

System Software

Unit code and version	11489.1
Unit offering option	218524
Study level	Level 3 - Undergraduate Advanced Unit
Credit points	3
Faculty	Faculty of Science and Technology
Discipline	Academic Program Area - Technology
Unit offering details	Semester 1, 2024 , ON-CAMPUS , UC - Canberra, Bruce
Unit convener name and contact details	<p>Dr Yibe Alem</p> <p>Email: yibe.alem@canberra.edu.au</p> <p>Phone: (02) 6206 8309</p> <p>Office: 6C36</p>

Administrative contact details

Academic content

Unit description

This unit provides an introduction to the design and the implementation of modern general purpose operating systems. Centered on the concept of resource sharing, the unit explains how an operating system manages the hardware resources and software applications of a computer system. The unit covers the essential principles and theories of modern operating systems: processes, threads, mutual exclusion, scheduling, virtual memory systems, I/O and file systems, network, and security. The unit also teaches basic system administration skills for commonly used operating systems. In addition, through the teaching, the unit promotes and strengthens important generic skills, such as communication, analysis and inquiry, problem solving, independent and group working, and professionalism and social responsibility. This unit may be cotaught with 8935 Systems Software G.

Learning outcomes

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

1. Describe the structures and implementation of modern operating systems by using the concepts of processes, threads, mutual exclusion, scheduling, virtual memory systems, I/O and file systems, network, and security;
2. Explain the role of an operating system plays in managing the hardware resources and software applications of a computer system;

3. Analyse and evaluate the factors which impact on the performance of a computer system;
4. Apply mutual exclusion theory and principles in concurrent programming;
5. Undertake basic system administration tasks for commonly used operating systems; and
6. Further strengthen important generic skills, such as communication, analysis and inquiry, problem solving, independent and group working, and professionalism and social responsibility.

Graduate attributes

1. UC graduates are professional
 - communicate effectively
 - display initiative and drive, and use their organisation skills to plan and manage their workload
 - employ up-to-date and relevant knowledge and skills
 - take pride in their professional and personal integrity
 - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
2. UC graduates are global citizens
 - behave ethically and sustainably in their professional and personal lives
 - communicate effectively in diverse cultural and social settings
3. UC graduates are lifelong learners
 - evaluate and adopt new technology
 - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Skills development

As students of the University of Canberra, you will develop your critical thinking skills, your ability to solve complex problems, your ability to work with others, your confidence to learn independently, your written communication skills, your spoken communication skills and a number of work-related knowledge and skills.

Prerequisites

7170 Software Technology 2.

Corequisites

None.

Accreditation

ACS Accreditation

This unit is part of courses accredited by the [Australian Computer Society \(ACS\)](#)

[Skills Framework for the Information Age \(SFIA\) v8](#)

This unit aligns with the following SFIA professional skills:

Skills framework for the Information Age:

- Software design SWDN
- System software SYSP
- Programming/software development PROG

SFIA skills are defined by levels of responsibility, based on autonomy, influence, complexity, business skills, and knowledge. Although this unit

may cover knowledge and skills at higher levels, it is expected that graduates of undergraduate degrees will be capable of operating at Level 2 overall.

Seoul Accord:

The UC generic skills address most of the requirements of the Seoul Accord. The remaining skills that are addressed in this unit are:

2. Knowledge for Solving Computing Problems
3. Problem Analysis
4. Design/Development of Solutions
5. Modern Tool Usage
8. Computing Professionalism and Society

This unit addresses complex computing problems that have one or more of the following characteristics:

- involves wide-ranging or conflicting technical, computing, and other issues;
- has no obvious solution, and requires conceptual thinking and innovative analysis to formulate suitable abstract models;
- a solution requires the use of in-depth computing or domain knowledge and an analytical approach that is based on well-founded principles;
- involves infrequently encountered issues;
- has significant consequences in a range of contexts;

These complex computing problems are assessed in the following assessment items:

