Department of Mathematics, University of Toronto
MAT291H1F - Calculus III
Course Administration (Syllabus) - Fall 2023

Brief Course Description

This is the first course in multivariable calculus, covering:

- functions of several variables, graphing techniques, limits, continuity, the directional derivative, and the gradient,
- multiple integrals and the Jacobian,
- line integrals, surface integrals, divergence, and curl of a vector field,
- Divergence theorem and Stokes' theorem in 3d and how they are applied in an application context,
- Green's Flux theorem and Circulation theorem, which are a 2d version of the Divergence theorem and Stokes' theorem respectively.

Students will be required to solve standard computational problems and understand the main concepts, definitions, and the main theorems in each section covered. Developing your ability to think precisely and mathematically is an important objective. The foundations of many courses you will take in your remaining two years are based on the material that we will cover in this course. Your instructors and TAs are available to help online either through Piazza or Office Hours should you encounter any difficulty.

Note: all items marked in black and bolded, except for section headings, relate to issues that could or will impact your grade.

Course Material

The course consists of the following **Mandatory** and **Supplementary** material:

Mandatory:

1. Selected sections from a textbook
2. Reading Assignment 3 (Short)
3. Extracted Lecture notes from Reading Assignments 0,1,2,4, and 5.

Supplementary:

1. Archived Lecture Notes and Lecture Videos
2. Archived Tutorial Notes and Tutorial Videos
3. Extended Reading Assignments (Full Version) and Solutions

Textbook

The main textbook for this course is "Calculus: Early Transcendentals, 3rd Edition" (Chapters 13.5,13.6, 15 (excluding 15.7 and 15.8), Chapter 16 (excluding 16.4 and 16.6) and problems from

Chapter 17 which are embedded in Reading Assignment 4 (Short and Full Version) and the Extracted Notes). A detailed description of the textbook purchase options from the publisher appears at the following link (Purchase of Textbook).

Archived Lecture Notes and Lecture Videos

The archived lecture videos are organized so that the first slide of each lecture indicates:

- where the material has been extracted from
- objectives
- concepts, tooling, and visualization skills that you will be exposed to

The second slide is a summary of the contents of the video. The remaining slides introduce the concepts, but in many cases, the last part of the video (pdf Notes) includes a selection of worked out problems. Many of the problems have been extracted from the textbook.

Class Notes

Class Notes are a guide for each in-person lecture and have been extracted from the Archived Video Lecture notes. The notes contain slides and some recommended problems to work on. The notes should be reviewed, and the problems attempted, after the lecture.

Reading Assignments

There are 5 Reading Assignments (Short) from which **lecture** material has been extracted. The Reading Assignments (Short) have been posted on Quercus and were extracted themselves from an even more extensive set of notes (Extended Reading Assignments (Full Versions)) that are also posted on Quercus for additional reference or curiosity.

- Reading Assignment 0 consolidates the relevant information you learned last year along with some new material. The introductory parts of Reading Assignment 0 are posted in the form of extracted notes and should be reviewed before classes begin.
- Reading Assignments 1 and 2 (Short) add material which is important in Engineering Mathematics but is not covered in the textbook.
- Reading Assignment 3 (Short) is a replacement of Section 16.4 of the textbook, with some modifications. This is the only Reading Assignment that you are responsible for and is assigned in Week 5.
- Reading Assignment 4 (Short) is a direct replacement and reorganization of Section 17 in the textbook.
- Reading Assignment 5 (Short) is focused on applying the Divergence Theorem and Stokes' Theorem to problems of physical interest. There is no textbook that covers this material. The last quiz and two out of six questions on the final exam are based on Reading Assignment 5. 33% of the final exam grade will be based on Reading Assignment 5 so make sure you manage your time appropriately. You will apply the material in Assignment 5 (Short) in the electric and magnetics field course ECE221 next term. Circuits, as taught this term in

ECE212, are a natural extension to the material in this set of notes, which provides the foundation upon which guiding principles of analysis, such as Kirchoff's Voltage and Current laws, are based.

