Welcome to the School of Informatics

Prof Jane Hillston, Head of School
University structure

• **College of Medicine & Veterinary Medicine (>2000 staff, 4 Schools)**
  - Biomedical Sciences; Clinical Sciences; Molecular, Genetic and Population Health Sciences; and Royal (Dick) School of Veterinary Studies.

• **College of Arts Humanities & Social Science (>1400 staff, 11 Schools)**
  - Business; Divinity; Economics; Edinburgh College of Art; Education; Health in Social Science; History, Classics & Archaeology; Law; Literatures, Languages & Cultures; Philosophy, Psychology & Language Sciences; Social & Political Science.

• **College of Science & Engineering (>1800 staff, 7 Schools)**
  - Biological Sciences; Chemistry; Engineering; GeoSciences; Informatics; Mathematics; Physics.
Informatics in a nutshell

~400 staff, inc.:
  ~135 Academic staff
  ~200 Research staff

~1600 students:
  ~940 Undergraduates
  ~370 MSc Students
  ~300 PhD Students

• Most research power in the UK

• Record number of startups & spinouts over the last ten years

• Dedicated commercialisation team
1640 students registered for this session including students from 82 countries outside the UK (30/05/2018)

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<th>Country</th>
<th>Undergraduates</th>
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26%
The science of information – how natural and artificial systems process, store and communicate information

- a fundamental Science underpinning all areas of life; Academic, Industrial and Social.

- encompasses Computer Science, Data Science, Robotics, Artificial Intelligence, Speech & Language Technology.

What is Informatics?
Our School has produced more **world leading** and **internationally excellent research**.
in computer science and informatics than ANY other university in the UK*.

Learn from recognised leaders in the field.

**Best and largest** computer science department in the UK: 940 undergraduates, 640 postgraduates and 330 academic and research staff (August 2018).

Lecturers regularly nominated by our students for **teaching awards**.

We attract the **brightest and best from all over the world** – students from over 60 countries.

**Athena SWAN Silver Award 2013 and 2016**.
Research Institutes

ANC | Institute for Adaptive and Neural Computation

CISA | Centre for Intelligent Systems and their Applications

ICSA | Institute for Computing Systems Architecture

IPAB | Institute of Perception, Action and Behaviour

Lifcs | Laboratory for Foundations of Computer Science

ILCC | Institute for Language, Cognition and Computation

BRAIN | Neuroinformatics, Machine Learning


COMPUTER SCIENCE | Parallel Computing, Micro Architectures, Wireless Protocols & Apps, Iterative Compilation, Self Timed Circuits

ROBOTICS | Robotics, Vision

THEORY | Databases Languages, Semantics, Complexity & Algebra, Concurrency & Modelling, S/W Engineering Theory

LANGUAGE | Natural Language Processing, Multi Modal Interaction, Information Extraction, Speech Synthesis
Welcome to Edinburgh
Taught Postgraduate Study
Dr Paul Jackson
Our MSc programmes

- Artificial Intelligence
- Cognitive Science
- Computer Science
- Data Science
- Design Informatics / Advanced Design Informatics
- Informatics

Also: High Performance Computing/with Data Science
- Analytical & Scientific Databases
- Bioinformatics, Systems & Synthetic Biology
- Cognitive Science
- Computer Systems, Software Engineering & High-Performance Computing
- Cyber Security & Privacy
- Intelligent Robotics
- Agents, Knowledge and Data
- Machine Learning
- Music Informatics
- Natural Language Processing
- Neural Computation & Neuroinformatics
- Programming Languages
- Theoretical Computer Science
Semester one
Informatics Research Review (IRR) — 10 credits of coursework + 50 Credits of Taught Courses

Semester Two
Informatics Project Proposal (IPP) — 10 credits of coursework + 50 Credits of Taught Courses

Summer
Dissertation Project
Structure of a course
• A standard lecture course normally consists of up to twenty one-hour lectures (two per week for one semester) together with associated coursework and background reading.

Core Courses
• The IRR and IPP courses introduce you to the research activity specific to your specialist area. Informatics Research Review gives you an opportunity to survey literature on a particular topic within your specialist area. Informatics Research Proposal allows you to build towards your summer research project. Both IRR and IPP are graded with a numerical mark, just as with the taught courses.

