

Course Outlines

2021

COMP SCI 7405 - Research Methods in Software Engineering and Computer Science

North Terrace Campus - Semester 1 - 2021

This course will prepare students for advanced research by examining how to plan, conduct and report on empirical investigations. The course will cover techniques applicable to each of the steps of a research project, including formulating research questions, theory building, data analysis (using both qualitative and quantitative methods), building evidence, assessing validity, and publishing. It will particularly focus on research involving software, developing statistical tools to measure software performance and the ways in which people interact with software tools.

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General Course Information

Course Details

Course Code	COMP SCI 7405
Course	Research Methods in Software Engineering and Computer Science
Coordinating Unit	School of Computer Science
Term	Semester 1
Level	Postgraduate Coursework
Location/s	North Terrace Campus
Units	3
Contact	2 hours per week
Available for Study Abroad and Exchange	N
Restrictions	Master of Data Science, Master of Software Engineering, Master of Cybersecurity, Master of Machine Learning students only
Course Description	This course will prepare students for advanced research by examining how to plan, conduct and report on empirical investigations. The course will cover techniques applicable to each of the steps of a research project, including formulating research questions, theory building, data analysis (using both qualitative and quantitative methods), building evidence, assessing validity, and publishing. It will particularly focus on research involving software, developing statistical tools to measure software performance and the ways in which people interact with software tools.

Course Staff

Course Coordinator: [Dr Christoph Treude](#)

Lecturers: Associate Professor Nick Falkner and Dr Christoph Treude.

Course Timetable

The full timetable of all activities for this course can be accessed from [Course Planner](#).

Learning Outcomes

Course Learning Outcomes

On successful completion of this course students will be able to:

- 1 Understand and be able to explain and apply the philosophy of science as it applies to research methods
- 2 Be able to explain principles of research design
- 3 Be able to apply principles of research design for a variety of projects
- 4 Understand and be able to explain research ethics and their implications
- 5 Understand and be able to apply a range of techniques, including, but not limited to: qualitative methods, quantitative methods, survey methods, case studies, interviews
- 6 Understand and be able to explain the important of data replication and the management of bias
- 7 Be able to design and implement research studies that meet the above requirements
- 8 Demonstrate the ability to produce written records of research work that are of a submittable standard
- 9 Demonstrate the ability to critique and review work in order to identify where research methodological principles have been followed well or could be improved, including the written presentation of the review to a professional standard

The above course learning outcomes are aligned with the Engineers Australia [Stage 1 Competency Standard for the Professional Engineer](#).

The course is designed to develop the following Elements of Competency: 1.1 1.2 1.3 1.4 1.5 1.6 2.1 2.2 2.3
2.4 3.1 3.2 3.3 3.4 3.5

University Graduate Attributes

This course will provide students with an opportunity to develop the Graduate Attribute(s) specified below:

University Graduate Attribute	Course Learning Outcome(s)
Deep discipline knowledge <ul style="list-style-type: none"> ■ informed and infused by cutting edge research, scaffolded throughout their program of studies ■ acquired from personal interaction with research active educators, from year 1 ■ accredited or validated against national or international standards (for relevant programs) 	1-9
Critical thinking and problem solving <ul style="list-style-type: none"> ■ steeped in research methods and rigor ■ based on empirical evidence and the scientific approach to knowledge development ■ demonstrated through appropriate and relevant assessment 	5,7,9

Teamwork and communication skills	2,4,9
<ul style="list-style-type: none"> ▪ developed from, with, and via the SGDE ▪ honed through assessment and practice throughout the program of studies ▪ encouraged and valued in all aspects of learning 	
Career and leadership readiness	3,5,7,9
<ul style="list-style-type: none"> ▪ technology savvy ▪ professional and, where relevant, fully accredited ▪ forward thinking and well informed ▪ tested and validated by work based experiences 	
Intercultural and ethical competency	4
<ul style="list-style-type: none"> ▪ adept at operating in other cultures ▪ comfortable with different nationalities and social contexts ▪ able to determine and contribute to desirable social outcomes ▪ demonstrated by study abroad or with an understanding of indigenous knowledges 	
Self-awareness and emotional intelligence	7-9
<ul style="list-style-type: none"> ▪ a capacity for self-reflection and a willingness to engage in self-appraisal ▪ open to objective and constructive feedback from supervisors and peers ▪ able to negotiate difficult social situations, defuse conflict and engage positively in purposeful debate 	

Learning Resources

Required Resources

The course has no text books but readings will be provided throughout the course and may be accessed through the on-line teaching portal.

