School of Science, Computing and Emerging Technologies

Unit Outline

COS80001

Cloud Engineering

Semester 1 2025

Please read this Unit Outline carefully. It includes:

PART A Unit summary

PART B Your Unit in more detail

PART C Further information

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PART A: Unit Summary

Unit Code(s)		COS80001
Unit Title		Cloud Engineering
Duration		One semester
Total Contact Hours		48 (2 hrs online session and 2 hrs lab class per week)
Requisites:		
	Pre-requisites	Nil
	Co-requisites	Nil
	Concurrent pre-requisites	Nil
	Anti-requisites	COS20019 Cloud Computing Architecture
	Assumed knowledge	Familiarity with web servers, computer networks and database concepts
Credit Points		12.5
Campus/Location		Hawthorn
Mode of Delivery		Blended, assignments, labs and tests. See details below.
Assessment Summary		HED Graded Mark

Aims

This unit aims to provide a comprehensive understanding of cloud architecture and generic principles of "everything as a service" in cloud computing. The course delves into theoretical foundations while also emphasizing practical deployments of industry-based architectures.

As cloud providers frequently release updates and introduce new features, the course content is continuously revised to incorporate these changes.

Students work on real-world projects that simulate the challenges faced by organizations when designing and implementing multi-cloud solutions, leveraging up to date learning materials and services of several cloud platforms such as Amazon Web Services (AWS) and Oracle Cloud Infrastructure (OCI). They learn how to design secure and scalable architectures, optimize cloud resource allocation, and troubleshoot potential issues.

Unit Learning Outcomes

Students who successfully complete this unit can:

1. Explain the principles and value of cloud computing.
2. Create and manage cloud services using a cloud management platform.
3. Implement and deploy a cloud-based web site that is reliable, scalable, secure and cost effective
4. Research available cloud services, then design and justify an architectural solution that uses these services.

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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 contributes to the development of the following Swinburne Graduate Attributes:

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

Other graduate attributes may be practised in the unit but are not formally taught as part of the unit content, nor incorporated within formal assessment.

Content

- Introduction to cloud computing
- Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS)
- Data management in the cloud
- Virtualisation
- Security and privacy in the cloud
- State-of-the-art/practice R&D in the cloud

AWS and Oracle Academy

This unit uses materials and infrastructure provided by Amazon Web Services (AWS), Oracle Academy and partners. These two academies cover knowledge required for multiple certificates such as:

- **AWS Cloud Practitioner**
- **AWS Solutions Architect (Associate)**
- **Oracle Cloud Infrastructure (OCI) Foundations Associate**
- **Oracle Cloud Infrastructure (OCI) Architect Associate**

Swinburne is accredited to run this unit as part of the AWS and Oracle Academy Programs.

Passing the Certification exams may require additional knowledge of AWS and OCI services for which additional study and exam preparation is recommended.

Students may be eligible for AWS and OCI certification discount vouchers. For further details, please refer to provided instructions on Swinburne Canvas page.

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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:

- Updated unit instructions and learning materials
- Additional online live lecture activities
- Higher quality pre-recorded lecture videos
- Detailed assessment criteria

Unit Teaching Staff

Name	Role	Room	Email / Teams	Consultation Times
Man Lau	Unit Convenor	EN 510a	elau@swin.edu.au	Monday 12:00–1:00pm
Bijan Raminzad	Lecturer		braminzad@swin.edu.au	Refer to Canvas
Lab Instructors Details on Canvas	Lab Instructor			Refer to Canvas

Learning and Teaching Structure

Category	Activity	Total Hours	Hours per Week	Teaching Period Weeks
Live Online	Live Sessions	24 hours	2 hours	Weeks 1 to 12
In person	Tutorials	24 hours	2 hours	Weeks 1 to 12
Self-study	Independent Learning	102 hours	8.5 hours	Weeks 1 to 12

Week by Week Schedule

Week	Week Beginning	Teaching and Learning Activities (Live Online & Pre-Recorded Lectures)	Student Tasks or Assessments (In-person Tutorial Labs)

1	Mar 3	• Overview of the unit
		• Introduction to cloud computing
		  o Virtualisation
		  o Cloud providers
		  o SaaS, PaaS, IaaS
		• Overview of AWS infrastructure and services.
			Accessing AWS resources
			Intro to Linux

2	Mar 10	• Compute services
		  o Virtual machines – EC2
		  o Serverless computing - Lambda
		  o Other compute services
		• Container-based/Serverless services
			No classes on Mar 10 Monday
			
			ACF Lab 3: Introduction to EC2 (~45 min)

3	Mar 17	• Network services
		  o Virtual Private Cloud - subnets
		  o Security groups firewalls
		  o Designing your Environment
		  o Content Delivery Networks and caching – Cloud Front
		Mandatory Lecture Quiz 1
			ACF Lab 2: Build a VPC and launch a Web Server (~45 min)
			ACA Module 11 Guided Lab - Streaming Dynamic Content using Amazon CloudFront (~30 min)