- Assignment
- Engagement (Tutorial problems and Lab tasks)

EA Accreditation

This unit is part of courses accredited by [Engineers Australia \(EA\)](#)

This unit assesses and exposes students to the following Professional Engineer Stage 1 Competencies:

1.1 Comprehensive, theory based understanding – Indicators Assessed: a

1.2 Conceptual understanding – Indicators Assessed: a

1.3 In-depth understanding – Indicators Assessed: a

1.4 Discernment – Indicators Assessed: a

1.5 Knowledge – Indicators Assessed: a

2.1 Application of established engineering methods – Indicators Assessed: a, b, c, e, f, g

2.2 Fluent application of engineering techniques, tools and resources – Indicators Assessed: a, c, g

3.2 Effective oral and written communication in professional and lay domains – Indicators Assessed: a, b

3.3 Creative, innovative and pro-active demeanour – Indicators Assessed: a

Timetable of activities

Week	Lecture Topic	Textbook Reading	Tute/Lab		
1	Computer Architecture and Operating Systems: Introduction	Chapter 1	No		
2	Communication with Operating Systems	Chapter 2	Tute/Lab		
3	Processes and Threads I	Chapters 3 & 4	Tute/Lab and Quiz 1 due		
4	Processes and Threads II	Chapters 3 & 4	Tute/Lab		
5	Concurrency I	Chapters 5 & 6	Tute/Lab		
6	Concurrency II	Chapters 5 & 6	Tute/Lab and Quiz 2 due		
7	Scheduling: Uniprocessor, Multiprocessor, Multicore, and Real-Time	Chapters 9 & 10	Tute/Lab		
8	CLASS	FREE	WEEK		
9	Memory Management and Virtual Memory I	Chapters 7 & 8	Tute/Lab		
10	Virtual Memory II	Chapters 7 & 8	Tute/Lab and Quiz 3 due		

11	I/O Management, Disk Scheduling, and File Management	Chapters 11 & 12	Tute/Lab		
12	Embedded Operating Systems, and Virtual Machines	Chapters 13 & 14	Tute/Lab and Assignment Report due		
13	Summary	Entire unit content	Tute/Lab and Evaluation Quiz, Peer Review due		
<p>Note: Schedule is provisional and subject to change (via Canvas announcement)</p>					

Unit resources

Required texts

"Operating Systems Internals and Design Principles" by William Stallings, 8th/9th Edition, ISBN: 9781292061351 / ISBN: 9781292214290

Materials and equipment

Personal laptop computers are desirable, but not essential.

Unit website

Each unit you are enrolled in has an online teaching site in the learning management system UCLearn. You access UCLearn through [MyUC](#).

Assessment

Assessment item details

Engagement

Due date

Over the semester (excluding Week 8)

Weighting

20% (Lab task completion, active participation in tutorials discussions, content views on Canvas, participation in unit based surveys, etc. (15%) and completion of Peer Evaluation of individual contributions to group assignment (5%))

Assessment details

This assessment item takes into account lab task completion, active participation in tutorials discussions, content views on Canvas, participation in unit based surveys, etc. across the semester.

Further details to be provided on the unit site.

Addresses learning outcomes

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

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- 4. Apply mutual exclusion theory and principles in concurrent programming;
- 5. Undertake basic system administration tasks for commonly used operating systems; and
- 6. Further strengthen important generic skills, such as communication, analysis and inquiry, problem solving, independent and group working, and professionalism and social responsibility.

Related graduate attributes

1. UC graduates are professional
 - communicate effectively
 - display initiative and drive, and use their organisation skills to plan and manage their workload
 - employ up-to-date and relevant knowledge and skills
 - take pride in their professional and personal integrity
 - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
2. UC graduates are global citizens
 - behave ethically and sustainably in their professional and personal lives
 - communicate effectively in diverse cultural and social settings
3. UC graduates are lifelong learners
 - evaluate and adopt new technology
 - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Quiz 1 (during tute/lab)

Due date

Week 3

Weighting

5%

Assessment details

Canvas quiz to be conducted in class during the tutorial/lab. Further details to be provided on the unit site.

