*W**e* *recognize and acknowledge that McMaster University meets and learns on the traditional territories of the Mississauga and Haudenosaunee nations, and within the lands protected by the “Dish With One Spoon” wampum, an agreement amongst all allied Nations to peaceably share and care for the resources around the Great Lakes.*

# MATH 2XX3 – Advanced Calculus II

# 2021 Winter Term

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**Office Hours:** TBA

## Disclaimer

The following information is tentative and subject to change.

## Lectures, Class Time, and Webpage:

* Lectures will be provided asynchronously (details will be announced on Avenue).
* The central course web page will be on [Avenue To Learn](http://avenue.mcmaster.ca/).
* Students are responsible for staying up-to-date with announcements, material, deadlines, and all other information.

## Course Description

Theory of functions of several variables: limits, continuity, differentiability, Inverse Function Theorem, Taylor's Theorem. Extreme values, optimization, introduction to Fourier series.

**Prerequisite(s):** MATH 2X03; or credit or registration in ISCI 2A18 A/B

## Course and Learning Objectives

### Learning Objectives

One of the central themes of this course is the interplay of calculus and linear algebra in studying multivariable functions. We will also cover several important topics such as space curves, optimization, and calculus of variations. In learning this material, we will emphasize both computational and conceptual knowledge and skills.

### Learning Expectations

It is especially important in the current online learning situation to establish our expectations for the course and each other.

* My primary goal as instructor is to provide you with the motivation, guidance, and information you need to learn the material and grow in your experience and ability with calculus. I will be approachable and available to answer your questions or point you in the right direction. I will make instructions clear and assessments fair.
* You will do your best to be engaged and learn the material. This includes watching lectures, studying the textbook, doing practice problems, and completing assignments. You will ask questions and contribute to the class discussions.
* Due to the challenges of online learning and social distancing, we will cover approximately 1 week less material than in a normal semester.

### Learning strategies

The following strategies may be helpful in the online learning format.

* **Focus:** Make a schedule and study and watch lecture recordings according to that schedule. Eliminate as many distractions as possible. Put your cellphone in another room. If you are watching lectures on your computer: turn off all other apps and pop-up notifications, watch videos on full-screen. Take notes by hand as if it was an in-person lecture. Whenever possible, put your computer away and study without it.
* **Practice:** Your schedule should include time for reviewing lecture notes and trying practice problems. Practicing is the most effective use of your time. Pause the lecture videos and try examples for yourself.
* **Study critically and be engaged:** Learning math is an active process not a passive one. Watch the lectures and read the textbook with a critical mindset. If something is claimed to be true, ask yourself why. Pause the lecture when prompted and try to answer questions yourself.
* **Participate and discuss:** Sometimes you cannot solve all the practice problems yourself on the first try. This is perfectly normal. Use office hours and Avenue Discussions to their full potential to ask questions and discuss the material with others. I also encourage forming smaller study groups among yourselves. If you are struggling to find a study group, consider asking in the Avenue Discussions.
* **Growth mindset:** Math is not an inherent talent some people have and others do not. Learning mathematics is a marathon process of training your mind to think a certain way. One can only master mathematical skills with persistent focused effort and practice. When self-reflecting on your

own learning, frame things in terms of your growth. View challenges as opportunities for growth. View failures and successes as data points which can be used to build a more effective strategy for learning and future growth.

## Materials & Fees

**Textbook**

The required book for this course is a custom courseware pack available from the bookstore.

• [Math 2XX3 - Advanced Calculus II by Prof. S. Alama](https://campusstore.mcmaster.ca/cgi-mcm/ws/txsub.pl?wsTERMG1=211&wsDEPTG1=MATH&wsCOURSEG1=2XX3&wsSECTIONG1=DAY%20C01&crit_cnt=1).

## Virtual Course Delivery

**To follow and participate in virtual classes it is expected that you have reliable access to the following:**

* A computer that meets performance requirements [found here](https://cto.mcmaster.ca/technology-resources-for-mcmaster-students/%23tab-content-device-recommendations).
* An internet connection that is fast enough to stream video.
* Computer accessories that enable class participation, such as a microphone, speakers and webcam when needed.

If you think that you will not be able to meet these requirements, please contact [uts@mcmaster.ca](mailto:uts@mcmaster.ca) as soon as you can. Please visit the [Technology Resources for Students page](https://cto.mcmaster.ca/technology-resources-for-mcmaster-students/%23tab-content-device-recommendations) for detailed requirements. If you use assistive technology or believe that our platforms might be a barrier to participating, please contact [Student Accessibility Services](https://sas.mcmaster.ca/), [sas@mcmaster.ca](mailto:sas@mcmaster.ca), for support.

## Course Overview and Assessment

### Topics

* Geometry of Euclidean space, R^n, and linear algebra review.
* Multivariable functions: limits, continuity, and derivatives.
* Optimization.
* Geometry of space curves: the Frenet frame and curvature.
* Inverse and implicit function theorems.
* Approximation, Taylor's theorem, and critical points.
* Calculus of variations.
* Fourier series.

## Assessment and Evaluation

### Submission Guidelines

Homework will be submitted through Crowdmark. Ensure your submissions adhere to the following guidelines.

* Writing must be neat and legible. If the TA cannot read something, then it cannot be graded.
* I recommend using a full sheet of paper for each problem. Do not cram your solutions into a small space.
* Scans and images should be a clear resolution. Good lighting helps.

See the course policies for late and missing work below.

