

CALCULUS 1000A 650 - CALCULUS I

COURSE OUTLINE

SUMMER 2022

1. COURSE INFORMATION

Instructor:	Sergio Zapata	Delivery Mode:	Online
Email:	szapatac@uwo.ca	Class Day/Time:	Asynchronous
Office Hours:	MTuWThF (hour TBA)	Lab Location:	NA
Office Location:	MC 286	Prerequisites:	MCV4U or Math 0110
Term:	Summer 2022	Antirequisites:	Calc 1500, Calc 1100, AM 1413

2. COURSE DESCRIPTION

The introduction of the coordinate plane by Descartes established a bridge between geometry and algebra, drastically changing the way we viewed mathematics; this provided a framework for the development of calculus. Indeed, the coordinate plane allows us to realize real-world processes geometrically. For instance, if we let y be the price of a stock at a given time x , then we could plot the points (x, y) as x progresses in time, yielding a curve (a geometric object!) in the plane. One can study properties of this curve (with the help of algebra) such as its length, the area enclosed by the curve and the x -axis, the existence of tangent lines to the curve, its behavior when x is very small or large, etc. Surprisingly enough, all of these properties have something meaningful to say in terms of the original problem. For instance, in our example, slopes of tangent lines to the curve tell us how fast the price of the stock is changing over time while the area reveals information about the average price of the stock.

The example above is just one of the many processes which can be modeled as curves in the coordinate plane. This course introduces a set of tools to study these curves. They are grouped into three main categories: limits (behavior of the graph of a curve as x is getting close to a fixed real number a), differentiation (rate of change, tangent lines), and integration (area under a curve, averages).

List of topics covered. Limits and derivatives of exponential, logarithmic, and rational functions. Trigonometric functions and their inverses. The derivatives of the trig functions and their inverses. L'Hospital's rules. The definite integral. Fundamental Theorem of Calculus. Simple substitution. Applications of integration, including areas of regions and volumes of solids of revolution.

Learning Outcomes. Upon successful completion of this course, students will be able to:

- Compute the limits of functions at a point or at infinity using methods of algebra, limit laws, and related concepts.
- Define the notion of continuous function and determine if a given function is continuous using limits or other theorems.
- Explain the role of limits in the definition of derivatives and integrals, and how the ideas of continuity, differentiability, and integrability are related to one another.
- Compute derivatives and integrals of various algebraic, trigonometric, exponential, and logarithmic functions.
- Deduce properties of the graph of a function from its derivatives and apply these concepts to solve optimization problems.
- Apply the idea of the definite integral to compute areas between curves.

Delivery Mode. This course is designed to be delivered in an asynchronous format. This means that the main content of the course will be released weekly in the form of videos and notes on the course OWL site (<https://owl.uwo.ca>). Students should make a serious effort to understand all course material, read the textbook, watch the videos, and do the assigned homework each week.

If you need assistance with the course OWL site, you can seek support on the OWL Help page. Alternatively, you can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

What is expected of the student?

- Students must assume responsibility for staying up to date with course content and for being aware of posted deadlines. As you can see in the table below, there is a lot covered in this course. Moreover, the topics heavily build one on the other. Therefore, **it is essential that you keep up with the course material and the suggested exercises week by week.**
- Students are expected to demonstrate understanding of all concepts and the ability to apply them in solving problems. Memorization alone will not be enough to be successful in this course.
- Students are expected to seek out help when needed. The course instructor will host drop-in office hours every weekday on Zoom. Additionally, students can get free drop-in assistance through the Virtual Math Help Centre which will host a channel dedicated exclusively to this course. **Students are strongly encouraged to make regular use of these spaces.**

Course Content Schedule*.

Week	Dates	Topic	Book Section
1	May 9 - 15	Introduction and review	1.1, 1.2
2	May 16 - 22	Exponential, trigonometric, and inverse functions	1.3, 1.4, 1.5
3	May 23 - 29	Limits and continuity	2.2, 2.3, 2.4
4	May 30 - Jun 5	Limits at infinity and derivatives	4.6, 3.1, 3.2
5	Jun 6 - 12	Differentiation rules	3.3, 3.5, 3.7
6	Jun 13 - 19	The chain rule, implicit differentiation, and derivatives of exponential and logarithmic functions	3.6, 3.8, 3.9
7	Jun 20 - 26	Related rates, maximum and minimum values, relationship between derivatives and the shape of a function	4.1, 4.3, 4.5
8	Jun 27 - Jul 3	Optimization problems and L'Hospital's rules	4.7, 4.8
9	Jul 4 - 10	Antiderivatives and sigma notation	4.10, 5.1
10	Jul 11 - 17	The definite integral and Fundamental Theorem of Calculus	5.2, 5.3
11	Jul 18 - 24	Integration formulas and substitution	5.4, 5.5, 5.6
12	Jul 25 - 29	Areas between curves and volumes	6.1, 6.2

*The instructor reserves the right to change the course content schedule if he perceives the need. Please check OWL announcements regularly for any changes to this schedule.

Required Textbook. G. Strang and E. Herman, Calculus. Volume 1. Houston, TX: OpenStax College, 2016. This is a free, open-source textbook that you can access at <https://openstax.org/books/calculus-volume-1/pages/1-introduction>.