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Quiz 2 (during tute/lab)

Due date

Week 6

Weighting

10%

Assessment details

Canvas quiz to be conducted in class during the tutorial/lab. Further details to be provided on the unit site.

Addresses learning outcomes

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Quiz 3 (during tute/lab)

Due date

Week 10

Weighting

15%

Assessment details

Canvas quiz to be conducted in class during the tutorial/lab. Further details to be provided on the unit site.

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Collaborative Task (Group Assignment)

Due date

Collaborative Report to be submitted on Canvas in Week 12 (20%), Friday 23:59.

Evaluation Quiz based on the topics covered in the collaborative task to be conducted during tutorial/lab times in Week 13 (30%).

Peer Evaluation to be submitted on Canvas in Week 12, Friday 23:59.

Weighting

50%

Assessment details

This assessment item provides students the opportunity to apply various concepts in system software design. The task is composed of three components: report (group task), peer evaluation (individual task - students must complete peer evaluation to receive the mark for the group report) and evaluation quiz (individual task).

Students are strongly encouraged to form their own groups (3 - 4 students) and assign themselves into a group on Canvas by 23:59 Friday Week 5. Those who do not exercise the right to form their own group by specified deadline will be randomly assigned to groups in Week 6. The report is a group work; individual submissions will NOT be accepted.

Further details will be made available on Canvas.

Addresses learning outcomes

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Submission of assessment items

Submissions are through Canvas (<http://uclearn.canberra.edu.au/>) only. No other forms of submission will be accepted.

If a student chooses to submit his/her assignment via the Internet from off-campus, it is the responsibility of the student to guarantee the accessibility of the Internet. Not being able to access the Internet at a location which is off-campus is not an excuse for extension.

Extensions

Students can apply for an extension to the submission due date for an assessment item due to extenuating, evidenced circumstances (specific details are found in the [Assessment Procedures](#)). An extension must be applied for before the due date. Documentary evidence (e.g. medical certificate) will be expected for an extension to be granted, however this will not guarantee that the application will be successful. The Unit Convener or relevant Program Director/Course Convener will decide whether to grant an extension and the length of the extension.

An Assignment Extension form is available from the [Student Forms](#) page.

Late submissions

The following late submission period and penalty is applicable to any teaching period commencing after 1 April 2024.

To support the provision of timely feedback to students within the unit, late penalties will apply for summative assessments where late submission is permitted. Late submissions without an approved extension or reasonable adjustment will result in a penalty of a mark reduction of 10% of the maximum available marks for the assessment item per day (or part thereof) up to and including three calendar days. If a student submits more than three calendar days late without an approved extension or reasonable adjustment, the student will be allocated a mark of

zero for that assessment, with no feedback provided.

Approval of extensions based on extenuating circumstances will be dependent upon the production of supporting documentation and at the discretion of the unit convener.

For teaching periods commencing prior to 1 April 2024, a late penalty of 5 % of the maximum available marks for the assessment item per day (or part thereof) was applied up to and including seven calendar days. An assignment submitted over 7 days late will not be accepted.

Special assessment requirements

An aggregate mark of 50% is required to pass the unit.

The final marks of a student are calculated by the following formula, and the final grade of a student is determined according to the following table.

Final marks (100%) = Engagement (20%) + Quiz 1 (5%) + Quiz 2 (10%) + Quiz 3 (15%) + Collaborative Task /Group Assignment (50%)

85 <= Final marks <= 100	Final grade = HD
75 <= Final marks < 85	Final grade = DI
65 <= Final marks < 75	Final grade = CR
50 <= Final marks < 65	Final grade = P
0 <= Final marks < 50	Final grade = FAIL (NX, NS, NC or NN)

Supplementary assessment

Refer to the [Assessment Policy](#) and [Assessment Procedures](#)

Academic integrity

Students have a responsibility to uphold University standards on ethical scholarship. Good scholarship involves building on the work of others and use of others' work must be acknowledged with proper attribution made. Cheating, plagiarism, and falsification of data are dishonest practices that contravene academic values. Refer to the University's [Student Charter](#) for more information.

