School of Science, Computing and Engineering Technologies

Unit Outline

SWE30003

Software Architectures and Design

Semester Jan, 2024

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
Total Contact Hours	48 hours
Requisites:	COS20007 Object Oriented Programming AND 150 credit points from a Bachelor degree
Pre-requisites	
Co-requisites	Nil
Concurrent pre-requisites	Nil
Anti-requisites	Nil
Assumed knowledge	Nil
Credit Points	12.5
Campus/Location	Ho Chi Minh 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.

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

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)

	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)
ULO4	
ULO5	Record and describe their design decisions and structures using a contemporary modelling language (K3, S1, S3, A4, A5)

Graduate Attributes

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

- Communication 1 - Verbal communication
- Communication 2 - Communicating using different media
- Teamwork 1 - Collaboration and negotiation
- Teamwork 2 - Teamwork roles and processes
- Digital literacies 1 - Information literacy
- 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 group work,

- 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
Dr Tuan Tran	Unit Coordinator	tuanatran@swin.edu.au	Appointment by 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	Class (Tutorials)	12 hours	1 hour	Weeks 1 to 12
Online	Directed Online Learning and Independent Learning	24 hours	2 hours	Weeks 1 to 12
Unspecified Activities	Independent Learning	90 hours	7.5 hour	Weeks 1 to 12

Week by Week Schedule

Teaching Week	Beginning Monday	Learning focus / delivery mode	Assessment
1	01 Jan	*Lecture*: Introduction, Issues in Software Design *Tutorial*: Introduction and Group Formation	
2	08 Jan	*Lecture*: Goal-Design Scale, User Tasks *Tutorial*: Software Design Issues	Assignment Group Formation
3	15 Jan	*Lecture*: Quality Attributes, Requirements Validation *Tutorial*: User Tasks	
4	22 Jan	*Lecture*: Domain Analysis, Domain Modelling, Software Abstractions *Tutorial*: Quality Attributes, Q&A - Assignment 1 discussions	
5	29 Jan	*Lecture*: Responsibility-Driven Design / Object Oriented Design *Tutorial*: Requirements Analysis Exercise	
Luna New Year's Holiday (05 – 18 February 2024 inclusively)			
6	19 Feb	*Lecture*: Detailed Object Design *Tutorial*: Object Oriented Design	Assignment 1 (Requirements Specification) **due 23:59 (VN Time) of Sunday, 25/02/2024**
7	26 Feb	*Lecture*: Case Study in Object Design *Tutorial*: Assignment 1 Feedback	
8	04 Mar	*Lecture*: Design Patterns *Tutorial*: Object-Oriented Design (II) Assignment 2 discussions	
9	11 Mar	*Lecture*: Software Architectures,	Assignment 2 (Object

		Architectural Styles *Tutorial*: Software Architecture and Patterns		<mark>Design I) **due 23:59 (VN Time) of Sunday, 17/03/2024**</mark>
10	18 Mar	*Lecture*: Case Study in Architectural Design *Tutorial*: Architectural Design (I)		
11	25 Mar	*Lecture*: Documenting Designs *Tutorial*: Architectural Design (II)		
12	01 Apr	*Lecture*: Summary of Main Concepts, Wrapping Up *Tutorial*: Assignment 2 Feedback, Q&A		Assignment 3 (Object Design II) <mark>**due 23:59 (VN Time) of Sunday, 07/04/2024**</mark>

Assessment

a) Assessment Overview

Tasks and Details	Individu al or Group	Weighting	Unit Learning Outcomes that this assessment task relates to	Assessment Due Date
Weekly Questions and Answers	Individual	10%	All	Weeks 2 - 12
Requirements Specification	Group	20%	1	<mark>**due 23:59 (VN Time) of Sunday, 25/02/2024**</mark>
Object-Oriented Design (Part I)	Group	25%	2, 3, 4, 5	<mark>**due 23:59 (VN Time) of Sunday, 17/03/2024**</mark>
Object-Oriented Design (Part II)	Group	25%	2, 3, 4, 5	<mark>**due 23:59 (VN Time) of Sunday, 07/04/2024**</mark>
Final Assessment (online test/exam)	Individual	20%	All	Formal Exam 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) 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.

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.

In cases where a hard copy submission is required 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 list *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 penalized 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 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 under 'Academic Integrity'.

Helpful information on referencing can be found at
http://www.swinbume.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 immediately notify 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.

Students are encouraged to use unallocated time between the lecture and tutorial for assignment work with their group!

Recommended Reading Materials

The Library has a large collection of resource materials, both texts and current journals. 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.
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- 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

- Soren Lauesen, *Software Requirements: Styles and Techniques*, Addison-Wesley, 2002

- 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 Current Students web page 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 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.

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; contributing fairly to group work; and completing tasks, tests and exams without cheating.

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 with regards to an exam or assessment are all breaches of academic integrity and treated as academic misconduct.

Plagiarism is submitting or presenting someone else's work as though it is your own without full and appropriate acknowledgement of their ideas and work. Examples include:

- using the whole or part of computer program written by another person as your own

- using the whole or part of somebody else's written work in an essay or other assessable work, including material from a book, journal, newspaper article, a website or database, a set of lecture notes, current or past student's work, or any other person's work

- poorly paraphrasing somebody else's work
- using a musical composition or audio, visual, graphic and photographic work created by another
- using realia created by another person, such as objects, artefacts, costumes, models
- submitting assessments that have been developed by another person or service (paid or unpaid), often 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. This is regardless of whether or not it is with the knowledge or consent of the other person(s). Swinburne encourages students to talk to staff, fellow students and other people who may be able to contribute to a student's academic work but where an independent assignment is required, the work must be the student's own
- enabling others to plagiarise or 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 expulsion from the unit and, in the extreme, exclusion from Swinburne.

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.

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, discuss any issues with your Unit Convenor. If you are dissatisfied with the outcome of the discussion or 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

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.

For an appointment, please call +61-(0)3-9214 5445 or email advocacy@swin.edu.au For more information, please see https://www.swinburne.edu.au/current-students/student-services- support/advocacy/