

CSW

Computer Science Writing

Fiona Polack

Who's here, doing what?

- All 3YOs (MEng):
 - assessment, lectures, practicals
- All those taking PR3 (third year project):
 - lectures

Aims

- To prepare for project work
- To prepare for writing up and assessment
- To prepare for project presentation

Learning Outcomes

- To be able to make an informed choice of text preparation facilities, and use these to present written text clearly and accurately
- To understand the difference between draft and final copy
- To be able to use literature effectively, including appropriate citation styles and constructing a critique
- [MEng] to prepare and give a presentation on an academic subject, in a fixed time

Comments (all students)

- This module was new last year and a new venture
- Generally people liked it, so it's similar this year, but I'm keen to have your thoughts on it
- If you don't like it
 - Or think it should be different
 - Say so... I may be able to modify later sessions!

Comments (for MEng)

- MEng (only) do an assessment
- Last year, assessment guidelines were ignored or misinterpreted
- The guidelines are very precise
- Divergence is heavily penalised
- Read the guidance material and follow it

Lectures

10 lectures:

- Friday 1015, B/B006 *Aut/1* only
- **Monday 1615, B/B006, Aut/2 to Aut/4**
- **Wednesday 1115, P/L001 Aut/2 to Aut/4**
- Friday 1015, B/B002 *Aut/2 to Aut/4*

Whatever course you're on, you should (!) attend the lectures

"Guest" lectures

- Preparing a project using MS Word,
 - Alistair Edwards, Wednesday week 2
- Preparing a project using latex
 - Jeremy Jacob, Wednesday week 3
- Scientific method & basic statistics
 - Susan Stepney, Wednesday & Friday week 4

Practicals I

MEng Students Only

Practical slots for practice presentations

- *MEng only; Aut/5 only (7-11 November)*

- Tuesday 1215, Aut/5 W/035C
- Tuesday 1415, Aut/5 W/035
- Tuesday 1615, Aut/5 W/035C
- Thursday 1515, Aut/5 W/035D
- Friday 1315, Aut/5 A/EW/110
- Friday 1415, Aut/5 W/035C

Practicals II

MEng Students Only

- 5 or 6 students; 5 minutes each
 - Timing strictly enforced
- Feedback from demonstrators
- Provisional schedule
 - <http://www-course.cs.york.ac.uk/csw/MEng.html>
- **Tell me if you're not on the list or would like to change session**

Practicals III

MEng Students Only

- Each student prepares a 5-minute presentation.
- Presented to other students in the session
- A demonstrator will supervise each session
 - Presentation feedback forms will be available later
- Details on web
 - <http://www-course.cs.york.ac.uk/csw/Presentation.html>

A silly interlude

If you are an MEng third year

- Stand on the right

If you are doing a PR3 project

- Stand on the left

Anyone else: come to the front

MOVE NOW

AND THEN....

- Find one or two people from your side
- Sit down together (so you can talk)

There will be mini-discussions from time to time

- For now,
 - Discuss projects and what they might mean

WHAT IS A PROJECT?

Discuss what might determine the
nature of projects in the
Department

2-3 minutes: timer

What do you think....?

Project definitions: rationale I

- Most degrees accredited by IEE/BCS
- Projects must conform to the Engineering Council definitions
- Ours are a lot bigger than the minimum!
 - <http://www.bcs.org/BCS/Products/HEAccreditation/courseguidelines.htm>

Project definitions: rationale II

- The National "Honours" and "Masters" level degree designations also affect project definitions
 - <http://www.qaa.ac.uk/academicinfrastructure/FHEQ/EWNI/default.asp> (see Annex 1)

Project definitions

- Project definitions can be accessed from Projects web pages:
 - <http://www.cs.york.ac.uk/projects/>
- Check the definition ... your supervisor may not have done so!

