DEPARTMENT OF MATHEMATICAL AND COMPUTATIONAL SCIENCES UNIVERSITY OF TORONTO MISSISSAUGA

MAT257Y5Y LEC0101 Analysis II Course Outline - Fall 2018

Class Location & Time Tue, 10:00 AM - 11:00 AM DV 1146

Thu, 09:00 AM - 11:00 AM DV 1146

InstructorTyler HoldenOffice LocationDH 3086

Office Hours

E-mail Address tyler.holden@utoronto.ca
Course Web Site https://q.utoronto.ca

Course Description

A theoretical second course in calculus for students with a serious interest in mathematics. Topology of Rn; compactness, functions and continuity, extreme value theorem. Derivatives; inverse and implicit function theorems, maxima and minima, Lagrange multipliers. Integration; Fubini's theorem, partitions of unity, change of variables. Differential forms. Manifolds in Rn; integration on manifolds; Stokes' theorem for differential forms and classical versions. [72L, 48T] **Note: MAT257Y5 will be accepted anywhere where MAT232H5 or MAT236H5 are accepted.**

Prerequisite: MAT157Y5, MAT240H5 (SCI)

Distribution Requirement: SCI

Students who lack a pre/co-requisite can be removed at any time unless they have received an explicit waiver from the department. The waiver form can be downloaded from here.

Textbooks and Other Materials

- [Mandatory] <u>Tyler Holden's notes</u> will be the primary resource for this class. All required material is present in these notes. These notes can be printed at your own discretion.
- [Optional] There is no textbook which covers the course as it will be taught. However, for additional perspective, you may want to consider
 - Calculus on Manifolds by Michael Spivak. Westview Press, 1971.
 - Analysis on Manifolds by James Munkres. Westview Press, 2001.

Calculus on Manifolds -- colloquially referred to as the *pamphlet* -- is incredibly terse, which makes it difficult to read. *Analysis on Manifolds* has the opposite problem: Munkres is known for being overly verbose in all of his books. Neither book will cover the manifolds portion in the same manner as us, though Munkres is more similar than Spivak.

Assessment and Deadlines

| Type | Description | Due Date | Weight |
|------------|---------------------------------|-----------------|---------------|
| Assignment | Ten (10) assignments at 2% each | On-going | 20% |
| Term Test | Term Test 1 | 2018-10-25 | 12.5% |
| Term Test | Term Test 2 | 2018-11-29 | 12.5% |
| Term Test | Term Test 3 | 2019-02-14 | 12.5% |
| Term Test | Term Test 4 | 2019-03-23 | 12.5% |
| Final Exam | Final Exam | TBA | 30% |
| | | Tota | l 100% |

More Details for Assessment and Deadlines

There will be ten (10) assignments -- 5 per term -- due roughly biweekly. Each assignment will be worth 2% of the final mark, and

is due at the beginning of tutorial.

Penalties for Lateness

No late assignments will be accepted.

Procedures and Rules

Missed Term Work

Missing a Term Test

If you are forced to miss a term test because of an illness or other extenuating circumstance, you must alert the course instructor Tyler Holden within 24 hours of the term test, and provide supporting documentation no later than one week after the term test. In particular, the university has very precise procedures regarding documentation of sick notes, and a form for extenuating circumstances.

Failure to adhere to any of these policies will result in your term test being assigned a grade of zero (0).

Students granted an exemption will have the weight of all missed term tests transferred to the final examination.

Missed Final Exam

Students who cannot write a final examination due to illness or other serious causes must file an<u>online petition</u> within 72 hours of the missed examination. Original supporting documentation must also be submitted to the Office of the Registrar within 72 hours of the missed exam. Late petitions will NOT be considered. If illness is cited as the reason for a deferred exam request, a U of T Verification of Student Illness or Injury Form must show that you were examined and diagnosed at the time of illness and on the date of the exam, or by the day after at the latest. Students must also record their absence on ACORN on the day of the missed exam or by the day after at the latest. Upon approval of a deferred exam request, a non-refundable fee of \$70 is required for each examination approved.

Academic Integrity

Honesty and fairness are fundamental to the University of Toronto's mission. Plagiarism is a form of academic fraud and is treated very seriously. The work that you submit must be your own and cannot contain anyone elses work or ideas without proper attribution. You are expected to read the handout How not to plagiarize (http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize) and to be familiar with the Code of behaviour on academic matters, which is linked from the UTM calendar under the link Codes and policies.

Final Exam Information

Duration: 3 hours Aids Permitted: None

Additional Information

Course description

MAT257 is a second year course in analysis. It is designed for students who are interesting in pursuing a degree in mathematics, or a mathematically heavily field. It is a full credit course, and covers

- Metric space topology
 - Open and closed sets
 - Limits, sequences, and continuity
 - Compactness and connectedness
- Differentiation
 - The derivative and chain rule
 - Optimization
 - Taylor series
 - The Implicit and Inverse Function Theorems
- Scalar valued integration
 - o Jordan measure
 - Integration in Rn , including improper integration
 - Fubini's theorem and change of variables
- Vector calculus
 - Embedded submanifolds of Rn
 - Vector fields (closed and exact)

- Line and surface integralsThe big three theorems (Green, Gauss, Stokes')

Email Policy

All emails must originate from a utoronto.ca email address, and contain [MAT257] in the beginning of the subject. Failure to adhere to these policies will result in your email not making it through my filters, and your email will not be read.

Last Date to drop course from Academic Record and GPA is February 18, 2019.