Faculty of Science, Engineering and Technology

Unit Outline

SWE20004

Technical Software Development

Semester 1 2019

Please read this Unit Outline carefully. It includes:

PART A Unit summary

PART B Your Unit in more detail

PART C Further information

"Swinburne University of Technology recognises the historical and cultural significance of Australia's Indigenous history and the role it plays in contemporary education

Each day in Australia, we all walk on traditional Indigenous land

We therefore acknowledge the traditional custodians of the land that our Australian campuses currently occupy, the Wurundjeri people, and pay respect to Elders past and present, including those from other areas who now reside on Wurundjeri land"

© Swinburne University of Technology, 2019
Except as provided in the Copyright Act 1968, this document may not be *reproduced in any form without the written permission of the University.*

PART A: Unit Summary

Unit Code(s)		SWE20004
Unit Title		Technical Software Development
Duration		1 Semester or equivalent
Total Contact Hours		48
Requisites:		
	Pre-requisites	COS10001 Algorithmic Problem Solving or COS10009 Introduction to Programming or RME10001 Robotics and Mechatronics Project 1 or ENG10004 Digital and Data Systems
	Co-requisites	Nil
	Concurrent pre-requisites	Nil
	Anti-requisites	Nil
	Assumed knowledge	
Credit Points		12.5
Campus/Location		Hawthorn
Mode of Delivery		Lecture (24 hrs.), Tutorial/Laboratory (24 hrs.)
Assessment Summary		Assignments, Lab exercises, Final Examination

Aims

This unit of study aims to develop the basic skills, both in understanding the underlying domains and in understanding the fundamentals of the programming process itself, required for programming scientific and engineering applications. This understanding includes what constitutes a "*good*" program and what an algorithm is. In particular, this unit is concerned with when to apply a specific solution approach, how to manage program complexity, and how to maintain healthy software solutions for scientific and engineering problems.

Unit Learning Outcomes

Students who successfully complete this unit should be able to:

1. Apply function decomposition, modularization, and object-oriented software development techniques in order to create maintainable programs. (K1, K3, K6, S1, S2, S3)
2. Interpret the tradeoffs and issues involved in the requirements, design, and implementation with respect to a given problem (K1, K6, S1)
3. Assess and compare the impact of algorithms on program performance and resource consumption (S2, A2)
4. Design, implement, evaluate, and apply unit testing and documentation strategies to programs. (K2, K3, S3)
5. Design and implement a sustainable code base for scientific and engineering problems. (K2, S3, A4)

Swinburne Engineering Competencies for this Unit of Study

This Unit of Study will contribute to you attaining the following Swinburne Engineering Competencies:

K1 **Basic Science**: Proficiently applies concepts, theories and techniques of the relevant natural and physical sciences.

K2 **Maths and IT as Tools:** Proficiently uses relevant mathematics and computer and information science concepts as tools.

K3 **Discipline Specific:** Proficiently applies advanced technical knowledge of the specific discipline within that context.

K6 **Professional Practice:** Appreciates the principles of professional engineering practice in a sustainable context.

S1 **Engineering Methods:** Applies engineering methods in practical applications.

S2 **Problem Solving:** Systematically uses engineering methods in solving complex problems.

S3 **Design:** Systematically uses engineering methods in design.

S4 **Project Management**: Systematically uses engineering methods in conducting and managing projects.

A2 **Communication**: Demonstrates effective communication to professional and wider audiences.

A4 **Information Management**: Demonstrates seeking, using, assessing and managing information.

Content

- Program design for scientific and engineering problems
- Object-oriented programming
- Modular program decomposition
- Memory management
- Unit testing and debugging strategies
- Program documentation
- Version control
- Measuring algorithm performance and program resource consumption

PART B: Your Unit in more detail

Unit Teaching Staff

Name	Role	Room	Phone	Email	Consultation Times
Dr Prince Kurumthodathu Surendran	Lecturer	EN126		pkurumthodathusurend@swin.edu.au	See Canvas
Mr Srikanth Thudumu	Tutor	ATC 620		sthudumu@swin.edu.au	See Canvas
Ms Syeda Zehra	Tutor	ATC 620		szehra@swin.edu.au	See Canvas
Mr Kai Renshaw	Tutor	ATC 620		krrenshaw@swin.edu.au	See Canvas
Mr Michael George	Tutor	ATC 620		mgeorge@swin.edu.au	See Canvas
Mrs Sharon Stratsianis	Tutor	ATC 620		sastratsianis@swin.edu.au	See Canvas
Ms Rida Fatima	Tutor	ATC 620		rfatima@swin.edu.au	See Canvas
Mr. Gavin Chan	Tutor	ATC 620			See Canvas

Learning and Teaching Structure

Activity	Total Hours	Hours per Week	Teaching Period Weeks
Lectures	24 hours	2 hours	Weeks 1 to 12
Tutorials/labs	24 hours	2 hours	Weeks 1 to 12