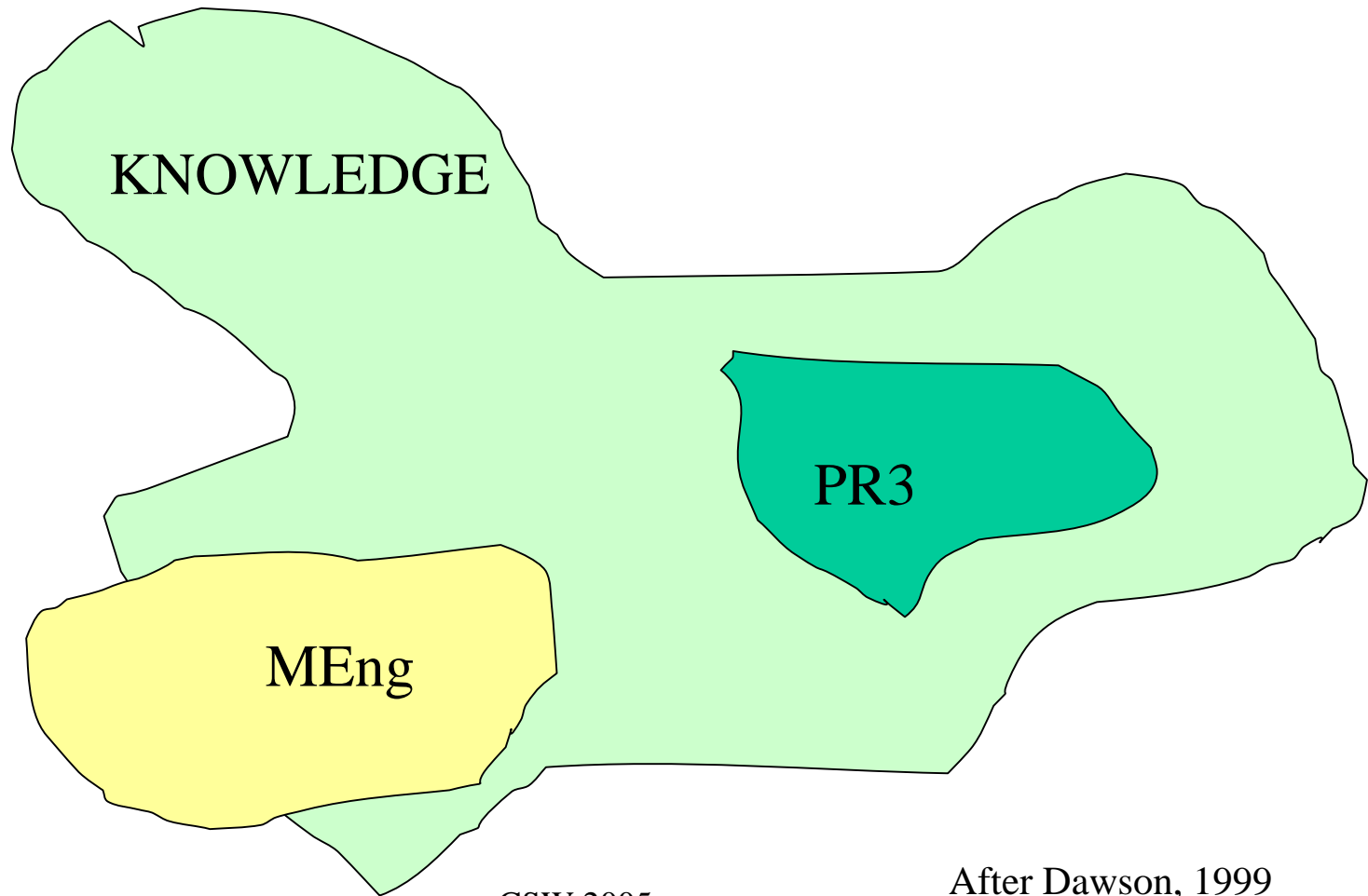
MEng Project Definition

- MEng projects (PR5) are Masters Level,
 - the degree qualifies for CEng exemptions
- A research or engineering project - the approach is similar
- There must be an element of originality

PR3 Project Definition

- Third year projects (PR3) are Honours Level
 - all treated as if they were part of IEng accreditation
- They are engineering projects

Projects and Knowledge



CSW 2005

After Dawson, 1999

"Engineering"

Discuss what Engineering means
2-3 minutes: timer

Definition I

The Engineering Council (SARTOR 1997),
an engineer is:

*"...one who has and uses scientific,
technical and other skills to create,
enhance, operate or maintain safe,
efficient systems, structures, machine,
plant, processes or devices of practical
and economic value."*

DEFINITION II

The Engineering Council is less exact these days:

- http://www.engc.org.uk/Registration/Register_Sections.aspx defines CEng, IEng and all the other levels of engineer

What is an Engineering Project?

- An engineering-style project *report*
- Written as if the project,
 - Follows a lifecycle and a method
 - Aims to “build” something
- States and explains the method
- Evaluates the method and product
- Any project can be written up in this way

General Engineering Issues

Professional organisations require,

- Quality
- Reliability
- Timeliness
- Maintainability

Think what these might mean for your project, and strive to achieve them!

