

Mathematics 1120H – Calculus II: Integrals and Series

TRENT UNIVERSITY, Summer 2018

[In Peterborough!]

Instructor

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

Text: *Single Variable Calculus* (Early Transcendentals), by David Guichard, licensed under the Creative Commons Attribution-NonCommercial-ShareAlike License. May be downloaded for free from:

<http://communitycalculus.org>

Meetings

Mondays and Wednesdays 13:00-15:50 in GCS 110. We will usually employ the first 30–40 minutes for tutorial time and to write the quizzes, and the remainder of the time for lectures.

Marking Scheme

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

Best 8 quizzes (4% each)	32%	Test	15%
Best 4 assignments (5% each)	20%	Final examination	33%

Please note that work worth at least 25% of the course should be completed, marked, and returned by the final date (Thursday, 12 July) 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 particular, some assignments will likely involve using Maple or similar software to plot functions and solve calculus problems.

Week 1. (18-22 June) Chapters 7 & 8: Definite and indefinite integrals, properties of integrals, techniques of integration. Quiz #1 on Wednesday, 20 June.

Week 2. (25-29 June) Chapter 8: More techniques of integration, improper integrals (§9.7). Quiz #2 written and Assignment #1 due on Monday, 25 June; Quiz #3 written on Wednesday, 27 June.

Week 3. (2-6 July) *University closed on Monday, 2 July [Canada Day]*. Chapter 9: Applications of integration to areas, volumes, and centers of mass. Quiz #4 written and Assignment #2 due on Wednesday, 4 July.

Week 4. (9-13 July) Chapters 9 & 11: Applications of integration to arc lengths and surface areas. Sequences and series, convergence tests. Test written on Monday, 9 July; Quiz #5 written and Assignment #3 due on Wednesday, 11 July. *The last date to drop this course without academic penalty is Thursday, 12 July.*

Week 5. (16-20 July) Chapter 11: More convergence tests, power series. Quiz #7 written on Monday, 16 July; Quiz #8 written and Assignment #4 due on Wednesday, 18 July.

Week 6. (23-27 July) Chapter 11: Calculus with power series, Taylor series. Quiz #9 written on Monday, 23 July; Quiz #10 written and Assignment #5 due on Wednesday, 25 July. *Classes end on Thursday, 26 July.*

Examination period. (27-30 July) The final exam will be written at a time and location to be determined.

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 University's Academic Integrity Policy. You have a responsibility to educate yourself unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trent's 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 at most minimal use Blackboard, and perhaps none at all. A web page at euclid.trentu.ca/math/sb/1120H/ will have hopefully-up-to-date information and all handouts.

Last modified 2018.04.03.