Welcome

Overview over the Module

Research Culture in Computer Science

Monday 3 October 2011

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http://www.cs.swan.ac.uk/~csetzer/lectures/researchmethodology/11/index.html
Overview over the Module
Research Culture in Computer Science

Available at
http://cs.swan.ac.uk/~csbob/teaching/whley10handbook2sep.pdf

General Structure

- Week 1/2: Introductory lectures (general).
- Week 3 - 7: Lectures by the degree scheme coordinates on research methodologies in the areas covered.
  - Typically
    - One lecture of general nature (e.g. “ethics”)
    - One lecture about research in that particular field.
  - In parallel tutorials led by tutors specialised in the pathways (+ one tutorial for non-specialist CS).
    - Students will carry out a mini-project related to their specialisation.
    - Could be an essay, a small program, a small user study.
    - Students write an essay and prepare a presentation.
- Week 8 - 10 Student presentations.

Synopsis

“This module consists in lectures and seminars about
- fundamental research methodologies and
- good practice in research,
- formulation of research questions and hypotheses,
- logical reasoning,
- literature research,
- proper acknowledgement of sources,
- principles in carrying out experimental research.”

Timetable

- 3 lecture slots per week:
  - Tuesday 11 - 12 Robert Recorde Room.
  - Friday 10 -11 Keir-Hardy 330
  - Friday 13 - 14 Grove 261
- In first 7 weeks only 2 lectures given.
- Usually lecture Friday 13 - 14 cancelled.
- On 14 October and 11 November,
  - lecture Friday 13 - 14 takes place
  - lecture Friday 10 - 11 cancelled
  - (CS-M13 takes place at the Friday 10 - 11 slot)
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Terminology

- Non-specialists means “MSc in Computer Science”.
- ACS usually refers to
  - MSc in Advanced Computer Science (including specialisations),
  - CAST MSc,
  - FIT MSc.

Assessment

- Mini project allocated by tutor:
  - One essay or project report (50 %)
  - One talk (50 %)

Choice of Specialisations

- Non-specialists have their own projects.
- ACS have projects corresponding to the 5 specialisations.

Students in ACS please hand in by Friday 7 October in Student Office:

- scheme transfer forms (if not required cross out).
- and (even if taking open specialisation or CAST MSc) indicate an intended specialisation from a list:
  - Human Computer Interaction (HCI),
  - Safe and Secure Systems,
  - Software technology,
  - Visual Computing,
  - or Web Science

Tutorials

- Tutorials will be allocated
  - One for non-specialist MSc
  - For ACS groups organised by specialisations.
Double Badging of Modules

- For Swansea BSc in Computer Science Graduates
  - Double-badged modules taken cannot be taken again.
    - Includes Data Visualisation, Computer Vision, High Performance Computing.
  - Subject to confirmation:
    - Those students can take CS-M59.
    - Those students get priority on Embedded Systems.

Election of Student Representatives

- Please consider being student representatives.
- Election will take place in Friday 14 October in CS-M00 (13-14).

Topics in this Module (Week 1/2)

1. Introduction (this lecture)
2. LaTeX (by Anton Setzer) (Word processing system)
3. Academic Integrity (by Chris Whitley).
4. Bibliographies (by Anton Setzer)

Topics (By Pathway Coordinators, Week 3 - 7)

(Order to be decided).
- Anton Setzer
  - Evaluation of Scientific Texts.
  - Specification and Verification of Software.
- Roger Stein
  - Project Management and Planning.
  - Project Selection.
Topics (By Pathway Coordinators)

- Max Wilson:
  - Writing Skills
  - Ethics Procedure
  - Introduction to HCI
  - Introduction to Web Sciences (TBC)
- Jason Xie:
  - Research paper critique and review rebuttal.
  - Visual computing research topics & general methodology

3 Main Methodologies

- Theoretical Research.
  - Thinking.
  - Foundations of Computer Science.
    - E.g. “What is a program?”.
    - What kind of data types do exists?
  - Developing new ways of solving problems.
    - New algorithms.
    - New programming paradigms.
    - · · ·
- Mathematical Research.
  - A lot of proofs carried out.
  - E.g.: Prove that algorithm A is better than algorithm B.
  - Prove that it is possible to decide that this program is correct.