The material in Reading Assignment 4 (Short) and Reading Assignment 5 (Short) will fill in some technical gaps in the textbook and thus give you the information you require in courses taken in the second semester of the second year and the third and fourth years. Notes that you are responsible for have been extracted from these Reading Assignments. You are only responsible for Reading Assignments 3 (Short) and selected sections of Reading Assignment 5 (Short). The Reading Assignments (Short) have been posted on Quercus.

You are responsible for the Class Notes, Class Note solutions, and all Extracted Lecture notes taken from the Reading Assignments. All other content is supplementary and for your own additional information/benefit.

Lecture Schedule and Format

Section	Q&A Time	Instructor	Room	Office Hours
LEC 101	T 10-11 R 10-11 F 10-11	F.P. Dawson dawson@ece.utoronto.ca	MS 3154 MC 252 MC 252	W 12-2 pm online
LEC 102	T 9-10 R 9-10 F 9-10	F.P. Dawson dawson@ece.utoronto.ca	MS 3154 MB 128 MB 128	W 12-2 pm online
LEC 103	M 1-2 T 2-3 R 1-2	Armanpreet Pannu arman.pannu@mail.utoronto.ca	SF 1105 SF 1101 PB B150	Wed 6-7 pm (in person)
LEC 104	T 5-6 R 5-6 F 5-6	Armanpreet Pannu arman.pannu@mail.utoronto.ca	MC 102 MC 102 MC 102	Wed 6-7 pm (in person)

Note: (Please Read)
There will be two additional lecture sections for Section L103:

Friday September 8: 1-2 pm, Rm: SF 1101

Friday October 13: 1-2 pm, Rm SF 1101: to make up for the Thanksgiving holiday.

There will be no lecture for Section 103 on Wednesday December 6.

In any given week, there will be three lectures. The following week there will be tutorials on the material covered the week before. On the Friday there will be a quiz on the material from the previous week. This process is repeated on a weekly basis.

Accessing Course Resources

- The course coordinator is Professor Francis Dawson; his contact email address is dawson@ece.utoronto.ca. The course website can be found on Quercus and will be administered by Armanpreet Pannu. He can be reached at arman.pannu@mail.utoronto.ca. All announcements and handouts will be posted to the website. Please visit the website regularly.
- From time to time, your instructors or TAs may wish to contact you with announcements via email. You are required to maintain a working utoronto.ca or equivalent email address for this course. **It is crucial that your email on ACORN (which appears on Quercus) is a utoronto.ca or equivalent email address**.
- The basic minimum technical requirements needed for students to access remote/online learning tools is available at this link: https://www.viceprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning/.

Piazza Resources

Piazza has been activated for this course and is now available within Quercus. The instructors will and the TAs be monitoring activity and responding to student questions. The Piazza resource is meant as a tool to allow the students to communicate with each other about the problems they are having. You can enroll in Piazza. The class signup link is:

https://piazza.com/utoronto.ca/fall2022/mat291h1flec0101

Note, it is important that when you ask a question that you post the question since many of the tutorial assistants do not have ready access to the textbook. By posting the questions the tutorial assistant can answer your question from a remote location.

Tutorials

The TAs responsible for conducting the tutorial Q&A session are listed as follows:

Tut Sect	Time	Room	TA	Email
01	W 11-12	SF 2202	Richard Perryman	richard.perryman@mail.utoronto.ca
02	W 11-12	GB 221	Timothy Sorochkin	timothy.sorochkin@mail.utoronto.ca
03	W 12-1	HA 403	Yongzhong Li	yongzhong.li@mail.utoronto.ca
04	W 12-1	SF 2202	Amesh Kahloon	amesh.kahloon@utoronto.ca
05	W 12-1	GB 248	Changhao Qin	changhao.qin@mail.utoronto.ca
06	W 12-1	BA 1210	Anustup Das	anustup.das@mail.utoronto.ca
07	W 9-10	SF 3202	Claire Phillips	cla.phillips@mail.utoronto.ca
08	W 9-10	GB 303	Yiyang Fu	yiyang.fu@mail.utoronto.ca

You must attend the Tutorial Q&A Section to which you have been assigned.

