

UM 204 : INTRODUCTION TO BASIC ANALYSIS

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<https://math.iisc.ac.in/~bharali/teaching.htm>

Course summary: This course is intended as a first course in Analysis, treated rigorously. The aim of the course is to establish the principles of Analysis, highlighting fundamental ideas that recur in the proofs in this subject. **To students auditing the course:** please note that the emphasis of this course is not on computation but on learning how to justify strong, general mathematical statements about sequences, series, and functions.

The notion of convergence will be the unifying theme of this course. This notion is central to Analysis (and to quantifying the notion of change). This course will present all of the formal rigour necessary to understand the word “convergence” in various settings.

Recommended books:

1. Walter Rudin, *Principles of Mathematical Analysis*, 3rd Edition, McGraw-Hill International Editions, 1976.
2. Terence Tao, *Analysis–I*, 3rd Edition, TRIM Series, Hindustan Book Agency, 2014.
3. T.M. Apostol, *Mathematical Analysis*, 2nd Edition, Narosa, 1996.

Rudin’s book is self-contained, but a bit terse. This book will influence, to a great extent, the sequence of topics to be covered. Tao’s book is very readable, and will be helpful to students who would like a little more detail on concepts and results stated for \mathbb{R} and its subsets.

Meeting times:

Lectures: Mondays, Wednesdays, and Fridays, 12:00–12:50 p.m.

Tutorials: Thursdays, 9:00–9:50 a.m.

Assignments and quizzes: During the course of the lectures, I shall assign problems for homework. It is **essential** for your own understanding of the course material that you work on these problems. On **most** weeks, a homework assignment will be posted on the course webpage some time between 5:30 p.m. on Friday and 5:30 p.m. the next day.

You will not be asked to submit homework assignments. Instead, assignments will form the material for **quizzes** that shall be given during the tutorials. The problems on each quiz will be drawn from the the most recent assignment that has been up on the course webpage for at least 5 days.

Assessment: Your assessment will be based on:

One mid-semester exam: 30%, Quizzes: 20%, Final exam: 50%

Examinations: Exams will be held on dates announced by the UG Office.

Tutors for this course:

- Naveen Gupta (*e-mail:* naveengupta@iisc.ac.in)
- Pratik Jadhav (*e-mail:* pratikjadhav@iisc.ac.in)
- Sudeshna Bhattacharjee (*e-mail:* sudeshnab@iisc.ac.in)

Things to bear in mind:

- The tutorials will be the forum in which you will discuss any problems on the homework assignment that you had difficulties with. **Attendance at the tutorials is mandatory!** You are encouraged to talk to the teaching assistant (TA) leading your tutorial for hints on problems on which you got stuck.
- At the end of (almost) every tutorial, your TA will give you a 10- or 15-minute quiz. This quiz will be based on the most recent assignment (see above for what “most recent” means), and will feature a problem adapted from it with minor modifications. **Quizzes will be unannounced.**
- The homework assignments are a necessary but **not sufficient** condition for understanding the material covered. It is in your interest to find and work out as many problems as you can. This is the reason for multiple textbooks recommended for this course