

# CSCM10 Computer Science Project Research Methods

## Introduction and Research Culture in Computer Science

Anton Setzer

[http://www.cs.swan.ac.uk/~csetzer/lectures/  
computerScienceProjectResearchMethods/current/index.html](http://www.cs.swan.ac.uk/~csetzer/lectures/computerScienceProjectResearchMethods/current/index.html)

January 22, 2020

# Welcome

- ① Overview over the Module
- ② Administrative Issues for MSc programs
- ③ Coursework Submission System
- ④ Research Culture in Computer Science

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# Aim of Module

- Introduction to
  - fundamental research methodologies and
  - good practicein computer science research.
- Support in undertaking
  - background research
  - including a literature review
- Culminating in
  - a full specification of your summer MSc project.

# Coursework

This is a general introduction for presentation purposes only.  
We will distribute later an assignment handout which will give full details and is to be used as the official specification of the coursework.

- Report surveying a research area related to your project (25 %).
  - Approximately 3000 words (TBC)
  - Due 10 February 2020, 11:00 am. (TBC)
  - Review of literature for a research area/topic
  - Indication of possible avenues for future research/project work.
- Presentation on Project and Initial Plan (25 %).
  - 10 minute presentation.
  - Planned as an away day taking place in the period 1 - 12 April.
  - Slides need to be submitted electronically via blackboard  
Provisional deadline: 23 March 2020, 11:00 am (TBC).

# Coursework

- Project Specification and Design Document (50 %)
  - Approximately 5000 words (TBC)
  - Due 29 April 2020 11:00 am
  - Background research, motivation, aims.
  - Specification of project.
  - Discussion of development methodology used.
  - Project plan including risk analysis.

# Lecturers

Dr Anton Setzer (AGS)

Main coordinator

Tutorials

Introduction

Writing your report

and your project specification

Research into Theoretical Computer Science

$\text{\LaTeX}$  and Bibliographies

How to give a presentation

How to write report



# Lecturers

Chris Whyley  
(CJW)  
Academic Integrity  
Coordinator Summer Project



# Lecturers

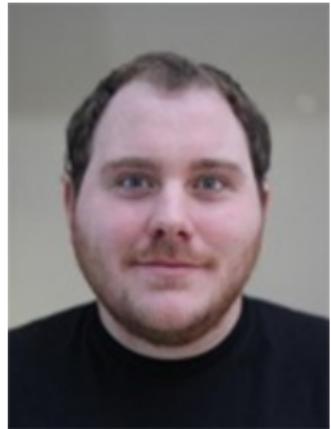
Stephen Lindsay  
(SCL)

Research into HCI

How to undertake a computer science project

Project Planning and Management

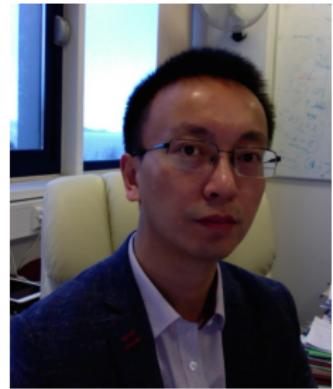
Ethics of Computer Science Research



# Lecturers

Xianghua (Jason) Xie  
(XX)  
Tutorials

Research into Visual Computing



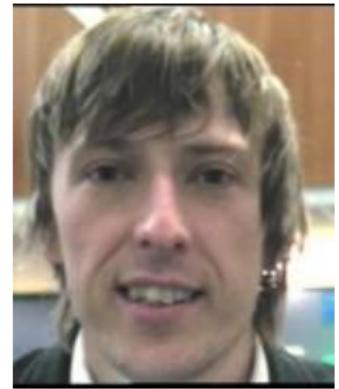
# Lecturers

Dr Oliver Kullmann  
Tutorials



# General Support

Dr Matthew Roach  
Organiser of Presentations



# Plan (TBC)

1 October	Anton Setzer Introduction to lecture, Administrative Issues, Coursework Submission System.
8 October	Anton Setzer Research Culture in Computer Science
15 October	Chris Whyley Academic Integrity
22 October	Anton Setzer $\text{\LaTeX}$
29 October (TBC)	Chris Whyley Distribution of Project Options

