School of Mathematics

Module MA2223 — Metric spaces 2010-11
(SF Mathematics, SF Two-subject Moderatorship)

Lecturer: Dr. Derek Kitson

Requirements/prerequisites: prerequisite: 121

Duration: Michaelmas term, 11 weeks

Number of lectures per week: 3 hours per week including lectures and tutorials

Assessment: Assignments will be worth 10% of the final mark.

ECTS credits: 5

End-of-year Examination: This module will be examined jointly with MA2224 in a 3-hour examination in Trinity term, except that those taking just one of the two modules will have a 2 hour examination. However there will be separate results for MA2223 and MA2224.

Description:

- Metric spaces (including open and closed sets, continuous maps and complete metric spaces)
- Normed vector spaces (including operator norms and norms on finite dimensional vector spaces)
- Topological properties of metric spaces (including Hausdorff, connected and compact spaces)

See also `http://www.maths.tcd.ie/~dk/MA2223.html`
Recommended Reading:

- *Introduction to metric and topological spaces*, W.A. Sutherland. Oxford University Press, 1975. Hamilton, S-LEN 514.3 L51 (13 copies), Open Access 514.3 L51;2
- *Metric spaces*, E.T. Copson. Cambridge University Press, 1968. Hamilton, Open Access 514.3 K8
- *Set theory and metric spaces*, I. Kaplansky. Boston, 1972. Hamilton, Open Access 511.3 L23
- *Introduction to the analysis of metric spaces*, J.R. Giles. Cambridge University Press, 1987. Hamilton, Open Access 515.73 M7
- *Metric spaces*, M. O'Searcoid. Springer Undergraduate Mathematics Series, 2007. Hamilton, Open Access 514.3 P7

Learning Outcomes: On sucessful completion of this module, students will be able to:

- accurately recall definitions, state theorems and produce proofs on topics in metric spaces, normed vector spaces and topological 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, topological and/or normed vector spaces.
- construct examples and counterexamples related to concepts from the module which illustrate the validity of some prescribed combination of properties.

January 19, 2011