Tutorials begin the week of September 11. By and large, the material covered in the tutorials will be based on the assigned homework problems. The tutorial assistants have a schedule of problems

which they are responsible for, as outlined in Table 2 of the Lecture/Quiz Schedule and Assigned Homework Problems Document. Normally we have no issues, however if a tutorial assistant deviates substantially from the schedule, then please email the course coordinator and raise any concerns that you may have. You can contact the course coordinator at the following email address: dawson@ece.utoronto.ca

Tutorial videos are available for some of the assigned problems. Note, the viewing of the tutorial videos is not mandatory although you may find the tutorial videos 10 and 11 useful.

To get the most out of your tutorial you must keep up to date with the homework and come prepared to ask questions.

Quizzes

There will be 10 formal quizzes during the term. We will count the best 9 of your quizzes. All quizzes are Type A and Type 4 examinations. This means that they are closed book examinations with **no aids permitted** and **no calculators**. The quizzes will take place in the rooms below on Fridays from 2-3 PM, based off of the assigned homework problems and quiz schedule in the Lecture/Quiz Schedule and Assigned Homework Problems document.

No make-up quizzes will be offered. We will post a more detailed summary of the quiz questions to expect on the Monday before the quiz is scheduled.

Tut Sect	Time	Room	TA	Email
01	F 2-3	SF 2202	Richard Perryman	richard.perryman@mail.utoronto.ca
02	F 2-3	GB 220	Timothy Sorochkin	timothy.sorochkin@mail.utoronto.ca
03	F 2-3	HA 403	Yongzhong Li	yongzhong.li@mail.utoronto.ca
04	F 2-3	SF 3202	Amesh Kahloon	amesh.kahloon@utoronto.ca
05	F 2-3	GB 248	Changhao Qin	changhao.qin@mail.utoronto.ca
06	F 2-3	BA 1210	Anustup Das	anustup.das@mail.utoronto.ca
07	F 2-3	GB 304	Mahdi Behdani	m.behdani@mail.utoronto.ca
08	F 2-3	GB 303	Yiyang Fu	yiyang.fu@mail.utoronto.ca

The quiz will be given to you on paper. You need to bring paper and a pen or pencil (HB or black) with you. **The quizzes will be scanned so the scanner must detect your writing.** You will be able to view your quiz grade on Gradescope within 1 to 2 weeks after you wrote your quiz. Quiz solutions will be posted on the weekend after the quiz was written.

Marking Scheme

There will be 10 formal quizzes during the term. We will count the best 9 of your quizzes. All quizzes are Type A and Type 4 examinations. This means that they are closed book examinations with **no aids permitted** and **no calculators**. The quizzes will take place synchronously on Fridays from 2-3 PM according to the quiz schedule in Lecture Quiz/Schedule and Assigned Homework Problems.

Your final mark will be calculated as per Table on the next page.

Final Exam Mark Percentage	# Of Quizzes Missed	Total Quiz Mark Percentage
46%	Best 9/10 Quizzes (6% each)	54%
46%	Best 9/9 Quizzes if you miss 1 Quiz	54%
52%	Best 8/8 Quizzes if you miss 2 Quizzes	48%
58%	Best 7/7 Quizzes if you miss 3 Quizzes	42%
64%	Best 6/6 Quizzes if you miss 4 Quizzes	36%

Note: If you miss a quiz because of sickness and have submitted a valid petition, then your final exam will be counted proportionately higher.

