COMP777

Computing Methods for Research

S2 Evening 2016

Dept of Computing

Contents

General Information

Unit convenor and teaching staff
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Credit points
4

Prerequisites
Admission to MRes

Corequisites

Co-badged status

Unit description
This unit deals with the effective use of computing devices and tools for research purposes. It aims at equipping research students with relevant computing skills that can greatly improve their research productivity. It introduces a range of tools covering data processing and analysis (eg, data mining), coding (eg, scripting, web-based programming, control version system), modelling techniques, communication media, document preparation systems (eg, LaTeX), computer-based presentation tools, bibliography management, and human-computer interfaces, among other topics.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Define and manage a project involving empirical research.

Apply a knowledge of programming and/or use of appropriate applications (for e.g. data gathering, curation, cleaning or analysis) in the context of an empirical research project in a relevant discipline.

Articulate clearly a coherent argument in written and oral form to a variety of audiences.

Apply a knowledge of the principles of ethical conduct of research, including an examination of the role of open access to data and publications.

Demonstrate best practice in document preparation and management in research.

General Assessment Information

Submission of assignments will be for the most part via iLearn; presentations associated with assignments will be given and assessed during class time.

For policy on late assignments, see Policies and Procedures.

Assessment Tasks

Name	Weighting	Due
Project Proposal Presentation	10%	Week 5
Project Proposal Document	10%	Week 6
Project Update Presentation	10%	Week 11
Draft Report	10%	Week 11
Final Presentation	25%	Week 14
Final Report	35%	Week 15

Project Proposal Presentation

Due: **Week 5**
Weighting: **10%**

The assessment for the unit will be built around a single project you will devise. This initial presentation is to pitch the idea to the audience (lecturers and students): explain the data you'll be using, give any relevant background, and outline a plan for tackling the project.

On successful completion you will be able to:

- Define and manage a project involving empirical research.
- Articulate clearly a coherent argument in written and oral form to a variety of audiences.

Project Proposal Document

Due: **Week 6**
Weighting: **10%**

This is a document that describes what you'll be doing in the project, based on the proposal presentation and feedback on that. It will also include an outline of the structure of the final report you'll be writing on the results of the project.

On successful completion you will be able to:

- Define and manage a project involving empirical research.
- Articulate clearly a coherent argument in written and oral form to a variety of audiences.
- Demonstrate best practice in document preparation and management in research.

Project Update Presentation

Due: **Week 11**
Weighting: **10%**

This presentation will give an update on the state of the project.

On successful completion you will be able to:

- Define and manage a project involving empirical research.
- Articulate clearly a coherent argument in written and oral form to a variety of audiences.

Draft Report

Due: **Week 11**
Weighting: **10%**

This will be a draft of the final report that you'll be writing about the project, primarily so that you can get feedback.

On successful completion you will be able to:

- Define and manage a project involving empirical research.
- Articulate clearly a coherent argument in written and oral form to a variety of audiences.
- Demonstrate best practice in document preparation and management in research.

Final Presentation

Due: **Week 14**
Weighting: **25%**

This presentation will describe to an audience the results of your project. Feedback from the presentation can be incorporated into the final report

On successful completion you will be able to:

- Define and manage a project involving empirical research.
- Apply a knowledge of programming and/or use of appropriate applications (for e.g. data gathering, curation, cleaning or analysis) in the context of an empirical research project in a relevant discipline.
- Articulate clearly a coherent argument in written and oral form to a variety of audiences.

Final Report

Due: **Week 15**
Weighting: **35%**

This report will describe the completed project as a whole: what the goals were, what data was used, how it was processed, and what the results were relative to the goals. It may also include any related programs written as part of the project, etc.

On successful completion you will be able to:

- Define and manage a project involving empirical research.
- Apply a knowledge of programming and/or use of appropriate applications (for e.g. data gathering, curation, cleaning or analysis) in the context of an empirical research project in a relevant discipline.
- Articulate clearly a coherent argument in written and oral form to a variety of audiences.
- Apply a knowledge of the principles of ethical conduct of research, including an examination of the role of open access to data and publications.
- Demonstrate best practice in document preparation and management in research.

