Research Skills: homework & exercises

This document details all of the homework and exercises associated with each of the lectures. For the later exercises, some of the details are preliminary. In these cases, you will need to check the course website later in the Term. Refer also to the course website for the dates of lectures, which are used a deadlines for the various exercises.

http://www.cl.cam.ac.uk/teaching/0910/C00/

Lecture 1: introduction to the course *and* how to read a paper

Homework

Read *Writing for Computer Science* chapter 10 "Doing Research".

Exercise 1

Deadline: the day of lecture 2.

Contribution to final grade: 5%.

[WfCS exercise 1] Read the academic paper "Extracting the essence from sets of images". This will be handed out in Lecture 1. Write a brief answer to each of the following questions.

a) What are the researchers trying to find out?

b) Why is the research important?

c) What things were measured?

d) What were the results?

e) What do the authors conclude and to what factors do they attribute the findings?

f) Can you accept the findings as true? Discuss any failings or shortcomings of the methods used to support the findings.

I am looking for short, factual answers to the questions. Two to four sentences should be sufficient answer for each of questions (a) to (e). Your answer to question (f) may need to be a little longer. Your whole submission should be no more than one side of A4 paper, in total.

The exercise should take three hours: reading the paper, making notes, drafting your answers, checking back to the paper, refining your answers.

Submit your page of answers to Student Administration on the day of Lecture 2.

Lecture 2: how to review a paper *and* the research process

Homework

Read *Writing for Computer Science* chapter 12 "Refereeing".

Exercise 2

Deadline: the day of lecture 3.

Contribution to final grade: 10%.

Use the same academic paper as for Exercise 1. Conduct a review in two parts. The first is **filling out the review form available from the course website**. The second part is free-form text with the following sections:

Summary: Please summarize the paper in 2-4 sentences and state what you consider to be the contributions of this paper to the field.

Major comments: Discuss the author's assumptions, technical approach, analysis, results, conclusions, reference, etc. Be constructive, if possible, by suggesting improvements.

Minor comments: This section contains comments on style, figures, grammar, typos, etc.

This exercise should take an hour if you made good notes for Exercise 1; it will take three hours if you need to re-read the paper.

Submit the completed review form (the first part) and the free-form text (the second part).

Lecture 3: writing—who are you writing for *and* style issues

Homework

Read *Writing for Computer Science* chapters 2 “Good style” and 3 “Style specifics”.

Exercise 3

Deadline: the day of lecture 4.

Contribution to final grade: 10%.

[WfCS exercise 9] Download one of the papers listed on the course website. Summarise it in 500 words.

Your aim here is to summarise the paper, not to review it. Marks will be awarded for the quality of the summarisation (how well it represents the paper) and the quality of the writing (how well it reads).

This should take the average student about four hours. One to two hours to read the paper. Two to three hours to draft, check, edit, and polish the summary.

Submit your summary.

Lecture 4: writing—writing the first draft *and* structuring a paper

Homework

Read *Writing for Computer Science* chapter 9 “Writing up”.

Exercise 4

Deadline: the day of lecture 6.

Contribution to final grade: 15%.

[WfCS exercise 10] Write a 300 word piece on ***one*** of the following:

1. An article for a University magazine explaining why you chose to apply for the MPhil in Advanced Computer Science and what you hope to get out of it.
2. A proposal to a University's Applications Committee explaining what you intend to do for your PhD.
3. A description of a major project that you undertook during your previous degree.

Now, iteratively reduce the article by 30 words. Iterate seven times, producing eight versions of the article of length 300, 270, 240, 210, 180, 150, 120, and 90 words. In each case the word count should be within ±7 of the target. Your aim, at each step, is to preserve the information content of the piece but not necessarily the original wording. It is common for the piece to improve in the early iterations and then to become more cryptic and incomplete in the later iterations.

To do this well, you need to split the exercise into two parts. First write the original 300 words. Only when you are happy with those 300 words, may you start to do the seven edits. You should spend up to three hours producing the original 300 words and up to another three hours doing the editing.

Submit all eight versions of your article, with word counts. Also submit your assessment of which version is best and which is worst. You will receive credit for the eight versions and, additionally, the version that you identify as "best" will be marked for the quality of the writing.

Lecture 5: writing—editing *and* where to publish papers

Homework

Read *Writing for Computer Science* chapter 8 "Editing".

Exercise 5

Deadline: the day of lecture 8.

Contribution to final grade: 10%.

[WfCS exercise 12] You will be given four other people's submissions from Exercise 3. Choose ***two*** of these. Revise these two submissions to improve the writing style—that is, edit for flow, expression, clarity, and so on. Mark the changes on a paper copy, then type up the result.

You will be assessed on how well you improved the originals in terms of style, but not in terms of factual content. You are given four submissions to choose from because it is likely that you will find at least one of the four difficult to improve.

