Make sure your email address is updated on CourseSpaces, as any email announcements will be sent through it.

Computer Facilities: Locations and operating hours of on campus Computer Facilities are available here http://www.uvic.ca/systems/facilities

Learning Objectives

By the end of the semester, you will have learned many integration techniques, but being able **to perform each individual technique** is not enough to successfully complete this course. It is also crucial to learn how to determine **when to use each technique**. You will learn several applications of the integral by finding volume of solids, arc-length of curves, and solving exponential growth and decay problems. In this course, we will learn about infinite sequences and series (which is an infinite list of numbers and an infinite sum of numbers). We will learn what it means for these things to converge and diverge, and we will learn a variety of tests to check this. Again, much like integration techniques, we will learn these tests separately but the main goal is to learn when it is appropriate to apply each test. Our final unit of the course will be looking at parametric equations. This is something that helps model a large variety of scenarios we encounter in many of the sciences. We will learn what these equations look like and how to do some familiar calculus with these types of equations. This course consists of:

- various integration methods (substitution method, integration by parts, trigonometric substitution, partial fractions, integral tables);
- two types of improper integrals;
- method for solving separable first-order differential equations;
- methods of using integrals to find volumes of solids;
- methods to find arc length of a curve (in rectangular and polar coordinates, and of parametric curve);
- methods of using integrals to find inclosed areas (in regrangular, and polar coordinates, and using parametric curves);
- methods to determine whether or not an infinite sequence of real numbers converges;
- various convergence tests for infinite series to determine its convergence or divergence (partial sums, geometric series, n^{th} term divergence test, integral test, p-series, comparison and limit comparison tests, absolute convergence test, ratio and root tests, alternating series test);
- methods for finding a sum of some converging infinite series;
- tests for alternating series to determine absolute convergence, conditional convergence, or divergence;
- method for determining the radius and interval of convergence of a power series;
- Taylor, Maclaurin and Binomial series;
- methods to represent functions using power series, and how to utilize the representation to solve problems using these representations;
- basic algebraic operation with complex numbers;
- geometric interpretation of complex numbers;
- methods of finding the nth power and n^{th} roots of complex numbers;
- calculus of parametric curves;
- graphs of polar coordinate equations, and analysis of the curves.

Assistance Outside of Office Hours

Math & Stats AC: The Mathematics & Statistics Assistance Centre is a large space where students can work, on their own or in groups, and obtain help with math and stats problems. The Centre is staffed with talented Teaching Assistants who are happy to assist with primarily first and second year course material with you. Please see `http://www.math.uvic.ca/~msassist/index.html` for more information.

Email: Due to the large number of students that I teach, it is often impossible to answer every email quickly. For this reason, if you use email to make an appointment with me, please give me at least 24 hours to reply. Moreover, as it is very hard to use email to explain technical questions, please use my office hours or Math and Stats Assistance Centre for such questions.

SUMS: Students in Undergraduate Mathematics and Statistics (SUMS) is UVic's student-run math and stats club. They host events, both academically focused (such as undergrad-level talks by members of the department) and more socially focused (bowling, math movie night, etc). Please see `http://www.uvic.ca/science/math-statistics/current-students/undergraduate/sums/index.php` for more information.

Evaluation and Grading

Components	Dates	Note	Weights
Take-home MML Quizzes	Most Weeks	Best 7 of 9	$7 \times 1\% = 7\%$
Tutorial Assessment	Most Tutorials	Best 6 of 7	$6 \times 0.5\% = 3\%$
Pretest (Math 100 Review)	Tuesday May 9	In Tutorial	3 %
Midterm 1	Tuesday May 23	In Tutorial	14%
Midterm 2	Tuesday June 20	In Tutorial	14%
Midterm 3	Tuesday July 18	In Tutorial	14%
Final Examination	TBA		45%

MML Homework In each non-midterm week you will have a collection of homework questions posted on MyMathLab that relates to material recently covered in class. This work is not for marks, but **you must receive a minimum grade of 65% on the homework** before you will be given access to the corresponding online take-home quiz (which is for marks). The **suggested problems** are indicated in the table at the end of this course outline. They will not be collected or marked, but solving them is necessary preparation for the upcoming quizzes, midterm exams, and final examination.

