CSCM10/CSCM10J Computer Science Project Research Methods

Introduction and Research Culture in Computer Science

Dr Scott Yang

January 2022

Welcome

Scope

- Overview of the Module

- Administrative Issues for MSc programs

- Coursework Submission

- Paper Submission of Coursework (mostly omitted during lecture)

- Research Culture in Computer Science

Overview of the Module

Aim of the Module

- Preparation for the Summer MSc Project CS-M20
- Introduction to
  - fundamental research methodologies
  - good practice in computer science research
- Support in undertaking
  - background research
  - literature review
- Culminating in
  - a full specification of your summer MSc project
- Learn career management skills

Combined Module CSCM10/CSCM10J

- This module is a combined module:
    - CSCM10 (MSc September intakes)
    - CSCM10J (MSc January intakes)
- Shared parts
    - Lectures are shared
    - Deadline for careers exercise is the same
    - Presentations will take place in the same student conference
- Differences
    - Initial report and specification document have different deadlines
    - CSCM10 is a TB1+2 module, in TB1 only tutorials took place
    - The specification for CSCM10J is due end of June 2022

Coursework

- There will be 4 coursework:
  - Careers Exercise (10%), due 21th February
  - Initial Report on project (15%) due including some academic references
    - 28th February for CSCM10
    - 25th March for CSCM10J
  - Presentation (25%)
    - After Easter vacation in the form of a student conference

Coursework cont.

- Full project specification (50%)
  - 2nd May for CSCM10
  - 30th June for CSCM10J

Note: a substantial part of the project for January intakes needs to be carried out during the summer vacation even before the specification is due
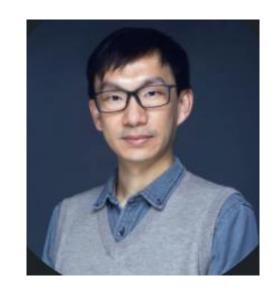
Timeline (from Ulrich)

- 19 Jan: Oct. starters - draft allocation
- 24 Jan: Oct. starters - announce allocation(Mon)
- 4 Feb: Jan. starters - deadline for project proposals (Fri)
- 7 Feb: Jan. starters - students can browse projects (Mon)
- 14 Feb: Jan. starters - project selection starts (was 11 Feb) (Mon)
- 21 Feb: … ends
- 25 Feb: Oct starters - deadline for ID (Fri)
- w/c 28 Feb: Jan. starters - announce project allocation (Mon)
- 25 Mar: Jan. starters - deadline for ID (Fri)
- 30 Jun: Jan. starters - deadline for Spec Doc (Thu)

Lecturers

Dr Scott Yang (Main coordinator)

Introduction

Research culture in CS

LATEX and Bibliographies

Writing your report and your project specification

How to give a presentation

Research in Theoretical Computer Science

…

Lecturers cont.

Dr Stuart Nicholson

Academic Integrity

Lecturers cont.

Mr Gareth Hill

Employability Component

Lecturers cont.

Dr Matthew Roach

Student Conference
Presentations

Lecturers cont.

Dr Ulrich Berger

CS-M20 MSc Project

Plan

27/01	Scott Yang Introduction to lecture, Administrative Issues, Research Culture in Computer Science
03/02	Stuart Nicholson Academic Integrity Gareth Hill Career Session 1
The followings are provisional	
10/02	Scott Yang Bibliographies LATEX
17/02	Scott Yang Project Planning of Computer Science Research Gareth Hill Career Session 2

Plan cont.

24/02	Scott Yang Writing a Research Report How to undertake a Computer Science Project
03/03	Scott Yang How to give a presentation Research into Theoretical Computer Science
10/03	Scott Yang The ethics of Computer Science Research Research in HCI
17/03	Scott Yang Research into Visual Computing Writing your Project Specification
…	…

Project Allocation

- Student from September intake should have been allocated a project and a supervisor (on Benjamin Mora's project manager)
  - You should regularly (weekly or biweekly) meet with your project supervisor
- Students from January intake will be able to select a project in February to be allocated by early March
  - Until this has happened there will be tutorials organised by Bertie Muller
  - Afterwards you should meet your project supervisor weekly or biweekly

Administrative Issues for MSc programmes

Administrative Issues

- The
  - handbook,
  - induction slides and recordings
  - a lot more material
- can be found
  - on Canvas in the Canvas Course HUB Computer Science Student Information
- Information not restricted to one module will be put onto those pages

Coursework Submission

Rules for Coursework Submission

- College of Science requires zero tolerance for coursework deadlines.
  - If you don't submit it on time (even if you are 1 minute late) you get 0%.
  - The only exception is if you have extenuating circumstances.
  - A special procedure has to be followed if you want to claim extenuating circumstances.
- The usual deadline for coursework is 11:00 am (Monday - Friday).

Submission via Canvas

- In practically all cases, you submit your coursework electronically via Canvas.

- Note that not all formats are acceptable
  - Check beforehand
  - Word documents might not be allowed or only certain version of word are allowed
  - pdf will usually work if a text document is required

- If you have multiple text documents, you will need to combine them into one pdf document or create a zip file depending on the specification by the lecturer.

