School of Information and Physical Sciences

SENG6320: Software Verification and Validation

Callaghan and Online
Semester 1 - 2024

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

COURSE OUTLINE

OVERVIEW

Course Description
This course focuses on software verification and validation throughout the software life cycle. Topics covered in this course will include reviews, inspections, formal verification, testing techniques, and testing frameworks.

Academic Progress Requirements
Nil

Requisites
This course has similarities to SENG3320. If you have completed SENG3320 you cannot enrol in this course.

Assumed Knowledge
SENG6350 (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 12 week(s) starting Week 2

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 12 week(s) starting Week 2

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 and Online
Dr Xiao Chen
Xiao.Chen@newcastle.edu.au
Consultation: Thursdays 9 am to 11 am (or other times by appointment) at SR273

Teaching Staff

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

School Office

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9am-5pm (Mon-Fri)
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SYLLABUS

Course Content

- Basic concepts in software verification and validation.
- Software testing techniques (black-box testing, white-box testing, etc.)
- Test adequacy and coverage criteria
- Automated testing tools and techniques
- Testing lifecycle and test management
- Non-functional testing
- Formal methods for software verification

Course Learning Outcomes

On successful completion of this course, students will be able to:
1. Synthesize and apply advanced concepts and theories in software verification and validation.

2. Proficiently apply varied testing techniques, strategically develop comprehensive test plans, create sophisticated test suites, and conduct in-depth assessments of test suite coverage, showcasing a deep understanding of software testing principles and their practical implementation.

3. Select, adapt, and orchestrate the most suitable technologies to optimize the testing process and ensure software quality.

4. Articulate and critically analyse the advanced research dimensions in software verification and validation, illustrating an in-depth comprehension of the evolving theoretical and practical paradigms that influence the quality and reliability of software systems.

Course Materials

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 - Formal Examination: Pass requirement 40% - Must obtain 40% in this assessment item to pass the course.

Compulsory Placement and WHS Requirements:

-

SCHEDULE

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	Assignment 1 -Test management	Friday of Week 8	Group	25%	1, 2, 3
2	Assignment 2 -Formal testing	Friday of Week 13	Group	25%	1, 2, 3
3	Formal Examination*	During Formal Exam Period	Individual	50%	1, 2, 3, 4

* 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 - Assignment 1 -Test management

Assessment Type Written Assignment
Description Test Case Design
Weighting 25%
Due Date Friday of Week 8
Submission Method Online
Assessment Criteria The detailed Assignment 1 Specification and Assessment Criteria will be provided in Canvas.
Return Method Not Returned
Feedback Provided Online - .
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Assignment 2 -Formal testing

Assessment Type Written Assignment
Description Automated Test Data Generation
Weighting 25%
Due Date Friday of Week 13
Submission Method Online
Assessment Criteria
Return Method Not Returned

Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Formal Examination

Assessment Type	Formal Examination
Description	The final exam is composed of short answer questions.
Weighting	50%
Compulsory Requirements	Pass requirement 40% - Must obtain 40% in this assessment item to pass the course..
Due Date	During Formal Exam Period
Submission Method	Formal Exam
Assessment Criteria	Demonstrate a level of conceptual understanding of course content, and problem solving abilities.
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:

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

Master of Professional Engineering

Graduate attribute	University of Newcastle Master of Professional Engineering Graduate Profile Statements	Taught	Practised	Assessed	Level of capability
1.	Comprehensive, theory-based understanding of engineering fundamentals and/or the underpinning natural and physical sciences as applicable to the engineering discipline				
2.	Conceptual understanding of the mathematics, numerical analysis, statistics and computer and information sciences which underpin the engineering discipline				
3.	In-depth understanding of specialist bodies of knowledge within the engineering discipline	X	X	X	4
4.	Discernment of knowledge development and research directions within the engineering discipline	X	X	X	4
5.	Knowledge of contextual factors impacting the engineering discipline	X	X	X	3
6.	Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline	X	X	X	3
7.	Application of established engineering methods to complex engineering problem solving	X	X	X	4
8.	Fluent application of engineering techniques, tools and resources	X	X	X	4
9.	Application of systematic engineering synthesis and design processes				
10.	Application of systematic approaches to the conduct and management of engineering projects				
11.	Ethical conduct and professional accountability	X	X	X	3
12.	Effective oral and written communication in professional and lay domains				
13.	Creative, innovative and pro-active demeanour				
14.	Professional use and management of information	X	X	X	3
15.	Orderly management of self, and professional conduct				
16.	Effective team membership and team leadership				
17.	Demonstrated capacity for dealing with uncertain problems using self-direction				