

School of Mathematics

Course 212 — Metric Spaces and Topology 2003-04
(Option for SF Mathematics, JS Mathematics, JS & SS Two-subject Moderatorship)

Lecturer: Dr Dmitri Zaitsev

Requirements/prerequisites: 121

Duration: 24 weeks

Number of lectures per week: 3

Assessment: Regular assignments

End-of-year Examination: One 3-hour examination

Description: The aim of the course is to provide an introduction to metric and topological spaces in sufficient depth that students will be comfortable with the use of these concepts in many other branches of mathematics. The course will begin by introducing concepts of interior and closure, open and closed sets, convergence and continuity, first in the contexts of subsets of Euclidean spaces, then in the context of metric spaces, and finally in the context of topological spaces. Further topological properties such as compactness and connectedness will be investigated. The course will conclude with an introduction to algebraic topology, including the concepts of homotopy and the fundamental group. If time permits, applications will be given to the topology of the plane, including Fundamental Theorem of Algebra and the two-dimensional case of Brouwer's Fixed Point Theorem.

Additional information and feedback form can (or will) be found at
<http://www.maths.tcd.ie/~zaitsev/212.html>

REFERENCES:

In the beginning the course will follow the book

W.A. Sutherland, *Introduction to Metric and Topological spaces*, Oxford University Press (1975)
and partially the book

G. F. Simmons, *Introduction to topology and modern analysis*, McGraw Hill Book Co., (1963)

For other references see the lecture notes by David Wilkins

<http://www.maths.tcd.ie/~dwilkins/Courses/212/>

<http://www.maths.tcd.ie/~dwilkins/Courses/421/>

and the books:

K. Kuratowski, *Introduction to set theory and topology*, Pergamon Press, (1972)

C. W. Patty, *Foundations of topology*, PWS-KENT Publishing Co., Boston, MA, (1993)

W. Rudin, *Principles of mathematical analysis*, McGraw-Hill Book Co., (1976)

J. Dieudonné, *Foundations of modern analysis.*, Academic Press, (1969)

October 11, 2004