Informatics Project Proposal (IPP)

Lecture 1: Introduction and Overview

2018/19

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Partially based on and adapted from earlier versions by Mark van Rossum, Alan Bundy, Victor Lavrenko, Stratis Viglas
Core IRR Course Team

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Overview

- Introduction
- Course Organisation
  - Timeline, Lectures, Tutorials, Project Supervisors
  - Website & Resources
- Technicalities
- Assessment
- Useful Information
- Introduction:
Your MSc Programme

• **Taught component (100 credits)**
  - Lectures, tutorials, coursework, exams
  - Learn established techniques that work

• **Research component (80 credits)**
  - Do something that’s never been done before
    - Study a new problem, develop a new method, etc.
    - Probably the most exciting (and hardest) part of MSc
  - Culminates in you writing a **dissertation** (~50 pages, 60 credits)

• **Two courses** prepare you:
  - **IRR:** literature review in your broad area of interest (10 credits)
  - **IPP:** write a detailed plan for your specific MSc project (10 credits)
MSc Project Timeline

• Semester 1 (IRR)
  • Learn about a relevant area: explore research papers
  • Write a 10-page critical review of what you learned

• January
  • Faculty supervisors propose project topics
  • Or, propose your own
  • Talk to supervisors, pick set of topics, algorithmic allocation

• Semester 2 (IPP)
  • write a detailed research plan for what you’re going to do

• Summer (provided you progress to the dissertation stage)
  • Work on your project (build, test, analyse results)
  • Write a dissertation
Why?
SCQF LEVEL DESCRIPTORS
The following descriptions are for guidance only – it is not expected that every point will necessarily be covered.

**LEVEL 11**

**CHARACTERISTIC 1: KNOWLEDGE AND UNDERSTANDING**
- Demonstrate and/or work with:
  - Knowledge that covers and integrates most, if not all, of the main areas of the subject/discipline/sector – including their features, boundaries, terminology and conventions.
  - A critical understanding of the principal theories, concepts and principles.
  - A critical understanding of a range of specialised theories, concepts and principles.
  - Extensive, detailed and critical knowledge and understanding in one or more specialisms, much of which is at, or informed by, developments at the forefront.
  - A critical awareness of current issues in a subject/discipline/sector and one or more specialisms.

**CHARACTERISTIC 2: PRACTICE: APPLIED KNOWLEDGE, SKILLS AND UNDERSTANDING**
- Apply knowledge, skills and understanding:
  - In using a significant range of the principal professional skills, techniques, practices and/or materials associated with the subject/discipline/sector.
  - In using a range of specialised skills, techniques, practices and/or materials that are at the forefront of, or informed by forefront developments.
  - In applying a range of standard and specialised research and/or equivalent instruments and techniques of enquiry.
  - In planning and executing a significant project of research, investigation or development.
  - In demonstrating originality and/or creativity, including in practices.
  - To practise in a wide and often unpredictable variety of professional level contexts.

**CHARACTERISTIC 3: GENERIC COGNITIVE SKILLS**
- Apply critical analysis, evaluation and synthesis to forefront issues, or issues that are informed by forefront developments in the subject/discipline/sector.
- Identify, conceptualise and define new and abstract problems and issues.
- Develop original and creative responses to problems and issues.
- Critically review, consolidate and extend knowledge, skills, practices and thinking in a subject/discipline/sector.
- Deal with complex issues and make informed judgements in situations in the absence of complete or consistent data/information.

**CHARACTERISTIC 4: COMMUNICATION, ICT AND NUMERACY SKILLS**
- Use a wide range of routine skills and a range of advanced and specialised skills as appropriate to a subject/discipline/sector, for example:
  - Communicate, using appropriate methods, to a range of audiences with different levels of knowledge/expertise.
  - Communicate with peers, more senior colleagues and specialists.
  - Use a wide range of ICT applications to support and enhance work at this level and adjust features to suit purpose.
  - Undertake critical evaluations of a wide range of numerical and graphical data.

**CHARACTERISTIC 5: AUTONOMY, ACCOUNTABILITY AND WORKING WITH OTHERS**
- Exercise substantial autonomy and initiative in professional and equivalent activities.
- Take responsibility for own work and/or significant responsibility for the work of others.
- Take significant responsibility for a range of resources.
- Work in a peer relationship with specialist practitioners.
- Demonstrate leadership and/or initiative and make an identifiable contribution to change and development and/or new thinking.
- Practise in ways which draw on critical reflection on own and others’ roles and responsibilities.
- Manage complex ethical and professional issues and make informed judgements on issues not addressed by current professional and/or ethical codes or practices.
IRR vs IPP

**IRR**
- Literature Review
- Assessed by tutors
- Mandatory tutorial groups

**IPP**
- Your Project Proposal/Plan
- Jointly assessed by tutor and project supervisor
- Mandatory tutorial groups and meetings with supervisor
• Learn skills of **project planning**
• Confirm choice of (research) **project area**
• Scope out your **summer project**
Further IPP Goals

• 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**.
  • Coming up with a **feasible** way to address the problem.
  • Propose **ways of evaluating** the techniques.
  • Present **expected outcomes** succinctly and objectively.

