Aims

The objective of this course is to develop skills and mathematical thinking for problem solving, to discover where mathematical concepts and methods appear in the 'real' world and to consider different modelling strategies.

Syllabus

Mathematics is everywhere — it can be found in the natural and social sciences, in engineering, in administration, in economics. Many of the technical devices that we use every day rely upon mathematical methods. A series of short case studies will present mathematical modelling in a range of contexts, emphasising the ideas underlying the model and its applicability. The case studies will be related to the following settings:

Games and competition: How can we determine the best outcomes in competitive scenarios? What does mathematical modelling tell us about well-known competitive games?

Communication and information: What’s the mathematics behind comparison of data and efficient digital communication?

Dynamical systems: Dynamical systems change: can we predict the long-term outcomes, and what tools do we need?

Optimization: How can we optimize the outcome of a complex system that is operating under constraints?

Maths and the media: How is mathematics presented in the media? Does it help our understanding of mathematics itself, and of its applications in understanding the world in which we live?

Real-world situations will lead us to apply and review important mathematical concepts; but the emphasis will be on successful mathematical modelling using quite elementary ideas.

Teaching and Assessment

Contact Hours: 4 interactive sessions per week
Assessment: 100% by class tests or other continuous assessment
0% by end of course 2-hour exam
Resit Type: Exam

Content: 28 August 2018
By the end of the course, students should be able to:

- understand how realistic applications have a non-trivial complexity and require careful working
- understand how basic mathematics may be applied in applications, and carry out such applications
- appreciate that applications often require more than one area of mathematics or science.