Submission via Canvas cont.

- Text documents (reports, essays etc) are often to be submitted via Turnitin.
  - Turnitin is a very advanced system which finds similarities of texts in your document with books, articles, web pages, even coursework submitted before via Canvas.
  - The university is very strict regarding plagiarism (see lecture by Stuart Nicholson).

List of Coursework

- Login to College Intranet at

https://science.swansea.ac.uk/intranet/

- This will then show you a list of all coursework due for you.

Rules for Coursework Submission

Rules for Coursework Submission

It might happen (not while the university is online only) that a coursework submissions is non-electronic (this will not happen often)

For completeness paper coursework is covered in the following.

Please check the college intranet for latest information.

Paper Coursework (for completeness only)

- All paper coursework need to be submitted to a specific Dropbox.
  - For computer science coursework the location needs to be confirmed.
- All paper coursework needs to be submitted with a cover sheet which contains a specific bar code for you.
  - Please print it out ahead of time, not in last minute.
  - Shortly before 11:00 large queues for printing out are to be expected.
- The following is the procedure as it is at the time of writing those slides. It is likely that there will be changes.

Coursework Submission

- Please refer to
https://science.swansea.ac.uk/intranet/help/students/coursework
for the latest updates of instructions.

- Instructions at
https://science.swansea.ac.uk/intranet/help/students/coursework

Coursework Submission Page

Logged in as **John Smith**. (Logout)

College of Science Intranet

HOME > SUBMISSION > MY COURSEWORKS

Courseworks

This page lists all your courseworks, grouped by status.

Current

You should have received the assignment details for these courseworks. When you have completed each piece of work, click the appropriate 'Submit' link and print the cover sheet that's displayed.

Module	Lecturer	Title	Deadline	
CS-170	Dr. A. Beckmann	Winning Strategies	Oct. 7, 2011, 11 a.m.	Cover sheet

Future

These courseworks will be handed out later in the year. The title and dates are subject to change, but should give you a rough idea of forthcoming workload.

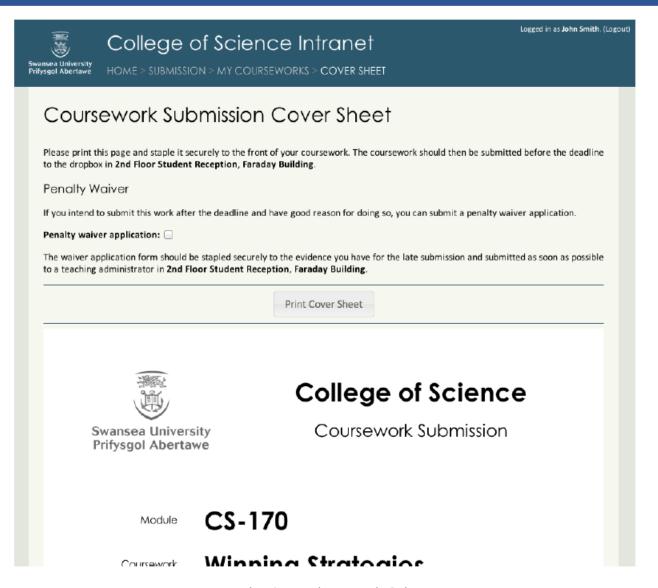| Module	Lecturer	Title	Set Date	Deadline
CS-110	Dr. N. Harman	Control Flow	Oct. 10, 2011	Oct. 14, 2011
CS-170	Dr. A. Beckmann	Cellular Automata	Oct. 10, 2011	Oct. 17, 2011
CS-110	Dr. N. Harman	Variable Declaration	Oct. 17, 2011	Oct. 21, 2011
CS-130	Mr. C. Whyley	Report 1	Oct. 24, 2011	Nov. 29, 2011

Printing out Cover Sheet

- The following only applies to coursework submissions by paper (not electronic submissions).

- Find coursework, click \Cover sheet" link.

- You will get a preview of cover sheet.

- Print out the Cover Sheet from your browser.
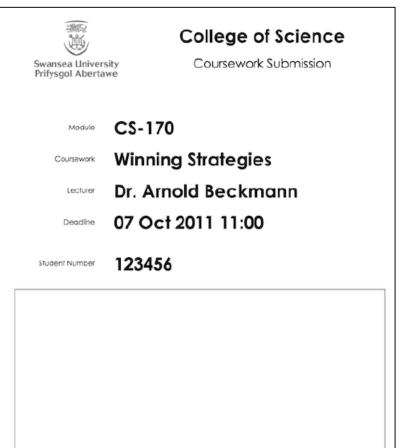
- Staple it to your course work

Cover Sheet Preview
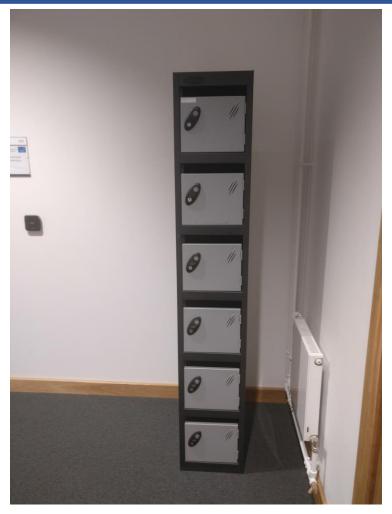
Cover Sheet Printed

Handing in

- Hand in at submission box.
- Afterwards check email for a receipt.