### Grade Break down

Your final grade will be calculated according to the following formula. (See also the course policy for MSAF below.)

|  |  |
| --- | --- |
| Grade Component | Weight |
| Homework | 20% |
| Best Term Test | 25% |
| Second Best Term Test | 15% |
| Final Exam | 40% |

### Homework

* There will be 8 homework assignments.
* The homework grade will be calculated as the average of the 7 best homework grades.

### Term tests

* There will be 2 term tests.
* The term tests will be take-home exams.
* We will provide a period of 3 days to complete each term test.

### Final exam

* The final exam will be a take-home exam.
* We will provide a period of 4 days to complete the final exam.

## Email policy

Please read this policy in detail. This will help us to communicate more effectively. I may not reply to emails which do not follow this policy.

* All emails pertaining to the course must include "MATH 2XX3" in the subject.
* I only reply to emails on weekdays between 9AM and 5PM (Eastern time), excluding holidays. Thus, I may not reply to your email immediately. You are responsible for planning accordingly (i.e. do not wait until the last minute before a deadline to ask a question).
* Check the course outline and Avenue Discussions before asking a question by email. I may not reply to emails asking questions which have already been answered in the course outline or the Avenue Discussions.
* General questions about the course and material which are not private in nature should be asked in the Avenue Discussions. If you ask such a question by email, I may direct you to the Avenue Discussions.
* I will not reply to emails about MSAFs unless there is a problem. If you have submitted an MSAF and everything is OK I will not reply to your email about the MSAF.
* I do not release course statistics.
* All regrade requests must follow the instructions for regrade requests provided below.

## Regrade request policy

Please consult solutions posted on Avenue before submitting a regrade request. Regrade requests shall be submitted by email to the course instructor using the following precise format:

*Subject: MATH 2XX3 regrade request*

*Body:*

* *Name, student number*
* *Assessment and problem to be regraded (e.g. Term test 1, question 2)*
* *1 sentence description of the reason for the regrade request.*

Regrade requests not submitted in this format will not be accepted.

## Avenue discussions policy

First and foremost, I hope that Avenue can be an inclusive, safe environment for lively discussion and learning of the material. In order to ensure this, I expect all participants to adhere to the following guidelines. We may remove posts which do not follow these guidelines.

* Everyone must demonstrate respect for each other at all times.
* Do not share solutions to graded assessments (i.e. assignments, tests).

## Requests for Relief for Missed Academic Term Work

[McMaster Student Absence Form (MSAF):](https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/msaf-mcmaster-student-absence-form/) In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar “Requests for Relief for Missed Academic Term Work”.

### MSAF Course Specific Information

Students who miss course work for valid official reasons (MSAF or other official accommodations) must follow McMaster’s guidelines. Moreover, students should follow those steps at the earliest possible date.

**MSAF policy**

* If an MSAF is applied to a homework assignment, then the homework grade will be calculated as the average of the 6 best homework grades.
* If an MSAF is applied to a term test, then the course grade will be calculated as follows:
  + 20% Homework
  + 30% Term test
  + 50% Final exam

### Missing or late work policy (no MSAF)

* In the absence of a MSAF, **all missing or late work will receive a grade of 0 with no exceptions**. It is your responsibility to submit work on time.
* Internet issues can sometimes interfere with online submission. For this reason, treati all submission deadlines as being 1 day earlier. Do not wait until the last minute to attempt to submit your work. The number of days provided for assignments and tests has already factored in an extra day for you to sort out potential submission difficulties.
* If you are trying to submit your homework ahead of the deadline and encounter a persistent technical difficulty, please do not hesitate to inform me by email.

## Academic Accommodation of Students with Disabilities

Students with disabilities who require academic accommodation must contact [Student Accessibility Services (SAS](https://sas.mcmaster.ca/)) at 905-525-9140 ext. 28652 or [sas@mcmaster.ca](mailto:sas@mcmaster.ca) to make arrangements with a Program Coordinator. For further information, consult McMaster University’s [Academic Accommodation of Students with Disabilities](https://secretariat.mcmaster.ca/app/uploads/Academic-Accommodations-Policy.pdf) policy.

## Academic Accommodation for Religious, Indigenous Or Spiritual Observances (Riso)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the [RISO](https://secretariat.mcmaster.ca/app/uploads/2019/02/Academic-Accommodation-for-Religious-Indigenous-and-Spiritual-Observances-Policy-on.pdf) policy. Students should submit their request to their Faculty Office ***normally within 10 working days*** of the beginning of term in which they anticipate a need

for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

## Courses with An On-Line Element

***Some courses*** ***may*** use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

## Online Proctoring

***Some courses may*** use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

## Academic Integrity

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

**It is your responsibility to understand what constitutes academic dishonesty.**

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the [Academic Integrity Policy](https://secretariat.mcmaster.ca/app/uploads/Academic-Integrity-Policy-1-1.pdf)*,* located at [https://secretariat.mcmaster.ca/university-policies-procedures- guidelines/](https://secretariat.mcmaster.ca/university-policies-procedures-%252520guidelines/)

**The following illustrates only three forms of academic dishonesty:**

* plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
* improper collaboration in group work.
* copying or using unauthorized aids in tests and examinations.

## Authenticity / Plagiarism Detection

***Some courses may*** use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster’s use of Turnitin.com please go to the [McMaster Office of Academic Integrity](https://www.mcmaster.ca/academicintegrity/)’s webpage.

## Conduct Expectations

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all our living, learning and working communities. These expectations are described in the [Code of Student Rights & Responsibilities (the “Code”).](https://secretariat.mcmaster.ca/app/uploads/Code-of-Student-Rights-and-Responsibilities.pdf) All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students’ access to these platforms.

## Copyright and Recording

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

Research Ethics - NA

## Extreme Circumstances

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.