Faculty of Engineering & Built Environment

School of Electrical Engineering and Computing

SENG2200: Programming Languages and Paradigms

Callaghan

Semester 1 - 2018

COURSE OUTLINE

OVERVIEW

Course Description

This course places the programming from year 1 into its correct theoretical context with the following topics:

- Elementary Language Theory and Specification.

- Low level implementation of language mechanisms (e.g. pointers, parameters, activation records and method tables).

- Implementation of software structures in both Java and C++.

- A comparison of object models in different object-oriented languages.

- An introduction to non-object programming paradigms, e.g. list processing, functional and declarative languages.

Assumed Knowledge

SENG1110 Introduction to Software Engineering 1 and SENG1120 Introduction to Software Engineering 2.

Contact Hours

Callaghan
Computer Lab
Face to Face On Campus
2 hour(s) per Week for Full Term

Lecture
Face to Face On Campus
2 hour(s) per Week for Full Term

Unit Weighting
10

Workload

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

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Teaching Staff

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9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

SYLLABUS

Course Content

This course places the programming from year 1 into its correct theoretical context with the following topics:

1. Elementary Language Theory and Specification
2. A second object-oriented language
3. Low level implementation of language mechanisms
   - Pointers
   - activation records
   - method tables
   - memory allocation/de-allocation and garbage collection
   - process and thread activation and communication
4. Parameter passing mechanisms
5. A comparison of object models in different object-oriented languages.
6. An introduction to advanced programming language features.
7. An introduction to concurrency and inter-process communication.
8. An introduction to non-object programming paradigms, eg.
   - list processing
   - functional languages
   - declarative languages.

Course Learning Outcomes

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

1. Use Elementary Language Theory and Specification to describe language features

2. Program using advanced features of object-oriented languages

3. Compare the low level implementation of language mechanisms, such as pointers and references, activation records, method tables, memory allocation/de-allocation and garbage collection, thread activation and communication

4. Compare and analyse alternate parameter passing mechanisms

5. Compare the object models in different object-oriented languages

6. Describe and evaluate advanced programming language features

7. Demonstrate an introductory understanding of concurrency and inter-process communication.

8. Demonstrate an introductory understanding of the area of machine intelligence

9. Describe the operation of non-object programming paradigms, eg. List processing, functional languages, and declarative languages.

Course Materials

Required Text:

- RW Sebesta, Concepts of Programming Languages, 10e, Pearson, 2012. ISBN 13:978-0-13-139531-2

COMPULSORY REQUIREMENTS

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

Contact Hour Requirements:

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Course Assessment Requirements:

- Assessment 5 - Formal Examination: Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade / mark in this assessment item to pass the course. Students whose overall mark in the course is 50% or more, but who score less than 40% in the compulsory item and thus fail to demonstrate the required proficiency, will be awarded a Criterion Fail grade, which will show as FF on their formal transcript. However, students in this position who have scored at least 25% in the compulsory item will be allowed to undertake a supplementary 'capped' assessment in which they can score at most 50% of the possible mark for that item.

Pre-Placement Requirements:

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ASSESSMENTS

This course has 5 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Assignment 1	Week 4	Individual	10%	2, 3
2	Assignment 2	Week 8	Individual	15%	2, 3, 6
3	Assignment 3	Week 12	Individual	15%	2, 3, 6
4	Quiz	Week 7	Individual	10%	1, 2, 3, 5
5	Formal Examination*	EXAM PERIOD	Individual	50%	1, 2, 4, 5, 6, 7, 8, 9

* 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.

2018 Retention of Scripts

In 2018, the University of Newcastle will undergo its 5 yearly accreditation cycle with Engineers Australia and the Australian Computer Society. Part of this routine process is the collection of a sample of student assignments over a 1+ year period. The objective is to provide the accrediting panel an indication of educational rigour across all courses. In 2017, we will commence collecting sample assignments from each and every assessment task, across the full spectrum of marks. They will be provided to the panel but not de-identified. If you object to your assignment being retained with your name associated, please indicate this on the submission, and if retained, we will de-identify your paper. All papers will be destroyed at the completion of the accreditation process.

Assessment 1 - Assignment 1

Assessment Type Written Assignment
Description Programming Assignments meet the course objectives of knowledge acquisition and demonstrated assimilation of data, upon reflection and analysis, to produce articulate and concise documents and artefacts which convey evidence-based understanding of the concepts and topics.
Weighting 10%
Due Date Week 4
Submission Method Online
Assessment Criteria Correctness of program code and clarity of documentation and written report.
Return Method Not Returned
Feedback Provided Online - .

