

**MATH 421/510: Functional Analysis/Real Analysis II**  
(3 credits)

**Instructor:** Mathav Murugan

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**Lectures:** MWF 11-12 at LSK 310

**Office hours:** Mon 3–4, Wed 9–10, Thu 2–3 at MATX 1104

**Course webpage:** <https://canvas.ubc.ca/courses/153085>

**Text:** There is no required text for this course but a good reference is G. B. Folland's book *Real analysis* (2nd edition). See course notes for further references.

Course notes will be available at <https://personal.math.ubc.ca/~mathav/teaching/notes/421notes.pdf> and will be updated throughout the term.

**Prerequisites:** Math 420/507 or equivalent.

**Piazza:** There is a link to Piazza on Canvas. Please use Piazza for questions that arise in your learning and for questions about all issues related to the course.

**Outline.** This cross-listed 1st-year graduate/4th-year undergraduate course will give an introduction to functional analysis. This is core material which, together with the measure and integration theory covered in Math 420/510, provides the foundation for much of mathematical analysis. It is an essential part of a graduate education or advanced undergraduate education in mathematics. It will be useful in many areas of pure and applied mathematics, including harmonic analysis, differential equations, probability theory, information theory, differential geometry, and mathematical physics.

The course will continue from Math 420/509, and will treat the following topics.

1. Point set topology.
2. Normed vector spaces.
3.  $L^p$  spaces.
4. Hilbert spaces.
5. Compact operators and their spectrum.

**Evaluation:** Homework will be assigned regularly (5 to 7 in total) for 60% of the grade. There will be a final exam for 40% of the grade.

**Policies regarding Homework:**

1. Homework should be submitted on Canvas by the deadline. Late submissions will not be accepted.
2. Solutions will be graded both on accuracy and quality of exposition. Solutions should be mathematically rigorous, well-crafted, and written in

complete English sentences. Solutions must always be legible; use of LaTeX is encouraged and appreciated.

**Academic integrity:** By enrolling as a student at UBC, you have agreed to abide by the University Rules on Academic Honesty. Here is what you have agreed to and are bound by: “Academic honesty is essential to the continued functioning of the University of British Columbia as an institution of higher learning and research. All UBC students are expected to behave as honest and responsible members of an academic community. Breach of those expectations or failure to follow the appropriate policies, principles, rules, and guidelines of the University with respect to academic honesty may result in disciplinary action. It is the student’s obligation to inform himself or herself of the applicable standards for academic honesty. Students must be aware that standards at the University of British Columbia may be different from those in secondary schools or at other institutions. If a student is in any doubt as to the standard of academic honesty in a particular course or assignment, then the student must consult with the instructor as soon as possible, and in no case should a student submit an assignment if the student is not clear on the relevant standard of academic honesty. If an allegation is made against a student, the Registrar may place the student on academic hold until the President has made his or her final decision. When a student is placed on academic hold, the student is blocked from all activity in the Student Service Centre.”

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