Engineering Lifecycle

Project & *write up* in terms of:

- Requirements: context, constraints
- Design: may be several stages
- Build: software, hardware, proof, experiment
- Evaluate: product, method, results
 - relate to requirements

These are good practice in all projects.

Method

Any method will do (if it's appropriate)

- Software Engineering methods - agile programming, RAD, unified process etc
- Hardware methods for specification/design
- Research method: problem-hypothesis-experiment
- Algorithm design/proof: problem-plan-do

STATE THE METHOD USED

Even if it was a retro-fit method
(if there's more than one method,
state them all)

Fitting a Project to a Lifecycle

- Design-and-build projects should fit ok
- Other projects:
 - Explain the goals, constraints, givens, literature
 - Write up the method: hypothesis, experimental design, plan etc
 - Write up and evaluate the results
 - Consider what maintenance might mean!

And MEng Projects...

- All the above apply
- More thoughtful and advanced in approach and content....
 - Systematic, comprehensive understanding
 - Critical awareness and evaluation
 - Forefront of the field; original knowledge or application

PLANNING

Planning I

Some supervisors ask for a formal plan

Planning is always a good idea

Why?

Planning II

Because things go wrong in projects

- If you don't know how long it should have taken, you don't know how to revise your plan

Plans are made to be revised!

HOW DO YOU PLAN A PROJECT?

Discuss what is important...

2-3 minutes: timer

Planning a Plan I

- How do you like to work?
 - Concentrated blocks or parallel to other things?
 - Department, Library, at home, in a café?
- What facilities do you need, and when?
- How easily do you write (long reports!)?
 - Do you need a proof reader?
 - Do you write it all in one go or in stages?

Planning a Plan II

- What needs doing? All projects have
 - Literature review: context, resources etc
 - Design or set-up or planning
 - Implementing or doing
 - Results or testing
 - Evaluation
- Schedule at least these activities

Planning a Plan III

- Reports are about writing, not just doing
- Decide, and plan in, whether you write up
 - at the end (inadvisable)
 - in stages
 - as you go along
- Plan in at least a week at the end to finish the report

Planning: advice

Anything that can go wrong will go wrong

- (Finagle's Law of Dynamic Negatives: see http://en.wikipedia.org/wiki/Finagle's_law)

- If you write up at the end, it WILL take at least 3 weeks
- However well you plan and work, something WILL go wrong in the last month/week/day/hour....

Doing the Work

- A less crucial part of the project... so long as it gets done
- Scale the work to fit the time
- The key things you need are
 - Clear notes
 - Good justification or motivation of what you did

The Report and its focii

The hourglass model

- Start work & report with wide focus
 - Lit. review explores focus and context
- From lit. review, sharpen & justify focus
 - Design to the sharper focus
- Implement & test what you can of the design
- Evaluate against to the original context

The hourglass report

- Adapt report title to what you did
 - project title may not be ideal for report
- Adapt report introduction & conclusion to rest of report
- Make developing focus clear at start & end of each relevant chapter

The hourglass model example

DB transaction project I

Project: modelling database transactions

- Method: an incremental development
 - Review, plan,
 - implement on case study,
 - plan next.
- Lit. review:
 - Existing modelling approaches
 - Definitions related to db transactions

The hourglass model example

DB transaction project II

- Use Lit. to select a particular aspect
 - eg specification using UML; integrity at physical design;... or whatever
- Design (for example...)
 - Language extension for the chosen aspect
 - Meta-model (language definition)

The hourglass model example

DB transaction project III

- Implementation (for example...)
 - Apply to a case study that highlights the chosen aspect of transaction modelling
 - Use the designed language on the case study
- Note what does and does not work

The hourglass model example

DB transaction project IV

Evaluation questions:

- Did the language & meta-model suffice?
- How did the result compare with existing models?
- How would the new work fit into existing methods?
- Was the approach to the project adequate?

