

# MATH 565: Functional Analysis

Winter 2026

**Prerequisites:** MATH 454 or MATH 564

**Course webpage:** [https://www.math.mcgill.ca/atserunyan/Courses/2026\\_W.Math565.Functional/](https://www.math.mcgill.ca/atserunyan/Courses/2026_W.Math565.Functional/)

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**Office:** BURN 915

**Office hours:** See [course webpage](#)

**Required Course Materials:** None, notes from lectures suffice and they will be posted after every lecture.

**Recommended Textbooks:**

- G. FOLLAND, *Real Analysis: Modern Techniques and Their Applications*, 2nd ed. (Chapters 5–7)
- T. TAO's blog: course [245B](#)
- J. CONWAY, *A Course in Functional Analysis*, 2nd ed.

**Means of Assessment:** Your course grade will be the **maximum** of the following two assessment options:

**Option 1:** 25% assignments + 25% midterm + 50% final exam

**Option 2:** 25% assignments + 75% final exam

**Course Topics:** Review of the basic theory of Banach and Hilbert spaces,  $L^p$  spaces, Baire category theorem, open mapping theorem, closed graph theorem, Banach-Steinhaus theorem (uniform boundedness principle), Hahn-Banach theorem, strong and weak operator topologies, weak and weak-\* convergence, weak convergence of measures, Riesz representation theorems, spectral theorem for compact self-adjoint operators, Fredholm theory, spectral theorem for bounded self-adjoint operators, Fourier series and integrals, additional topics.

Assessment Type	Description	Due Date	Considerations and Late Penalties
Midterm Exam	In-person during class, long answer, proof-based questions	February 17	No make-up exam will be provided. Students missing the midterm for any reason will automatically be assessed by assessment option 2
Final Exam	Cumulative, long answer, proof-based questions	To be centrally scheduled during the final exam period	Missed final exams are handled by Service Point
Homework	6 graded assignments (roughly one every two weeks) to be submitted on Crowdmark, long-answer, proof-based questions	Typically due Tuesdays	Unexcused late assignments will not be accepted and will receive a grade of 0

## Rules and Regulations:

- The purpose of the [Policy on Assessment of Student Learning \(PASL\)](#) is to provide a set of common principles to guide the assessment of students' learning. Per PASL, assessment should be equitable and consistent, and promote effective learning experiences, a healthy learning environment, and academic integrity. Learn more on the [For Students](#) page of the PASL website. Also see [Faculty of Science-specific rules](#) on the implementation of PASL.
- Legally mandated academic accommodations are handled by Student Accessibility and Achievement. For more information see <https://www.mcgill.ca/access-achieve/>
- Academic considerations for assessments that are missed or late for valid reasons will be provided at the instructor's discretion. As per the new Quebec guidelines, medical notes are not required for absences of less than 5 days. *Note that repeated, similar requests for academic considerations in this course are unlikely to be granted.*
- In accord with [McGill University's Charter of Students' Rights](#), students in this course have the right to submit in English or in French written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives. (Approved by Senate on 21 January 2009)

Conformément à la [Charte des droits de l'étudiant de l'Université McGill](#), chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté, sauf dans le cas des cours dont l'un des objets est la maîtrise d'une langue. (Énoncé approuvé par le Sénat le 21 janvier 2009)

- McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the [Code of Student Conduct and Disciplinary Procedures](#) (Approved by Senate on 29 January 2003) (See [McGill's guide to academic honesty](#) for more information).

- In the event of extraordinary circumstances beyond the University's control, the content and/or assessment tasks in this course are subject to change and students will be advised of the change.