Recommended Resources

There are no recommended resources.

Online Learning

All materials will be available from MyUni, myuni.adelaide.edu.au, Canvas Learning Management System. Online learning materials are likely to include podcasts, video recordings, electronic documents and on-line quizzes to verify knowledge. Students may also interact with the Mahara portfolio system as part of their coursework.

Learning & Teaching Activities

Learning & Teaching Modes

This course will require students to carry out pre-reading and, on occasion, prepare presentations prior to attending the face-to-face session time, one two-hour session every week. The face-to-face will consist of mini-lectures, group discussion, collaborative activities, presentation, and peer evaluation. It is essential that students are prepared before attending. While the face-to-face sessions may be recorded, the activities contained may not necessarily be captured by that system.

Workload

The information below is provided as a guide to assist students in engaging appropriately with the course requirements.

The information below is provided as a guide to assist students in engaging appropriately with the course requirements. Students will be expected to undertake 3-4 hours of reading and preparation each week, with one two-hour face-to-face

session every week. Course assessment activities will take approximately 4 hours a week on average.

As there is no examination, assessment activities and load will continue into Week 13 and possibly Week 14.

Learning Activities Summary

This course will prepare students for advanced research by examining how to plan, conduct and report on empirical investigations. The course will cover techniques applicable to each of the steps of a research project, including formulating research questions, theory building, data analysis (using both qualitative and quantitative methods), building evidence, assessing validity, and publishing. It will particularly focus on research involving software, developing statistical tools to measure software performance and the ways in which people interact with software tools.

Specific Course Requirements

Students should be the final year of an Honours undergraduate program, enrolled in an Honours or coursework Masters program or have recently started a PhD program. Students should, preferably, be starting their project work and be able to undertake this course in conjunction with the first 6-12 months of their project.

Small Group Discovery Experience

The focus of this course is research and students will be undertaking small-group activities as part of the course.

Assessment

The University's policy on [Assessment for Coursework Programs](#) is based on the following four principles:

1. Assessment must encourage and reinforce learning.
2. Assessment must enable robust and fair judgements about student performance.
3. Assessment practices must be fair and equitable to students and give them the opportunity to demonstrate what they have learned.
4. Assessment must maintain academic standards.

Assessment Summary

Due to the current COVID-19 situation modified arrangements have been made to assessments to facilitate remote learning and teaching. Assessment details provided here reflect recent updates.

Assessment Task	Weighting (%)	Individual/ Group	Formative/ Summative	Due (week)*	Hurdle criteria	Learning outcomes	Ali
Produce a short research paper. Written paper	40	Individual	Summative	Week 12	Min 40%	1. 2. 3. 4.5.6.7.8.	1. 2. 3.
Critique a research paper. Written submission	15	Individual	Summative	Week 6		2. 3. 4. 5. 9.	
Construct and refine an appropriate methodology for a research question. Short paper	15	Individual	Summative	Week 12		1. 2. 3. 4. 5. 6. 7.	1.1 2.2 3.2 4.3
Miniresearch project: demonstrate the ability to produce designs for a range of specific methodologies and carry out the investigation. Written submission and presentation	20	Individual	Summative	Week 12		1. 2. 3. 4. 5. 6. 7.	1.1 2.2 3.2 4.3
Presentation of a research paper in class	10	Group or Individual	Summative	Week 12		1. 2. 3. 4. 6. 7. 9.	1.1 2.4

* The specific due date for each assessment task will be available on MyUni.

This assessment breakdown complies with the University's Assessment for Coursework Programs Policy.