Optional. Stewart, D. Clegg, and S. Watson, Single variable calculus: early transcendentals, Ninth edition. Boston, MA: Cengage Learning, 2021. This is another text

used for the most versions of Calculus 1000A. While it is not required that you have access to this text, some students may benefit from an additional resource.

Technical Requirements. Gradescope (<https://www.gradescope.ca>) will be used as a grading platform for written work in the course. A free account will be created on your behalf, although you will be required to verify the account and change the password during the first week of class. Details regarding the set-up of your account and the submission requirements for your written work will be posted on OWL. It is the responsibility of the student to ensure their work is submitted in the correct format (PDF or PNG.) Submitting work in an improper format may result in your work not being graded, and this cannot form the basis of a regrade request.

Additionally, students will need:

- a laptop or computer;
- a stable internet connection;
- a working microphone and webcam;
- to have installed recent versions of Chrome AND Firefox browsers, a pdf reader, and Zoom on their computer;
- a device for scanning (either a scanner or an app that can be used in conjunction with your device's camera).

Students without reliable access to YouTube must install an mp4 player on their computer so they may view video lessons. An up-to-date browser like Chrome will likely satisfy this requirement.

3. ASSESSMENT DESCRIPTION

The assessments for this course will be as follows.

Assessment	Format	Weighting	Date
Assignments (equally weighted)	WeBWorK	16%	Weekly (varies)
Quiz*	Online	8%	Tentatively scheduled for Saturday, Jun 11 (time TBA)
Midterm**	Online (Proctortrack)	31%	Tentatively scheduled for Saturday, Jul 2 (time TBA)
Final exam***	Online (Proctortrack)	45%	TBA

* The quiz will be 60 minutes in duration and will cover all material up to and including Section 3.3.

** The midterm will be 120 minutes in duration and will consist of a mixture of short answer and multiple-choice-style questions. **The midterm will cover all material up to and including all of Week 7.** This will be a closed book test.

*** The final exam will be 180 minutes in duration and will consist of a mixture of short answer and multiple-choice-style questions. The final exam will be scheduled by the registrar during the final exam period. **It will cover all the material you learned in the course.** This will be a closed book exam.

Accommodated Evaluations. Missing a quiz, term test, the final exam, or the due date of a submitted homework assessment will result in a grade of zero unless appropriate permission is sought and granted (see section 5). In the case of homework assignments, your mark will be re-weighted to exclude the missed assessment. Likewise, if you miss the quiz (and have appropriate permission), your mark will be re-weighted. In the case of a missed term test, a makeup test will be arranged. If you miss a term test and the corresponding makeup test and have appropriate permission for both, then the final exam will be re-weighted to include the weight of the missed term test.

Proctortrack. Examinations in this course will be conducted using the remote proctoring service, Proctortrack. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data) and the session will be recorded. More information about this remote proctoring service is available in the Online Proctoring Guidelines at <https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf>.

Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. Information about the technical requirements are available at

<https://www.proctortrack.com/tech-requirements>.

Important dates.

Classes begin: May 9, 2022.

Classes end: July 29, 2022.

Exam Period: August 2-5, 2022.

4. COURSE POLICIES

Email policy.

- Any email sent to the instructor must include a properly descriptive subject line that consists of **the course number followed by a very brief phrase that summarizes the subject of your message.**
- For privacy reasons, I will not respond to emails from non-uwo.ca addresses.

- Grades are final, non-negotiable and will not be discussed, in any case, via email.
- Provided you follow the email policy, you can expect to receive a response to your message within 48 hours. Response times may be longer depending on the volume of emails received. It is your responsibility to ensure you raise your concerns in a timely manner.

Additional policies.

- All students are expected to engage online in a professional and respectful manner. This includes all interactions with peers, as well as communication between TAs or your Professor. Failure to do so will result in academic discipline.
- Course content created by a faculty member is considered the faculty member's intellectual property; it should not be distributed, shared in any public domain, or sold by a student or other third party without prior written consent of the faculty member.

5. STUDENT ABSENCES

Academic Consideration for Student Absences. Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

- (1) Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met. To be eligible for a Self-Reported Absence:
 - an absence must be no more than 48 hours
 - the assessments must be worth no more than 30% of the student's final grade
 - no more than two SRAs may be submitted during the Fall/Winter term
- (2) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.
- (3) Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the period covered, unless otherwise instructed in the course outline.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For the policy on Academic Consideration for Student Absences – Undergraduate Students in First Entry Programs, see https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf, and for the Student Medical Certificate (SMC), see http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Religious Accommodation. When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University’s list of recognized religious holidays (updated annually) at <https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

Absences from Final Examinations. If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

6. ACCOMMODATION AND ACCESSIBILITY

Students with disabilities work with Accessible Education (formerly SSD), which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at [Western University Policy on Academic Accommodation for Students with Disabilities](#).

7. ACADEMIC POLICIES

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy, https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf, the centrally administered e-mail account provided to students will be considered the individual’s official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

The use of calculators and other electronic devices during the term tests or final exam is prohibited.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

8. SUPPORT SERVICES

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (<http://www.health.uwo.ca/mentalhealth>) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.