

Network Architecture

Unit code and version	11484.1
Unit offering option	219855
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 2, 2024 , ON-CAMPUS , UC - Canberra, Bruce
Unit convener name and contact details	<p>Unit Convener/Lecturer:</p> <p>Dr Ibrahim Elgendi Phone: +61 2 6201 8325 Email: Ibrahim.Elgendi@canberra.edu.au Office: 6C23</p> <p>Unit Moderator:</p> <p>A/Prof.Mohammad.Abulsheikh</p>
Administrative contact details	<p>Student Central Building 1, Level B Email: Student.Centre@canberra.edu.au Phone: 1300 301 727</p>

Academic content

Unit description

This unit aims towards developing an understanding of the process of architecting computer and communication networks. This will be achieved through bridging the gap between theoretical and practical aspects and learning the step-by-step procedures of network analysis, architecture, and design. Students will learn about the fundamental relationships between major building blocks required in a successfully architected network. Case studies will include national networks (e.g. NBN) and enterprise networks (e.g. campus). Guest lectures and group projects with hands-on laboratories will be used for enhancing student-learning experience.

Learning outcomes

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

1. Disseminate knowledge, ideas and opinions effectively and professionally;
2. Competently identify, analyse and formulate the requirements for a network design;
3. Demonstrate the understanding to evaluate architectural design and components that best meet the requirements;
4. Plan the process of architecting a networking system and use interpersonal skills to work collaboratively; and
5. Develop a broad design of network systems for specific real life deployment scenarios.

Graduate attributes

1. UC graduates are professional
 - communicate effectively
 - employ up-to-date and relevant knowledge and skills
 - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
 - work collaboratively as part of a team, negotiate, and resolve conflict
2. UC graduates are global citizens
 - make creative use of technology in their learning and professional lives
3. UC graduates are lifelong learners
 - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
 - 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

Must have passed unit 11485 Introduction to Network Engineering.

Corequisites

None.

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:

- Systems installation/decommissioning HSIN
- System software SYSP
- IT operations ITOP
- Programming/software development PROG
- Research RSCH
- Network planning NTPL

- Solution Architecture ARCH
- Network Design NTDS

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 3 overall.

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, b

1.5 Knowledge – Indicators Assessed: Exposed d, f

1.6 Understanding – Indicators Assessed: Exposed a, d

2.1 Application of established engineering methods – Indicators Assessed: a, b, d, Exposed e, g

2.2 Fluent application of engineering techniques, tools and resources – Indicators Assessed: a, exposed b, d

2.3 Application of systematic engineering systems and Design Processes- Exposed b

2.4 Application of Systematic Approaches – Exposed a, b, c

3.1 Ethical conduct and professional accountability – Indicators Assessed: a

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

3.3 Creative, innovative and pro-active demeanour – Exposed c

3.6 Effective Team Membership and Team Leadership – Exposed b

Seoul Accord

The UC generic attributes address graduate attributes 1, 6, 7, 9, and 10 of the [Seoul Accord](#). The remaining graduate attributes that are covered in this unit are:

2. Knowledge for Solving Computing Problems

3. Problem Analysis

4. Design/Development of Solution

This unit addresses complex computing problems that have 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;
- is a high-level problem possibly including many component parts or sub-problems;

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

- Research Paper

Timetable of activities

Weeks	Lecture Topic	Assessment Due
1	Introduction	-
2	Requirements Analysis I	Lab-1
3	Requirements Analysis II	Tute-1
4	Flow Analysis	Lab-2 & Quiz1
5	Network Architecture I	Tute-2
6	Network Architecture II	Lab-3 & Quiz2
7	Addressing and Routing Architecture	Tute-3

8	Class free period	-
9	Network Management Architecture	Lab-4
10	Performance Architecture	Tute-4
11	Security and Privacy Architecture	Quiz3
12	Network Design	Tute-5
13	-	-
14	Research Paper (Weight 50%)	50%

Unit resources

Required texts

- Required: Network Analysis Architecture and Design (3rd edition) by James McCabe, Elsevier
- Recommended: Computer Networking, A Top-Down Approach (Global 7th edition), Kurose and Ross, Pearson Higher

Materials and equipment

Students are expected to have access to a computer for online lectures, labs and tutorials.

