

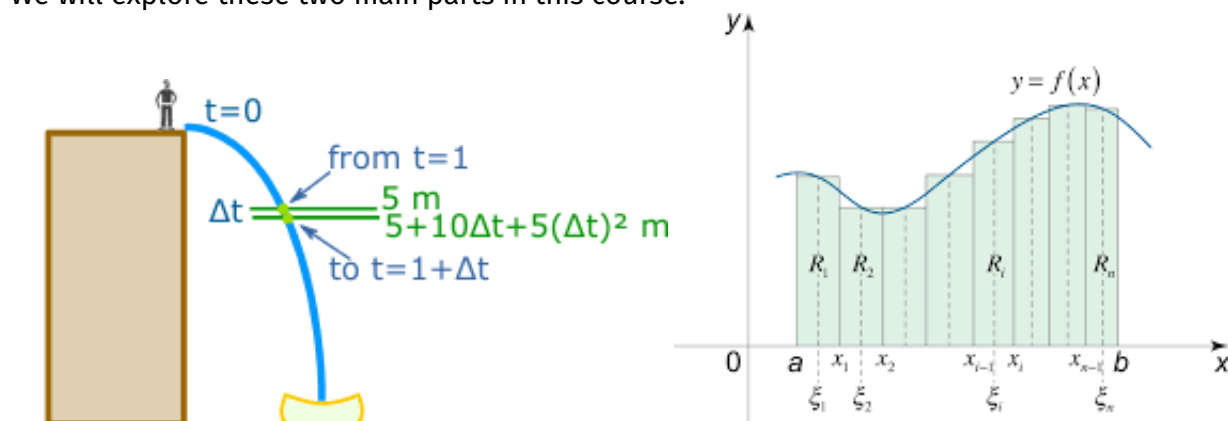
University of Toronto MAT 137Y: Calculus with proofs
Fall 2024– Winter 2025

Syllabus

August 28, 2024

Introduction

Welcome to MAT137! The word “Calculus” comes from Latin meaning “small stones”. We learn and understand Calculus by looking at small pieces. Differential calculus cuts something into small pieces to find how it changes and integral calculus joins the small pieces together to find how much there is. We will explore these two main parts in this course.



We are creating many learning opportunities in this course: office hours, videos, lectures, tutorials, pre-class quizzes, practice problems, Piazza, problem sets, and tests. Take advantage of all of them! We are excited to support your learning experience so talk to us at any time. We wish you a productive and rewarding year.

1 Rights and Expectations

1.1 Rights of the learner

As a student in this course, you have the right:

- to be confused,
- to make a mistake,
- to speak, listen and be heard,
- to enjoy doing mathematics, and
- to feel safe and respected.

1.2 Commitment to the learning community

We respect and appreciate the diversity and individual differences in this course and recognize them as a source of strength. Students in this course are encouraged and expected to speak up and participate during class, and respectfully listen to each other. Any actions that are destructive to the sense of community that we strive to create are not welcome. You have a right to be addressed however you prefer. You are welcome to let the teaching team know your pronouns(s) and/or preferred name at any time. If you experience any form of discrimination, kindly reach out to your TA, the course instructor, or Professor Xiaoyue Cui, who is the course coordinator.

1.3 Course Learning Outcomes

This course has four objectives for your growth and development.

1. Calculus concepts: We want you to become fluent in various concepts in calculus (limits, derivatives, integrals, sequences, and series) and their applications to math and science. This includes learning to compute with them, and learning the most important theorems that deal with them.
2. Mathematical rigour: We will introduce you to mathematical logic. We want to make you comfortable with reading and understanding mathematical statements and precise definitions, and with reading, critiquing, and writing rigorous proofs.
3. Problem solving: In your future career, we would like you to be able to attack new problems that you have never seen before, to figure out by yourself how to adjust old methods to new situations, and to learn how to be confident with your answers. You will achieve this not by memorizing a lot of formulas and methods, but by understanding why they work and by coming up with them by yourself.
4. Academic Integrity: University life requires respecting academic integrity. This includes being honest and fair, honouring the trust that is placed on you, taking responsibility for your actions, and never using others' work as your own. You will uphold these values in this course.

2 Contact

2.1 Teaching Team

You can find a complete list of the teaching team including instructors and TAs on [Quercus](#). Here is a list of instructors.