MML Quizzes: The online MyMathLab quiz will consist of a small number questions (30 minutes) testing similar topics and of the same difficulty level as the set of homework problems, and is to be completed at home before the posted due date. **You are expected to complete the quiz on your own without any outside assistance.**

Pretest: During the first tutorial, you will complete a 40-minute pretest worth 3% of your final grade. The pretest will cover review topics from Math 100, focussing on techniques for solving limits, derivatives, and integrals.

Tutorials: Tutorials begin the second week of classes (Tuesday May 9). During weeks without a pretest or midterm, tutorial practice problems will be posted to CourseSpaces a few days in advance for you to study. It is expected that you attempt most of the problems before Tuesday. At the end of the corresponding tutorial, a short (5 minute) tutorial assessment quiz will be given on the material.

Students registered in Pathways (Section A02) will attend a second tutorial on Thursdays.

Midterm Tests: There are three 50-minute midterm tests given in tutorial. Each test is worth 14%. **Regardless of the reason, there will be no make-up midterm tests**. If you miss a midterm test due to illness, accident, or family affliction, you must notify your instructor upon returning to classes, and provide a written request to be excused as well as supporting documentation. In such cases, the 14% for this midterm test will be proportionally redistributed among all other grade items. If you miss two midterms, you will need to meet with your instructor to discuss your course reweighting. A student missing all three midterms cannot pass this course.

Final Exam: The 3-hour final examination will be scheduled by Records to occur during the Final Examination Period (Aug 8 - 18, 2017).

Off-schedule final examinations (i.e., deferred examinations) are given only in accordance with the university policy as outlined in the Calendar. If you are unable to write a final examination due to illness, accident or family affliction, please refer to the following webpages for detailed instructions how to proceed: `http://web.uvic.ca/calendar2017-05/undergrad/info/regulations/exams.html`, and `http://web.uvic.ca/calendar2017-05/undergrad/info/regulations/concessions.html`.

Students are **strongly advised not to make plans for travel or employment during the final examination period** as special arrangements will not be made for examinations that conflict with such plans.

Grading: Percentage scores will be converted to letter grades according to the university-wide standard table (`http://web.uvic.ca/calendar2017-05/undergrad/info/regulations/grading.html`).

Supplemental Examinations: The Department of Mathematics and Statistics does not award 'E' grades or offer Supplemental Examinations in any of its courses.

Once marked, tests, quizzes and homework will be returned in class, or can be claimed during office hours. Any term work that is not collected by the end of final examinations will be recycled. If you have a question or concern about your mark on a test or assignment, you must bring it to your instructor's attention within 7 calendar days of the date when it was returned in class.

How to Succeed in this Course

- Spend a few minutes looking over the text for the upcoming lesson. If you do this, the new concepts will make sense quicker, and stay on in your memory longer, since in class discussion would be your second time seeing at this material.

- Accept that cramming does not work in Calculus II. There are too many new methods, and newly derived formulaes to simply memorize them before the tests. Students often comment that they know all the methods introduced in the course, but unable to recognize which of those methods will work for a particular type of question. This level of expertize comes only with sufficient practice. So, plan ahead!

- Create a **study group** if you prefer to discuss your analysis of exercises with someone. We encourage you to complete the tutorial problems and MML Homework problems together.

- Learn to **justify every conclusion you make** using a definition, theorem, or property. A correct answer without proper justification does not count on exams.

- Use the **MyMathLab Study Plan**. The Study Plan adapts to your needs. If you are struggling with a topic, do the problems suggested there. When you're feeling more confident, take the practice quiz offered there - you can repeat it as many times as you like without penalty.