Delivery and Resources

CLASSES

Each week of COMP777 has a three-hour session which is a mix of lecture (typically for the first two hours), tutorial and practical session. For details of days, times and rooms, consult the University timetables webpage (http://www.timetables.mq.edu.au).

REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

There is no set text for the unit. We will be providing pointers to reading material over the course of the unit.

The unit has some parallels with the freely available Software Carpentry course. We'll be using those resources as supplementary ones for the unit.

UNIT WEBPAGE AND TECHNOLOGY USED AND

REQUIRED

Web Home Page

COMP777 will make extensive use of the iLearn course management system, including for delivery of class materials, discussion boards, submission of work and access to marks and feedback. Students should check the iLearn site (https://ilearn.mq.edu.au) regularly for unit updates.

Questions and general queries regarding the content of this unit, its lectures or mixed classes, or its assignments should be posted to the discussion boards on the COMP777 iLearn site. In particular, any questions which are of interest to all students in this unit should be posted to one of these discussion boards, so that everyone can benefit from the answers. Questions of a private nature should be directed to the unit teaching staff.

Technology Used and Required

The practical work in this unit involves programming in the Python language (http://www.python.org/) which is widely used for the sorts of scripting purposes covered in this unit. Python can be downloaded free of charge for a range of operating systems from the Python website. The unit will use Python 2.7.

Note that as this is a master's unit, there will be some self-directed learning. We do not expect that you will know Python before the unit starts, but will pick up the necessary elements in the first few weeks of the unit; we will give pointers to resources for learning Python, will include snippets of Python in lecture notes where relevant to computational experiments, and will have set exercises for discussion during class.

The unit will also use Amazon's Mechanical Turk for data gathering, and a range of other tools. Much of the work -- on cloud computing, iPython notebooks, etc -- will be carried out in the Microsoft Azure framework; students will get a free, six-month educational licence for its use.

Unit Schedule

This is a tentative schedule. The weekly topics are intended to cover useful techniques and tools for carrying out a data-oriented project, and may change depending upon chosen student projects, etc.

Week 1	Philosophy of (computer) science Tools for empirical research: iPython notebooks
Week 2	Introduction to cloud computing and virtual machines
Week 3	Version control and the linux shell Discussion of data-based projects

Week 4	Tools for data analysis Planning presentations
Week 5	Project proposal presentations
Week 6	Tools for data analysis (cont.)
Week 7	Introduction to data gathering and cleaning
	RECESS
Week 8	More on data gathering and cleaning
Week 9	Cloud computing
Week 10	More on cloud computing Introduction to LaTeX
Week 11	Project update presentations
Week 12	More on cloud computing
Week 13	no class
Week 14	Final presentations

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Late Assignment Policy: No extensions will be granted. Late tasks will be accepted up to 72 hours after the submission deadline. There will be a deduction of 20% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 40% penalty). This penalty does not apply for cases in which an application for special consideration is made and approved.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcomes

- Define and manage a project involving empirical research.
- Articulate clearly a coherent argument in written and oral form to a variety of audiences.
- Apply a knowledge of the principles of ethical conduct of research, including an examination of the role of open access to data and publications.

Assessment tasks

- Project Proposal Presentation
- Project Proposal Document
- Project Update Presentation
- Draft Report
- Final Presentation
- Final Report

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Define and manage a project involving empirical research.
- Apply a knowledge of programming and/or use of appropriate applications (for e.g. data gathering, curation, cleaning or analysis) in the context of an empirical research project in a relevant discipline.

Assessment tasks

- Project Proposal Presentation
- Project Proposal Document
- Project Update Presentation

- Draft Report
- Final Presentation
- Final Report

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Define and manage a project involving empirical research.
- Apply a knowledge of programming and/or use of appropriate applications (for e.g. data gathering, curation, cleaning or analysis) in the context of an empirical research project in a relevant discipline.
- Articulate clearly a coherent argument in written and oral form to a variety of audiences.
- Demonstrate best practice in document preparation and management in research.