Section	Instructor	Email
LEC 0101	Xiaoyue Cui (Coordinator)	xiaoyue.cui@utoronto.ca
LEC 0102	Alice Rolf	alice.rolf@mail.utoronto.ca
LECo201	Renato Velozo Ruiz	renato.velozo.ruiz@utoronto.ca
LEC 0202	Tianhao Xian	tianhao.xian@utoronto.ca
LECo301	Simone Coccia	simone.coccia@utoronto.ca
LEC 0401	Luciano Salvetti Martinez	luciano.salvetti@mail.utoronto.ca
LEC 0501	Ismael Sierra Del Rio	ismael.sierra@utoronto.ca
LEC 0601	Boris Khesin	khesin@math.utoronto.ca
LEC 5101	Daniel Calderon Wilches	d.calderon@mail.utoronto.ca

You must email us from your [@mail.utoronto.ca](#) account and you must follow [basic email etiquette](#). Otherwise, your email will be automatically deleted. Email is reserved for administrative questions. **Please include “MAT137” on the subject of any email you send to us.** Please refrain from emailing your TA; their availability is limited, and reading/responding to emails is not within their TA duties. Given the difficulty in effectively communicating mathematics over email, the MAT235 team requests that you do not send detailed math questions over email. Check the following subsection for more details when you have questions or struggles.

2.2 Questions

- **Mathematics:** Post on [Piazza](#), or talk to course material during [office hours](#).
- **Course advice:** Post on [Piazza](#) or email your instructor.
- **Course administration:** First, read this syllabus carefully. Second, search the [announcements](#). Third, read the frequently updated [Policies and FAQ](#) on Quercus. If you have searched these sources and cannot find the answer to your question, then email admin137@math.toronto.edu.
- **Academic Integrity:** Contact our course staff [Wendy Liu](#).
- **Accessibility:** If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom, or course materials, please contact [Accessibility Services](#) as soon as possible.
- **University life:** Please contact your [college registrar](#) for almost any aspect of your university life, especially if you are experiencing any academic, personal, or financial struggles.

2.3 Health and wellness

The [Health and Wellness Center](#) provides a range of services for your physical and mental health, wellness programs, and information to help support you in achieving your personal and academic goals. We encourage you to explore their offerings and build health habits.

If you are searching for immediate and/or ongoing confidential support for any school, health, or general life concern then please call [U of T Telus Health Student Support](#) at 1-844-451-9700 (or 001-416-380-6578 for outside North America). This service is free and available 24 hours a day in many languages. Telus Health Student Support is a new name for MySSP and it is not run by UofT.

The city of Toronto has a mental health resources page: [Toronto Mental Health Resources](#)

3 Course Platforms

- [Quercus](#) is your MAT137 homepage. You are responsible for checking it regularly. We will post on it all official announcements, logistics, deadlines and course materials, including office hours, problem sets, and test information. Grades for pre-class quizzes will be posted on Quercus. However, grades for tutorial worksheets, problem sets and tests can only be viewed on Gradescope; these will not be synced with Quercus. By default, you should get an email every time an announcement is posted, as long as your utoronto email address is correct on Quercus. You can also always read old announcements by logging in. This email should be the same as the one for Quercus (<https://q.utoronto.ca/profile/settings>).
- [Mathmatize](#) is your MAT137 lecture activity software. It is free for you and you don't need to install anything in advance on your laptop or cellphone. You will explore questions collaboratively and get instant feedback. Pre-course module and three computation quizzes will be built in this platform.
- [Piazza](#) is your MAT137 discussion forum. It is free for you. You can use it to meet other MAT137 students, ask questions, discuss problems, make study groups, and in general help each other. Instructors and TAs will moderate the forum.
- [GradeScope](#) is your MAT137 grading and submission software for tutorial worksheets, problem sets and tests. Log in to the **Canadian** server only(www.gradescope.ca). Do not use the .com server. This is the place you will submit your tutorial worksheets and problem sets. Your TAs will also mark all your tutorial worksheets, problems sets and exams here. Your @mail.utoronto.ca account will be automatically signed up for a free account when you are assigned your first problem set. Check more details about [Gradescope FAQ](#) under "Start Here" module of the course page on Quercus. Browse their [help centre](#) for technical support.

