Informatics Research Proposal

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(slides adapted from earlier versions by Alan Bundy, Alex Lascarides, Stratis Viglas)

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The MSc (project) process

IRR (semester 1) → Pass
Exams (April-May) → Pass ≥ 50% avg
Dissertation (summer)

IRP (semester 2) → Pass

MSc dissertation

- MSc research projects:
  - major component of your MSc degree
  - experience real research
  - projects proposed by supervisors (today)
  - you select projects you would like to do
  - work over the summer, write a dissertation (August)
- IRR (S1): learn about a relevant scientific area
- IRP (S2): write a detailed plan for your project

IRP: What is it?

- Proposal of a research project
  - your summer project
- Delivered and assessed by project supervisor
  - supported by mandatory tutorial groups
- Full proposal around six pages
  - more possible, subject to supervisor approval
Why do it? (the easy answer)

- Learn skills of **research planning**
- **Confirm** choice of **research area**
- **Scope** out your **summer project**
- **Compulsory** course in your **MSc degree**
  - fail IRP = not allowed to do the project

Why do it? (the hard answer)

- Knowing **what to work** on is a big **part of research**
  - **Motivation** is identifying a **void** in the **literature**, or a real-world **problem** that has **not** been **solved**
  - Propose **techniques** to **fill** this **void**, or **solve** the **problem**
  - Propose **ways** of **evaluating** the **techniques**
  - Present **expected outcomes** in the most **succinct** and **objective** way

What to do

- Select your MSc project (available end of today)
  - [Projects](https://projects.inf.ed.ac.uk/msc/projects)
- Establish **aims and objectives** of the project
- Establish **hypothesis and evaluation**
- Break project into **work-packages**
- Submit **full proposal** by **16:00, Thursday 5 April 2012**

Components of the IRP

- **Regular meetings with project supervisor:**
  - schedule a regular time, do not let it slip
  - **supervisor marks your IRP** (not the tutor)
- **Continue to meet with IRR groups:**
  - same groups, same tutors (mostly)
  - meet every week, tutor will arrange meeting times
  - attendance is mandatory: **ignore meetings = fail IRP**
IRP Timeline

• 18 Jan. Introductory Lecture (1pm, LT3) MSc project topics announced
• 25 Jan. group: discuss topics of interest submit your project preferences
• 27 Jan. MSc project topics announced
• 1,8 Feb. group: work on literature review submit your project preferences
• 10 Feb. projects assigned to students
• 15 Feb. group: first draft of proposal
• 21 Feb. group: feedback on draft
• 24 Feb. deadline to change projects
• 7 Mar. short presentation to your group
• 14-28 Mar. group: refine proposal
• 5 Apr. submit IRP by 4pm (hard deadline)

Structure of proposal

• Motivation: aims and objectives, hypothesis, timeliness, significance, feasibility, novelty, beneficiaries
• Background material (use your IRR if you can)
• Methodology and techniques to be used
• Metrics for evaluation
• Outcomes
  • application? experimental results? new data?
• Research plan (usually in the form of a Gantt chart)

Getting started

• The supervisor’s proposal is a good starting place
• How would you change it to make it more interesting to you?
  • consider both research perspective, and skills perspective
  • your IRR may also be helpful here
• Do you need to study further to identify the exact scope of the project?
  • Hint: most likely, yes
• What is the actual hypothesis/claim you will be investigating?
• What evidence is necessary to support the hypothesis/claim?
Typical claims in Informatics

- **X** is better than **Y** on task **Z** along some dimension **W**
  - What kind of things are **X** and **Y**?
    - system?
    - technique?
    - parameter?
  - What is task **Z**?
  - What is the dimension **W**?
    - behaviour, coverage, efficiency, usability, dependability, maintainability

For keyword-based searches in medical databases, Pseudo-Relevance Feedback will provide better search results than Topic Modeling as measured by mean average precision of the ranked list.

Think early about evaluation

- One of the most crucial parts of the project
- Identify the metrics
  - metrics help you form the hypothesis and solution
  - in essence, the nature of the project
- Must be clear in the proposal
  - discuss it with your supervisor
  - do not leave it until the last minute

How can claims be established?

- **Theoretical** claims: proof of some property
  - Correctness, soundness, completeness, complexity, etc.
- **Experimental** evidence: analytical metrics
  - Running times (raw performance)
  - Success rates (e.g., precision and recall in IR)
  - Comparison between different approaches
  - Comparison between computer and human output

Plan ahead

- Break your project into **work-packages**
  - What are their dependencies?
    - How should you tackle them?
    - In **series**, or in **parallel**?
    - Some will be **essential**, some will be **optional**
    - How much **time** will each **work-package** need?
      - Build in some **slippage time**
      - **Do they fit** into the time available?
      - If **not**, trim the project!
Example Gantt chart

- Specification
- Implementation
- Testing
- Evaluation
- Write-up

June    July    August

Assessment

• Your report will be marked by your supervisor

• Assessment will be based on:
  • How well project is motivated
  • Quality of research plan
  • Demonstrated understanding of area
  • Clarity of expression and presentation

Basic criteria (you need these!)

• Clear explanation and justification of each of the following
  • Project aims and hypothesis
  • Project deliverables
  • Research plan, with timetable of dependencies
  • Plans for evaluating work
  • Relation to previous work

Additional criteria (it would be nice to have these)

• Convincing arguments about each of the following
  • Timeliness and significance of research
  • Potential commercial or academic impact
  • Backup plan if original plan fails
Marking guidelines

• **Pass:** adequate on basic criteria
• **Fail:** inadequate on two or more basic criteria

If you fail IRP, then whether you pass the MSc overall will depend on decisions taken at the BoE meeting (you don’t want that)

Common problems

• **Hypothesis** is unclear, ill-formed, or blatantly wrong
• Project attempts to solve a non-problem
• Assuming **you will succeed** where others have failed
• **Insufficient detail** to assess outcomes
• **Unaware** of related research
• **Bad** presentation, **incomprehensible** report
• **KISS** = Keep It Simple, Student (words to live by)

As usual, pace yourself

• Work out a **timetable** for your writing
  • **Split** your time into **reading, thinking, and writing**
• Leave plenty of **time** for **feedback**
• Write at a **steady pace**
• **Meet** with your **supervisor regularly**
  • if they say no, keep contacting them
  • if they say no again, contact me: vlavrenk@inf

Summary

• Identify **hypothesis** and how to **evaluate** it
• **Plan** research programme
  • Break project into **work-packages**
  • Gauge duration, deliverables and dependencies
• **Motivation:** significance, feasibility, novelty
• **Pace yourself**
  • Leave time for **feedback and correction**
  • **Self-assessment** against marking criteria