

MATH0038 History of Mathematics

<i>Year:</i>	2023–2024
<i>Code:</i>	MATH0038
<i>Level:</i>	6 (UG)
<i>Normal student group(s):</i>	UG Year 3 Mathematics degrees
<i>Value:</i>	15 credits (= 7.5 ECTS credits)
<i>Term:</i>	2
<i>Assessment:</i>	80% examination, 20% coursework
<i>Normal Pre-requisites:</i>	A-level calculus and geometry is required.
<i>Lecturer:</i>	Mr S Rose

Course Description and Objectives

The history of mathematics is not history alone, nor is it mathematics alone, but a subject requiring sympathy for and knowledge of the techniques of both disciplines. The aim of the course is to provide a survey of mathematical thought from the earliest times up to the early nineteenth century, so that students may see, for example, how Archimedes obtained his famous bounds for π and how non-Euclidean geometry was discovered. While the material of the course is delivered in the lectures, with additional notes provided, students are expected to read some primary sources from the set anthology of mathematical writings as well as specific chapters from the standard histories. The basic requirement for the course is a good understanding of high school calculus, algebra and geometry but there are also one or two more challenging topics which demand a slightly higher level of mathematics. It is also advantageous to have a good command of written English.

Recommended Texts

The course reader is Fauvel & Gray, *History of Mathematics, a Reader* (McMillan, C. £25), which is essential. Short surveys like D J Struik's *Concise History* (4th edn only) indicate a framework. General histories like those of Boyer & Merzbach, and V. Katz, are useful adjuncts to the course. S. Hollingdale's *Makers of Mathematics* is a readable and informative introduction.

Assessment

Each year there is a special subject, on which there will be a compulsory question in the final examination. The special subject for 2024/25 will be 'Euler: Analysis, Number Theory and Combinatorics'. This question will require students to show detailed mathematical knowledge. Students may be asked to provide definitions and proofs as well as to comment on the material but there will be no requirement to solve unseen problems. The rest of the final examination will consist of unseen essay questions. In addition there is an assessed coursework component: students will be expected to submit eight short essays as well as to give a brief oral presentation on a topic of their own choosing. 20% of the final mark is allocated to coursework.

Detailed Syllabus

Topics covered in the course may include the following:

- Special subject for 2020-21: 'The Beginnings of Calculus'
- Egypt and Babylon

- Greek mathematics (Euclid, Archimedes, Apollonius, Ptolemy)
- Mathematics in the Islamic World
- The transmission of the mathematics of antiquity to medieval Europe
- Algebra, trigonometry and arithmetic in the Renaissance
- Analytic geometry in the seventeenth century (Descartes, Fermat)
- The beginnings of calculus
- The calculus of Newton and Leibniz
- Newton's *Principia*
- Euler
- Gauss
- The history of the parallel postulate
- The discovery of non-Euclidean geometry
- Galois and the Solution of Polynomial Equations