

Announcements:

- **Registration issues:** In the Mathematics department, course instructors do not have the authority to enroll students in courses or sign any forms related to registration. For all registration issues or concerns, please contact the Mathematics Undergraduate Chair, Prof. Mark Mac Lean, at ugradchair@math.ubc.ca.
- **The Canvas course page** will be published at the beginning of the term.

Mathematics 227 (Honours Advanced Calculus II), Winter/Spring 2020

Section 201: MWF 12:00-12:50, MATH 102. Credit value: 3 credits.

Instructor: Professor I. Laba

- **Bio:** Ph.D. 1994 (University of Toronto). At UBC since 2000. Full Professor since 2005.
- **Contact information:** Math Bldg 200, (604) 822 4457, ilaba@math.ubc.ca
- **Office hours (tentative)** Mon 11-12, Wed 1-2, and by appointment, in MATH 200.
- The best way to contact the instructor is by email. Please note that email received on evenings and weekends will be answered on the next business day.
- If you cannot attend regular office hours due to schedule conflict, you can request an appointment. Please make your request at least one day in advance. Our schedules can fill up, so that drop-ins and same-day requests for appointments can be difficult or impossible to accommodate.

Prerequisites: A score of 68% or higher in MATH 226.

Course structure: 3 lecture hours per week, supplemented by 3 office hours per week, regular homework, and discussion boards on Canvas and Piazza. There will also be opportunities to ask questions during class.

Required learning materials:

- **Textbook:** Robert A. Adams and Christopher Essex, *Calculus: Several Variables (or Calculus: A Complete Course)*, 9th ed., Pearson, ISBN 9780134579788. The book costs \$179.40 at the UBC Bookstore, and was also used in MATH 226. (Used copies and older editions are acceptable alternatives and may be less expensive.)
- **Homework assignments** (will be posted on Canvas)
- **WebWork** (must be accessed through Canvas)

Course-level learning objectives:

- Learn advanced concepts of multivariable calculus, including differential geometry of curves and surfaces, line and surface integrals, the fundamental integral theorems, and the general framework of differential forms.
- Explore the connections between "visible" geometric features of objects and their mathematical expressions.
- Use multivariate calculus to solve mathematical questions related to motion in space, force fields, electromagnetism and fluid dynamics.
- Practice high quality mathematical writing, including constructing and writing formal mathematical proofs.

Course topics and tentative schedule:

- **Vector-valued functions and curves (Chapter 11):** curves, velocity, acceleration, arc length, curvature, tangent, normal, binormal.
- **Vector fields and line integrals (Sections 15.1-15.4):** vector fields, field lines, conservative fields, line integrals.
- **Surface integrals (Sections 15.5-15.6):** surfaces, surface area, flux integrals.
- **Integral theorems (Chapter 16):** gradient, divergence and curl, vector identities, divergence theorem, Green's theorem, Stokes' theorem, applications.
- **Differential forms (Chapter 17):** differential forms, exterior derivative, generalized Stokes' Theorem (if time permits).

Detailed updates on class topics covered each week will be posted regularly on Canvas.

Learning activities: Your learning practice should include textbook reading, class attendance, and working on practice problems. All three components are essential.

- The textbook has full and complete explanations of all topics covered in class. It also has a broad selection of practice problems for you to work on (specific recommendations will be posted on a regular basis).
- Lectures will supplement (rather than duplicate) the textbook. We will often focus on particularly important and/or difficult points, problem-solving techniques, etc. Issues related to good mathematical writing and, specifically, writing of formal mathematical proofs will also be discussed in class.
- Mathematics is not a spectator sport. You cannot learn mathematics just by watching someone else do it, not any more than you could learn to play the piano or ride a bike by watching others do it. You have to try it for yourself. The required homework assignments represent the *minimum* amount of practice you need. In order to master the subject, many students need additional practice, such as the recommended textbook problems.
- Class participation, discussion board participation, and office hours attendance are not mandatory and will not be taken into account in the calculation of your course grade. However, we strongly recommend that you attend office hours and participate in class discussions at least from time to time. This is a good way to get early feedback on your work (before it is evaluated for credit), make sure that you really understand the concepts, etc.

Your course mark will be based on WebWork (10%), longform homework assignments (15%), midterm exam (25%), and the final exam (50%). The grades may be **slightly** scaled at the end of the course.

