

- **Lecturer:** Paschalis Karageorgis (pete@maths.tcd.ie).
- **Web page:** <https://www.maths.tcd.ie/~pete/analysis>
- **Homework:** Homework problems will be assigned every week. You may discuss them during your tutorial before writing up solutions.
- **Reading:** Scanned notes will be posted online every week. If you need some additional references, then you may always consult
 - *A first course in real analysis* by Sterling Berberian,
 - *A first course in real analysis* by Murray Protter and Charles Morrey.
- **Marking policy:** 85% annual exam and 15% homework.
- **Annual exam:** You should be able to reproduce the theorems and proofs covered in class. You should also be able to solve problems which are similar to those assigned for homework.
- **Module content:** The main topic is analysis and topology of the real line. We shall study functions of one real variable and subsets of \mathbb{R} .

The main concepts to be introduced in this module are the following.

- ① **Basic concepts:** image of a set, inverse image, lower and upper bound, infimum, supremum, minimum, maximum.
- ② **Point set topology:** open and closed set, closure, interior, limit point, continuity, relatively open set, connected set, compact set, uniform continuity, Cauchy sequence, complete set.
- ③ **Riemann integration:** partition, refinement, lower and upper Darboux sums, Riemann integrability.

On successful completion of this module, students will be able to:

- accurately recall definitions, state theorems and produce proofs on topics related to the analysis and topology of the real line;
- construct rigorous mathematical arguments using appropriate concepts and terminology from the module, including open, closed and bounded sets, interior, closure, convergence, continuity, uniform continuity, completeness, compactness and connectedness;
- solve problems by identifying and interpreting appropriate concepts and results from the module in specific examples involving concepts that were introduced in the module;
- construct examples and counterexamples related to concepts from the module which illustrate the validity of some prescribed properties.