Week by Week Schedule

Week	Week Beginning	Teaching and Learning Activity	Student Task or Assessment
1	04 March 2019	Lecture: Introduction to C++, Fundamental concepts. Tutorial: writing, editing, compiling executing simple C++ programs	Readings: Chapter 1
2	11 March 2019	Lecture: Simple C++ programs, data types, strings, operands. Tutorial: writing C++ programs involving simple calculations	Readings: Chapter 2
3	18 March 2019	Lecture: Assignment, casting, C++ I/O: <iostream>, <iomanip>, Selection, boolean logic, testing, validation, guards. Tutorial: Assignment, formatting and input/output, Selection exercises.	Readings: Chapter 3 and 4 **Release Assignment 1**
4	25 March 2019	Lecture: Repetition, validation, sentinels, scope. Tutorial: Repetition exercises	Readings: Chapter 5
5	01 April 2019	Lecture: Functions, references, templates, recursion. Tutorial: Functions, recursion.	Readings: Chapter 6 **Assignment 1 due**
6	08 April 2019	Lecture: Arrays, vectors, sort algorithms, big O.	Readings: Chapter 7 **Lab exercise component 1 (in lab)**
	18 - 25 April 2019	Semester/Easter Break --- No Classes	
7	22 April 2019	Lecture: File I/O, sequential access, random access. Tutorial: File I/O, arrays, vectors Assignment 2	Readings: Chapter 8 **Release Assignment 2**
8	29 April 2019	Lecture: Addresses, pointers and structures Tutorial: Addresses, pointers and structure	Readings: Chapter 10 **Assignment 2 due**

9	06 May 2019	Lecture: Addresses, pointers and structures contd... (linked list, stack and queue) Tutorial: linked list, stack and queue	Readings: Chapter 10 **Release Assignment 3**
10	13 May 2019	Lecture: Addresses, pointers and structures contd... Tutorial: pointers, structures etc	**Assignment 3 due**
11	20 May 2019	Lecture: C++ Classes and objects, simple OOP	Readings: Chapter 11, 12 **Lab exercise component 2 (in lab)**
12	27 May 2019	Lecture: Exam information Tutorial: Classes and objects	

Assessment

a) Assessment Overview

Assessment Task	Individual/ Group Task	Related Learning Objective(s)	Weighting	Due Date
Assignments 1-3	Individual	1-5	20%	As specified on the assignment handouts
Lab Exercises	Individual	1-5	20%	Week 6 and Week 11
Final Examination (3h)	Individual	1-5	60%	Exam period

b) Minimum requirements to pass this Unit

The final grade for the course will be weighted towards the final exam.

To pass this unit, you must:

- achieve an overall mark for the unit of 50% or more, and
- achieve at least 40% in the final exam

Students who do not achieve at least 40% for the final exam, will receive a maximum of 44% as the total mark for the unit and will not be eligible for a conceded pass.

Failure to submit assignment work may lead to disqualification from special examinations. Students may be asked to demonstrate their work (lab exercises and assignments) as part of marking process.

c) Examinations

If the unit you are enrolled in has an official examination, you will be expected to be available for the entire examination period including any Special Exam period.

The final examination is closed book.

d) Submission Requirements

Assignments must be submitted through the ESP assessment submission system (https://esp.ict.swin.edu.au) or Canvas as instructed in the assignment handout.
Please ensure you keep a copy of all assessments that are submitted.
An Assessment Cover Sheet will be submitted with your assignment when submitted through ESP. For reference, the standard Assessment Cover Sheet is available from the Current Students web site (see Part C).

e) Extensions and Late Submission

Extensions will only be granted in exceptional circumstances on medical or compassionate grounds. Extensions must be applied for in advance of the assignment's due date (Doctors certificate must be provided).

Absolutely no marks for late homework will be given at any time, unless otherwise negotiated in advance with the subject convener!

f) Referencing

To avoid plagiarism, you are required to provide a reference whenever you include information from other sources in your work. Further details regarding plagiarism are available in Section C of this document.

You need to acknowledge the origin and authorship of any code not written by you.

Helpful information on referencing can be found at
http://www.swinburne.edu.au/lib/studyhelp/harvard-quick-guide.pdf

g) Groupwork Guidelines

There are no group assessment tasks in this unit.

You can work in groups to tackle problem sets. However, your contribution to the solution must be original and not just echo group consensus.

Required Textbook(s)

Gary Bronson: C++ for Engineers and Scientists, Cengage, 4th Edition or later.

PART C: FURTHER INFORMATION

For further information on any of the below topics, refer to Swinburne's Current Students web page http://www.swinburne.edu.au/student/.

Student Charter

Please familiarise yourself with Swinburne's Student Charter. The charter describes what students can reasonably expect from Swinburne in order to enjoy a quality learning experience. As students contribute to their own learning experience to that of their fellow students, the charter also defines the University's expectations of students.

Student behaviour and wellbeing

Swinburne has a range of policies and procedures that govern how students are expected to conduct themselves throughout the course of their relationship with the University. These include policies on expected standards of behaviour and conduct which cover interaction with fellow students, staff and the wider University community, in addition to following the health and safety requirements in the course of their studies and whilst using University facilities.