- **Examinations:** There will be one in-class 50-minute midterm, tentatively scheduled on Wednesday, February 26, in class (12-1), and a 2.5 hour final exam in April. The midterm date will be confirmed by January 17. The date of the final examination will be announced by the Registrar later in the term. All examinations will be strictly closed-book: no formula sheets, calculators, electronic devices, or other aids will be allowed.
- **WebWork:** WebWork problem sets will generally be assigned weekly. In order for your grades to be recorded properly, you have to access problem sets through Canvas. The first problem set (HW0, not graded) will be an introduction to WebWork, for those who have not used it previously. To allow for minor illnesses, technical difficulties with WebWork, etc.), the WebWork part of your grade will be 110% of your total WebWork score^{*}, so that you can miss almost 10% of WebWork and still get full credit. (*If this is more than 10 points, your WebWork score will be 10.)
- **Longform homework assignments:** tentatively, there will be 4 assignments, due on January 22 (Wednesday), February 10 (Monday), March 16 (Wednesday), and April 1 (Wednesday). These problem sets will have only 3-4 questions, but that will include proofs, and you will be graded both on the correctness of your mathematics and on the quality of your mathematical writing. For full credit, you will need to present complete and well written explanations; the correct answer alone will **not** be sufficient.

Each assignment will be posted at least a week in advance. Your solutions are to be uploaded to Canvas and will be graded online. Late assignments will not be accepted. To allow for minor illnesses and other emergencies, the lowest homework score will be dropped with no questions asked.

Academic concession: The rules and procedures for obtaining academic concession are governed by [UBC Policy V-135 on Academic Concession](#). The details in this course are as follows.

- **Missing the midterm:** There will be no make-up midterms in this class. Missing the midterm for a valid reason will normally result in the weight of the midterm being transferred to the final exam. Examples of valid reasons include illness, participating in a religious observance, or being required to attend a court session. Missing the midterm for a non-valid reason (e.g. conflicts with personal travel schedule) will result in a mark of 0. Any student who misses the midterm for a valid reason must present the [Department of Mathematics Academic Concession self-declaration form](#) to the instructor within 72 hours of the missed midterm if at all possible. Please note that academic concession for certain reasons, such as valid schedule conflicts that can be foreseen, must be requested in advance and may require additional documentation.
- **Missing the final exam:** If you miss the final exam for a valid reason such as a medical emergency, you will need to present your situation to the Dean's Office of your Faculty to be considered for a deferred exam. [See the Academic Calendar for detailed regulations](#). Your performance in a course up to the exam is taken into consideration in granting a deferred exam status (e.g. failing badly generally means you will not be granted a deferred exam). In Mathematics, students usually sit the next available exam for the course they are taking, which could be several months after the original exam was scheduled.

Your personal travel schedule is **NOT** a valid reason for missing a final exam. Any student who misses the final exam for that reason will receive a mark of 0 on the exam. Do not make travel or other personal commitments before the final exam date is confirmed.

- **Late or missed homework:** Late assignments will not be accepted. Missing the deadline will result in a mark of 0 for that assignment. To account for minor illnesses and emergencies, the homework grading scheme (see above) allows for 1 longform assignment and about 10% of WebWork to be missed with no penalty. Academic concession requests involving two or more missed longform assignments, or more than 10% of WebWork, should be accompanied by the self-declaration form. You may also be required to submit additional documentation.

Academic misconduct: UBC takes cheating incidents very seriously. After due investigation, students found guilty of cheating on tests and examinations are usually given a final grade of 0 in the course and suspended from UBC for one year. [See here for more information](#).

- While students are encouraged to study together, they should be aware that blatant copying of another student's work is a serious breach of academic integrity. Your final write-up should be your own.
- Academic misconduct includes misrepresenting a medical excuse or other personal situation for the purposes of postponing an examination or quiz or otherwise obtaining an academic concession.
- Academic misconduct also includes making any alterations to graded midterms or other graded work before submitting a request for regrading. **To discourage this practice, randomly selected midterms will be copied and retained for verification in the event of a regrading request.**

Additional help:

- Office hours are the designated time when your professor is available to answer your questions related to the course. If you cannot come to the scheduled office hours, please request an appointment. Our schedules can fill up, so please make your request at least a day in advance.

- [Mathematics Learning Centre](#): The MLC is a space for undergraduate students to study math together, with friendly support from tutors, who are graduate and undergraduate students in the math department. The MLC is located at LSK301 and LSK302 and is open 5 days a week 11am-5pm. Every undergraduate student studying Math is welcome here!

In the MLC, students may join the study groups if students wish so. Please note that while students are encouraged to seek help with homework, the MLC is not a place to check answers or receive solutions, rather, our aim is to aid students in becoming better learners and to develop critical thinking in a mathematical setting. Check the website above for any additional information, changes to hours and announcements.

- [Past final exam database](#), maintained by the Mathematics department.
- [UBC Math Club](#), located in Math Annex 1119, sells math exam packages (old exams together with solution sets) for a nominal price before each final exam session.

Statement about the University's values and policies, mandated by [UBC Policy V-130](#): UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available [here](#).

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