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

Tute

Due date

Fortnightly

Weighting

10%

Assessment details

Tutorials [10%]: This unit will have Tutorials to give the students the required knowledge and experience in network design, performance testing, and configurations. Five (5) Tutorials of 2% weight each. Each tute report must be submitted online within two weeks of assigning. Penalties for late submissions apply 10% per day or part thereof, maximum of 3 days late

Addresses learning outcomes

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

- 1. Disseminate knowledge, ideas and opinions effectively and professionally;
- 2. Competently identify, analyse and formulate the requirements for a network design;
- 3. Demonstrate the understanding to evaluate architectural design and components that best meet the requirements;
- 4. Plan the process of architecting a networking system and use interpersonal skills to work collaboratively; and

Related graduate attributes

1. UC graduates are professional
 - use creativity, critical thinking, analysis and research skills to solve theoretical and real-world problems
3. UC graduates are lifelong learners
 - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
 - evaluate and adopt new technology
 - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development

Labs

Due date

Fortnightly

Weighting

10%

Assessment details

Laboratories [10%]: This unit will have laboratories to give the students the required knowledge and experience in network design and performance testing. Five (5) laboratories of 2% weight each. Each lab report must be submitted online within two weeks of assigning. Penalties for late submissions apply 10% per day or part thereof, maximum of 3 days late. each lab has Wireshark software and practical show case. the practical show case includes but not limited to practical network architecture components, practical flow models, and network architecture references. The practical case is optional and not include in the lab assessments. The practical case is for more training and increasing your experiences.

Addresses learning outcomes

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

- 1. Disseminate knowledge, ideas and opinions effectively and professionally;
- 2. Competently identify, analyse and formulate the requirements for a network design;
- 3. Demonstrate the understanding to evaluate architectural design and components that best meet the requirements;

Related graduate attributes

- 3. UC graduates are lifelong learners
 - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
 - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development
- 1. UC graduates are professional
 - communicate effectively
 - employ up-to-date and relevant knowledge and skills

Quiz2

Due date

Week 7, Thursday, 2:30 pm

Weighting

10%

Assessment details

Quiz2 [10%]: This unit will have quiz2 to give the students the required knowledge and experience in network design, analysis, performance testing, and configurations. quiz2 must be answer and submit online. students who will not attend the quiz will get no mark.

Canvas module has all the details of the quiz

Addresses learning outcomes

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

- 1. Disseminate knowledge, ideas and opinions effectively and professionally;
- 2. Competently identify, analyse and formulate the requirements for a network design;
- 3. Demonstrate the understanding to evaluate architectural design and components that best meet the requirements;
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- 5. Develop a broad design of network systems for specific real life deployment scenarios.

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Research Paper

Due date

Available from Week-1 and due Week 14, Friday, 10:30 am

Weighting

50%

Assessment details

Students who do not participate in the research paper will receive a final grade of NC (Not Complete).

Research Project Requirements

The course project in 11484UG & 10099PG requires students to demonstrate an in-depth understanding of some important aspect of network architecture and design and/or network protocol performance. Project accounts for 50% of the final grade for the course, and thus should represent a month or so of research effort. Projects are to be done in group with minimum 2 students and maximum 3 students.

The project should take the form of a research paper, similar to those found in the published networking literature. (Of course, there is no requirement that your paper be publishable!) The research paper should present your own (novel) research results on a relevant network architecture and design performance problem. Results may be obtained analytically, through simulation, or experimentally through measurement of an existing system or implementation. The paper should be 7-9 pages in length, including abstract, figures, tables, and bibliography. Use a reasonable word processing package, a readable font size (10 Times New Roman, and double-column formatting. Papers must be submitted using an Urkund text matching.

A lot of background reading is required to do a good research paper on a given topic, and must be reflected in your bibliography. Note, however, that it is NOT sufficient to do just a SURVEY PAPER. Creativity, originality, and your own contribution are also required. This must involve applying previously known approaches to new network data or scenarios, or applying new approaches or analyses to previously studied data or scenarios, or new approaches to new problems entirely.

Topics of your own choosing are preferred, but if you need ideas, I can offer several suggestions, and point you to relevant literature. Several possible project ideas are included below. In any event, put your thinking caps on, and discuss your idea(s) with me as soon as possible using any online way such as virtual room.

Deadlines

The timetable for project requirements is as follows:

- Due by Friday (06/11/2024) at 10:30 am: Submit completed research paper in word format using Canvas online submission. Projects involving significant implementation effort can be accompanied by a demo, if appropriate, also can submit using Canvas system.
 - Late Submission: Penalties for late submissions apply 10% per day or part thereof, maximum of 3 days late. Project submitted over 3 days late will not be accepted.
 - Submission using online Text-Matching on Canvas system.