Submit your revised versions and your marked-up originals. Keep a *photocopy* of the marked-up versions for yourself in order that you have your own record.

Lecture 6: guest lecture: how to write a good research paper (Simon Peyton Jones)

Homework

Browse the online resources on writing available from the course webpage.

Exercise

There is no exercise associated with this lecture.

Lecture 7: graphs, figures, tables, maths & algorithms

Homework

Read *Writing for Computer Science* chapters 6 "Graphs, Figures & Tables", 5 "Mathematics" and 7 "Algorithms".

Exercise 6

Deadline: the day of lecture 9.

Contribution to final grade: 10%.

Download the four data sets from the course website. Present each of the datasets in a way that best communicates useful information. Further details will be made available on the website.

Lecture 8: how to give a presentation

Homework

Read *Writing for Computer Science* chapter 14 "Giving Presentations".

Exercises 7, 8, and 9

You will give a 10 minute presentation to the whole class, based on a paper published in the last year, as if you are the author of that paper. Your presentation should be prepared so as to be comprehensible to an intelligent computer scientist who is *not* familiar with the field in which the paper lies.

There are three parts to this, each of which attracts marks.

(Exercise 7) You first choose and summarise your paper.

(Exercise 8) You then prepare a presentation; you get one rehearsal of your presentation in front of academic staff and some classmates and you will be given immediate feedback.

(Exercise 9) You revise your presentation in light of the feedback; you then present the revised version to the whole class.

Rehearsal and presentation times will be given out in lectures.

The first two parts (Exercises 7 and 8) attract a small number of marks, mainly given for submitting something sensible on time. The final presentation (Exercise 9) attracts the majority of the marks.

MPhil students: There will be four presentations in each rehearsal session. You must attend two rehearsal sessions, your own and one other. The final presentations will be over the Thursday and Friday after lectures finish at the end of Term. You must attend the final presentation sessions. You will be asked to provide feedback on a subset of the other presentations on the forms provided; your feedback will be assessed and contribute to your marks.

First year PhD students: The dates of your rehearsal and presentation sessions have not yet been set. They may be in the new year. Details will be announced later.

Exercise 7

Deadline: the day of lecture 10.

Contribution to final grade: 5%.

Select a paper to present. **It must have been published in the last year.** It could be one of the suggested papers on the course website, a set paper from one of your other modules, or a paper related to your proposed or previous project. Summarise the paper (300 words). Explain why you chose it (150 words).

Submit your summary and explanation, along with either a copy of the paper or an electronic link to a version of the paper. E-mail the bibliographic information and electronic link to the course lecturer.

Exercise 8

Deadline: the day of your rehearsal.

Contribution to final grade: 5%.

Prepare a presentation based on the paper. Your presentation should be 10 minutes long and be comprehensible to an intelligent computer scientist who is *not* familiar with the field in which the paper lies. Give the presentation at your rehearsal session.

Exercise 10

Deadline (for MPhil students): the Monday following the presentations.

Contribution to final grade: 20%.

Revise your presentation based on the feedback. Give it to the whole class. Provide your assessment of the five other presentations that you are allocated to assess.

Submit any slides and any script that you use. Submit your assessment of the other presentations.

Lecture 9: presentation style

Homework

Browse the online resources on presentations available from the course webpage.

Exercise

The exercises for Lecture 8 continue.

Lecture 10: experiment design (Per Ola Kristensson)

Homework

Read *Writing for Computer Science* chapter 11 "Experiments".

Exercise

There is no exercise for Lecture 10.

Lecture 11: statistical analysis 1 (Per Ola Kristensson)

Homework

Read the notes provided by the lecturer.

Exercise 10

Deadline: one week after Lecture 11.

Contribution to final grade: 10%.

Download the exercise from the website. Submit the information requested in the exercise. Further details will be made available on the website.

Lecture 12: statistical analysis 2 (Per Ola Kristensson)

Homework

Read the notes provided by the lecturer.

Exercise

The exercise for Lecture 11 continues.

Rehearsals of MPhil student presentations

The rehearsal sessions (Exercise 8) will be held during the scheduled time-slots for Lectures 13–16. Each student must attend two rehearsal sessions. You will be told which sessions you are scheduled to attend. If there are more presentations that will fit into the scheduled lecture times, parallel sessions will be run or alternative times given to some students. A timetable for these sessions will be drawn up during the course and distributed in good time to ensure that everyone is able to attend their two sessions.

Mini-conference of MPhil student presentations

This will take place on the Thursday and Friday after the end of formal lectures on all modules. Students will give their presentations for Exercise 9. Each student will be allocated five other presentations on which they will be asked to give feedback. The submission related to these presentations is due on the following Monday.

Rehearsals and presentations by PhD students

These will take place later than those for the MPhil student. Details will be announced later.