Submission Box

Location Computational Foundry 2nd floor in front of labs
Check for any notes and emails about Changes

Receipt

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Hi John,

Your coursework for CS-170 has been received.

Details:
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Module: CS-170
Coursework: Winning Strategies
Deadline: 07 Oct 2011 11:00
Received: On time



This receipt is available online at https://science.swansea.ac.uk/intranet/submission/receipt/20fba
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Research Culture in Computer Science

3 Main Methodologies

- **Theoretical Research**.
  - Thinking.
  - Foundations of Computer Science.
    - e.g., what is a program?"
  - 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.

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.

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 talks 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-Letter Institute (Stockholm).
  - Research Institute for Mathematics Oberwolfach
  - Schloss Dagstuhl - Leibniz Center for Informatics
- Research visits.
  - Between 1/2 day and several years.
- Seminars, colloquia.

Scientific Journals

- Typically called
    - Transactions of … (IEEE Transactions on Pattern Analysis and Machine Intelligence)
    - Journal of … (Journal of Neuroscience Methods)
    - Annals of … (Annals of Pure and Applied Logic)
    - Archive of … (Archive of Mathematical Logic)
    - International journal of … (International Journal of Biomedical Imaging)
    - Many more.

Scientific Journals

- Most published by scientific publishers.
  - E.g. IEEE, Elsevier, Springer, ACM, …
  - 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.

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 peer-reviewed, CVPR, NIPS...
- Some are highly competitive (acceptance rates e.g., 20 %, 10 %).

Referee Process

- Submission of article to an Editor-in-Chief.

- Editor sends it to associate editor(s)Referees.

- Associate editor(s) pass it to Referees.

- Referees write anonymous reports.

- Associate editor(s) decides about

    - Revised version required
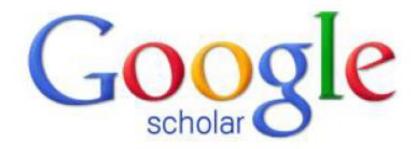
    - Rejection

    - Acceptance

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.
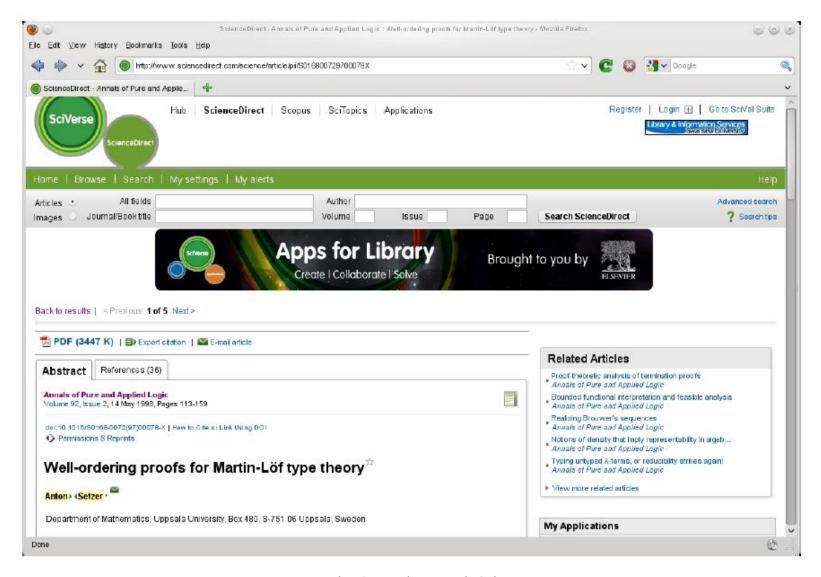
Ways of Searching Quality Scientific Articles

Enable "Get it at Swansea" in Settings of Google Scholar
(Get it at Swansea will often link you directly to the doi pages)

Look for DOI (Digital Object Identifier)

Identifying Electronic Versions of Articles

Look at pages of publishers

- Springer: Springer Link; Elsevier: Science Direct; ACM: ACM Digital Library.

University has subscriptions to articles.

- It should works directly when you are on campus.

- If you are off campus you get the same rights if you make a VPN connection to the campus network.

- Otherwise (including sometimes when on campus) you need to find institutional login on the DOI pages to Swansea University via Athens or Shibboleth.

References to Articles

- Always collect good references to your articles.
- If you have access to the official version from the publisher, that's preferred.
  - Many authors have their version online, but that's often not the final version, especially it usually has not the correct page numbers.
- If you have web pages, always record the web address and date of download, so that you can find it again later, and create good references later.
- Personal recommendation: Mendeley

MENDELEY

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