- Keep a dedicated **notebook/binder** for your Math 101 practice problem work. This will help you to review your work, and makes it easier for your instructor or TA to help you with exercises you have found difficult.

- **Visit CourseSpaces often.** All course notifications will be posted to CourseSpaces. A series of student forums are also available for asking administrative and technical calculus questions. We strongly encourage you to both ask and answer questions! Your grades for quizzes, midterms, and tutorials will be posted to CourseSpaces; make sure to check them frequently to track your progress.

- **Visit your instructor in office hours.** I would be very happy to see you! Bring practice problems that you have struggled with or a specific topic that you find challenging - or just stop in to say 'hello'.

- Use appropriate strategies for in-class learning, for solving homework questions on your own, for preparing for tests, and for taking tests. Here are recommendations:
  1) `https://blueollie.wordpress.com/2008/12/13/how-to-succeed-in-calculus-class-and-why-it-is-worth-it/`

  2) `http://campus.murraystate.edu/academic/faculty/divansic/03spring/308tips.html`

Course Survey

We value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to us regarding the course and our teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to `http://ces.uvic.ca`. You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. We will remind you nearer the time, but please be thinking about this important activity during the course.

Policies and Ethics

The UVic Math and Stats Department Course Policy Statement can be found here:
`http://www.uvic.ca/science/math-statistics/current-students/undergraduate/course-policies/index.php`

Academic Integrity: Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offenses.
The responsibility of the institution
Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects.
The responsibility of the student
Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the students transcript, or a suspension.
It is your responsibility to understand the University's policy on academic integrity:
`http://web.uvic.ca/calendar2017-05/undergrad/info/regulations/academic-integrity.html`

Accessibility: Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach your instructor and/or the Resource Centre for Students with a Disability (RCSD) as soon as possible. The RCSD staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations `http://rcsd.uvic.ca/`. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Attendance: The university Calendar states 'Students are expected to attend all classes in which they are enrolled.'. Our courses are conducted on that basis. If you miss an announcement (information concerning midterms, corrections to assignment, etc.) because you did not attend class, you must accept the consequences of not having learned of the change (see `http://web.uvic.ca/calendar2017-05/undergrad/info/regulations/attendance.html`).

Commitment to Inclusivity and Diversity: The University of Victoria is committed to promoting, providing and protecting a positive, supportive and safe learning and working environment for all its members.

Guidelines on Religious Observances: Where classes or examinations are scheduled on the holy days of a religion, students may notify their instructors, at least two weeks in advance, of their intention to observe the holy day(s) by absenting themselves from classes or examinations. Instructors will provide reasonable opportunities for such students to make up work or missed examinations.

Recordings: Audio and/or video recording is not permitted during lectures and tutorials without the express consent of the instructor/TA.

Important administrative dates in Summer 2017

Last day for adding courses: Saturday May 13.
Last day for withdrawing from courses with 100% fee reduction: Saturday May 13
Last day for withdrawing from courses with 50% fee reduction: Saturday June 3.
Last day for withdrawing from courses without penalty of failure: Wednesday June 28.
Reading Break: July 3-4.
Last day of lectures: Friday July 28.
Examination period: August 8-18.

