MA2223 – General information

- **Lecturer:** Paschalis Karageorgis (pete@maths.tcd.ie).
- **Web page:** http://www.maths.tcd.ie/∼pete/ma2223
- **Homework:** Assignments will be posted online each Friday and they will be due a week later. No late homework will be accepted.
- **Reading:** Lecture notes and proofs will be posted online. If you need some additional references, then you may always consult
  - *Introduction to metric and topological spaces* by Wilson Sutherland,
  - *Topology: a first course* by James Munkres.
- **Marking policy:** 90% annual exam and 10% 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 structure:** We shall study three main topics, namely metric spaces, topological spaces and normed vector spaces.

MA2223 – Main concepts

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

1. **Metric spaces:** metric, open ball, bounded, open set, convergence, closed set, continuity, Lipschitz continuity, pointwise and uniform convergence, Cauchy sequence, complete, contraction, completion, uniform continuity.
2. **Topological spaces:** topology, metrisable, convergence, closed set, closure, interior, boundary, neighbourhood, limit point, continuity, subspace and product topology, Hausdorff, connected, compact, homeomorphism.
3. **Normed vector spaces:** norm, bounded linear operator, operator norm, Euclidean norm, equivalent norms, Banach space, absolute convergence, invertible linear operator, dual space.

MA2223 – Learning outcomes

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

- accurately recall definitions, state theorems and produce proofs on topics in metric spaces, topological spaces and normed vector spaces;
- construct rigourous mathematical arguments using appropriate concepts and terminology from the module, including open, closed and bounded sets, convergence, continuity, norm equivalence, operator norms, completeness, compactness and connectedness;
- solve problems by identifying and interpreting appropriate concepts and results from the module in specific examples involving metric spaces, topological spaces and normed vector spaces;
- construct examples and counterexamples related to concepts from the module which illustrate the validity of some prescribed properties.