To enhance understanding of academic integrity, all students are expected to complete the Academic Integrity Module (AIM) at least once during their course of study. You can access this module within [UCLearn \(Canvas\)](#) through the 'Academic Integrity and Avoiding Plagiarism' link in the [Study Help site](#).

Use of Text-Matching Software

The University of Canberra uses text-matching software to help students and staff reduce plagiarism and improve understanding of academic integrity. The software matches submitted text in student assignments against material from various sources: the internet, published books and journals, and previously submitted student texts.

Student responsibility

Learner engagement

Activities	hours
Lectures	24
Tute/lab: 2 hours per tute/lab	22
Weekly study commitment (preview and review): 2 hours/week	24
Preparation for 3 Quizzes	34
Assignment: 40 hours, 1 time	40
Assignment Evaluation Quiz (preparation + attempt)	6
Total	150

Inclusion and engagement

It is strongly recommended that students who need assistance in undertaking the unit because of disability or an ongoing health condition register with the [Inclusion and Engagement Office](#) as soon as possible so that reasonable adjustment arrangements can be made.

Participation requirements

Your participation in both class and online activities will enhance your understanding of the unit content. Lack of participation may result in your inability to satisfactorily pass assessment items as well as not achieving engagement marks.

Withdrawal

If you are planning to withdraw please discuss with your Unit Convener. UC College students must also seek advice from the College.

Required IT skills

A basic understanding of computer systems, hardware and software, and programming is required.

In-unit costs

Textbook purchase and some printing costs are anticipated.

Work integrated learning

None

Student feedback

All students enrolled in this unit will have opportunities to provide anonymous feedback on the unit through the InterFace Student Experience Questionnaire (ISEQ). The request for your feedback will be posted on your InterFace page at least twice during a teaching period. InterFace can be accessed through MyUC.

Changes to unit based on student feedback

Some changes have been made to learning activities and assessment items based on student feedback:

- Quiz questions have been updated to better align with learning outcomes
- Collaborative task requirements and structure have been updated

Authority of this unit outline

This unit outline must be read in conjunction with the University of Canberra's Policies and Procedures, including the [Assessment Policy](#) and associated [Procedure](#). The Assessment Policy and Assessment Procedure include information on matters such as plagiarism, grade descriptors, moderation, feedback, and deferred exams.

Any change to the information contained in the Academic content and Assessment sections of this document, will only be made by the Unit Convener if the written agreement of the Program Director and a majority of students has been obtained; and if written advice of the change is then provided on the teaching site in UCLearn. If this is not possible, written advice of the change must be then forwarded to each student enrolled in the unit at their registered term address. Any individual student who believes themselves to be disadvantaged by a change is encouraged to discuss the matter with the Unit Convener.

Authority Text

Main

Exception – Potential changes to a unit's learning activities and assessment items (Approved Academic Board 2020)

In the event of Australian Government and/or ACT Government directive, such as those requiring physical distancing and restrictions on movement because of a pandemic, learning activities and/or assessment items in some units may change. These changes will not be updated in the published Unit Outline but will be communicated to students via the unit's UCLearn (Canvas) teaching site. The new learning activities and/or assessment items will continue to meet the unit's learning outcomes, as described in the Unit Outline.

New learning activities and/or assessment items will be available on the unit's UCLearn (Canvas) teaching site. Please contact the Unit Convener with any questions.

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UC acknowledges the Ngunnawal people, traditional custodians of the lands where Bruce campus is situated. We wish to acknowledge and respect their continuing culture and the contribution they make to the life of Canberra and the region. We also acknowledge all other First Nations Peoples on whose lands we gather.