Disclaimer

Most of the pictures used in this lecture are downloaded from the internet.
They are not my original work.
3 Main Methodologies (Cont.)

- Experimental Research.
  - User Studies.
  - Software Experiments.
- Software Production.
  - Usually experimental software
  - Trying out new algorithms, paradigms, programming languages.

However most of it is

Thinking Thinking Thinking

Ideas

- Creative Process.
- Ideas usually have roots in other ideas.
- Inspirations from others.
- Inspiration from other fields inside computer science, outside computer science.
- Or even arts, travelling.

Example: Greek Philosophy

- Greek philosophy origins from colonies close to Turkey, exposure to other cultures.
- Many researchers have been exposed to different cultures in early childhood.
  - Parents moving to other countries.
  - Being part of a minority in a country.
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Most Important

Exchange of Ideas

Conferences

Conferences, Workshops

- A lot of research happens at conferences, workshops.
- From two to several thousands participants.
- Small workshops, large conferences.
- Some high prestigious by invitation only.
  - Oberwolfach (Germany)
  - Dagstuhl (Germany)
  - NII Shonan Meeting (Japan)

Social Events more Important than Lectures

Most happens during coffee breaks, lunches, dinners. Coffee breaks often more important than lectures.
My own experience

- Good lectures give rise to new ideas even if I don’t understand what the lecturer is talking about.

Other Forms of Collaborations

- Sabbaticals.
- Visits to Research Institutes.
  - Institute for Advanced Studies (Princeton).
  - Newton Institute (Cambridge).
  - Mittag-Leffler Institute (Stockholm).
  - ...
- Research visits.
  - Between 1/2 day and several years.
- Seminars, colloquia.

Scientific Journals

- Typically called
  - Journal of ... (Journal of Symbolic Logic)
  - Annals of ... (Annals of Pure and Applied Logic)
  - Archive of ... (Archive of Mathematical Logic)
  - Transactions of ... (ACM Transactions on Human-Computer Interaction).
  - Acta ... (Acta Informatica)
  - Many more.

- Most published by scientific publishers.
  - E.g. Elsevier, Springer ...
  - Subscriptions very expensive.
  - Access to electronic subscriptions at Swansea
    - On campus.
    - Off campus through Athens.
- Increasingly open access journals.
  - Produced by the scientific community.
  - Reason: Most articles submitted in directly publishable form.
    - No need for process of editing.
  - Why pay if publishers don’t add much to it.
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Proceedings

- Proceedings of Conferences
  - Often published in
    - Springer Lecture Notes in Computer Science.
    - Electronic Notes in ... (e.g. Electronic Notes in Theoretical Computer Science).
  - Many other outlets.
- Usually refereed.
- Often highly competitive (acceptance rates e.g. 20 %, 10 %).

Referee Process

- Submission of article to an Editor.
- Editor sends it to Referees.
- Referees write anonymous reports.
- Editor decides about
  - Revised version required
  - Rejection
  - Acceptance.

Festschrift

- Festschrift = German for “Festive publication”.
- Proceedings in honour of somebody famous.
  - Typically 60th, 65th, 70th, 75th, ... birthday
  - or retirement
- Sometimes not of highest quality (no thorough referee process).
- Sometimes very high quality.

Good Way of Searching Quality Scientific Articles

Enable “Get it at Swansea” in Settings
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Look for Doi pages (Document Object Identifier)

Identifying Electronic Versions of Scientific Articles

Look at pages of publishers
  ▶ Springer: Springer Link.
  ▶ Elsevier: Science Direct.
  ▶ ACM: ACM Digital Library.

Main Motivation for Doing Research

- It’s fun.
- Enthusiasm.
- Being amongst highly creative people.
- Going to the limit of human consciousness.
- It benefits society.
  - Top universities are hot beds for innovative companies.

Research and Teaching

- Research and teaching go hand in hand.
- Although research often beyond what is taught, it influences teaching.
- A researcher often shows not so much by what s/he is teaching, but how s/he is teaching, behaving, acting, thinking...
Be Inspired