School of Science, Computing and Engineering Technologies

SWINBURNE UNIVERSITY OF TECHNOLOGY

Unit Outline

SWE30003

Software Architectures and Design

Semester January, 2025

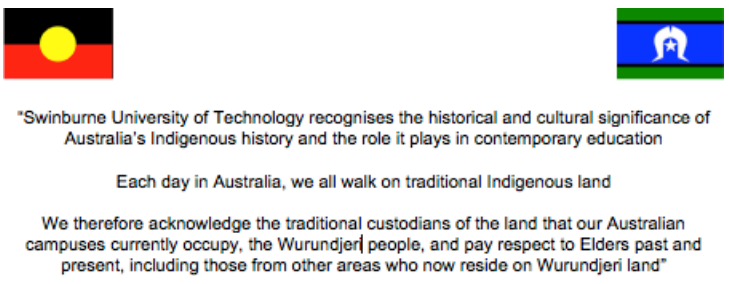
Note that the lectures are to be conducted live online via Canvas/Collaborate-Ultra, and tutorial classes will be conducted face-to-face on campus.

Please read this Unit Outline carefully. It includes:

PART A Unit summary

PART B Your Unit in more detail

PART C Further information



PART A: Unit Summary

Unit Code(s)		SWE30003
Unit Title		Software Architectures and Design
Duration		One semester or 12 weeks
Total Contact Hours		36 hours
Requisites:		
	Pre-requisites	COS20007 Object Oriented Programming AND 150 Credit Points
	Co-requisites	
	Concurrent pre-requisites	
	Anti-requisites	
	Assumed knowledge	
Credit Points		12.5
Campus/Location		Da Nang City
Mode of Delivery		Blended
Assessment Summary		Final assessment test / exam, three group-based assignments, and weekly questions and answers submissions. As the minimum requirements of assessment to pass the unit and meet all Unit Learning Outcomes to a minimum standard, a student must achieve: (i) An aggregate mark of 50% or more, and (ii) At least 40% in the final assessment test, and (iii) At least 40% of the possible marks for the weekly questions and answers. Students who do not successfully achieve hurdle requirements (ii) and (iii) will receive a total mark for the unit of at most 45%.

Aims

The unit aims to facilitate an in-depth study of state-of-the-art approaches and techniques for system design with a special focus on the relationship between non-functional requirements and software architectures.

Unit Learning Outcomes

Students who successfully complete this unit can:

ULO1	Given a set of user goals and priorities, identify, formulate and analyse the requirements and constraints of a software system under consideration (K3, K6, S1, A2, A4, A5)
ULO2	Identify, construct and justify design abstractions at suitable levels for given user goals and system constraints (K3, K6, S1, S2, S3, A4, A6)
ULO3	Analyse a given system design in terms of the common design patterns used, and its benefits, limitations and appropriateness for the given user goals and priorities (K3, S1, A2, A4)
ULO4	Given a system's specification, formulate and document architectural decisions in terms of common patterns, and analyse the benefits and limitations of these decisions (K3, S1, S3, A4, A5)
ULO5	Record and describe their design decisions and structures using a contemporary modelling language (K3, S1, S3, A4, A5)

Graduate Attributes

The Swinburne Graduate Attributes describe the capability of our graduates to use knowledge, skills and behaviours to contribute to society meaningfully and positively. They include professional, self-directed learning and future-ready skills.

This unit may contribute to the development of the following Swinburne Graduate Attributes:

- GA1 Communication 1 - Verbal communication
- GA2 Communication 2 - Communicating using different media
- GA3 Teamwork 1 - Collaboration and negotiation
- GA4 Teamwork 2 - Teamwork roles and processes
- GA5 Digital literacies 1 – Information literacy
- GA6 Digital Literacies 2 – Technical literacy

Content

Specifications

- User goals
- Constraints
- Priorities
- Validation
- Analysis

Abstractions and Patterns
- Abstractions in software
- Levels of abstraction
- Object-oriented abstractions
- Common patterns (structural and behavioural)
- Pattern recognition and identification
- Pattern systems

Software Architectures
- Decisions vs. structures
- Architectural patterns
- Documentation and communication

Architectural Styles
- Message-driven architectures
- Client-server architectures
- Layered Architectures

PART B: Your Unit in more detail

Unit Improvements

Feedback provided by previous students through the Student Survey has resulted in improvements that have been made to this unit. Recent improvements include:

- Making all assignments groupwork,
- Clarifying the expectations and their differences from prior units, and
- Introducing new architecture styles, including service-oriented architecture (SOA).

