

Course Outline

MATH 436: Calculus on manifolds [12239]

Instructor(s)

Lecturer Dr. Heath Emerson

Research Area Operator algebras and Noncommutative Geometry

Email hemerson@uvic.ca

Phone 250-721-7462 [For emergency use only]

Office David Turpin Building A447

General Course Information

Number of Units 1.5

Pre-requisites MATH 211 and 212, and one of: MATH 236 and 204, 236 and 300, 335, or 336.

Class Meetings

Mondays and Thursdays, 1:00-2:20, in CLED125.

Office Hours and Assistance

Day Wednesdays 2:00 -3:15, Mondays 9:00-10:00

The Mathematics & Statistics Assistance Centre is a large space where students can go to work, on their own or in groups, and to discuss math & stats problems. The Centre is staffed with talented Teaching Assistants who are happy to discuss primarily first and second year course material with you. Please see <http://www.math.uvic.ca/~msassist/index.html> for more information.

Math Club Students in Undergraduate Mathematics and Statistics (SUMS) was founded in 2014 as the reincarnation of a previous undergraduate course union that had been inactive for a few years. Please see <http://www.uvic.ca/science/math-statistics/current->



students/undergraduate/sums/index.php for more information.

Course Materials and Online Resources

Textbook *An Introduction to Manifolds*, by Loring W. Tu.

Specific Topics

Math 436 is an introduction to the modern, abstract notion of (smooth) manifold, a concept going back to Riemann. A manifold is a type of topological space on which one can do calculus. Much activity in mathematics in the 20th century was concerned with understanding the interaction of the algebraic topology of such manifolds, and infinitesimal considerations to do with calculus on them. We will start with some necessary topics in linear algebra, especially exterior algebra (Chapter 1 of the text), go onto the definition of manifold (Chapter 2) and smooth functions on such manifolds, then introduce the tangent bundle to a smooth manifold (Chapter 3), and associated bundles (the cotangent bundle, etc..), and, if time allows, topics such as differential forms and de Rham cohomology, and/or Lie groups and Lie algebras.

Evaluation and Grading

Your final percentage grade will be computed according to the following scheme.

Homework Assignments	Midterm	Final Exam
4-5	Oct. 22	TBA
30%	20%	50%

Missing work No late assignments will be accepted except in case of illness, in which case a doctor's note will be required. Midterms missed by illness also require a doctor's note. If a midterm is missed due to illness, the missing grade will be replaced by the average of your grade on the Final Exam and your average cumulative grade on the assignments.

Accessibility Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require



accommodations, please feel free to approach me and/or the Centre for Accessible Learning (CAL) as soon as possible. The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations <https://uvic.ca/cal>. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Grading Percentage scores will be converted to letter grades according to the university-wide standard table

(Undergraduate: <http://web.uvic.ca/calendar2016-09/undergrad/info/regulations/grading.html#>

Graduate: <http://web.uvic.ca/calendar2016-09/grad/academic-regulations/grading.html#>)

Final Examination Off-schedule final examinations (i.e., deferred examinations) are given only in accordance with the university policy as outlined in the Calendar. If you are unable to write a final examination due to illness, accident or family affliction, please refer to the following webpages for detailed instructions how to proceed: <http://web.uvic.ca/calendar2016-09/undergrad/info/regulations/concessions.html#>

Students are strongly advised not to make plans for travel or employment during the final examination period as special arrangements will not be made for examinations that conflict with such plans.

Supplemental Examinations. The Department of Mathematics and Statistics does not award 'E' grades or offer Supplemental Examinations in any of its courses.

Policies and Ethics

Attendance The university Calendar states 'Students are expected to attend all classes in which they are enrolled.' Our courses are conducted on that basis. If you miss an announcement (information concerning midterms, corrections to assignment, etc.) because you did not attend class, you must accept the consequences of not having learned of the change. (see <http://web.uvic.ca/calendar2016-09/undergrad/info/regulations/attendance.html#>).

Guidelines on Religious Observances Where classes or examinations are scheduled on the holy days of a religion, students may notify their instructors, at least two weeks in advance, of their intention to observe the holy day(s) by absenting themselves from classes or examinations. Instructors will provide reasonable opportunities for such students to make up work or missed examinations.

Academic Integrity Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offenses.

The responsibility of the institution

Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage



through cheating on essays, exams, and projects.

The responsibility of the student

Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the students transcript, or a suspension.

It is your responsibility to understand the University's policy on academic integrity:

<http://web.uvic.ca/calendar2016-09/undergrad/info/regulations/academic-integrity.html#>

How to Succeed in This Course

Students must follow the text with attention, the lectures support the textbook and are intended as a discussion around material introduced there. The text provides many exercises, and it is recommended that the students work on them as much as possible, to gain facility with the techniques.