• Important skills
  • For PhD applications
  • For grant writing
  • For industry project proposals
Course Organisation
Approximate Timeline

- Jan. Introductory Lecture
- Jan. IRR DEADLINE
- Jan. MSc project topics announced
- Jan/Feb. submit your project preferences
- Feb. projects assigned to students
- Feb – Apr. IPP
  - attend weekly tutorials
  - ask your tutor about:
    - presentations within group
    - first draft deadline + feedback
- Apr. submit IPP

contact potential supervisors
regular meetings with your supervisor
Degree Project Management Tool (DPMT)

### MSc Projects - 18/19

<table>
<thead>
<tr>
<th>Date</th>
<th>Project Name</th>
<th>Proposer</th>
<th>Difficulty</th>
<th>Popularity</th>
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</thead>
<tbody>
<tr>
<td>11/01/19</td>
<td>A tool for cocktail enthusiasts</td>
<td>Perdita Stevens (1)</td>
<td>1 - Easy</td>
<td>0</td>
</tr>
<tr>
<td>11/01/19</td>
<td>A tool for novice writers of crime fiction</td>
<td>Perdita Stevens (1)</td>
<td>1 - Easy</td>
<td>0</td>
</tr>
<tr>
<td>13/01/19</td>
<td>Autonomous Agents Modelling Other Agents</td>
<td>Stefano Albrecht (0)</td>
<td>3 - Hard</td>
<td>0</td>
</tr>
<tr>
<td>07/01/19</td>
<td>Bayesian experimental design and inference of stem cell differentiation rates</td>
<td>Linus Schumacher (1)</td>
<td>4 - Very Hard</td>
<td>0</td>
</tr>
</tbody>
</table>

**Tags:**
- Android
- App-Programming-Language
- Java
- UI
- Web
- App-Programming-Language
- Crime-Fiction
- Writers-Workbench
- Artificial-Intelligence
- Autonomous-Agents
- Modelling-Other-Agents
- Multi-Agent-Systems
- Industry Supported
- Bayesian Inference
- Bayesian Optimization
- Computational-Biology
- Experimental-Design
- Inference
Components of the IPP

- Small number of lectures
- Weekly IPP tutorials
- Regular meetings with project supervisor
1. Introduction and overview of the IPP course
2. ELE - TBC
3. ELE - TBC
4. General Data Protection Regulations & Ethics
5. Project Planning
IPP Tutorials

• Tutorials focus on **generic project planning** skills and **proposal writing**, not the technical content of your plan
• Meet every week, tutor will arrange meeting times
• Same groups, same tutors (mostly)
• Get in touch if you want to switch groups
• Note that precise group is not very important
• Tutors are there to help you. Use them.
• Attendance is mandatory: ignore meetings = fail IPP
Regular Meetings
with Project Supervisor

• Start after project allocation
• You are in charge to schedule regular meetings
  • Do not let it slip. Supervisors will not chase you.
• Supervisors mark the technical content of your report.
Relation with Supervisor

• **Weekly meetings** are a good starting point, but cancel if you had no time to work on things.

• On the other hand, **do not cancel if you are stuck!**

• **Bad practice**
  • Last minute cancellations.
  • Asking feedback on many versions of your IPP.

• **Good practice**
  • Show initiative.
  • Search and read secondary literature.
Website & Resources
• Course Website - will be continually updated
http://www.inf.ed.ac.uk/teaching/courses/ipp/

• LEARN page
https://www.learn.ed.ac.uk

• IPP Piazza Forum - discussions throughout the course
http://piazza.com/ed.ac.uk/spring2019/infr11147/home

• Wiki (materials for tutorials)
https://www.wiki.ed.ac.uk/display/irrirpwiki/IRR+and+IPP+Wiki

• LaTeX/Overleaf Template
https://github.com/bfranke1973/IPP-Template.git

• MSc Projects Website
http://www.inf.ed.ac.uk/teaching/courses/diss/
Technicalities

what are other words for technicalities?

minutiae, specifics, details, technicality, niceties, fine point, particulars, fine points, technology
Report Template

- LaTeX/Overleaf template provided
  - Similar to IRR template
  - https://github.com/bfranke1973/IPP-Template.git
- Complete the relevant sections
- Adapt the research plan to fit your own project
- **Page limit: 8 pages**
  - Including references, but not including title page
- **Deadline: 10am on April 5, 2019**
Report Structure

- **Motivation**
  - Aims and objectives, hypothesis, timeliness, significance, feasibility, novelty, beneficiaries

- **Background** material (maybe derived from IRR)

- **Methodology** and techniques to be used

- Metrics for evaluation

- **Expected outcomes**
  - Insights, discovery, validation, …
  - application? experimental results? new data?