**What if your Project
"doesn't work"?**

No project “fails” (though reports sometimes do)

- The plan can be revised
- The proposal can be rewritten, re-vetted etc
- The report reflects what was possible
 - Evaluation may be easier than for a project that achieved its original goal

Reasons for “Failure”

- Method proved inappropriate
- Resources late or not available
 - Includes “not enough time”
- Research showed that the original project was infeasible or had already been done

Method proved inappropriate

- Can you change methods part way through?
 - use the experience to enhance the method justification;
 - Admit what happened and exploit it!
- Otherwise
 - Write up the project as done
 - In evaluation explain why method was inappropriate and what would have been better
 - A long and detailed evaluation/discussion

Resources late or not available

Necessary hardware, software not available,

OR your time ran out

OR there was more work than anticipated

- Revise project to fit what could be done
 - Adapt your plan and report
- Comment (neutrally) on the problems in the introduction and evaluation

Project infeasible or already done

- Consider adjusting the project
 - Redraft the proposal
 - Write the report on the revised project
 - you do **not** need to explain why original was not done
- Vary context to an area not already done
 - Use lit. review to reflect on existing work
 - Requirements/design for revised context

Report presentation issues

WHAT STYLE SHOULD YOU USE FOR A PROJECT?

Discuss what is important...

2-3 minutes: timer

General Style I

It's a report, not a manual

- Write for an academic audience
 - Succinct
 - Precise
- Support points with evidence
 - From literature (with academic citation)
 - From your research

General Style II

- Use the marking criteria
- Marking forms are on line:
 - PR3: <http://www.cs.york.ac.uk/projects/BEng.pdf>
 - PR5 (MEng)
<http://www.cs.york.ac.uk/projects/MEng.pdf>
- The general marking criteria are on line:
 - http://www-users.cs.york.ac.uk/~fiona/PROJECTS_WEBPAGES/marketing_form.html

Some Good Projects I

- Dong, X (2005) PR3
 - Elegant, clear structure to chapters
 - Careful choice and use of method
 - Novelty level of PR5
 - Clear evaluation and conclusions
 - http://www.cs.york.ac.uk/library/onlineprojlib/proj_files/2005/ug/xd101/

Some Good Projects II

- Thomas, B (2005) PR5
 - Beautifully presented, citation and structure
 - Excellent example of method (eg ch. 4)
 - Excellent scientific method (hypotheses)
 - http://www.cs.york.ac.uk/library/onlineprojlib/proj_files/2005/ug/brt100/

Some Good Projects III

- Sedding (2004) PR3
 - Engineering presentation of research
 - not particularly "literary", but well structured and very clearly written
 - Nice use of literature, and good referencing
 - http://www.cs.york.ac.uk/library/onlineprojlib/proj_files/2004/ug/jps118/jps118_project.pdf

Some Good Projects IV

- Goude (2003) PR3
 - Experimental project; could have been structured better as an engineering report
 - Very clearly written
 - Excellent evaluation chapter, and in-text justification or rationale
 - http://www.cs.york.ac.uk/library/onlineproject/proj_files/2004/ug/jps118/jps118_project.pdf

Some Good Projects V

- Crawford (2004) PR3
 - Well-presented engineering and methods
 - Good use of sources in literature and development
 - http://www.cs.york.ac.uk/library/onlineprojlib/proj_files/2004/ug/adc109/adc109_project.pdf

And some other names...

- PR3
 - Weeks, Gurney (2004)
 - Thorn, Lloyd (2003)
- PR5 (MEng final year)
 - Naylor, Whitham, Davis (W) (2004)
- PR4 (MMath final year):
 - Walker (2004), Minichiello (2003)

Audience

- Assume a general computer science background.
- Elaborate specialist aspects of the project area
 - In literature review (with references)
 - In other chapters
 - In appendix if necessary

Readable reports

- Don't leave the reader guessing
 - Say what you're going to discuss,
 - discuss it
 - Summarise it
- Applies at report, chapter, and section level
- This is different to a lab book (or a novel), where the plot unfolds as you progress

Linguistic issues

Language

Academic norms (not essential):

- Third person
 - "The project presents...."
 - "No further examples were found..."
- Present tense for main text
 - "This section contains...."
 - "The design uses"

See also J. Zobel, *Writing for Computer Science*, 2nd edn, 2004

Drafting the report

- Everyone writes draft first time
- Native *and* non-native English speakers make mistakes and typographic errors
- Spelling checkers do *not* proof read
 - Do spell check, but also read it carefully

Proof readers

- If you want your report checking, you may ask someone to *proof-read* it

BUT:

- Don't expect your supervisor to do it
- Don't ask a student from this Department;
- Don't accept *any* technical input (risk of collusion).