Addresses learning outcomes

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

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 - evaluate and adopt new technology
 - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development
2. UC graduates are global citizens
 - make creative use of technology in their learning and professional lives

Quiz1

Due date

Week 4, Thursday 2:30pm

Weighting

10%

Assessment details

Quiz1 [10%]: This unit will have quiz2 to give the students the required knowledge and experience in network design, analysis, performance testing, and configurations. quiz2 must be answer and submit online. students who will not attend the quiz will get no mark.

Canvas module has all the details of the quiz

Addresses learning outcomes

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

- 1. Disseminate knowledge, ideas and opinions effectively and professionally;
- 2. Competently identify, analyse and formulate the requirements for a network design;

Related graduate attributes

1. UC graduates are professional
 - communicate effectively
 - employ up-to-date and relevant knowledge and skills
2. UC graduates are global citizens
 - make creative use of technology in their learning and professional lives
3. UC graduates are lifelong learners

- adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas

Quiz3

Due date

Week 10, Thursday 2:30pm

Weighting

10%

Assessment details

Quiz3 [10%]: This unit will have quiz2 to give the students the required knowledge and experience in network design, analysis, performance testing, and configurations. quiz3 must be answer and submit online. students who will not attend the quiz will get no mark.

Canvas module has all the details of the quiz

Addresses learning outcomes

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

- 1. Disseminate knowledge, ideas and opinions effectively and professionally;
- 2. Competently identify, analyse and formulate the requirements for a network design;
- 3. Demonstrate the understanding to evaluate architectural design and components that best meet the requirements;
- 4. Plan the process of architecting a networking system and use interpersonal skills to work collaboratively; and
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 - communicate effectively
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3. UC graduates are lifelong learners
 - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
 - evaluate and adopt new technology

Submission of assessment items

Penalties for late submissions apply 10% per day or part thereof, maximum of 3 days late. Research paper submitted over 3 days late will not be accepted.

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.
- Students who do not participate and submit the research paper inappropriate conditions will receive a final grade of NC (Not Complete).
- The unit convener reserves the right to question students on any of their submitted work and may adjust awarded marks based on this questioning. See [Grading Schema](#) for the full grading schema and grade descriptors.

Supplementary assessment

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

Academic integrity

Students must apply academic integrity in their learning and research activities at UC. This includes submitting authentic and original work for assessments and properly acknowledging any sources used.

Academic integrity involves the ethical, honest and responsible use, creation and sharing of information. It is critical to the quality of higher education. Our academic integrity values are honesty, trust, fairness, respect, responsibility and courage.

UC students have to complete the [Academic Integrity Module](#) annually to learn about academic integrity and to understand the consequences of academic integrity breaches (or academic misconduct).

UC uses various strategies and systems, including detection software, to identify potential breaches of academic integrity. Suspected breaches may be investigated, and action can be taken when misconduct is found to have occurred.

Information is provided in the [Academic Integrity Policy](#), [Academic Integrity Procedure](#), and [University of Canberra \(Student Conduct\) Rules 2023](#). For further advice, visit [Study Skills](#).

Student responsibility

Learner engagement

Activities	Estimated hours	Inclusion and engagement
		It is strongly recommended that students who need assistance in undertaking the unit

12 lectures x 2 hours each	24	
12 tutorials x 2 hours each	24	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.
Tutorials/Labs attending (2*11)	22	
Tutorials/Labs preparation (2*11)	22	Your participation in both class and online activities will enhance your understanding of the unit content and therefore the quality of your assessment responses. Lack of participation may result in your inability to satisfactorily pass assessment items.
Quiz	18	
Research Paper	40	If you are planning to withdraw please discuss with your Unit Convener. UC College students must also seek advice from the College.
Total	150	

Participation requirements

Your participation in both class and online activities will enhance your understanding of the unit content and therefore the quality of your assessment responses. Lack of participation may result in your inability to satisfactorily pass assessment items.

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

Intermediate understanding of mathematics, programming, computer hardware, operating systems, and networking.

This unit involves online meetings in real time using the Virtual Room in your UCLearn teaching site. The Virtual Room allows you to communicate in real time with your lecturer and other students. To participate verbally, rather than just typing, you will need a microphone. For best audio quality we recommend a microphone and speaker headset. For more information and to test your computer, go to the Virtual Room in your UCLearn site and 'Join Course Room'. This will trigger a tutorial to help familiarise you with the functionality of the virtual room.

Work integrated learning

N/A

Additional information

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 InterInterface page at least twice during a teaching period. InterInterface can be accessed through MyUC.

Changes to unit based on student feedback

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

Changes to Unit Based on Student Feedback:

Tute/lab activities have been readjusted back to the originally designed 2-hours sessions.

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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CRICOS 00212K

TEQSA Provider ID: PRV12003 (Australian University)

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.