- **Research plan** (Gantt chart, milestones, deliverables)
• The *supervisor’s proposal* is a good starting place
• How would you change it to make it clear what to do?
  • consider both research perspective, and skills perspective
  • your IRR may also be helpful here
• Further study to identify the **exact scope of the project**
• What is the actual *hypothesis/claim* you will be investigating?
• What **evidence** is necessary to support the hypothesis/claim?
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
  • Match between data and simulation
  • Comparison between computer and human output

• **Check with your supervisor!**
How will you evaluate your project?

- Think about: “When is this project successful?”
- A crucial part of the project (although dependent on the field)
- Thought experiment: suppose everything works as planned…
- 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
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!
- Assume for the project (not the IPP) **one month for writing**.
Example Gantt Chart

**Background Reading**

- **Objective 1**
  - Task A
  - Task B

- **Objective 2**
  - Task A
  - Task B

- **Dissertation**
  - Task A

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<thead>
<tr>
<th>Milestone</th>
<th>Week</th>
<th>Description</th>
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<tbody>
<tr>
<td>$M_1$</td>
<td>2</td>
<td>Feasibility study completed</td>
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<tr>
<td>$M_2$</td>
<td>5</td>
<td>First prototype implementation completed</td>
</tr>
<tr>
<td>$M_3$</td>
<td>7</td>
<td>Evaluation completed</td>
</tr>
<tr>
<td>$M_4$</td>
<td>10</td>
<td>Submission of dissertation</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Week</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D_1$</td>
<td>6</td>
<td>Software tool for ...</td>
</tr>
<tr>
<td>$D_2$</td>
<td>8</td>
<td>Evaluation report on ...</td>
</tr>
<tr>
<td>$D_3$</td>
<td>10</td>
<td>Dissertation</td>
</tr>
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</table>
Assessment
IPP Assessment

• Your report will be **jointly marked** by your IPP tutor (structure & writing) and project supervisor (technical content)
  
  • **Supervisor has veto rights** - stop you from continuing with the project even if you should pass IPP and also progress to the MSc dissertation stage

• Numerical mark

• Assessment will be based on:
  
  • How well the project is motivated
  
  • Quality of research plan
  
  • Demonstrated understanding of area, including knowledge of literature
  
  • Clarity of expression and presentation
## Marking Guidelines

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Possible considerations</th>
<th>absent</th>
<th>poor</th>
<th>fair</th>
<th>good</th>
<th>v. good</th>
<th>excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature</td>
<td>Concise review of literature, correct referencing.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Introduction</td>
<td>Accessible to non-experts; motivation and relevance; audience</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Objectives</td>
<td>Clear statement of objectives; hypotheses</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Approach</td>
<td>Method; plan of work; evaluation metric; time-table.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Presentation</td>
<td>Reasonable length, correct English, correct level</td>
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</tbody>
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**Comments:**
- Strengths (box)
- Weaknesses (box)
- Areas for Improvement (box)
- Final Mark (numerical):
Basic Criteria

• Essential criteria for passing IPP

• 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/measures of success
  • Relation to previous work
Additional Criteria

- Additional criteria for achieving a better grade
- Convincing arguments about each of the following:
  - Timeliness and significance of research
  - Potential commercial or academic impact
  - Backup plan if original plan fails
Common Problems

- Hypothesis is unclear, ill-formed
- Assuming, without reason, that you will succeed where others have failed
- Insufficient detail to assess outcomes
- Unaware of related research
- Bad presentation, incomprehensible report
  - Audience: fellow student
- Too ambitious (better two good results, than five half results)
Avoid Plagiarism

• **Quotations** must be acknowledged
  • Including close paraphrase

• **Use quote marks and cite source**
  …Smith(2009, p.138) argued that “the Level 2 cache systems are the core to fast database systems in future HPC”….

• **Do not copy-paste-edit** from online sources

• Read **School guide on plagiarism**
  • http://www.inf.ed.ac.uk/admin/ITO/DivisionalGuidelinesPlagiarism.html

• Plagiarism carries **serious penalties**. Fail on the course is the least severe…

• Guidance on **Good Academic Practice** on the course website
Consequences

- Better to submit nothing than to submit plagiarized material
- Submit nothing: lose 10 credit points
  - You may still progress to the MSc dissertation, decided by the Board of Examiners on a case-by-case basis
- Submit plagiarized report: Academic Misconduct review
  - Average case: downgraded to a diploma (not an MSc but something)
  - Worst case: kicked out of the program altogether
Re-using IPP in your MSc thesis

• The work but not the words of IPP can be used in thesis
• University policy: cannot be marked twice for the same work
  • Cannot copy-and-paste sections from IPP into your MSc dissertation
• Two options:
  • Quote the included sections with a citation to your own IPP. They will not be considered original material during the marking
  • Re-narrate those sections. (This is the better option) By August you will likely have a different understanding of the material.
Useful Information
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 problem persists, contact me: bfranke@inf.ed.ac.uk
  - For other problems: personal tutor. The earlier the better.

- Piazza forum!