Final Copy

- Clear explanation
- No typographic errors or wrong spellings
- Clear structure, with "waymarks" to content
- Consistent citation
- Consistent referencing of diagrams, tables, appendices etc
- All chapters and sections included

Report don'ts

- Don't "tart up" the text
 - but do lay it out nicely, with section headings, bullets etc
- Don't try to "sell" your product
- Don't embellish the truth (or the product)
- Don't repeat substance (but do provide clear "waymarks" through the text)

REPORT CONTENTS I

Preamble and Appendices

Preamble

- Included in word & page counts:
 - Title page
 - Abstract
 - Contents page(s)
 - Acknowledgements
- Be canny
 - follow rules in (online) Student Handbook
 - but don't put in more than you need

Appendices (Marked)

- Explicitly included in word & page counts
- Supplementary material that you want marking, eg
 - Large diagrams, tables, results that are essential but peripheral to main text
- Use appendices to make report text flow

Appendices (unmarked)

- Supplementary material for reader, eg
 - Early versions of diagrams, if you wish
 - Code listings and implementation detail
 - Screen shots (if not an HCI project!)

On title page, list unmarked appendices & state that these are excluded from word & page counts

REPORT CONTENTS II

Context and literature review

Context

- A project always has a context
 - Those things that motivate, limit and define the project from without
- Context needs to be explored in early chapters of report
 - Project definitions refer to all the contextual material as "literature review"

Literature review as context

- Thus, for projects, *literature review* is not only a review of relevant literature
- Could cover any context-setting material
 - Selection of methods, based on literature
 - Review of other research in the area
 - Review of things from other areas that are relevant to project

Project literature review

Literature Review

- May be one chapter or several
- May include sections of other chapters
 - For instance, each design, implement or evaluation chapter could justify approach or content based on cited sources

Bibliography

- Between main text & appendices
- *Not* included in page and word counts
 - There's no penalty for
 - Citing lots of sources
 - Giving full citations
 - Other good bibliographic practice

**Good use of literature always
benefits a project.**

WHAT CAN YOU USE?

**HOW CAN YOU FIND
MATERIAL?**

Discuss possible sources...

2-3 minutes: timer

Finding Material

- [google](#)
- [citeseer](#)
- [University library Catalogue](#)
 - Current periodicals, Interlibrary loans
 - [MetaLib](#)
- Pages of relevant academics
- Anything else you can think of....

Books

- Good for background material
- Good for information about established methods, notations etc
- Often out of date (even new ones)
- Not usually sufficient on their own

Journals

- Academic papers, reviewed and accepted by an academic community
- May include seminal or key works
- Usually reasonably accurate
- Most journals take over a year to publish a paper, so not really state of the art

Conferences

- Proceedings of academic talking-shops
- State of the art, both good and bad
- Reviewed and accepted by academic panels, but discrimination may be poor
- Good for review purposes, but expect to find contentious points or errors

LNCS, LNAI etc

- <http://www.springeronline.com/sgw/cda/frontpage/0,11855,3-164-12-72397-0,00.html>
- Specialist Computer Science publishers
- Many conference proceedings
- Some specialist issues
- Find them in the library and browse!

Technical reports

- From educational and industrial organisations
- “unpublishable” reports e.g.
 - Pre-publication papers and results
 - Highly technical material with little “chat”
 - Case studies
- If also published, use published version
- [eg. http://www.cs.york.ac.uk/ftpdир/](http://www.cs.york.ac.uk/ftpdир/)

Web pages

- Technical info, manuals, user hints on commercial products
- Free & non-commercial software
- Shortcut to published material
 - cite the published source where possible
- Don't worry if a page disappears
 - cite the link and the date you last consulted it
- *Beware*: a lot of rubbish appears on the Web

Popular press

- Reputable magazines eg *Nature*, *Science* and *New Scientist* for context
- Other magazines and newspapers are sometimes good for evidence of trends
- May be too sensationalist for serious literature review
 - Back up popular press information with serious academic references

Unpublished sources

- Draft papers, comments, emails
- Try to get originator's permission for use
- If cited, state that it is *unpublished*
- Use *personal communication* footnotes if necessary^{1,2}

1. Personal communication, F. A. C. Polack, 14 October 2005
2. Email, Prof. Ding Bats, received 21 May 2004, used with permission

Reading and noting

- Always record the details of a source when you get it
 - Saves a huge amount of time later
- Note comments as well as content
 - Review is about critique, not just content
- Be realistic about the amount of review you can do

Citation to distinguish your Contribution

The report must make clear what is your work & what is other people's

- Include a citation to every use of any material
 - Background literature
 - Method steps
 - Equations
 - Reused code or structures ...

