School of Information and Physical Sciences

SENG4430: Software Quality

Callaghan and Online
Semester 1 - 2024

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

COURSE OUTLINE

OVERVIEW

Course Description

This course examines principles and techniques for designing quality into software, and for measuring and monitoring quality in software. Students will also obtain practical experience with software quality management and use of quality management tools.

Academic Progress Requirements

Nil

Requisites

This course has similarities to SENG3130. If you have successfully completed SENG3130 you cannot enrol in this course.

Assumed Knowledge

SENG2130 Systems Analysis and Design

Contact Hours

Callaghan
Lecture
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1

Workshop
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1

Online
Lecture
Online
2 hour(s) per week(s) for 13 week(s) starting Week 1

Workshop
Online
2 hour(s) per week(s) for 13 week(s) starting Week 1

Unit Weighting Workload

10
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator

Callaghan
Dr Adrian Tan
Adrian.Tan10@newcastle.edu.au
(02) 4055 0700
Consultation: Thursdays 9 am to 11 am (or other times by appointment) at ES233

Teaching Staff

Other teaching staff will be advised on the course Canvas site.

School Office

School of Information and Physical Sciences
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9am-5pm (Mon-Fri)
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SYLLABUS

Course Content

Software Quality Fundamentals
Software Engineering Culture and Ethics
Value and Costs of Quality
Models and Quality Characteristics
Software Quality Improvement
Software Safety

Software Quality Management Processes
Software Quality Assurance
Verification and Validation
Reviews and Audits

Practical Considerations
Software Quality Requirements
Defect Characterization
Software Quality Management Techniques
Software Quality Measurement

Software Quality Tools

Course Learning Outcomes

On successful completion of this course, students will be able to:
1. Explain general strategies used for software quality improvement.

2. Evaluate software engineering factors that impact the overall quality of software system.

3. Integrate quality assurance practices throughout a software development project.

Course Materials

Recommended Text:

- Claude Y. Laporte, Alain April, Software quality assurance [electronic resource], Hoboken, NJ : Wiley-

IEEE Computer Society, Inc., 2018
- Jeff Tian, Software quality engineering: Testing, quality assurance, and quantifiable improvement, Hoboken, N.J. : Wiley, 2005
- Ian Sommerville, Software engineering, Harlow, England : New York : Pearson/Addison-Wesley, 2004+ (ed7+).

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

-

Course Assessment Requirements:

- Assessment 3 - Final Exam: Pass requirement 40% - Must obtain 40% in this assessment item to pass the course.

Compulsory Placement and WHS Requirements:

-

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	26 Feb	Software Quality Engineering	Workshop 1	
2	4 Mar	Software Quality Metrics Verification and Validation	Workshop 2	
3	11 Mar	Quality Engineering Quality Assurance	Workshop 3	
4	18 Mar	Software Engineering Project Management	Workshop 4	
5	25 Mar	Security	Workshop 5	
6	1 Apr	Design Patterns and Architectures	Workshop 6	
7	8 Apr	Anti-Patterns and Refactoring	Workshop 7	
Mid-Semester Recess				
Mid-Semester Recess				
8	29 Apr	Software Inspection & Formal Verification	Workshop 8	
9	6 May	Risk Analysis, Reliability & Safety Cases	Workshop 9	
10	13 May	Design for Testability and Test-Driven Development	Workshop 10	
11	20 May	Aspect Oriented Software Engineering	Workshop 11	
12	27 May	Course Review		Assessment 2 Due
13	3 Jun	Revision		Assessment 1 Due
Examination Period				
Examination Period				

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Group Report	Week 13 (07 June 2024, 11:59 pm)	Group	30%	1, 2, 3
2	Group Presentation	Week 12 (31 May 2024, 11:59 pm)	Group	20%	1, 2, 3
3	Final Exam*	Formal examination period	Individual	50%	1, 2

* This assessment has a compulsory requirement.

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Group Report

Assessment Type Report
Purpose At the end of the course, a professional final report should be presented, outlining how objectives were met, changes made during project life, decisions made and justified, and a conclusion about the development, testing and evaluation of the group project software quality tool. The report will be in the form of a dependability/quality case.
Description Final report.
Weighting 30%
Due Date Week 13 (07 June 2024, 11:59 pm)
Submission Method Online
Assessment Criteria See assessment specification and marking form on Canvas.
Return Method Not Returned
Feedback Provided Online - .
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Group Presentation

Assessment Type Presentation
Purpose The purpose of the presentation is to demonstrate a working version of the software quality tool developed in the group project. Evidence on the quality of the tool will also be demonstrated.
Description Group presentation of final software quality tool system and supporting documents, e.g., user manual, deployment guide and maintenance manual.
Weighting 20%
Due Date Week 12 (31 May 2024, 11:59 pm)
Submission Method In Class
Presentation documents must be submitted via Canvas.
Assessment Criteria See assessment specification and marking form on Canvas.
Return Method Not Returned
Feedback Provided In Class - .
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Final Exam

Assessment Type Formal Examination
Purpose The formal examination is designed to test the students' knowledge of the course material and their ability to describe, analyse and synthesis problem solutions from this material.
Description Formal examination.
Weighting 50%

Compulsory Requirements	Pass requirement 40% - Must obtain 40% in this assessment item to pass the course..
Due Date	Formal examination period
Submission Method	Formal Exam
Assessment Criteria	
Return Method	Not Returned
Feedback Provided	No Feedback - .
Opportunity to Reattempt	Students WILL be given the opportunity to reattempt this assessment.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in

	all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35.
Adverse Circumstances	The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where: 1. the assessment item is a major assessment item; or 2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system; 3. you are requesting a change of placement; or 4. the course has a compulsory attendance requirement. Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at: https://policies.newcastle.edu.au/document/view-current.php?id=236
Important Policy Information	The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.

GRADUATE PROFILE STATEMENTS

The following table illustrates how this course contributes towards building the skills students will need to work in their profession.

Level of capability

- Level 1 indicates an introduction to a topic at a university level
- Levels 2 and 3 indicate progressive reinforcement of that topic
- Level 4 indicates skills commensurate with a graduate – entry to professional practice
- Level 5 indicates highly specialist or professional ability

Bachelor of Engineering

	University of Newcastle Bachelor of Engineering Graduate Profile Statements	Taught	Practised	Assessed	Level of capability
	Knowledge Base				
1	1.1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.				
2	1.2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.				
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	X	X	X	3
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.				
5	1.5. Knowledge of contextual factors impacting the engineering discipline.	X	X	X	3
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				
	Engineering Ability				

7	2.1. Application of established engineering methods to complex engineering problem solving.				
8	2.2. Fluent application of engineering techniques, tools and resources.	X	X	X	3
9	2.3. Application of systematic engineering synthesis and design processes.				
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.				
	Professional Attributes				
11	3.1. Ethical conduct and professional accountability				
12	3.2. Effective oral and written communication in professional and lay domains.	X	X	X	3
13	3.3. Creative, innovative and pro-active demeanour.				
14	3.4. Professional use and management of information.	X	X	X	3
15	3.5. Orderly management of self, and professional conduct.				
16	3.6. Effective team membership and team leadership.	X	X	X	3

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.