4 Resources

4.1 Textbook

There is no official textbook for this course. The videos and practice problems are enough. Nevertheless, those who prefer a traditional textbook, and those who want more examples or a bigger collection of practice problems. You can use:

- "*Calculus in One Dimension*" by Tyler Holden. Volume 1. 2018 updated edition.
- "*Calculus in One Dimension*" by Tyler Holden. Volume 2. 2018 edition. ([errata](#))

Volume 1 2018 updated edition contains many corrections compared to the original edition. You can still use the original one and use the list of [errata](#) to check any potential errors.

The book is a set of lecture notes written by a former MAT137 instructor. It is much cheaper than a regularly published textbook, and it is better suited for us. You may buy it at the UofT bookstore.

Notice that the textbook sometimes may go in more depth, or provide more examples, or emphasize different concepts, so it is a great source to complement videos and lectures when you are confused.

4.2 Practice problems

We will post practice problems of each unit for you to practice. We encourage you to work through them as we cover the sections in class. These are good resources that you can use to prepare your problem sets and tests. You can always visit us during office hour or use Piazza for help. These practice problems won't be turned in.

5 Support

5.1 Office hours

For math-related questions, you are welcome to talk to any of us in-person; you are not restricted only to your lecturer. For our office hours and locations, please check the [office hour calendar](#) on Quercus, as they will likely change. You do not need an appointment to come during our regularly scheduled office hours. If you cannot make any of our office hours, ask us for an appointment by email or by talking to us at the end of a lecture. We are always happy to talk to students!

5.2 Math Learning Center

At the MLC, you can drop-in and:

- Find space to work on problem sets.
- Collaborate with other 137 students.
- Ask math questions to any TA. Certain hours have TAs with 137 expertise.

The MLC serves many different MAT courses and has daily regular hours. Math Learning Centre and other college-specific MLCs can be found [here](#). The MLC also holds online TA office hours in the evenings and weekends. A TA will answer your questions via video chat but you will not need to share audio or video. More details will be posted on the course site.

5.3 Pre-Calculus Review Material

One of the most common reasons for failure in calculus is a weak background in precalculus. To help you with this, please explore [precalculus preparation website](#) which is developed by our math department.

We will not review these material in class. We expect you to review them by yourself and work on the practice problems by the end of the second week of class. **Ignoring this material or letting it go past the second week will make it very difficult to succeed in this course.** You may of course ask any questions to instructors or TAs during office hours. You may also use Piazza to ask other students.

6 The MAT137 Learning Circle

Complete pre-class essentials

Hours/week: 1+

We have short YouTube videos that contain short summaries of the main concepts throughout the course. They are linked from the course page on Quercus. Your instructor will tell you which videos to watch before each lecture. We expect you to watch them before each class and **complete one short pre-class quiz**, so we can start each day doing meaningful practice. This way, we don't have to waste time on copying down definitions or performing rote computations. If there's something you don't understand in the videos, you should ask about it on Piazza before class. Coming to lecture without having watched the corresponding videos and completing the pre-class quiz will be a waste of time. It is recommended to plan ahead and put time for this into your weekly schedule.

Participate in lectures

Hours/week: 3

You have three weekly hours of class. They are called "Lectures" at UofT, but there won't be a lot of actual "lecturing" on the lecture sections (that is what the videos are for!). We will expect you to have watched some short videos and take your own notes before coming. You will spend class time working on difficult, conceptual questions and discussing them with your peers.

Collaborate in tutorials

Hours/week: 1

In addition to lectures, you will have one hour of tutorial per week, on Tuesday or Wednesday or Thursday. Each week we will select a topic that is particularly important or that we know students struggle with, and you will have the opportunity during tutorial to get very useful practice and to get help from a TA in a small setting. You will have a fixed tutorial group which is assigned to you and you will submit your worksheet with your group members. **Notice that you need to enrol (through ACORN or through your registrar) both on a lecture section and on a tutorial section separately by September 16. Tutorials begin the week of September 16th.**

Problem Sets

Hours/week: 3+

The only way to learn mathematics is to practice and receive feedback. To help you with this, there will be **8 problem sets** throughout the year. These are your deep practice and the most fundamental part of this course. You may submit problem sets individually or in groups of two people. You may change your group from problem set to problem set. One of you will need to scan your completed problem sets as pdf files and submit them electronically via Gradescope. For details, see the "Start Here" module under the course page on Quercus.