Academic culture, Citation & Plagiarism avoidance

Prof. S. Stepney, PD1 lectures, 2003-04

- [http://www-
course.cs.york.ac.uk/csw/MyLectures/Ex
tractSSPD1Ethics.ppt](http://www-course.cs.york.ac.uk/csw/MyLectures/ExtractSSPD1Ethics.ppt)

Citation styles

- Some use *[Stepney03]* or *[Ste03]* in text
 - May need *[Ste03a]* and *[Ste03b]* etc
 - In bibliography:
[Ste03] S. Stepney, Lecture Notes, PD1 Ethics, 2003
- Others use numbers *[1]* in text
 - In bibliography:
[1] S. Stepney, Lecture Notes, PD1 Ethics, 2003

Either is fine, but be consistent

Fine-grained citation

- Computer Scientists are slapdash about citing precisely
- If you want to use a finer grain of citation:
 - In text: [1, chapter 2]; [Stepney03, p3]
- In bibliography, do not repeat detail
 - just one entry for each reference, [1] or [Stepney03], as before

Citation Planning

- Latex bibtex does most of the layout for you (see Jeremy Jacob's material)
- Microsoft Word has cross-referencing, which does some of it for you (see Alistair Edward's material)
- Always check the bibliography for accuracy

Bibliographic content

Enough information to trace your source:

- Books - author(s) or editor; title; publication date
- Journals - article author and title; journal title, volume and number (as appropriate)
- Web pages - full http address; date accessed

Bibliographic entry examples

I

- C. J. Date, *Introduction to Databases*, 2000
 - Could add edition (7th edition)
- F. Polack, *A Case Study using Lightweight Formalism to Review an Information System Specification*, *Software Practice & Experience*, 31(8), 2001
 - Could add pages (pp57-80), month (July)

Bibliographic entry examples

II

- Jill Srivatanakul, John A Clark and Fiona Polack, Security Zonal Analysis, Technical Report YCS-2004-374, University of York Computer Science Department, 2004.
- <http://www-course.cs.york.ac.uk/pd1/ethics.pdf>, last accessed 20 September 2004
 - Could add author (S. Stepney) and subject (PD1 notes on Ethics).

Some things to avoid in citation

- Don't use footnotes for citation
- Don't put more than one bibliographic entry per source
- Don't include uncited material in the bibliography
 - use a separate listing of uncited but influential works if necessary

Using Literature

Critical Review

- Projects get credit for justification, motivation, explanation
- Critical review contributes to these
- *Critique* means commentary
 - Positive and negative, and neutral
- Don't just regurgitate published material

Good and bad reviews

- The best reviews present an argument or discussion, supported by literature
- The worst reviews just present the contents of what was read with no comment
- You get no credit (and may lose it) if a review does not include appropriate citations

Project presentations

All projects include presentation

- From this year, all students do a project presentation
 - MEngs did so last year for first time
- Marked by *second* marker and an independent member of staff
- 5:95 ratio of marks
- Project pages give detailed requirements

Project presentation details I

- A 10-minute talk, followed by questions
 - Timing strictly enforced
- 10 minutes is not very long:
 - keep it simple
- Sessions running in parallel

Project presentation facilities

- Might vary slightly - you'll be told
- A standard dual-boot PC
 - Networked to the student system
- Projector connection for portables
- Overhead projector and flipchart
- Student wireless network access

Personal Computers

Can use your own portable computer, but

- All electrical equipment must be power checked in advance
- Wireless access requires advance registration

Contact support@cs.york.ac.uk for advice

- Don't leave it to the last minute

Project presentations needing special facilities eg hardware

- Specialist requirements must be notified
 - at least 14 days before the report hand-in
- Presentations may take place at separate times and locations

It's your duty to notify the presentations co-ordinator of your requirements

Project presentation contents

1. Project title and objectives
2. Context
 - quick summary of background and literature
3. How you did the project - your method(s)
4. What you achieved
 - you must include a demo if you can
5. Evaluation - how you evaluated the project and what you concluded

FEEDBACK

- Presentation feedback will be available with the returned copy of the report
- Currently, there is no formal feedback on the project; if this changes, you'll get that too!

MEng CSW Assessment

Presentation and literature review

MEng CSW Presentation I

- Week 5 sessions
- Review one recent paper by a member of staff (see module webpage)
- Use this structure:
 1. Paper title and subject area
 2. Context: general CS background
 3. What the paper covers
 4. Evaluation - what are its merits and demerits?

MEng CSW Presentation II

- 5 minute presentations in flat classrooms
- Facilities are limited, and so is time
 - Ambitious presentations are not acceptable
 - Computer presentations may not work
 - OHP slides, hand written, are fine
 - Black- or white-board available
- Don't waffle