Missed Quiz

Students can submit **one term-work petition per term without documentation through the Engineering Portal** under the following restrictions:

- A petition supported by a self-declaration of illness (i.e., without medical documentation) may not cover a period longer than three days.
- Any missed term work valued at 15% or greater will require a signed Verification of Illness (VOI) (VOI) form.
- A student may not self-declare an illness if they miss an exam. All exam petitions require supporting documentation.
- A student may only self-declare their absence once per term. Documentation must be provided for all other petitions submitted within that same term.

The Verification of Illness (VOI) is being re-introduced for all term-work and final exam petitions, except for the one term-work petition without documentation under the guidelines listed above.

Refer to this link:

https://undergrad.engineering.utoronto.ca/petitions/term-work-petitions/

If you do not submit a valid petition for missing a quiz, then you will be assigned a grade of 0 for that quiz. Any concerns regarding the petition process should be discussed with the undergraduate counsellor leanne.dawkins@utoronto.ca.

Regrading Policy

A given quiz will be graded by the same grader, to ensure consistency. The graders for the course are known in advance on Gradescope, however, for your convenience the following table gives you the information briefly:

Quiz	Grader	Email
1	Ali Azizi	ali.azizi@mail.utoronto.ca
2	Yuanzhi Liu	yuanzhi.liu@mail.utoronto.ca
3	Sina Talebi	sina.talebi@mail.utoronto.ca
4	Mahdi Behdani	m.behdani@mail.utoronto.ca
5	Ali Azizi	ali.azizi@mail.utoronto.ca
6	Yuanzhi Liu	yuanzhi.liu@mail.utoronto.ca
7	Sina Talebi	sina.talebi@mail.utoronto.ca
8	Mahdi Dehdani	m.behdani@mail.utoronto.ca
9	Ali Azizi	ali.azizi@mail.utoronto.ca
10A	Claire Phillips	cla.phillips@mail.utoronto.ca
10B	Yiyang Fu	yiyang.fu@mail.utoronto.ca
10C	Yongzhong Li	yongzhong.li@mail.utoronto.ca

Re-grading Procedure

Any given quiz is graded by a single grader to ensure consistency. All questions will be graded using a transparent rubric which can be found on Gradescope along with your quiz results. If you feel that the grader made a mistake or missed some of the work, you may request a regrade request directly on Gradescope. **Regrade requests will open 2 days after your quiz is returned to you and close 5 days after the quiz is returned**. **All regrade requests must be made in this 3-day window.**

To make the regrade request, open Gradescope to your graded quiz and select the question you would like regraded. Then press the "request regrade" button on the bottom left corner. **You must provide a clear and detailed reason for your regrade request.** Your reasoning must specifically reference the Gradescope rubric to justify your request. Please note that we will not respond to frivolous requests. An addition error is an obvious reason for a regrade. All regrade requests will be handled by the grader for that quiz to ensure consistency and fairness. **Please note that regrading may result in your mark being lowered.**

Final Exam

A question-by-question summary of what the final exam will cover will be posted in the last week of term, or not later than the weekend before your scheduled exam. The exam covers some of the material from the textbook, material from Reading Assignment 3, extracted Lecture Notes 17-25D and certain sections of Reading Assignment 5 (Short) which will be stated explicitly during the last week of term. No solutions to prior final exams will be posted. **All programmable calculators will be disallowed (Type 4) and the exam is a closed book exam (Type A). This could change if exams are done online. We will keep you posted in case of any changes.**

University Policies

Notice of Video Recording and Sharing (Download and Re-use Prohibited)

Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor. For questions about recording and the use of videos in which you appear please contact your instructor.

