Mathematics 1120H – Calculus II: Integrals and Series

Trent University, Winter 2020   *[In Peterborough!]*

Instructor   **Department of Mathematics**

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Prerequisite: MATH 1110H – Calculus I: Limits, Derivatives, and Integrals

Text:

    Single Variable Calculus (Early Transcendentals), by David Guichard, 2019, licensed under the Creative Commons BY-NC-SA License. May be downloaded for free from: `communitycalculus.org`

Meetings

Lectures: Wednesday 16:00-16:50 and Thursday 16:00-17:50 in SC 137.
Seminars: Tuesday 08:00-08:50 (W01) in ENW 103, 09:00-09:50 (W04) in ENW 106, 10:00-10:50 (W03) in ENW 108, 12:00-12:50 (W02) in ENW 103, and 18:00-18:50 (W05) in ENW 106. (Note that "ENW" labels the rooms formerly designated "GCS", not that the timetable seems to have caught up.)

    Times and locations may change. For up-to-date information, please consult the Academic Timetable at: `www.trentu.ca/registrar/academic-timetable/undergraduate-timetable-0`

Marking Scheme

    There will be at least nine quizzes, at least six assignments, a test, and a final examination. These will weigh as follows in the final mark:

Best 8 quizzes (3.5% each)	28%	Test	15%
Best 5 assignments (5% each)	25%	Final examination	32%

Please note that work worth at least 25% of the course should be completed, marked, and returned by the final date (Friday, 8 March) to withdraw from the course without academic penalty. Students who miss the test or more than one quiz for reasons beyond their control should contact the instructor as soon as possible to arrange to write a make-up. Assignments will not normally be accepted after the due date; students unable to hand in the assignments in time for reasons beyond their control should contact the instructor as soon as possible. Note that there is no attendance requirement *per se*, but the consequences of missing classes are ultimately the students' responsibility to deal with.

    This scheme may be modified for individual students in exceptional circumstances, such as a lengthy absence due to illness. Any such modification will require the agreement of both the student and the instructor.

Content & Learning Outcomes

    MATH 1120H is an introduction to concepts and techniques of single-variable integral calculus and series, with some applications to other areas of mathematics and science. Upon successful completion of this course, a student should be able to:

1. Compute definite and indefinite integrals of many functions using various substitutions, integration by parts, and/or partial fractions.
2. Identify and evaluate improper integrals.
3. Use integrals to compute the arc-length of curves, the areas of surfaces of revolution, and centres of mass of various objects.
4. Compute limits of sequences, using both direct (*e.g.* algebraic) and indirect (*e.g.* squeeze-play) methods.
5. Use various tests to determine whether a given series converges or not, and be able to compute the sum of some (*e.g.* geometric series).
6. Use various tests to determine the radius and interval of convergence of a power series.
7. Use Taylor's formula to find the Taylor series of a function at a point, and be able to use a remainder term to estimate how close a Taylor polynomial is to the original function.

8. Have sufficient abstract conceptual understanding of continuity, derivatives, integrals, and antiderivatives to can understand the main ideas in the proofs of some of the results and techniques used in the course (*e.g.* the Comparison and Ratio Tests), and the statements of various others well enough to use them (*e.g.* term-by-term differentiation and integration of Taylor series inside the radius of convergence).

Schedule

In terms of content, this schedule should be taken with a grain of salt: no lesson plan survives contact with students unchanged. We will speed up or slow down, and perhaps rearrange some material, depending on how things go. Please note that while we will not fully cover the content of every chapter, we will from time to time cover bits of material that is not in the textbook. In addition, some assignments may involve using `Maple` or similar software.

Weeks 1 & 2. *(6-17 January)* Chapters 7 & 8: Definite and indefinite integrals, properties of integrals, techniques of integration. Quiz #1 written and Assignment # 1 due on Thursday, 16 January.

Weeks 3 & 4. *(20-31 January)* Chapter 8: More techniques of integration, improper integrals (§9.7). Quiz #2 written on Thursday, 23 January; Quiz #3 written and Assignment #2 due on Thursday, 30 January.

Weeks 5 & 6. *(3-14 February)* Chapter 9: Applications of integration to areas, volumes, and centers of mass. Quiz #4 written on Thursday, 6 February; Quiz #5 written and and Assignment #3 due on Thursday, 13 February.

Reading Week. (17-21 February) Enjoy! *University closed for Family Day on Monday, 17 February.*

Weeks 7 & 8. *(24 February – 6 March)* Chapters 9 & 11: Applications of integration to arc lengths and surface areas. Sequences and series, convergence tests. Test written on Thursday, 27 February; Quiz #6 written and Assignment #4 due on Thursday, 5 March. *The last date to drop this course without academic penalty is Friday, 6 March.*

Weeks 9 & 10. *(9-20 March)* Chapter 11: More convergence tests, power series. Quiz #7 written on Thursday, 12 March; Quiz #8 written and Assignment #5 due on Thursday, 19 March.

Weeks 11 & 12. *(23 March – 3 April)* Chapter 11: Calculus with power series, Taylor series. Quiz #9 written on Thursday, 26 March; (possible) Quiz #10 written and Assignment #6 due on Thursday, 2 April. *Classes end on Friday, 3 April.*

Examination period. *(6-22 April)* The final exam will written at a time and location to be determined. *University closed for Good Friday on Friday, 10 April*

Academic Integrity

Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from failure on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent Universitys Academic Integrity Policy. You have a responsibility to educate yourself unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trents Academic Integrity website to learn more: `www.trentu.ca/academicintegrity` .

For clarity, the following guidelines will apply in MATH 1120H:

You are permitted and encouraged to work with others and ask anyone willing (especially the instructor!) for explanations, hints, and suggestions on the assignments, and to consult whatever sources you wish. However, **all work submitted for credit must be written up entirely by yourself, giving due credit to all relevant sources of help and information. For the quizzes, test, and final exam, you may not give or receive any help**, nor use any aids except for a calculator (any that you like) and one letter- or A4-sized aid sheet with whatever you want on (all sides!) of it, except with the instructor's express permission.

Access to Instruction

It is Trent University's intent to create an inclusive learning environment. If a student has a disability and documentation from a regulated health care practitioner and feels that he/she may need accommodations to succeed in a course, the student should contact the Student Accessibility Services Office (SAS) at the respective campus as soon as possible.

Web page

This course will make minimal use Blackboard. A web page at `euclid.trentu.ca/math/sb/1120H/` will have hopefully-up-to-date information and all handouts. *Last modified 2020.01.02.*