Unit Teaching Staff

Name	Role	Email	Consultation Times
Mr Hoang Nhu	Unit Coordinator	nhoang@swin.edu.au	By appointment via email

Learning and Teaching Structure

Category	Activity	Total Hours	Hours per Week	Teaching Period Weeks
In person	Lectures	24 hours	2 hours	Weeks 1 to 12
In person	Tutorials	12 hours	1 hour	Weeks 1 to 12

Week by Week Schedule

Week	Week Beginning	Teaching and Learning Activity	Student Task or Assessment
1	Dec 30	*Lecture*: Introduction, Issues in Software Design *Tutorial*: Introduction and Group Formation	
2	Jan 06	*Lecture*: Goal-Design Scale, User Tasks *Tutorial*: Software Design Issues	Assignment Group Formation
3	Jan 13	*Lecture*: Quality Attributes, Requirements Validation *Tutorial*: User Tasks	
4	Jan 20	*Lecture*: Domain Analysis, Domain Modelling, Software Abstractions *Tutorial*: Quality Attributes; Assignment 1 Q&A	
Lunar New Year's Holiday (27 January - 08 February 2025, inclusively)			
5	Feb 10	*Lecture*: Responsibility-Driven Design / Object Oriented Design *Tutorial*: Requirements Analysis Exercise	
6	Feb 17	*Lecture*: Detailed Object Design *Tutorial*: Object Oriented Design	Assignment 1 **due at 23:59 VN Time of Sunday, 23/02/2025**
7	Feb 24	*Lecture*: Case Study in Object Design *Tutorial*: OO Design Exercises (II part 1); Assignment 2 Q&A	
8	Mar 03	*Lecture*: Design Patterns *Tutorial*: Object-Oriented Design (II part 2), Assignment 1 feedback	
9	Mar 10	*Lecture*: Software Architectures, Architectural Styles *Tutorial*: Software Architecture and Patterns	Assignment 2 **due at 23:59 VN Time of Sunday, 16/03/2025**
10	Mar 17	*Lecture*: Case Study in Architectural Design *Tutorial*: Architectural Design (I); Assignment 3Q&A	
11	Mar 24	*Lecture*: Documenting Designs *Tutorial*: Architectural Design (II); Assignment 2 Feedback	
12	Mar 31	*Lecture*: Summary of Main Concepts, Wrapping Up *Tutorial*: Architecture Tactics, Documentation, and Evaluation; Q&A	Assignment 3 **due at 23:59 VN Time of Sunday, 06/04/2025**

Assessment

a) Assessment Overview

Tasks and Details	Individual or Group	Weighting	ULO	AssessmentDue Date
Weekly Questions and Answers	Individual	10%	All	Weeks 2 – 12
Requirements Specification	Group	20%	1	Week 5
Object-Oriented Design (Part I)	Group	25%	2, 3, 4, 5	Week 9
Object-Oriented Design (Part II)	Group	25%	2, 3, 4, 5	Week 12
Final Assessment (onlinetest/exam)	Individual	20%	All	Final Assessment Period

b) Minimum requirements to pass this unit

As the minimum requirements of assessment to pass a unit and meet all ULOs to a minimum standard, an undergraduate student must have achieved:

- an aggregate mark for the unit of 50% or more,
- at least 40% in the final assessment, and
- at least 40% of the available marks for the Weekly Questions and Answers submissions.

Students who do not achieve any of the above requirements, will receive at most 45% as the total mark for the unit.

c) Final Assessment Period

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.