All students are expected to familiarise themselves with University regulations, policies and procedures and have an obligation to abide by the expected guidelines. Any student found to be in breach may be subject to relevant disciplinary processes. Some examples of relevant expected behaviours are:

- Not engaging in student misconduct
- Ensuring compliance with the University's Anti-Discrimination, Bullying and Violence and Sexual Harassment requirements
- Complying with all Swinburne occupational health and safety requirements, including following emergency and evacuation procedures and following instructions given by staff/wardens or emergency response.

In teaching areas, it is expected that students conduct themselves in a manner that is professional and not disruptive to others. In all Swinburne laboratories, there are specific safety procedures which must be followed, such as wearing appropriate footwear and safety equipment, not acting in a manner which is dangerous or disruptive (e.g. playing computer games), and not bringing in food or drink.

Canvas

You should regularly access the Swinburne learning management system, Canvas, which is available via the Current Students webpage or https://swinburne.instructure.com/ Canvas is updated regularly with important unit information and communications.

Communication

All communication will be via your Swinburne email address. If you access your email through a provider other than Swinburne, then it is your responsibility to ensure that your Swinburne email is redirected to your private email address.

Plagiarism

Plagiarism is the action or practice of taking and submitting or presenting the thoughts, writings or other work of someone else as though it is your own work. Plagiarism includes any of the following, without full and appropriate acknowledgment to the original source(s):

- The use of the whole or part of a computer program written by another person;
- the use, in essays or other assessable work, of the whole or part of a written work from any source including but not limited to a book, journal, newspaper article, set of lecture notes, current or past student's work, any other person's work, a website or database;
- The paraphrasing of another's work;
- The use of musical composition, audio, visual, graphic and photographic models,
- The use of realia that is objects, artefacts, costumes, models and the like.
- Plagiarism includes the submission of assessments that have been developed by another person or service through contract, tender or online writing services.

- Plagiarism also includes the preparation or production and submission or presentation of assignments or other work in conjunction with another person or other people when that work should be your own independent work. This remains plagiarism whether or not it is with the knowledge or consent of the other person or people. It should be noted that Swinburne encourages its students to talk to staff, fellow students and other people who may be able to contribute to a student's academic work but that where independent assignment is required, submitted or presented work must be the student's own.

Enabling plagiarism contributes to plagiarism and therefore will be treated as a form of plagiarism by the University. Enabling plagiarism means allowing or otherwise assisting another student to copy or otherwise plagiarise work by, for example, allowing access to a draft or completed assignment or other work.

Swinburne University use the Turnitin system that helps check for improper citations or potential plagiarism in assignments submitted electronically via Canvas. Your Unit Convenor will provide further details.

The penalties for plagiarism can be severe, ranging from a zero grade for an assessment task through to expulsion from the unit and, in the extreme, exclusion from Swinburne. Consequently, you need to avoid plagiarism by providing a reference whenever you include information from other sources in your work.

Student support

You should talk to your Unit Convenor or Student Services for information on academic support services available for Swinburne students.

Special consideration

If your studies have been adversely affected due to serious and unavoidable circumstances outside of your control (e.g. severe illness or unavoidable obligation), you may be able to apply for special consideration (SPC).

Applications for Special Consideration will be submitted via the SPC online tool normally no later than 5.00pm on the third working day after the submission/sitting date for the relevant assessment component.

Accessibility needs

Sometimes students with a disability, a mental health or medical condition or significant carer responsibilities require reasonable adjustments to enable full access to and participation in education. Your needs can be addressed by Swinburne's AccessAbility Services by negotiating and distributing an 'Education Access Plan'. The plan makes recommendations to university teaching and examination staff. You must notify AccessAbility Services of your disability or condition within one week after the commencement of your unit to allow the University to make reasonable adjustments.

Review of marks

An independent marker reviews all fail grades for major assessment tasks. In addition, a review of assessment is undertaken if your final result is between 45 and 49 or within 2 marks of any grade threshold.

If you are not satisfied with the result of an assessment, you can ask the Unit Convenor to review the result. Your request must be made in writing within 10 working days of receiving the result. The Unit Convenor will review your result to determine if your result is appropriate.

If you are dissatisfied with the outcomes of the review, you can lodge a formal complaint.

Feedback, complaints and suggestions

In the first instance, you may discuss any issues with your Unit Convenor. If you are dissatisfied with the outcome of the discussions with the Unit Convenor or would prefer not to deal with your Unit Convenor, then you can complete a feedback form.

Advocacy

Should you require assistance with any academic issues, University statutes, regulations, policies and procedures, you are advised to seek advice from an Independent Advocacy Officer at Swinburne Student Life (previously Swinburne Student Amenities Association (SSAA).

For an appointment, please call 03 9214 5445 or email advocacy@swin.edu.au

For more information, please see https://www.swinburne.edu.au/current-students/student-services-support/advocacy/