

MATH553. The topology and geometry of surfaces

STUDENT CONTACT: 48 hours

PRE-REQUISITE: MATH243 or equivalent

BARRERED COMBINATIONS: None

PRELIMINARY READING: Beginning sections of recommended texts

DIVISION: Pure Mathematics

DELIVERY: 36 lectures

CO-REQUISITE: None, but connections to MATH340

AIMS.

To present and convey the basic topological and geometric theory of surfaces.
LEARNING OUTCOMES.

An understanding of basic concepts in topology, especially with application to the topology of surfaces and their homeomorphisms. An understanding of geometry and complex structures on surfaces, and the connections with the topology.

OUTLINE SYLLABUS.

The concepts of compact, connected. Topological manifolds, especially in two dimensions (that is, surfaces). Complex and hyperbolic structures on surfaces. The fundamental group and basic covering space theory, in both topological and geometric contexts. Hyperbolic geometry in two dimensions and the construction of hyperbolic surfaces. The topology of surfaces: isotopy, ambient isotopy, Euler characteristic and Euler's Theorem. The Teichmüller space of a surface.

RECOMMENDED TEXTS.

James W. Anderson: Hyperbolic Geometry, Springer 1999 ISBN 1852331569, QA322.2.A54

C.T.C. Wall: A geometric introduction to topology, Addison Wesley, 1972, QA12.A5.W8.

More generally, look in the library catalogue for key phrases such as: surface topology, Riemann surfaces, hyperbolic geometry.

ASSESSMENT. 15% homework projects, 85% examination.