For this unit, a final assessment is to be conducted via an online test/exam during the final assessment/exam period.

d) Submission Requirements

Assignments and other assessments are generally submitted online through the Canvas assessment submission system which integrates with the Turnitin plagiarism checking service.

Please ensure you keep a copy of all assessments that are submitted.

An Assessment Cover Sheet must be submitted with your assignment. The standard Assessment Cover Sheet is available from the Submitting work webpage or www.swinburne.edu.au/studentforms/

The exact deliverables for each assignment will be indicated in the corresponding assignment specification. In general, the deliverables are to be submitted through Canvas or other means to be specified in the assignment specifications.

The Weekly Questions and Answer submission will be in electronic form. The corresponding submission system can be accessed through Canvas.

For every group assignment, a contribution sheet *must be signed by all group members*, and submitted with the assignment. *Team assignments submitted* ***without the signed contribution list*** *may not be marked and may not receive any feedback.* In addition, Individual members must submit a statement of evidence to substantiate their contributions.

e) Extensions and Late Submission

Extensions for ongoing assessments are available for medical reasons (doctors certificate must be provided). Students must apply for an extension by emailing the Unit of Study convenor *at least 48 hours prior to the due date* and also must supply any supporting documentation if requested.

Late Submissions - Unless an extension has been approved, late submissions will result in a penalty. You will be penalised 10% of your achieved mark for each working day the task is late, up to a maximum of 5 working days. After 5 working days, a zero result will be recorded.

In general, no late submission will be granted for the Weekly Question and Answer submission.

f) Referencing

To avoid breaching academic integrity, you are required to provide references whenever you include information from other sources in your work and acknowledge when you have used Artificial Intelligence (AI) tools (such as ChatGPT). Further details regarding academic integrity are available in Section C of this document.

Helpful information on referencing can be found at http://www.swinburne.edu.au/library/referencing/

g) Groupwork Guidelines

A group assignment is the collective responsibility of the entire group, and if one member is temporarily unable to contribute, the group should be able to reallocate responsibilities to keep to schedule. In the event of longer-term illness or other serious problems involving a member of group, it is the responsibility of the other members to notify immediately the Unit Convenor or relevant tutor.

Group submissions must be submitted with an Assignment Cover Sheet, signed by all members of the group.

All group members must be satisfied that the work has been correctly submitted. Any penalties for late submission will generally apply to all group members, not just the person who submitted.

Recommended Reading Materials

The Library has a large collection of resource materials. Listed below are some references that will provide valuable supplementary information to this unit. It is also recommended that you explore other sources to broaden your understanding.

Here is a list of recommended reading materials for this unit:

- Soren Lauesen, *Software Requirements: Styles and Techniques*, Addison-Wesley, 2002
- Len Bass, Paul Clements, and Rick Kazman, *Software Architecture in Practice* (4th Edition), Addison-Wesley, 2021
  Please note that the 3rd or 2nd edition are also available through the Swinburne library and can be referenced..
- David Budgen, *Software Design* (2nd Edition), Addison-Wesley, 2003
- Eric Evans, *Domain-Driven Design*, Addison-Wesley, 2004
- Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, *Design Patterns*, Addison-Wesley, 1995
- Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad and Michael Stal, *Pattern-Oriented Software Architecture: A System of Patterns*, Wiley, May 1996
- Ian Sommerville, *Software Engineering* (8th Edition), Addison-Wesley, August 2007
- Craig Larman*, Applying UML and Patterns* (3rd Edition), Prentice Hall, 2005
- Rebecca Wirfs-Brock and Alan McKean, *Object Design*, Addison-Wesley, 2003
- Jeff Garland and Richard Anthony, *Large-Scale Software Architecture*, Wiley, 2003.

Further reading material will be provided during the lectures and/or made available on Canvas.

PART C: FURTHER INFORMATION

For further information on any of these topics, refer to Swinburne's Student webpage http://www.swinburne.edu.au/student/

Student behaviour and wellbeing

All students are expected to: act with integrity, honesty and fairness; be inclusive, ethical and respectful of others; and appropriately use University resources, information, equipment and facilities. All students are expected to contribute to creating a work and study environment that is safe and free from bullying, violence, discrimination, sexual harassment, vilification and other forms of unacceptable behaviour.