We will not be including routine computational questions on your problem sets, since you do not need our feedback to become good at these. We will include them in the practice problems, in some tutorials, and certainly in tests. You are responsible for getting enough practice so you can quickly solve such questions on tests without error.

Studying

Hours/week: 2+

After class, you should spend time organizing your notes and coming up with questions you still need answered. Your classmates, TAs, and instructors will be available on Piazza to discuss these problems with you. Also you can use office hours and MLC to get help. We also recommend putting time for studying into your weekly schedule.

You should therefore spend a total of about 10 to 11 hours per week on MAT137. This matches the expectation that full-time university students with 4 to 5 courses will spend about 40 to 55 hours per week on their studies.

7 Assessments

7.1 Pre-Course Module

In this module, you will be introduced the basics of the mathematical proofs. It's built in Mathmatize. You will have multiple attempts with a long time window to complete this module. It's worth 2% of your final grade.

7.2 Pre-Class quizzes

Pre-Class quizzes are low-stake assessments that contain one or two questions that can be done after you watch and understand the pre-class videos. Each quiz will take 5 to 10 minutes. There are a total of at most 70 pre class quizzes (one per lecture hour) on Quercus. Your best 50 quizzes will count towards your final grade.

7.3 Tutorial worksheets

You will have 23 tutorial worksheets that you submit on Gradescope as your group work. These supplement your learning and deepen your understanding in lectures. You should submit your group work each week. Only 17 of 23 will count towards your final grade.

7.4 Computation Quizzes

You will have three computation quizzes built in Mathematize which are targeted to three topics: limits, derivatives and integrals. You will be given multiple attempts with a long time window to complete them. These questions will help you develop your computations skills and better prepare you for the coming tests.

7.5 Problem Sets

You will have 8 problem sets that you submit on Gradescope. Only your best 6 out of 8 will count towards your final grade.

7.6 Term tests

There will be four in-person term tests. **The dates and times are still tentative:**

- Test #1: Friday 11 October 2024, 4:10-6pm
- Test #2: Friday, 29 November 2024, 4:10-6pm
- Test #3: Thursday, 6 February 2025, 4:10-6pm
- Test #4: Thursday, 20 March 2025, 4:10-6pm

A test reflection will be assigned after each term test. This is optional and gives a chance to improve your test performance if you choose to complete it. This will be marked by mastery based grading and you will get some additional points added in your original test scores.

7.7 Final Exam

The three-hour cumulative final exam will be held in April 2025 and is tentatively planned to be held in-person only. Details on the format will be shared mid-semester in winter 2023. The exact date and time will be posted by the Faculty of Arts and Science. We do not permit the use of any type of calculator during term tests or the final exam.

8 Grades

8.1 Marking breakdown

Your course mark will be

- 2% Pre-course Module
- 3% Computation Quizzes
- 5% Tutorial worksheets: Only your best 17 out of 23 will be counted.
- 5% Pre-class quizzes: Only your best 50 out of 70 will be counted.
- 12% Problem sets: Only your best 6 out of 8 will be counted, so each is worth 2%.
- 39% Term tests: Only your best 3 out of 4 will be counted, so each is worth 13%.
- 34% Final exam

8.2 Adjustments and curving

We understand that sometimes things happen (you may have a bad day, you may have multiple tests in a row, perhaps a particular test is a bit easier or a bit harder). That is why we have a generous grading scheme with automatic “adjustment” procedures built into it. This is a way to soften any blow and allow you to recuperate easily from a bad day.

We try to evaluate you in absolute, not relative standards. Your grade should reflect the quality of your work against the learning objectives of the course, not how well you do relative to your peers. If you all do well, there will be a lot more As than usual. If you all do poorly, there will be a lot more Fs than usual. When appropriate, we will round up to nearby letter grades but that is all. A passing grade in MAT137 should mean that you have a chance of completing MAT237, not that you are in a certain percentile of the class. We will not adjust grades just because students do well or bad. So do not ask for any additional adjustments: there will be none.

8.3 Late or missed assessment policies

Students who are absent from class for any reason (e.g., COVID, cold, flu and other illness or injury, family situation) and who require consideration for missed academic work should report their absence through the online absence declaration. The declaration is available on ACORN under the Profile and Setting menu. For more details, please check [The ACORN Absence Declaration Tool](#)

Late submissions will not be accepted for any assessment for any reason at all.