# Plan (TBC)

5 November	Anton Setzer Bibliographies Distribution of suggested areas for first report
12 November	Anton Setzer Writing a Background Research Report
19 November	Xianghua (Jason) Xie Research into Visual Computing
Mid November	Student submit project preferences
26 November	Stephen Lindsay Research into HCI

# Plan (TBC)

(date TBC)	Allocation of students to projects After allocation of students projects tutorials will be replaced by personal meetings with project supervisor.
3 December	Anton Setzer Research into Theoretical Computer Science
10 December	Stephen Lindsay How to undertake a computer science project
28 January	Stephen Lindsay Project Planning and Management
4 February	Stephen Lindsay The Ethics of Computer Science Research

# Plan (TBC)

10 February 11:00 am	Deadline first report
11 February	Anton Setzer How to give a presentation
23 March TBC 11:00 am	Submission of Presentation Slides
Weeks 23/3 - 3/4 (TBC)	Presentations on Project Specification
31 March	Anton Setzer Writing your Project specification
29 April 1100 am	Submission of Project Specification

# Schedule of Module

- Main lecturing slot: Tuesday 9 am (Semester 1)
- All other slots in the timetable for CSCM10 are tutorial slots.
  - You will be allocated one tutorial slot, which you need to attend every 2 weeks.
  - So you can **ignore** all other slots.
  - We will make sure that there are no clashes of that slot with other lectures. (Should there be any clashes please contact Anton Setzer to resolve it).
  - Tutorials and Academic Mentoring will start in week 2 of teaching.

# Academic Mentoring, Project Supervision, GAMS

- In Semester 1 you will be allocated an **academic mentor**. Tutorials conducted by the **academic mentor** will take place every 2nd week.
- At end of semester 1 or beginning of semester 2 (TBC) you will be allocated a project and a project supervisor.
- Project supervisor will take over as well the role of the **academic mentor**.
- Attendance of tutorials and project meetings is monitored.
  - System for monitoring called **GAMS** (TBC).
  - You need to be signed off as attending once in every **2 week block**.
    - Once a 2 week block has passed we can't add you in anymore.
  - For overseas students attendance of GAMS is important for **Visa purposes**.
  - Not attending could have serious circumstances for everybody

- Regarding attendance of lectures and tutorials/project meetings please **check regularly** your **official university email address**.

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# Administrative Issues

- The
    - handbook,
    - induction slides (advanced schemes)
    - module selection forms for all MSc programs (except MSc Human-Centred ...)
- can be found
- On Blackboard in the computer science student information pages  
Located on the top right side of the start page of blackboard.
  - Information not restricted to one module will be put onto the **Computer Science student information pages**
  - You can find in the pane “**General Information**”
    - the handbook in folder Handbooks 2019-20,
    - the slides of the induction lecture for the advanced schemes in folder Induction Slides
    - the forms in folder Forms 2019-20.
  - Any remaining hard copies of the handbook and the module selection forms are available from the student office CoFu-016.

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# 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.
- All paper coursework deadlines will be at the given day (Mo - Fri) at 11:00 am.
- Electronic submission might have the times for submission (the default is 11:00 am)  
Electronic submissions are usually via Blackboard.

# Submission via Blackboard

- In most cases you submit your coursework electronically via Blackboard.
- Note that not all formats are acceptable (check beforehand; pdf should always work).
- If you have multiple text documents, you will need to combine them into one pdf document.
- Text documents (reports, essays etc) often are 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 blackboard.
  - The university is very strict regarding plagiarism (see lecture by Chris Whyley later in CSCM10).

# Rules for Coursework Submission

- **We are currently reviewing the coursework submission and might move to paperless submission.**  
For completeness paper coursework is covered in the following.
- All paper coursework need to be submitted to a specific dropbox.
  - For computer science coursework the location needs to be confirmed.
- Most coursework is to be submitted electronically, some physically.
- 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 latest updates of instructions.
- Instructions at  
<https://science.swansea.ac.uk/intranet/help/students/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.**

# Coursework Submission Page



Swansea University  
Prifysgol Abertawe

## College of Science Intranet

Logged in as John Smith. (Logout)

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.	<a href="#">Cover sheet</a>

#### 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

Logged in as John Smith. (Logout)

College of Science Intranet

Swansea University  
Prifysgol Abertawe

HOME > SUBMISSION > MY COURSEWORKS - COVER SHEET

## Coursework Submission Cover Sheet

Please print this page and staple it securely to the front of your coursework. The coursework should then be submitted before the deadline to the dropbox in **2nd Floor Student Reception, Faraday Building**.