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4	Mar 24	• Storage services o File Storage – EBS, EFS o Object storage – S3, Glacier • *Web accessible content on S3*	Mandatory Assignment 1a Due ACF Lab 4: Working with EBS (~45 min) *Lab Exercise - Create a publicly accessible S3 web page*
5	Mar 31	• Database services o SQL and NoSQL databases o RDS o DynamoDB o Other databases Mandatory Lecture Quiz 2	ACF Lab 5: Build your DB Server and interact with your DB using an App (~45 min)
6	Apr 7	• Security o Access Control concepts o AWS IAM o Authorization using Policies o Securing your AWS account o AWS Authentication o Securing Data o Auditing Mandatory Lecture Quiz 3	Mandatory Assignment 1b due ACF Lab 1: Intro to AWS IAM (~45 min) Assignment 2 Q & A.
7	Apr 14	• Oracle Cloud Infrastructure Overview • OCI Differentiation from Other Offerings • Getting Started with Oracle Cloud Infrastructure • Introduction to OCI VCN Service **### Mandatory MCQ Test 1 ###**	**Mid-Semester Break Thursday 17 April to Wed 23 April (inclusive). No classes on these days.** **No classes on April 25 (ANZAC day)** Configure VCN Peering (~60 min) • Lab1 • Lab2
8	Apr 28	• Compute services o OCI Compute Services o VM Images • OCI Functions – Serverless platforms • Network o CIDR o IP Addresses o Routing and Gateways o VPN & FastConnect Mandatory Lecture Quiz 4	Create an IAM User on OCI (~15 min) Create Compute Instances (~60 min) • Lab1 • Lab2
9	May 5	• Storage: o Block Volume o File storage o Object Storage • Database: o Available DB Systems on OCI o Autonomous DB (ADB) o Data Guard	Mandatory Assignment 2 due Create an Object Storage (~20 min) • Lab1 Load and Analyse Your Data with Autonomous Database (~50 min) • Labs1-4 Using OCI Block Volumes (~20 min) • Labs 1-2
10	May 12	• Security o IAM Policies o Data Encryption o WAF o Monitoring • Billing and Cost Management Mandatory Lecture Quiz 5	Identity and Access Management (~60 min) • Lab 1-2 Load and Analyze Your Data with Autonomous Database (Labs 1-4, 50 minutes) • Lab 1-4
11	May 19	• Multi-Cloud architecture	Assignment 3 discussion

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12	May 26	Assignment 3 Presentations ### **Mandatory MCQ Test 2** ###	Assignment 3 due Assignment 3 Presentations

Assessment

a) Assessment overview

Tasks and Details	Individual or Group	Assessment Prerequisite	Weighting	Mapped Unit Learning Outcomes	Mapped Graduate Attribute	Due Date
Portfolio	Individual		100%	1, 2, 3, 4	GA1-6	Week 13
Components of portfolio			Refer to Portfolio Tracker on Canvas			
Labs	Individual	None		2, 3, 4	GA1, GA6	During Tutorial
Lecture Quizzes	Individual	None		1, 2, 3, 4	GA5, GA6	During Live Online Lectures
Assignment1a	Individual	None		2, 3	GA1, GA6	Week 4
Assignment1b	Individual	None		2, 3	GA1, GA6	Week 6
MCQ Tests 1&2	Individual	None		1, 2, 3, 4	GA6	Week 7,12
Assignment2	Individual	None		2, 3	GA1, GA2, GA6	Week 10
Assignment3 (Multicloud project)	Group of minimum 3 maximum 4 students	Refer to Portfolio Tracker on Canvas		2, 3, 4	GA2-6	Week 12
Assignment3 presentation	Group of minimum 3 maximum 4 students	Refer to Portfolio Tracker on Canvas		2, 3, 4	GA1-6	Week 12 Presentations may extend over into Week 13

I. **Lab submissions**:

Weekly labs and practical deployments **MUST** be demonstrated and assessed during in-person lab tutorials to receive marks.

Lab instructors would observe student deployments and may ask simple questions for assessment. Students will receive lab marks immediately.

Exception: Under any difficult circumstances, students **MUST** inform their lab instructor and provide evidence (e.g. medical certificate) if they cannot attend their tutorial class (lab class) and/or could not demonstrate their lab deployment during the allocated time.

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If accepted, students are given maximum 7 calendar days to submit a lab report. Lab reports must be written in **IEEE standard format**, including relevant screenshots and explanations for each step to receive a full mark.

II. Resubmission and Test Resits:

Students who missed the deadline of their first submission OR students who have received less than 50% for any of the Mandatory tasks (please refer to Canvas and Portfolio Tracker for Mandatory tasks details) will be eligible for a resubmission subject to the following conditions:

- Resubmissions will be available to eligible students upon their request ONLY (requests must be submitted to student's Lab Instructor/Tutor within 3 calendar days of original due date of submission).
- All resubmissions are due by a maximum 5 calendar days after original due date.
- Maximum achievable mark for all resubmissions is **60%** of the original mark (penalised by 40%).
- There are **NO resubmissions** available for **Labs**, **Lecture Quizzes** and any assessments due in **week 12** of the semester.
- All resubmissions will only be marked after week 12 of the semester.

