Welcome to SMSTC!

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SMSTC Director

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What is SMSTC?

SMSTC is the Scottish Mathematical Sciences Training Centre.

We provide graduate mathematics courses to all of Scotland.

There are eight member departments.

Why do we exist?

UK higher education in mathematics has traditionally been:

- short: typically 3 years undergrad + 1 year Masters + 3 years PhD, which is shorter than most of the rest of Europe;
- narrow: e.g. in the USA, you'd probably spend your first year or two of graduate school taking courses.

The 2004 International Review of UK mathematics concluded that PhD graduates were often strong in their narrow field, but lacked breadth.

As a result:

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As a result:

- the standard PhD programme was lengthened to 3.5 years,
- with the first 0.5 years to be spent on broadening training.

This training is provided by six 'taught course centres' across the UK.

Who are we?

SMSTC is a community project, not an external body. It includes:

- Students: mostly 1st year maths PhD, but also higher years, other subjects, other universities, postdocs, staff, ...
- Lecturers: c. 50 per year, drawn from all eight universities.
- Administrators: ICMS.
- Director: David Pritchard.
- Theme Heads: Natalia Bochkina, Heiko Gimperlein, Sira Gratz, Richard Scott.
- Technical staff at each university.
- Postgraduate directors of studies at each university.
- Tutors at each university.
- External advisers from outwith Scotland.
- Student representative at each university (volunteers needed!)
- Student representative on the SMSTC committee (volunteer needed!)

What courses do we offer?

We run core modules and supplementary modules.

Core modules:

- run every year;
- are aimed mostly at first-year PhD students;
- consist of two-hour lectures once a week for ten weeks;
- have graded assignments.

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Supplementary modules:

- appear and disappear from year to year: an ever-changing selection;
- may be more advanced and taken by higher-year PhD students;
- may be shorter;
- don't always have graded assignments.

If you want a supplementary module to count towards your department's training requirements, talk to your supervisor or postgraduate coordinator.

Themes

You can take any combination of modules you want, as long as:

- you have the prerequisites (see the Prospectus under the Timetable tab)
- your department agrees.

For convenience, we organize the core modules into four themes:

- Analysis
- Applications of Mathematics
- Probability & Statistics
- Structure & Symmetry

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Analysis

Theme Head: Heiko Gimperlein (Heriot-Watt)

Core modules:

- Dynamical Systems and Conservation Laws (Semester 1)
- Measure and Integration (Semester 1)
- Elliptic and Parabolic PDEs (Semester 2)
- Functional Analysis (Semester 2)

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Applications of Mathematics

Theme Head: Richard Scott (St Andrews)

Core modules:

- Asymptotic and Analytical Methods (Semester 1)
- Continuum Mechanics (Semester 1)
- Numerical Methods (Semester 2)
- Mathematical Biology and Physiology (Semester 2)

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Probability and Statistics

Theme Head: Natalia Bochkina (Edinburgh)

Core modules:

- Foundations of Probability (Semester 1)
- Regression and Simulation Methods (Semester 1)
- Stochastic Processes (Semester 2)
- Modern Regression and Bayesian Methods (Semester 2)

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Structure and Symmetry

Theme Head: Sira Gratz (Glasgow)

Core modules:

- Groups, Rings and modules (Semester 1)
- Algebraic Topology (Semester 1)
- Algebras and Representation Theory (Semester 2)
- Manifolds (Semester 2)

Supplementary modules

First semester:

- Combinatorics on Words
- Finance, Risk, Asset-Pricing, Credit Scoring etc.
- Geometry of Gauge Fields
- History of Mathematics
- Mathematical Foundations of Elasticity Theory

Second semester:

- Classical and Quantum Integrable Systems
- Incidence Geometry, Continuous and Discrete (tbc)
- Inverse Problems
- Mathematics for the Future Energy Industry (tbc)
- Variational Methods for PDEs and Nonlocal Problems

How do lectures work?

Lectures will be delivered via Zoom.

- Joining details will be emailed to enrolled students.
  Please don't share them further.
- Lectures will not (and must not) be recorded
  — exceptions by request only.
- Full notes are available on the website.
- It's up to you if you want video on/off and if you want to participate
  — but if you can participate, this should benefit you.

What happens outside lectures?

Material on the website: The website (www.smstc.ac.uk) is crucial!

Study the notes, do the exercises, follow up on suggested texts, etc.
Some modules are 'flipped': you're expected to read in advance.

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Assessment: Each core module is assessed in either one or two assigments.

You get written feedback, a grade for each assignment, and an overall grade for the module. All this is visible to your supervisor.

How many modules should I do?

If you're EPSRC-funded, the amount of training that EPSRC demands is equivalent to five or six modules.

If you're not EPSRC-funded, your department will probably require a similar amount anyway.

Your choices should be to widen your knowledge, not directly to support your research.

Your postgraduate director decides what's required (not us).

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Example scenarios:

- Student A takes six core modules.
- Student B has already done a lot of high-level courses in her Master's degree, so only takes three modules: two core, one supplementary.
- Student C takes four core modules, but wants to learn some other subjects that SMSTC doesn't offer, so also takes an undergraduate course and a reading course.

How much time does all this take?

Typically, about 75% of your time for the first six months of your PhD is intended to be spent on training.

Make sure your supervisor doesn't overload you with other work.

Warning: You are likely to have clusters of assignment deadlines around the middle and end of semesters.

Plan ahead for this!

What doesn't SMSTC do?

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SMSTC doesn't provide tutorials.

These are the responsibility of your department.

Lectures are done centrally by videoconference—organized by SMSTC.

Tutorials are done locally in person—organized by your department.

If you're not being offered tutorial support, *complain to your department!*

Whom can I ask stuff?

Local tutors: e.g. specific mathematical points.

Lecturer: e.g. points that your tutor can't answer.

Theme Head: e.g. feedback on course provision.

Postgraduate director and supervisor: e.g. questions about your training.

SMSTC administrators: purely administrative questions.

David Pritchard (director): questions about SMSTC as a whole.

Me, now: . . . ?

Why, oh why?

We have a feedback exercise every spring to get detailed feedback from you on every module.

This is extremely useful for future students.

But you don't have to wait for spring!

Feedback is welcome at all moments. Options:

- Speak directly to the lecturer or theme head.
- Talk to your student representative, who will pass it on to us.
- Talk to me.

What now?

Here's what happens over the next couple of days:

- An overview of each theme, including content, prerequisites and assessment, and giving you
  - help to make up (or change) your mind on which modules to take
  - a chance to broaden your knowledge, even if you've already made your choices
- Presentations on some useful stuff for PhD students to know
- Meeting students and staff from universities across Scotland