

PMATH 665, SMOOTH MANIFOLDS

Published

CLASS SCHEDULE

Section	Location	Time	Instructor(s)
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INSTRUCTOR / TA INFORMATION

Doug Park, Office: MC 5022, E-mail: bdpark@uwaterloo.ca

COURSE DESCRIPTION

Point-set topology; smooth manifolds, smooth maps, and tangent vectors; the tangent and cotangent bundles; vector fields, tensor fields, and differential forms; Stokes's theorem; integral curves, Lie derivatives, the Frobenius theorem; de Rham cohomology.

LEARNING OUTCOMES

By the end of this course students should be able to:

Understand how to perform multi-variable calculus in the setting of smooth manifolds.

TENTATIVE COURSE SCHEDULE

We will attempt to cover some of the following material from the textbook.

Chapter 1. Smooth Manifolds
Chapter 2. Smooth Maps
Chapter 3. Tangent Vectors
Chapter 4. Submersions, Immersions and Embeddings
Chapter 5. Submanifolds
Chapter 8. Vector Fields
Chapter 9. Integral Curves and Flows
Chapter 10. Vector Bundles
Chapter 11. The Cotangent Bundle
Chapter 12. Tensors
Chapter 14. Differential Forms
Chapter 15. Orientations
Chapter 16. Integration on Manifolds
Chapter 17. DeRham Cohomology
Chapter 19. Distributions and Foliations

TEXTS / MATERIALS

Title / Name	Notes / Comments	Required
Introduction to Smooth Manifolds, John M. Lee	Second edition	Yes

STUDENT ASSESSMENT

Component	Value
In-class tests	40%

Component	Value
Final exam	60%

The weight of any missed in-class test will be transferred to the final exam.

ASSIGNMENT SCREENING

No assignment screening will be used in this course.

ADMINISTRATIVE POLICY

UNIVERSITY POLICY

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (https://uwaterloo.ca/academic-integrity/) for more information.]

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read [Policy 70, Student Petitions and Grievances, Section 4](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) . When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for their actions. [Check [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (https://uwaterloo.ca/academic-integrity/) for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to [Policy 71, Student Discipline](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) . For typical penalties, check [Guidelines for the Assessment of Penalties](https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties) (https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties) .

Appeals: A decision made or penalty imposed under [Policy 70, Student Petitions and Grievances](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (other than a petition) or [Policy 71, Student Discipline](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) may be appealed if there is a ground. A student who believes they have a ground for an appeal should refer to [Policy 72, Student Appeals](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72) (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72) .

Note for students with disabilities: [AccessAbility Services](https://uwaterloo.ca/disability-services/) (https://uwaterloo.ca/disability-services/) , located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.