The Student Charter describes what students can reasonably expect from Swinburne in order to enjoy a quality learning experience. The Charter also sets out what is expected of students with regards to your studies and the way you conduct yourself towards other people and property.

You are expected to familiarise yourself with University regulations and policies and are obliged to abide by these, including the Student Academic Misconduct Regulations, Student General Misconduct Regulations and the People, Culture and Integrity Policy. Any student found to be in breach of these may be subject to disciplinary processes.

Examples of expected behaviours are:

- conducting yourself in teaching areas in a manner that is professional and not disruptive to others
- following specific safety procedures in Swinburne laboratories, 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
- following emergency and evacuation procedures and following instructions given by staff/wardens in an emergency response

Canvas

You should regularly log on to the Swinburne learning management system, Canvas. You can access Canvas via the Student login 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.

Academic Integrity

Academic integrity is about taking responsibility for your learning and submitting work that is honestly your own. It means acknowledging the ideas, contributions and work of others; referencing your sources and acknowledging the use of artificial intelligence tools (such as ChatGPT, DALLE, Midjourney); contributing fairly to group work; and completing tasks, tests and exams without cheating. Artificial intelligence tools should only be used where approved by the Unit Convenor.

Swinburne University uses the Turnitin system, which helps to identify inadequate citations, poor paraphrasing and unoriginal work in assignments that are submitted via Canvas. Your Unit Convenor will provide further details.

Plagiarising, cheating and seeking an unfair advantage in a test, exam or assessment task are all breaches of academic integrity and treated as academic misconduct. Examples of breaches of academic integrity include:

- using the whole or part of computer program written by another person as your own without appropriate acknowledgement
- copying the whole or part of somebody else's work in an assessment, including material from a published work, a website or database, a set of lecture notes, current or past student's work, or any other person's work
- using output from artificial intelligence tools (e.g. ChatGPT) in whole or part without acknowledgement and/or without the approval of the Unit Convenor
- poorly paraphrasing somebody else's work
- using a musical composition or audio, visual, graphic and photographic work created by another without acknowledgment
- using objects, artefacts, costumes or models created by another person and presenting them as your own
- submitting assessments that have been developed by another person or service (paid or unpaid), referred to as contract cheating
- presenting or submitting assignments or other work in conjunction with another person or group of people when that work should be your own independent work.
- enabling others to cheat, including letting another student copy your work or by giving access to a draft or completed assignment.

The penalties for academic misconduct can be severe, ranging from a zero grade for an assessment task through to exclusion from Swinburne.

For further details, see https://www.swinburne.edu.au/student-login/academic-integrity/

Student support

Swinburne offers a range of services and resources to help you complete your studies successfully. Your Unit Convenor or studentHQ can provide information about the study support and other services available for Swinburne students. See https://www.swinburne.edu.au/life-at-swinburne/student-support-services/ for further information.

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 are 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. See https://www.swinburne.edu.au/life-at-swinburne/student-support-services/special-consideration-assistance/

Accessibility needs

Sometimes students with a disability, a mental health or medical condition or significant carer responsibilities require reasonable adjustments to fully access and participate in education. Swinburne's AccessAbility Services can develop an 'Education Access Plan' that includes the

services and reasonable adjustments that you need. The plan makes recommendations to University teaching and examination staff.

It is recommended that you register with AccessAbility Services 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.

You can ask the Unit Convenor to check the result for an assessment item or your final result. Your request must be made in writing within 10 working days of receiving the result. The Unit Convenor can discuss the marking criteria with you and check the aggregate marks of assessment components to identify if an error has been made. This is known as local resolution.

If you are dissatisfied with the outcome of the local resolution, you can lodge a formal complaint.

Feedback, complaints and suggestions

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

See https://www.swinburne.edu.au/corporate/feedback/

Advocacy

If 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. Talking to an Advocacy Officer is free, independent and confidential.