**Department of Mathematics & Statistics**
**Concordia University**

# MATH 464, Sec. A (MAST 661/MAST 837), Sec. B: Real Analysis (Fall 2026)

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| **Instructor:** | Dr. M. Bertola |
| **Email Address:** | marco.bertola@concordia.ca |
| **Office Hours:** | _____ |
| **Important:** | Students should get the above information from their instructor and from the course Moodle site. The instructor is the person to contact should there be any questions about the course. |
| **Class Schedule:** | Mondays & Wednesdays, 13:15-14:30. |
| **Prerequisites:** | MAST 219; MATH 365; or equivalent. |

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## Reading Week

Begins on Saturday, October 10 and ends on Friday, October 16, 2026. No classes that week.

## Reference Textbooks

*Real Analysis*, 2nd or 3rd or 4th Edition, by H. L. Royden (MacMillan ed.).
The textbook is a classical analysis textbook, but the contents of the course are highly standardized and can be found in several books of advanced undergraduate level.

Another classical reference is "*Principles of Mathematical Analysis*" by W. Rudin.

## Assignments

Provided weekly, but not part of the grading.
Any exercise that we can devise is relatively standard and already in the training data of modern LLMs. This renders *the grading* of assignments a sub-optimal allocation of resources. However, exercises fulfill an essential part of mathematical education, and they will be given regularly but will be **not graded**. In other words, assigned problems are for the students' training, but not for their assessment. Solutions will also be provided, and office hours may be used to discuss them in detail and for other brainstorming sessions.

## Topics

The following topics will be covered, as time permits:

- Review: sets, functions, relations, countable sets.
- Incompleteness of the rationals, construction of the real numbers.
- Topology and properties of the real numbers.
- Metric spaces, normed linear spaces, point set topology.
- Compactness, Heine-Borel theorem, Bolzano-Weierstrass property.
- Baire Category theorem.
- Continuous functions, connectedness, intermediate value theorem.
- Function spaces, uniform convergence, Arzela-Ascoli theorem.
- Approximation, Stone-Weierstrass theorem.
- Fixed point theorems and applications.

There might be complementary topics as well, depending on time.

## Calculators

Only calculators approved by the Department (with a sticker attached as proof of approval) are permitted for the class test and final examination. For the list of Approved calculators see https://www.concordia.ca/artsci/math-stats/services/advising/calculators.html

## Term Exams

There will be two tests in week 4 or 8. **There will be no make-up midterm exam.**

## Final Grade

For students registered in **464**:
The two midterms for 20% each + Final 60% or
Best of the two midterms for 20% + Final 80% (whichever is most favorable).

For students registered in **661/837**:
The two midterms for 20% each + Final 50% + 10% presentation or
Best of the two midterms for 20% + Final 70% + 10% presentation (whichever is most favorable).
The presentation (approx. 15-20 min) will be on a topic to be discussed and chosen during the course.

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

### Student Services

You may wish to access the many services available to you as a Concordia student. An overview of these resources can be found here: https://www.concordia.ca/students/services.html

### Academic Integrity and the Academic Code of Conduct

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: https://www.concordia.ca/conduct/academic-integrity.html" *[Undergraduate Calendar, Sec 17.10.2]*

### Behaviour

All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the Code of Rights and Responsibilities which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in university activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

### Intellectual Property

Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the Academic Code of Conduct and/or the Code of Rights and Responsibilities. As specified in the Policy on Intellectual Property, the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

### Use of Concordia email

Your Concordia email is the official channel for all university communications, as required by the university's Policy on Concordia email accounts for students and employees. Please use your Concordia email for all communication related to this course and check it regularly so you don't miss important information. Learn more about how to access your Concordia email.

As a student, you are expected to follow the email policy and to use your Concordia email in a respectful and responsible manner. The policy helps ensure that communication across the university is secure, reliable, and consistent.

### Extraordinary circumstances

In the event of extraordinary circumstances and pursuant to the Academic Regulations the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.