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Day 0. 8.5.2013

HISTORY OF MATHEMATICS

Professor N. H. BINGHAM

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Course website: My homepage.

Tue 11-12, 130; Wed 9-10, 139; Fri 12-1, 139

Course text:

Carl B. BOYER, *A history of mathematics*, Wiley, 1968 (2nd ed., with Uta C. MERZBACH, Wiley, 1989) (a good general text; less good on applied mathematics, science, and the 19th and 20th centuries).

Other texts:

Morris KLINE, *Mathematical thought from ancient to modern times*, OUP, 1972 (a good general alternative; rather too long for this course).

Mactutor: this website on the History of Mathematics is maintained by the Mathematics Department of the University of St. Andrews. It contains accounts of the lives and work of most of the principal figures in mathematics.

Ioan JAMES, *Remarkable mathematicians, from Euler to von Neumann*, CUP, 2002 (a good selection of short accounts of many of the main figures; the emphasis is on the author's area, topology).

Aim:

To give an overview of the development of mathematics, from ancient to modern times, with particular reference both to the undergraduate curriculum on the one hand, and to the history of science and to history generally.

Syllabus

I. ANCIENT [12 hours]

Pre-history. Egypt and Mesopotamia. The Greeks: the Pythagoreans; Plato and Aristotle; Euclid; Archimedes; Apollonius. China and India. The Arabs.

II. MODERN [20 hours]

Europe in the middle Ages; the Renaissance; Galileo and Kepler; Fermat, Descartes, Huygens; Newton and Leibniz; the Bernoullis; mathematics around the French Revolution; Gauss and Cauchy. The 19th C: geometry; analysis;

algebra; applied. Poincaré and Hilbert. The 20th C: enter the USA; analysis; other pure; applied.

There are a number of good films available, and we will aim to devote one to three lectures to films.

Why History of Mathematics?

1. Mathematics is a human creation. It has emerged over millennia, as a result of great labour by very many highly intelligent people. It is constantly evolving, and is not set in stone. Knowing something of the history of the subject helps to bring any individual course to life, and the undergraduate programme as a whole to life.
2. The evolution of mathematics spans a number of different historical periods, and a number of different cultures. Its study helps one to put one's own knowledge and environment in a broader context.
3. Mathematics is the common core of all science; science is the difference between the modern world and the Middle Ages. Without mathematics there is no science; without science (there is no Imperial College and) we're back in the Middle Ages burning witches.
4. The course will focus on what mathematics is used for as well as mathematics for its own sake. You will emerge with an enhanced awareness of science.
5. The course will enhance your historical sense generally. History is not so much a matter of lists of names and dates as an overview of how human experience in different parts of the world and different time periods fits together.
6. The course will give you practice in writing English prose. You will not have done much of this since leaving school, and may be rusty (or even have fled into mathematics to avoid it). But good document preparation – in undergraduate or MSc projects, in PhD theses, in professional life later – is a valuable skill. You will gain a greater ability to express yourself clearly in good English.
7. The course will teach you a lot you didn't previously know, but will also "re-live" your previous experience of mathematics – from childhood up to now. Most people find this emotionally as well as educationally satisfying (and it is excellent preparation for parenthood!).
8. For those of you intending to take mathematics further: by broadening your awareness of different areas, the course may help you to take a better informed decision on which area you want to work in.

NHB