

MATH 4200 Course Outline

General Information

Course Title: Advanced Analysis

Course Description: This senior course in analysis will cover basic operator theory on Hilbert spaces, including self-adjoint operators and the spectral theorem. Other topics may include weak solutions, Sobolev spaces, inverse problems, measure theoretic probability or advanced topics from linear or nonlinear functional analysis.

Credit Weight: 0.5

Academic Department (or campus): Mathematics & Statistics

Campus: University of Guelph

Semester Offering: Fall 2018

Class Schedule and Location: MWF 11:30-12:30 in MacKinnon 234

Instructor Information

Instructor Name: Rajesh Pereira

Instructor Email: pereirar@uoguelph.ca

Office location and office hours: MacN 519, Office Hrs TBA

Course Content

Specific Learning Outcomes: Students in this course will learn the basic ideas and tools of analysis. Student will learn how to construct proofs and write mathematical arguments.

Lecture Content:

Review of normed linear spaces, inner product spaces, metric spaces and pseudo-metric spaces with examples. The key concepts of analysis such as convergence, completeness and compactness will be covered. Banach Spaces as well as the completion of a normed linear space or a metric space will be discussed.

Fixed Point Theory including the Banach and Schauder fixed point theorems and applications.

Hilbert Spaces: Orthonormal bases, closed convex sets and the projection theorem, Bessel's and Parseval's inequalities.

The theory of L_p spaces with an introduction to Measure Theory. Some applications to concepts in Probability and Statistics will be covered.

An introduction to the theory of bounded linear operators on Hilbert and Banach spaces with special emphasis on the properties of Self-Adjoint and Compact operators.

Course Assignments and Tests:

There will be six assignments. Some assignment, midterm and final exam questions will be different in the graduate and undergraduate versions of the course.

Midterm: TBA

Final examination date and time: December 15, 2017 from 8:30-10:30

Final Examination regulations are detailed at:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-exam.shtml>

Course Resources

Required Text: D. H. Griffel, Applied Functional Analysis, Dover Publications 2002.

We will cover parts II and III and the appendix of the book.

Course Policies

Grading Policies: Assignments: 25%, Midterm 25%, Final 50%

Course Policy on Group Work: While you may consult with one another or any reference about the general ideas on assignments, any written work must be your own. It is not permitted to ask someone for step by step guidance on assignment problem nor to copy from the work of another student or any other source.

Standard Statements

The following are standard statements for inclusion on all course outlines (adapted with permission from the College of Arts). Some departments or colleges may also elect to post this information on a common website and link to such sites in the course outline. However, it is strongly recommended that statements on academic misconduct

and links to the academic misconduct section of the academic calendars are included on all course outlines.

E-mail Communication

As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. [See the undergraduate calendar for information on regulations and procedures for Academic Consideration.](#)

Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; in the Fall 2018 semester this day is November 2nd 2018. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic

integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

[The Academic Misconduct Policy is detailed in the Undergraduate Calendar.](#)

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.