Programming requirement
• All MSc students should be able to program well by the time they leave the School of Informatics. This requirement can be fulfilled by taking one or more approved programming classes, unless you obtain an exemption (see below). Most students fulfill the programming requirement by taking Introduction to Java Programming (IJP) in Semester 1. This class moves quickly, really assuming that you have some prior programming experience, and should take you to the level where you can construct large programs in Java.
Samples of Dissertations:

- Video Tracking of Drosophila Melanogaster Gravitaxic Behaviour
- Controlling robot in virtual world applying AI planning
- A generic metadata management tool for large-scale data-intensive applications
- Automated Stock Trading and Portfolio Optimization
- Using XCS Trader and Technical Analysis
- Accuracy measures for neural population codes with correlated variability
- Probabilistic Time Lapse Video
- Query Evaluation over Distributed File Structures
- Paying Attention to Attention: towards a unified computational model of visual perceptual learning
- Implementing a Workflow Engine for Executing Business Process and Business Analysis
- Exploring Neural Models of Path Integration Using Sub-optimal HTN-Generated Plans as a Basis for Searching for Near-optimal Plans
- Creating a Natural Logic Inference System with Combinatory Categorical Grammar
- Evaluating the Quality of Data on the Web ...
Any questions?

Optional tour for people interested in MSc only.

You are also welcome to stay for the CDT and Research Talk.

Refreshments are available in Mini Forum 2 (Level 4).

Our Student Ambassador will direct you.
Overview of CDT’s
Prof Jane Hillston
AI: focus is on automated system
- Emulating human-like behaviour in a general setting for a given task.

Data Science: focus is on the challenge/data in a scenario
- Properties, needs, tasks, and models.

- CDT in Data Science and AI integrates these two.
- 1 year MScR + 3 year PhD. Breadth and Depth
- Strong cohort
- MSc Project and PhD Project
Quality of individual lives as well as entire economies now depend on software robustness and security. Is a huge challenge to make software error-rate acceptably low.

CDT about creating new **formal lightweight** verification techniques
- **Formal**: maths and logic based to deliver strong assurances
- **Lightweight**: language-embedded and automated to promote uptake

Innovative aspects:
- Research skills training
- Masterclass days on core topics (e.g. type theory, formal semantics, model checking, SAT/SMT solvers)
- Team projects
- Industrial placements for all students

Application domains: digital healthcare, robotics, cybersecurity, cryptocurrencies, fintech, manycore systems, data science, internet of things, and many others.

Collaborators:
- Heriot-Watt University
- University of Glasgow
- University of Strathclyde
- University of St Andrews
Natural language processing
semantics, discourse, parsing, generation, machine learning for NLP, machine translation.

Speech technology
speech recognition, speech synthesis, prosody, information structure.

Dialogue and multimodal interaction
conversational agents, negotiation, multi-party interaction, language and vision.

Computational theories of human cognition
cognitive modeling, human parsing, language acquisition, music, educational technology.

Information retrieval and design informatics
summarization, question answering, social media analysis, visualization, human-computer interaction.

4-year PhD degree with integrated training
Social Media Analysis

Social media data is not just text:
• time stamps, locations, interaction histories
• user-specified tags and emojis
• user profiles and user networks

Applications:
• sentiment: predict attitude towards events, propositions, people, products
• analyse political and social trends
• fact checking, content moderation

Sentiment towards Ukraine around MH17 plane crash (17/07/14):

<table>
<thead>
<tr>
<th>Month</th>
<th>March 6th-12th 2014</th>
<th>June 20th-27th 2014</th>
<th>July 17th-23rd 2014</th>
</tr>
</thead>
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Robotics and Autonomous Systems

4 Year PhD Programme

1. Technical Training
   - Robotics Science and Systems
   - Autonomous Systems Research
   - Electives from ~50 courses
   - Software Bootcamp/Hackathons

2. Innovation Training
   - Innovation Training and Innovation Fund
   - Gateway Events
   - Soft skills, e.g. presentation skills
   - Responsible Research and Innovation (RI)

3. International Experience
   - International lab or industry placements

[Diagram showing the relationship between Innovation Training, Technical Training, and International Experience]
Overall goal
Design, analysis & engineering of IT systems/services that are:
  – resilient to attacks
  – in harmony with their social context

44 Partners
£32.3M total (£29M in kind and £3.3M in cash), including:
Any questions?

Optional Tour for people interested in MSc/CDT’s only.