Assessment 2 - Assignment 2

Assessment Type Written Assignment
Description Programming Assignments meet the course objectives of knowledge acquisition and demonstrated assimilation of data, upon reflection and analysis, to produce articulate and concise documents and artefacts which convey evidence-based understanding of the concepts and topics.
Weighting 15%
Due Date Week 8
Submission Method Online
Assessment Criteria Correctness of program code and clarity of documentation and written report.
Return Method Not Returned
Feedback Provided Online - .

Assessment 3 - Assignment 3

Assessment Type Written Assignment
Description Programming Assignments meet the course objectives of knowledge acquisition and demonstrated assimilation of data, upon reflection and analysis, to produce articulate and concise documents and artefacts which convey evidence-based understanding of the concepts and topics.
Weighting 15%
Due Date Week 12
Submission Method Online
Assessment Criteria Correctness of program code and clarity of documentation and written report.
Return Method Not Returned
Feedback Provided Online - .

Assessment 4 - Quiz

Assessment Type Quiz
Description Mid-term Quiz: the purpose and benefit of the class tests and/or regular quizzes is to provide the students with regular feedback on student learning. These tests highlight areas of concern and may stimulate discussion with tutors and lecturers.

Weighting	10%
Due Date	Week 7
Submission Method	In Class
Assessment Criteria	Clarity/correctness of written answers and program code.
Return Method	In Class
Feedback Provided	In Class - .

Assessment 5 - Formal Examination

Assessment Type	Formal Examination
Description	exams are designed to test students¿ knowledge and understanding of the course material and their ability to analyse that material. The Final Examination is a Compulsory Course Component
Weighting	50%
Compulsory Requirements	Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade / mark in this assessment item to pass the course..
Due Date	EXAM PERIOD
Submission Method	Formal Exam
Assessment Criteria	Clarity/correctness of written answers and program code.
Return Method	Not Returned
Feedback Provided	
Opportunity to Reattempt	Students WILL be given the opportunity to reattempt this assessment. Refer to course outline for details.

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.

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 http://www.newcastle.edu.au/policy/000608.html.
Adverse Circumstances	You are entitled to apply for special consideration because adverse circumstances have had an impact on your performance in an assessment item. This includes applying for an extension of time to complete an assessment item. Prior to applying you must refer to the Adverse Circumstances Affecting Assessment Items Procedure, available at http://www.newcastle.edu.au/policy/000940.html. All applications for Adverse Circumstances must be lodged via the online Adverse Circumstances system, along with supporting documentation.
Important Policy Information	The 'HELP for Students' tab in UoNline contains important information that all students should be familiar with, including various systems, policies and procedures. This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers - Graduate Attributes):

Graduate Profile Statements

	University of Newcastle Computer Science 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.**	☑	☑	☑	2
4	**1.4. Discernment of knowledge development and research directions within the engineering discipline.**	☑	☑	☑	**2**
5	**1.5. Knowledge of contextual factors impacting the engineering discipline.**				
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.**	☑	☑	☑	**2**
8	**2.2. Fluent application of engineering techniques, tools and resources.**	☑	☑	☑	**2**
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.**				
13	**3.3. Creative, innovative and pro-active demeanour.**				
14	**3.4. Professional use and management of information.**	☑	☑	☑	**2**
15	**3.5. Orderly management of self, and professional conduct.**				
16	**3.6. Effective team membership and team leadership.**				

This course builds students' capacity in the following University of Newcastle Bachelor of Computer Science Graduate Profile Statements:

	University of Newcastle Computer Science Graduate Profile Statements	Taught	Practised	Assessed	Level of Capability
1	**Knowledge of basic science and computer science fundamentals.**				
2	**In depth technical competence in the discipline of computer science**	☑	☑	☑	2
3	**An ability to carry out problem analysis, requirements capture, problem formulation and integrated software development for the solution of a problem.**	☑	☑	☑	2
4	**Capacity to continue developing relevant knowledge, skills and expertise in computer science throughout their careers.**	☑	☑	☑	2
5	**An ability to communicate effectively with other Computer Scientists, Software Engineers, other professional disciplines, managers and the community generally.**				
6	**Ability to undertake and co-ordinate large computer science projects and to identify problems, their formulation and solution.**				
7	**Ability to function effectively as an individual, a team member in multidisciplinary and multicultural teams and as leader/manager with capacity to assist and encourage those under their direction.**				
8	**Understanding of social, cultural, global and business opportunities of the professional computer scientist; understanding the need for and principles of sustainability and adaptability**				
9	**Understanding of professional and ethical responsibilities and a commitment to them.**				
10	**Understanding of entrepreneurship; need of and process of innovation, as well as the need of and capacity for lifelong learning.**				

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.