Assessment tasks

- Project Proposal Presentation
- Project Proposal Document
- Project Update Presentation
- Draft Report
- Final Presentation
- Final Report

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Define and manage a project involving empirical research.
- Apply a knowledge of programming and/or use of appropriate applications (for e.g. data gathering, curation, cleaning or analysis) in the context of an empirical research project

in a relevant discipline.

Assessment tasks

- Project Proposal Presentation
- Project Proposal Document
- Project Update Presentation
- Draft Report
- Final Presentation
- Final Report

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- Define and manage a project involving empirical research.
- Articulate clearly a coherent argument in written and oral form to a variety of audiences.
- Apply a knowledge of the principles of ethical conduct of research, including an examination of the role of open access to data and publications.
- Demonstrate best practice in document preparation and management in research.

Assessment tasks

- Project Proposal Presentation
- Project Proposal Document
- Project Update Presentation
- Draft Report
- Final Presentation
- Final Report

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcomes

- Define and manage a project involving empirical research.
- Apply a knowledge of the principles of ethical conduct of research, including an examination of the role of open access to data and publications.

Assessment tasks

- Project Proposal Presentation
- Project Proposal Document
- Project Update Presentation
- Draft Report
- Final Presentation
- Final Report

Changes from Previous Offering

This year much of the work -- data analysis, use of iPython notebooks, virtual machines, cloud computing, etc -- will be carried out within the Microsoft Azure framework.

Assessment Standards

COMP777 will be graded according to the following general descriptions of the letter grades as specified by Macquarie University; following the general description is additional description of the standards specific to this unit. In the course of the unit, samples of past successful project will be provided in order to illustrate these standards.

High Distinction (HD, 85-100): provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality and insight in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; critical evaluation of problems, their solutions and their implications; creativity in application as appropriate to the discipline.

In the context of this unit, the project has a good design, and has used some data that is interesting or non-obvious, or has required some effort to obtain or use. It involves a good analysis of the data, and fairly extensively draws on the techniques and tools presented in the unit and possibly on others discovered independently by the student. The project is described in a report and a presentation that are well-structured and essentially free from errors; these would be of a standard that could be presented at a conference with little or no polishing.

Distinction (D, 75-84): provides evidence of integration and evaluation of critical ideas, principles and theories, distinctive insight and ability in applying relevant skills and concepts in relation to learning outcomes. There is demonstration of frequent originality in defining and analysing issues or problems and providing solutions; and the use of means of communication appropriate to the discipline and the audience.

In the context of this unit, the project has a good design, and has used some data that is interesting or non-obvious, or has required some effort to obtain or use. It involves a good analysis of the data, and fairly extensively draws on the techniques and tools presented in the unit. The project is described in a report and a presentation that are well-structured and mostly free from errors; these would be of a standard that could be presented at a conference with some polishing.

Credit (Cr, 65-74): provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is demonstration of substantial understanding of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; convincing argumentation with appropriate coherent justification; communication of ideas fluently and clearly in terms of the conventions of the discipline.

In the context of this unit, the project has a sound design, and demonstrates some thought in the choice of data. It involves a good analysis of the data, and uses a reasonable number of the techniques and tools presented in the unit. The project is described in a report and a presentation that are well-structured and mostly free from errors.

Pass (P, 50-64): provides sufficient evidence of the achievement of learning outcomes. There is demonstration of understanding and application of fundamental concepts of the field of study; routine argumentation with acceptable justification; communication of information and ideas adequately in terms of the conventions of the discipline. The learning attainment is considered satisfactory or adequate or competent or capable in relation to the specified outcomes.

In the context of this unit, the project has a satisfactory design and uses some easily accessible data. It involves a successful, or nearly successful, analysis of data, and shows some familiarity with tools or techniques presented in the unit. The project is described in a satisfactory report and presentation.

Fail (F, 0-49): does not provide evidence of attainment of learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; missing, undeveloped, inappropriate or confusing argumentation; incomplete, confusing or lacking communication of ideas in ways that give little attention to the conventions of the discipline.