You are also welcome to stay for the Research Talk.

Refreshments are available in Mini Forum 2 (Level 4).

Our Student Ambassador will direct you.
Research Postgraduate Study

Prof Nigel Topham, Director of Graduate School
What is a PhD, and what will I learn?

- PhD is a research degree
  - Training you to be a professional researcher in your field
- You’ll discover what is current in your subject.
- You’ll know how to make an original contribution.
- You’ll have mastered the appropriate methods, and can build on them.
- You will learn to communicate your results effectively.

- It’s like your final year/MSc project only longer and you have the responsibility to drive the project
Motivation for doing a PhD

- 😊 Advancing the frontiers of knowledge
- 😊 Personal satisfaction
- 😊 Passion for the subject
- 😊 Improved job prospects

- 😞 3+ years of sustained work
- 😞 Success not guaranteed, but failure is rare
What does doing a PhD involve?

- Challenging work
- ... on an original research topic
- ... with the help of experienced researchers:
  - principal supervisor + assistant supervisor
  - or equal co-supervisors from different areas
  - often within a research group of post-docs or further advanced PhD students
  - within an Informatics Research Institute
- PhD study is a research apprenticeship
Typical timeline of activities…

**First year:**
- Fill in gaps in background, learn about current research directions, decide exact topic, develop a research plan, and start…

**Second year:**
- Follow plan and achieve goals 1, 2, 3, discover that goal 4 is unachievable, change to plan B, achieve goal 4B...

**Third year:**
- Write thesis outline, achieve more goals from plan, write thesis, look for jobs, submit thesis…

**Fourth year:**
- Oral thesis examination (viva)
What else will you do?

- Practice presenting your research
  - Talks, papers, workshops, conferences
- Learn more
  - Seminars, MSc courses, summer schools
- Learn to teach
  - Tutorials, other teaching assistance
- Transferrable skills training
  - Presentation skills, management skills, entrepreneurship skills, ...
Post-doctoral career options?

• Many options:
  - academic positions, university research,
  - corporate research,
  - start-ups,
  - consultancy firms,
  - government departments

• Our graduates are in high demand
The role of PhD students in Informatics?

• PhD students are the largest constituency (350) in the School.

• PhD students are involved in every aspect of research, and make a massive contribution towards the success of the School.

• 😊 There is a strong and thriving community

• 😊 There are a large range of opportunities to get involved in, beyond your direct study
• Need at least a 2:1, but 1st or MSc Distinction is more realistic
• We expect to admit 70-80 new students
• Funding is key limiter:
  • Informatics will be able to fund approx. 45 places
• UK / EU students:
  • Funding from 3 CDTs and EPSRC DTAs
• Overseas students:
  • Having your own national funding helps enormously
  • Be aware of any scholarships available to you
  • University and Informatics scholarships are available
• More information on Informatics PGR website
• There are scholarships for 2019 entry 😊
• Funding is limited, and therefore not guaranteed, but Informatics is well-placed:
  • CDT programmes are expected, will be announced late 2018
  • 10+ individual EPSRC scholarships
• Wide range of funding sources
  • Some open to best students, with strong research proposals
  • Some for specific topics (supervisor has project and associated student funding)
  • Many in specific research areas
• See: www.ed.ac.uk/schools-departments/informatics/postgraduate/fees/researchscholarships
To apply

- [http://www.ed.ac.uk/schools-departments/informatics/postgraduate](http://www.ed.ac.uk/schools-departments/informatics/postgraduate)
- Find out about our research
- Approach potential supervisor(s)
- Decide what you want to do
- Write a provisional research proposal
- Find two referees
- Submit an application NOW
- Understand your funding options and take action if necessary
- Wait for the result
Any questions?

Optional Tour of facilities. Refreshments are available in Mini Forum 2 (Level 4).

Our Student Ambassador will direct you.