**Penalty Waiver**

If you intend to submit this work after the deadline and have good reason for doing so, you can submit a penalty waiver application.

**Penalty waiver application:**

The waiver application form should be stapled securely to the evidence you have for the late submission and submitted as soon as possible to a teaching administrator in **2nd Floor Student Reception, Faraday Building**.

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[Print Cover Sheet](#)

  
Swansea University  
Prifysgol Abertawe

**College of Science**

Coursework Submission

Module CS-170

Coursework Winning Strategies

# Cover Sheet Printed



## College of Science

Coursework Submission

Module **CS-170**

Coursework **Winning Strategies**

Lecturer **Dr. Arnold Beckmann**

Deadline **07 Oct 2011 11:00**

Student Number **123456**

A large, empty rectangular box with a thin black border, intended for the student to attach their coursework.

By submitting this work, you agree to the following statement:

"I am aware of the University policy on unfair practice and I certify that this coursework is the result of my own independent work except where otherwise stated, and that all other sources are explicitly acknowledged"

This cover sheet should be securely stapled to the front of your work, and then submitted before the deadline to the dropbox in 2nd Floor Student Reception, Faraday Building.

Generated at 14:20 04/10/11.



**20fba**

# Handing in

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

# Submission Box



Location Computational Foundry 2nd floor in front of labs  
(Please Check)

Check for any notes and emails about Changes

# Receipt

Hi John,

Your coursework for CS-170 has been received.

Details:

-----

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/submit/receipt/20fba>

## Late Submission

- If you need to submit late with a valid serious reason you can apply for penalty waiver.
- The penalty waiver application is a separate cover sheet you print and hand in to the student office with any supporting evidence (e.g. doctor's note).
- To print the penalty waiver form, click on “Penalty waiver application” and print the page.
- Penalty waiver application can be printed after you printed the cover sheet (but should usually be handed in with the coursework).

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# 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.

## 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 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 Institute for Mathematics Oberwolfach
  - Schloss Dagstuhl – Leibniz Center for Informatics
  - ...
- Research visits.
  - Between 1/2 day and several years.
- Seminars, colloquia.

- 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.

# Scientific Journals

- Most published by scientific publishers.
  - E.g. 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.
  - Why pay if publishers don't add much to it.

# 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 of Google Scholar  
(Get it at Swansea will often link you directly to the doi pages)

# Look for Doi pages (Document Object Identifier)

ScienceDirect - Annals of Pure and Applied Logic : Well-ordering proofs for Martin-Löf type theory - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.sciencedirect.com/science/article/pii/S016800729700078X

ScienceDirect - Annals of Pure and Applied Logic

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**Abstract** References (36)

**Annals of Pure and Applied Logic**  
Volume 92, Issue 2, 14 May 1998, Pages 113-159

doi:10.1016/S0168-0072(97)00078-X | How to Cite or Link Using DOI  
Permissions & Reprints

**Well-ordering proofs for Martin-Löf type theory** 

Anton Setzer 

Department of Mathematics, Uppsala University, Box 480, S-751 06 Uppsala, Sweden

Done

**Related Articles**

- Proof-theoretic analysis of termination proofs  
*Annals of Pure and Applied Logic*
- Bounded functional interpretation and feasible analysis  
*Annals of Pure and Applied Logic*
- Realizing Brouwer's sequences  
*Annals of Pure and Applied Logic*
- Notions of density that imply representability in algebraic theories  
*Annals of Pure and Applied Logic*
- Typing untyped  $\lambda$ -terms, or reducibility strikes again!  
*Annals of Pure and Applied Logic*

View more related articles

**My Applications**

# Identifying Electronic Versions of Scientific Articles

Look at pages of publishers

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

The university has often subscriptions to articles, so you can get the official versions.

- It sometimes 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.
- Athens contains a password hint (use your email credentials).

## References to Articles

- Always collect good references to your articles (best obtained via publishers web pages).
- 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.

# 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