

---

# Programming in the Undergraduate Mathematics Curriculum

---

## Schedule

### Time

---

11:00am - 11:15am      Registration

---

11:15am - 12:00pm      Noel-Ann Bradshaw: To code or not to code? For employers there is no question

---

12:00pm - 12:30pm      Peter Rowlett: Programming as a mathematical activity

---

12:30pm - 1:15pm      Lunch

---

1:15pm - 1:45pm      James Denholm-Price: Nooblab and MATLAB: Teaching programming to maths and computing students

---

1:45pm - 2:15pm      Vincent Knight: Four stories and four models of learning

---

2:15pm - 2:45pm      Matthew M. Jones: Group assessment and design patterns

---

2:45pm - 3:00pm      Coffee and refreshments

---

3:00pm - 3:30pm      Stephen Lynch: Programming on a Maths Degree to Enhance, Teaching, Learning, Assessment, Research and Employability

---

3:30pm - 4:00pm      Chris Sangwin: Automatic assessment of students' code using CodeRunner

---

# Abstracts

11:15 - 12:00

## Noel-Ann Bradshaw: To code or not to code? For employers there is no question.

Many of the maths graduates I have taught have ended up coding in Python, SQL or other languages regardless as to the content of their degree programme, however, those who have been taught have arguably progressed more quickly. This talk will demonstrate the value of programming to the undergraduate from an employer's perspective and the benefit that this has on their future employment. It will also explain how the world of work is changing, with programming skills becoming more important to graduates of all disciplines. I will draw on my experiences of working both in industry and HE.

12:00 - 12:30

## Peter Rowlett: Programming as a mathematical activity

I have taken on an optional second year programming module for the first time in 2018/19. I will talk about my attempt to redesign, teach and assess this. I will argue that programming is not the same as coding and that programming is relevant to mathematical thinking. I will talk about the structure of the module and its assessment, and redesigning these to be more relevant to future employment.

13:15 - 13:45

## James Denholm-Price: Nooblab and MATLAB: Teaching programming to maths and computing students

Programming is a key employability skill for mathematicians (as for many "knowledge worker" graduates) and arguably mathematicians have been doing it for as long as computer scientists. The techniques for introducing programming should have some universality and at Kingston we have shared aspects of introductory programming (or perhaps in the maths world we might label it computational thinking) with CS's "programming 1" for several years. In this session we will share examples from this practice and attempt to draw parallels between the two sides whilst highlighting the need for different approaches, and also illustrate how it can align within a broader employability skills agenda to support a minority of maths undergraduates working within a larger computer science cohort.

13:45 - 14:15

## Vincent Knight: Four stories and four models of learning

In this talk I will discuss 4 different areas where programming is learnt at Cardiff University's school of mathematics. This will include a proposed model of where a programming (and indeed any) course sits on a number of dimensions. The talk will not only describe these specific dimensions but also describe implementation of the courses in such a way as to promote active learning and best pedagogic practice. Finally, some personal reflections will also be offered.

14:15 - 14:45

### Matthew M. Jones: Group assessment and design patterns

Our programming content is embedded in a Problem Solving Methods module where students work in teams to discuss and solve unfamiliar problems. I'll talk about our approach to teaching the problem solving aspects of programming and how we can use team work to develop students' knowledge of more advanced ideas in software design including design patterns

15:00 - 15:30

### Stephen Lynch: Programming on a maths degree to enhance teaching, learning, assessment, research and employability

In the UK, Mathematics is the most popular subject at A-Level, however, it is not a popular subject to study at university level. Can the use of Mathematics packages make it a more popular subject to study at A-Level and at university? At MMU we wanted to attract and retain mathematics students and prepare them for careers upon graduation. By integrating Maths/Stats packages across the curriculum and by solving real world problems we have managed to make the course highly desirable and loved by our students. Stephen is a STEM Ambassador, a Speaker for Schools and a Public Engagement Champion. He is the author of Maple, MATLAB, Python and Mathematica books.

15:30 - 16:00

### Chris Sangwin: Automatic assessment of students' code using CodeRunner

Programming is widely taught, particularly to all STEM students, in a variety of languages. This talk will describe our experiences of using CodeRunner (<https://coderunner.org.nz>). CodeRunner is a plug-in for Moodle that can automatically assess program code submitted by students in answer to a wide range of programming questions in many different languages. It is intended primarily for use in computer programming courses although it can be used to grade any question for which the answer is text. In this talk I will describe how we have used CodeRunner at the University of Edinburgh for Python, Matlab (Octave) and other languages.