Assessment Requirements	Details
b) Use of generative AI (genAI) in this unit	You can use genAI to learn, study and research into the relevant topics introduced in this unit. However, you are **NOT** allowed to use genAI to do the assessment tasks, for example, generating and / or writing your reports required in this unit.
c) Hurdle requirements	**No Hurdle requirements** **Minimum requirement to pass this Unit** To pass this unit, you must: ▪ Achieve an overall mark of 50% or more for the unit To track your progress please refer to Canvas and Portfolio Tracker excel file.
d) Final assessment period	If the unit you are enrolled in has a final assessment (including invigilated exams), you will be expected to be available for the entire final assessment period including any Special Exam period.
e) Submission requirements	Assignments and other assessments are generally submitted online through the Canvas assessment submission system which integrates with the Turnitin . 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/

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f) Extensions and late submissions	**Late Submissions** - Unless an extension has been approved prior to the submission deadline, submission of an assessment item after the deadline will be stopped. Students may be eligible for a resubmission (please refer to "Resubmission and Test Resits" section above for further details). **Extensions** - If a student is seeking an extension, they MUST apply on or before the assessment due date and time. Otherwise, it will be considered as a resubmission/late submission. Applications for an extension of **5 calendar days or less** (from the original due date) can be submitted through Swinburne Special Consideration and Extensions portal or directly to the unit convenor via email, providing documentary evidence. Unit convenor would process extension applications directly and students may be asked to apply for a Special Consideration Assessment (SCA/SPC) application to validate requester's situation and documentary evidence in detail. All extension requests for **more than 5 calendar days** (from the original due date) are submitted via Swinburne Special Consideration and Extensions portal. For further information, please refer to Special Consideration and Extensions page on Swinburne website.
g) 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. Referencing conventions required for this unit are: Any as long as consistent Helpful information on referencing can be found at http://www.swinburne.edu.au/library/referencing/
h) 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. 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.

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Required Textbook(s)

NA

Recommended Reading Materials

Swinburne Library has a large collection of resources. 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.

- *Implementing AWS: Leverage AWS Features to Build Highly Secure, Fault-Tolerant, and Scalable Cloud Environments*
  Wadia, Yohan ; Udell, Rowan ; Chan, Lúcás ; Gupta, Udita
  Birmingham: Packt Publishing, Limited; 2019
- *Getting started with Oracle Cloud free tier : create modern web applications using always free resources*
  Png, Adrian. author; Demanche, Luc.
  Berkeley, CA : Apress; 2020
- *Practical Oracle Cloud Infrastructure : infrastructure as a service, autonomous database, managed Kubernetes, and serverless*
  Jakóbczyk, Michał Tomasz. author
  Berkeley, CA : Apress L.P.; 2020

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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 generative artificial intelligence;

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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.

Plagiarism, collusion, contract cheating, unauthorised file sharing, falsification, fabrication, manipulation or misrepresentation of information, reuse of previous work and non-compliance with instructions in an invigilated or non-invigilated assessment item are all breaches of academic integrity and treated as academic misconduct. Examples of breaches of academic integrity include, but are not limited to:

- submitting work as your own for assessment that has been fully or partially completed by a third party, either paid or unpaid
- using output from artificial intelligence tools (e.g. ChatGPT) in whole or part without acknowledgement and/or without the approval of the Unit Convenor
- using another person's work or ideas as though it is your own work, without appropriate attribution
- working closely with another student or group of students (either past or current), to submit for assessment, some or all of the other student or students' work as your own work
- sharing without permission of the Unit Convenor, Swinburne resources or other material related to assessment to an entity or document repository site
- creating, intentionally modifying or inventing information that is intended to be submitted as part of an assessment item
- using the whole or part of a computer program written by another person as your own without appropriate acknowledgement
- poorly paraphrasing somebody else's work
- using a musical composition or audio, visual, graphic and photographic work created by another person without acknowledgment
- enabling others to cheat, including letting another student copy your work or by giving access to a draft or completed assignment
- letting someone or something else impersonate you, or you impersonate someone else in an invigilated or non-invigilated assessment item
- accessing, obtaining and/or providing to others unauthorised materials relating to an invigilated or non-invigilated assessment item.

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. For further information, see the Current students web page.

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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/

Note: Submitting fraudulent (fake or altered) medical certificates is considered misconduct and can lead to serious penalties from Swinburne. In addition, your doctor may report fraudulent medical certificates as a prosecutable offence under the Victorian Crimes Act.

AccessAbility Services

If you are a student with a disability, medical or mental health condition or you have significant carer responsibilities, you may require reasonable adjustments to fully access and participate in education. Swinburne's AccessAbility Services can develop an Education Access Plan (EAP) that includes the services and reasonable adjustments that you need.

It is recommended that you register with AccessAbility Services when you first commence your course but you can contact the service at any time during your studies to find out about reasonable adjustments. Contact Accessibility Services to discuss further.

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 the Swinburne Student Association. Talking to an Advocacy Officer is free, independent and confidential. For more information and booking an appointment, please see https://www.swinburne.edu.au/current-students/student-services-support/advocacy/

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