MSc Applied Computational Science & Engineering
Why study the Applied Computational Science and Engineering MSC?

- Gain programming and foundational domain knowledge combined with advanced numerical literacy.
- Develop computational and data skills needed in industry and academic research.

- Take on a unique course:
  - Training on software development for science and engineering applications.
  - Intersection of mathematics, physics, engineering and computing.

- Research-led teaching
Expertise in Earth Science & Engineering

The Department has a wide range of computational science and engineering expertise.

- Simulation technologies
- Advanced numerical methods
- Machine learning
- Domain specific languages
- Automatic code generation
- Adjoint-state methods for data-inversion and optimisation problems
What is the course about?

- Model dynamical processes using numerical methods and advanced programming.
- Large scale, big data, machine learning.
- Combining mathematics, physical sciences, engineering, and computational science.
- Preparing tomorrow’s technologists, entrepreneurs and computational problem solvers.

“Students will engage with a broad range of trending coding techniques and applications – we will prepare them for success in industry and academia”

Dr Adriana Paluszny
Royal Society University Research Fellow
Course outline

• 12 month MSc course
• New programme, first intake October 2018 (31 students).
• Strong emphasis on programming and practical assessment.
• Students undertake a three month individual research project in academic research lab or industry.
• Seminar series from academic and industrial researchers.
• Training workshops – professional development.
Term 1
- Modern programming methods
- Modelling dynamical processes
- Numerical methods
- Group projects

Term 2
- Advanced programming
- Patterns for parallel programming
- Inversion and optimisation
- Group project

Term 3
- Machine learning
- Group project
- Independent Research Project
Industry Collaborations

- Training workshops
- Careers visits (in 2018/19 this included visits from Microsoft, Improbable, Halliburton and others)
- Hackathons
- Internships
Individual research projects

50 different projects offered in 2018/19
Example topics included:

• Advanced error models for adaptive tidal turbine arrays modelling.
• Machine learning in the geosciences – integrating seismic, well logs and production data.
• Inverting crater clusters on Mars to infer impactor properties in support of the NASA InSight mission.
• Computational methods for radiation transport on supercomputers.
• Optimisation and inversion of large problems in the real world.
• Model reduction using Long Short Term Memory neural networks.
Graduates

• Fill the market demand for those with applied, hands-on computational experience who can solve real world problems.
• Expert analysts in industry: geoscience, risk management or climate science.
• Pursue academic careers: computational techniques, optimisation and inversion, fluid mechanics, machine learning applications.
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