Academic Integrity

- **You must answer quizzes yourself and without assistance from any other person**. Submitting shared work or work that is not your own could leave you liable for a violation of the Code of Behavior on Academic Matters.
- You must **follow the proper petition process if you miss a quiz due to sickness**. Forgery of a medical certificate could leave you liable for a violation of the Code of Behavior on Academic Matters. Any concerns regarding the petition process should be discussed with the undergraduate counsellor leanne.dawkins@utoronto.ca.
- Academic integrity is a serious issue. Please refer to the resources published by the Office of Academic Integrity for more information on academic offences: https://www.academicintegrity.utoronto.ca/perils-and-pitfalls/
- If the instructor has reasonable grounds to believe that you have committed an academic offence, the Office of Academic Integrity provides a general overview of the process you can expect to go through and its key consequences:

https://www.academicintegrity.utoronto.ca/process-and-procedures/
https://www.academicintegrity.utoronto.ca/key-consequences/

Office Hour Format

The instructor and tutorial assistants for the course will hold weekly office hours. The time and locations are listed in the module titled 'Office hour schedule" on Quercus. Office hours will start the week of September 11. Office hours are for generic problems associated with previous material which you had a problem understanding or concepts that you are still struggling with. **Questions related to the assigned problems should be discussed with your TA or posted on Piazza.** We have several TAs including the instructors who will respond to your questions within an hour or so. All office hours are by appointment, and you are welcome to attend office hours for any instructor or TA.

Before the Q&A/office hour sessions, please do the following:

- Try the exercises in the last column of Table 3 of **MAT291 Lecture Schedule and Assigned Problems**

- If you have questions about the problems in Table 3 of **MAT291 Lecture Schedule and Assigned Problems**, please email them **24 hours in advance** to your TA with the subject "MAT291 Q&A question" and they will be answered in the Q&A session.
- If your question is not related to the current tutorial video or material outlined in Table 3 for that week, then please send a question with the heading "MAT291 office hour question" and it will be answered during the office hour. Alternatively, post your question on Piazza.

During an online office hour session:

- Please kindly mute your microphone while you are not talking, especially if your room has a lot of background noise.
- Your TA/instructor may either prepare typed or hand-written notes to answer the questions (which is why it is **critical that you prepare them in advance**). They may also write the answers in real-time or use a combination of real-time writing and prepared notes.
- During the office hours you may take screenshots if you want, but we will not be uploading any notes on Quercus.

Remark requests are NOT handled by your tutorial TA, but by the grading TA. However, if you need some clarification on concepts relating to the solution, we can still address those during office hours.

F. DAWSON'S FALL SCHEDULE

Hour	Monday	Tuesday	Wednesday	Thursday	Friday
9-10	X	MAT291 L102	MAT291 T107 / MAT291 T108	MAT291 L102	MAT291 L102
10-11	X	MAT291 L101	X	MAT291 L101	MAT291 L101
11-12	X	ECE1068 Q&A	MAT291 T101 / MAT291 T102	X	X
12-1	X	X	MAT291 T103,104,105,106 / Office Hour Dawson (online)	X	X
1-2	MAT291 L103	X	Office Hour Dawson (online)	MAT291 L103	X
2-3	X	MAT291 L103	X	X	Quiz when scheduled
3-4	X	X	X	X	X
4-5	X	MAT291 T101 / MAT291 T102	X	X	X
5-6	X	MAT291 L104	X	MAT291 L104	MAT291 L104
6-7	X	X	Office Hour Pannu (in person)	X	X
7-8	X	X	X	X	X
8-9	X	X	X	X	X

X – not available but can be contacted by email.
Professor Dawson will be out of town Sept 15, and Sept 28-Oct 2 inclusive. Zacharie Leger will look after the Lecture sessions in Professor Dawson's absence. There will be two additional lecture sections for Section L103:

- Friday September 8: 1-2 pm, Rm: SF 1101
- Friday October 13: 1-2 pm, Rm: SF 1101 to make up for the Thanksgiving holiday.
- There will be no lecture for Section 103 on Wednesday December 6.

Mr. Pannu's office hours are from 6-7 pm on Wednesdays, **in person**., and Professor Dawson's Office hours are from 12:00-2:00 pm on Wednesdays, **online**.