If you miss a pre-class quiz, tutorial worksheet, or problem set then it will be one of the assessments that are dropped according to the policies outlined above.

If you are unable to write any of the term tests for a legitimate reason (e.g. severe illness or emergency), we drop the lowest term test grade for each student and it will be the one we drop for you. There are no accommodations, extensions, or make-up tests for these reasons.

8.4 Conflicts

If you have an academic conflict for one of the tests (for example, a tutorial or a lab for a different course), then we will offer you an alternative time. For this, you will need to let us know at least one week before the date of the test. We will post more information on the Quercus course page.

8.5 Academic Integrity

How much can you collaborate on problem sets?

Discussing exercises with your other classmates is a useful and mathematically healthy practice. You will have the option to submit problem sets individually or with a partner.

If you submit individual work then, when it comes time to write up your solutions for submission, you must present solutions in your own words. To be certain, work together with other classmates in the discovery phase, but do not work together when you are writing your solutions, never share your solutions with your peers, and never have the solution written by a friend in front of you.

If you submit group work then the same rules above apply except you can write solutions with your partner. However, do not “split the tasks”. You must work on all aspects together in both the discovery and writing phase. Both of you should solve problems together and debate the solutions. One of you can write up a draft of a solution but both of you should understand, review, and edit every solution. Doing otherwise amounts to **academic misconduct**, and the penalties are severe.

If in doubt, ask us. You will never get in trouble for asking if a type of collaboration is acceptable.

8.6 Code of Behaviour

You are expected to be familiar with University of Toronto’s Code of Behaviour on Academic Matters, available here.

<https://www.academicintegrity.utoronto.ca>

Not being aware of a rule is not an excuse. If you have questions, please ask us.

The University of Toronto treats cases of academic misconduct very seriously. All suspected cases of academic dishonesty will be investigated following the procedures outlined in the Code. The consequences for academic misconduct can be severe, including a failure in the course and a notation on your transcript. **Every year, students get expelled from the University of Toronto for academic offenses.** Potential offenses include, but are not limited to:

- Using or possessing unauthorized aids during an exam or test
- Looking at someone else’s answers during an exam or test, or showing them your answers
- Misrepresenting your identity
- Using someone else’s ideas or words without appropriate acknowledgement

Please note that a potential penalty for academic dishonesty on the Final Exam is a 0 on the Exam.

Asking a Chegg “tutor” to do your work for you, then trying to pass that work off as your own, is one example of an academic offense. This is true even if you come by the Chegg tutor’s work secondhand.

Furthermore, the penalties for posting test questions on sites like Chegg are much more severe.

The use of generative artificial intelligence (AI) tools is strictly prohibited in all course assessments unless explicitly stated otherwise by the instructor. This includes, but is not limited to, ChatGPT, GitHub Copilot, and open-source models that you have trained and/or deployed yourself. You may not interact with, nor copy, paraphrase, or adapt any content from any generative AI for the purpose of completing assignments in this course. Use of generative AI will be considered use of an unauthorized aid, which is a form of academic misconduct under the Code of Behavior on Academic Matters.

This course policy is designed to promote your learning and intellectual development and to ensure that our evaluations are a fair and accurate assessment of your learning. Though it may be tempting to use generative AI to assist you when completing your assignments, this will simply inhibit your learning.

9 Copyright

There are on-campus and off-campus enterprises out there that offer so-called “course preparation” and that will ask you to provide course material to them, sometimes in exchange for money, sometimes in exchange for “free help”, sometimes without any direct benefit to you. **You must not share the material of this course with such enterprises.** They make a profit selling our intellectual property that we choose to give for free to members of our classes.

The copyright holders hereby **explicitly deny you the right to share the course material** with anyone who is not enrolled in the course. If you choose to do so anyways, **you are acting illegally** and we will not hesitate to initiate legal proceedings against you. Furthermore, depending on what material you share and how you share it, **you might also be committing an academic offense**. In that case, on top of the non-academic prosecution of your offense, you will face academic disciplinary action.

10 Email Policy

1. If you do not email us from your ____@mail.utoronto.ca address, then your email will be ignored.
2. Please put MAT137 in the subject when you send out an email.
3. If you have questions about course policies, please triple-check the syllabus before emailing.
4. Instead of emailing us mathematical questions, please post them on Piazza. This helps us ensure all questions get responses in a timely manner. Additionally, everyone can benefit from the discussion that your post may generate.