****CBOK is the Core Body of Knowledge for ICT Professionals defined by the Australian Computer Society. The alignment in the table above corresponds with the following CBOK Areas:**

1. Problem Solving
 - 1.1 Abstraction
 - 1.2 Design
2. Professional Knowledge
 - 2.1 Ethics
 - 2.2 Professional expectations
 - 2.3 Teamwork concepts & issues
 - 2.4 Interpersonal communications
 - 2.5 Societal issues
 - 2.6 Understanding of ICT profession
3. Technology resources
 - 3.1 Hardware & Software
 - 3.2 Data & information
 - 3.3 Networking
4. Technology Building
 - 4.1 Programming
 - 4.2 Human factors
 - 4.3 Systems development
 - 4.4 Systems acquisition
5. ICT Management
 - 5.1 IT governance & organisational
 - 5.2 IT project management
 - 5.3 Service management
 - 5.4 Security management

Assessment Related Requirements

Hurdle Requirement: If your overall mark for the course is greater than 44 F but, your marks for the short research paper are less than 40%, your overall mark for the course will be reduced to 44 F.

Assessment Detail

The detailed assessment breakdown is:

1. Produce a short research paper. Written paper. 40%
2. Critique a research paper. Written submission and presentation. 15%
3. Construct and refine an appropriate methodology for a research question. Written submission. 15%
4. Mini-research project: demonstrate the ability to produce designs for a range of specific methodologies and carry out the investigation. Written submission and presentation. 20%
5. Presentation in class: 10% (Graded by lecturer and combined with peer evaluation. Two separate project-related presentations)

Item 1 is a hurdle requirement for this course. Students must achieve at least 40% of the available mark for this component.

CBOK Mapping:

Research paper

- Abstraction: 3
- Design: 3
- Ethics: 3
- Professional expectations: 2

Interpersonal communications: 3
 Understanding of ICT profession: 3
 Data & Information: 3
 Programming: 3
 Human factors: 3
 Systems development: 3

Critique

Ethics: 4
 Data & Information: 4

Construct and refine methodology

Abstraction: 3
 Design: 3
 Ethics: 3
 Professional expectations: 2
 Interpersonal communications: 3
 Understanding of ICT profession: 3
 Data & Information: 3
 Programming: 3
 Human factors: 3
 Systems development: 3

Mini-research project

Abstraction: 3
 Design: 3
 Ethics: 3
 Professional expectations: 2
 Interpersonal communications: 3
 Understanding of ICT profession: 3
 Data & Information: 3
 Programming: 3
 Human factors: 3
 Systems development: 3

Presentation of a research paper

Abstraction: 3
 Design: 3
 Professional expectations: 3
 Interpersonal communications: 3
 Understanding of ICT profession: 3
 Data & Information: 3

Submission

All work will be submitted through either the School of Computer Science's Web Submission Gateway, the LMS, or the Mahara Portfolio system. Each assignment will have clear instructions as to the submission mode and to the model of lateness management that is being employed.

Traditional late penalties may not be used in this class although, if not otherwise stated, this is the model that will be used. Instead, when clearly identified on a submission, late submission may result in the loss of access to certain grading resources. (As always, documented reasons for lateness can be acceptable and we would then provide other opportunities as required.) For example, if work is not submitted in time to be distributed for peer review, the work will not receive a peer review mark. If the work is not delivered in time for detailed marking, then a simpler rubric will be employed that will have fewer opportunities to receive marks, once all other marking of submissions has completed and if time allows. If a student has not prepared for a presentation, then that grading opportunity is lost.

Our goal is to provide the best feedback we can, as soon as possible, to the largest number of students. We wish to provide marks that clearly recognise each student's contribution but must balance this with our duty of care to all students and a principle of fairness.

Course Grading

Grades for your performance in this course will be awarded in accordance with the following scheme:

M10 (Coursework Mark Scheme)

Grade	Mark	Description
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FNS		Fail No Submission
F	1-49	Fail
P	50-64	Pass
C	65-74	Credit
D	75-84	Distinction
HD	85-100	High Distinction
CN		Continuing
NFE		No Formal Examination
RP		Result Pending

Further details of the grades/results can be obtained from [Examinations](#).

Grade Descriptors are available which provide a general guide to the standard of work that is expected at each grade level. More information at [Assessment for Coursework Programs](#).

Final results for this course will be made available through [Access Adelaide](#).