

Mathematics 1120H – Calculus II: Integrals and Series

TRENT UNIVERSITY, Summer 2021 (S62) [Last modified 2021-04-14.]

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. Download it for free from: <http://communitycalculus.org> (There will also be a local copy on Blackboard.)

Delivery

The course will run during the second six-week summer session (S62), 16 June – 27 July. We will only use the first hour of the three-hour blocks set aside for lectures in the timetable, for live Zoom seminars 13:00–14:00 on Tuesdays and Thursdays. Pre-recorded lectures will be posted in the Course Content section of the course Blackboard site, usually on Monday, Wednesday, and Friday mornings. Zoom office hours will be held at times to be determined.

Marking Scheme

There will be at least six twenty four hour quizzes (mostly on Wednesdays), at least five assignments (due Fridays), and a take-home final examination, all via the Assignments module on Blackboard, with email as a backup. These will weigh as follows in the final mark:

Best 5 do-at-home quizzes (6% each)	30%
Best 4 assignments (10% each)	40%
Do-at-home final examination	30%

Please note that work worth at least 25% of the course should be marked and returned by the final date (Monday, 12 July) to withdraw from the course without academic penalty. Students unable to complete quizzes or assignments in time should contact the instructor as soon as possible.

This scheme may be modified for individual students in *exceptional* circumstances. 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 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. 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 occasionally cover material that is not in the textbook.

Week 0. (16–18 June) Chapters 7 & 8: Definite and indefinite integrals, basic properties of integrals, techniques of integration. *Classes begin on Wednesday, 16 June.*

Week 1. (21–25 June) Chapter 8: Techniques of integration. Quiz #1 written on Wednesday, 23 June; Assignment #1 due on Friday, 25 June.

Week 2. (28 June – 2 July) Chapter 9: Applications of integration to areas, volumes, and centers of mass. Improper integrals. Quiz #2 written on Wednesday, 30 June; Assignment #2 due on Friday, 2 July. *University closed on Canada Day, Thursday, 1 July.*

Week 3. (5–9 July) Chapters 9 & 11: Applications of integration to arc lengths and surface areas. Sequences and series, convergence tests. Quiz #3 written on Wednesday, 7 July; Assignment #3 due on Friday, 9 July.

Week 4. (12–16 July) Chapter 11: More convergence tests. Quiz #4 written on Wednesday, 14 July; Assignment #4 due on Friday, 16 July. *The last day to withdraw from S62 courses is Monday, 12 July.*

Week 5. (19–23 July) Chapter 11: Power series, Taylor series. Quiz #5 written on Wednesday, 21 July; Assignment #5 due on Friday, 23 July.

Week 6. (26–27 July) Chapter 11: Taylor series. Quiz #6 written on Tuesday, 27 July. *Classes end on Tuesday, 27 July.*

Examination period. (28–31 July) The final exam will be posted at noon on Wednesday, 28 July, and be due by noon on Saturday, 31 July.

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 and final exam, you are permitted to use your textbook and all other course material, but you may not use any other sources or aids, nor give or receive any help**, except to ask the instructor to clarify questions and to use a calculator (any that you like), unless you have 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.

Stefan's Calculus Archive Page

... is at <http://euclid.trentu.ca/math/sb/calculus/> and has links to quizzes, assignments, tests, and exams, many with solutions, from past iterations of MATH 1120H and other first-year calculus courses.