11 Topics of the course

Unit 1: Logic, sets, notation, definitions, and proofs
Unit 2: Limits and continuity
Unit 3: Derivatives
Unit 4: Transcendental functions
Unit 5: The Mean Value Theorem and its applications
Unit 6: Applications of limits and derivatives
Unit 7: The definition of integral
Unit 8: The Fundamental Theorem of Calculus
Unit 9: Integration methods
Unit 10: Applications of the integral
Unit 11: Sequences
Unit 12: Improper integrals
Unit 13: Series
Unit 14: Power series and Taylor series

12 Tentative Weekly schedule

All assessments deadlines are tentative.

Week	Date	Sections	Important Assessments
0	Sep. 3-6	1.1,1.2,1.3	
1	Sep. 9-13	1.4-1.13	
2	Sep. 16-20	1.14-2.4	
3	Sep. 23-27	2.5-2.11	Problem Set 1 due Sep. 26 at 11:59pm
4	Sep. 30-Oct. 4	2.12-2.18	
5	Oct.7 -11	2.19-2.22, 3.1-3.3	Term Test 1 on Oct. 11
6	Oct. 15-18	3.4-3.9	Problem Set 2 due Oct. 17 at 11:59pm
7	Oct. 21-25	3.10-3.13,4.1-4.2	
8	Nov. 4-8	4.3-4.14	
9	Nov. 11-15	5.1-5.9	Problem Set 3 due Nov.14 at 11:59pm
10	Nov. 18-22	5.10-5.12,6.1-6.4	
11	Nov. 25-29	6.5-6.14	Term Test 2 on Nov. 29
12	Dec. 2-3	6.15-6.18	Problem Set 4 due Dec. 5 at 11:59pm
13	Jan. 6-10	7.1-7.6	
14	Jan. 13-17	7.7-7.10, 8.1-8.2	
15	Jan. 20-24	8.3-8.7, 9.1-9.3	Problem Set 5 due Jan.23 at 11:59pm
16	Jan. 27-31	9.4-9.12	
17	Feb. 3-7	unit 10, 11.1-11.2	Term Test 3 on Feb.6
18	Feb. 10-14	11.3-11.8	Problem Set 6 due Feb. 13 at 11:59pm
19	Feb. 24-28	12.1-12.10	
20	Mar. 3-8	13.1-13.9	
21	Mar. 10-15	13.10-13.17	Problem Set 7 due Mar. 14 at 11:59pm
22	Mar. 17-22	13.18-13.19, 14.1-14.4	Term Test 4 on Mar.20
23	Mar. 24-28	14.5-14.10	
24	Mar. 31-Apr.4	14.11-14.15	Problem Set 8 due Apr.3 at 11:59pm

Important dates for 2024-2025

- Sep. 3 -Fall classes begin
- Sep. 16 – Last date to add a course, or to add or change a lecture section or tutorial section
- Week of Sep. 16– First MAT137 Tutorial
- Oct. 14 – Thanksgiving holiday (no classes)
- Oct. 28 to Nov.1 – Fall reading week (no classes, tutorials, or office hours)
- Dec. 2 – Fall semester ends
- Dec. 3 – make up day for the missing Monday (Thanksgiving)
- Jan. 6 – Winter semester begins
- Feb. 14 2025 – Last date to drop the Y course without academic penalty.
- Feb.17 to Feb. 21 – Winter reading week
- Apr. 4–Winter semester ends
- Apr.9–Apr.30 Winter final exam period

For more details, please check this link:

<https://www.artsci.utoronto.ca/current/dates-deadlines/academic-dates>

13 Other Academic and Personal Supports

- Writing Centre <https://writing.utoronto.ca/writing-centres/arts-and-science/>
- U of T Libraries <https://onesearch.library.utoronto.ca/>
- Art and Science Academic Advising and Support: <https://www.artsci.utoronto.ca/current/academic-advising-and-support>
- Engineering Academic Advising and Support: <https://undergrad.engineering.utoronto.ca/advising-and-wellness/academic-advising/>
- Feeling Stressed? <https://studentlife.utoronto.ca/task/support-when-you-feel-distressed/>
- College/Faculty Registrars: <https://registrar.utoronto.ca/list-of-faculty-colleges-and-campus-registrar-offices/>
- Academic Success Center: <https://studentlife.utoronto.ca/departments/academic-success/>