Suggested Problems

Section	Thirteenth Edition
6.1 Volumes Using Cross Sections	1-53 odd, 55, 56, 59, 63
6.2 Volume Using Cylindrical Shells	1-37 odd, 39-44 all, 46, 47
6.3 Arc Length	1-13 odd, 15(a,b only)-21(a,b only) odd, 23, 25-28 all, 35
7.1 The Logarithm Defined as an Integral	1-51 odd, 53-56 all, 70
7.2 Exponential Change and Separable Differential Equations	1-49 odd
7.3 Hyperbolic Functions	1-81 odd, 82, 84-86 all
8.1 Using Basic Integration Formulas	1-39 odd, 41-44 all, 47-50 all
8.2 Integration by Parts	1-57 odd, 59(a-c), 63-77 odd
8.3 Trigonometric Integrals	1-71 odd
8.4 Trigonometric Substitutions	1-53 odd, 55(a), 57
8.5 Integration of Rational Functions by Partial Fractions	1-55 odd
8.8 Improper Integrals (no Computer Algebra Systems)	1-73 odd, 66
10.1 Infinite Sequences	1-101 odd, 104, 107, 111-123 odd
10.2 Infinite Series	1-79 odd, 81-86 all, 89, 91-93 all
10.3 The Integral Test (no Error Estimation)	1-41 odd, 43(a), 47, 48, 53-57 odd, 61
10.4 Comparison Tests	1-53 odd, 57, 59-62 all, 65-70 all
10.5 Absolute Convergence; The Ratio and Root Tests	1-65 odd
10.6 Alternating Series and Conditional Convergence (no Error Est.)	1-47 odd, 59, 62-65 all
10.7 Power Series	1-47 odd, 49-58 all,
10.8 Taylor and Maclaurin Series	1-35 odd, 37, 38
10.9 Convergence of Taylor Series (No Remainders)	1-33 odd, 43, 44
Appendix 7 Complex Numbers	see page AP-34, exercises 1-23 odd, 26, 28, 29
10.10 The Binomial Series and Applications of Taylor Series	1-13 odd, 29-53 odd, 56, 58, 59, 60(a), 61, 62, 66, 67-73 odd
11.1 Parameterizations of Plane Curves	1-33 odd, 34, 38, 39
11.2 Calculus with Parametric Curves (No Areas of Surfaces of Rev.)	1-29 odd, 41-44 all
11.3 Polar Coordinates	1-67 odd
11.4 Graphing Polar Coordinate Equations	1-27 odd
11.5 Areas & Length in Polar Coord. (No Length of Polar Curves)	1-19 odd, 31

Course Schedule (subject to change)

Week	Dates	Topics	HW Quiz / Midterm Notes
1	May 1-5	Review: Antiderivatives Sections 8.1: Basic Integration Formulas Review: Inverse Trig Functions	No tutorials this week
2	May 8-12	Sections 7.3: Hyperbolic Functions Sections 8.2: Integration by parts	MML HW & Quiz #1 Pretest (in tutorial), Tuesday May 9
3	May 15-19	Sections 8.3: Trig Integrals Sections 8.4: Trig substitutions	MML HW & Quiz #2
4	May 22-26	Sections 8.5: Partial Fractions Sections 8.8: Improper Integrals	Midterm #1 (in tutorial), Tuesday May 23
5	May 29-June 2	Sections 6.1: Volume; Cross-Sections Sections 6.2: Volume; Cylindrical Shells	MML HW & Quiz #3
6	June 5 - 9	Sections 6.3: Arc-length Sections 7.1: Logarithms & Exponents Sections 7.2: Exponential Change	MML HW & Quiz #4
7	June 12-16	Appendix 7: Complex Numbers Sections 10.1: Infinite Sequences	MML HW & Quiz #5
8	June 19-23	Sections 10.2: Infinite Series Sections 10.3: Integral Test	Midterm #2 (in tutorial), Tuesday June 20
9	June 26-June 30	Sections 10.4: Comparison Tests Sections 10.5: Ratio and Root Tests Sections 10.6: Alternating Series Test	MML HW & Quiz #6
10	July 3-7	Sections 10.7: Power Series Sections 10.8: Taylor / Maclaurin Series	MML HW & Quiz #7 No tutorial July 4 No tutorial July 4
11	July 10-14	Sections 10.9: Convergence of Taylor Series Sections 10.10: Binomial Series	MML HW & Quiz #8
12	July 17-21	Sections 11.1: Parametric Equations Sections 11.2: Calc. & Parametric Curves Sections 11.3: Polar Coordinates	Midterm #3 (in tutorial), Tuesday July 18
13	July 24-28	Sections 11.4: Graphing Polar Coords. Sections 11.5: Area Between Polar Coords.	MML HW & Quiz #9