UNIVERSITY OF CANBERRA

System and Network Administration

Unit code and version	11514.2
Unit offering option	221830
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	Dr. Md Farhad Hossain Room # 6C20 Email: MdFarhad.Hossain@canberra.edu.au
Administrative contact details	Student Central Building 1, Level B Email: Student.Centre@canberra.edu.au Phone: 1300 301 727

Academic content

Unit description

IT infrastructure is broadly known as a collection of hardware, software, networks, data, security, and policies etc. to provide reliable, available, and confident IT services. It plays critical roles in modern society. In this unit, students will learn and apply the principles and basic techniques of system and network administration through setting up the IT infrastructure of an fictitious organisation from scratch and then maintaining the on-going operations of the IT infrastructure. Topics include system selection and installation, software configuration, network administration, security operation, user management, backup, interoperability among multiple platforms, performance tuning, and auditing etc. In addition, the unit also exposes students to the industry, professionalism, and professional ethics. The unit arms students with the knowledge and practical skills in system and network administration to be job-ready to work in the fields and also for future career development. Further, 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 is a laboratory-based learning-by-doing unit. This unit will be co-taught with 11514 System and Network Administration (UG).

Learning outcomes

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

1. Develop an advanced knowledge of the principles and practices of system and network adminstration;
2. Apply the principles and practices of system and network administration to IT infrastructure;
3. Formulate solutions to solve the problems related to system and network administration, e.g., software configuration, user management, data storage, networking, security, performance tuning, testing and auditing etc.;
4. Evaluate the current practice and predict future trends; and
5. Demonstrate the 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
   - employ up-to-date and relevant knowledge and skills
   - communicate effectively
   - 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
   - think globally about issues in their profession
   - adopt an informed and balanced approach across professional and international boundaries
   - make creative use of technology in their learning and professional lives
   - behave ethically and sustainably in their professional and personal lives
3. UC graduates are lifelong learners
   - reflect on their own practice, updating and adapting their knowledge and skills for continual professional and academic development
   - adapt to complexity, ambiguity and change by being flexible and keen to engage with new ideas
   - evaluate and adopt new technology

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

11485 Introduction to Network Engineering AND 11906 Introduction to Cyber Security

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:

- Security operations SCAD
- Network design NTDS
- Network support NTAS
- Technology service management ITMG
- Information security SCTY
- Specialist advice TECH
- Threat intelligence THIN
- Vulnerability assessment VUAS
- Vulnerability research VURE
- Systems installation and removal HSIN
- Penetration testing PENT
- IT infrastructure ITOP

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 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 Solutions

5. Modern Tool Usage

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

- 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 items:

- Assignment 1
- Assignment 2
- Assignment 3
- Weekly Quizzes

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 Exposed: a, b

1.5 Knowledge – Indicators Assessed: a, b; Exposed: c, d

1.6 Understanding – Indicators Exposed: a, b

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

2.2 Fluent application of engineering techniques, tools and resources – Indicators Assessed: a, b, d; Exposed: c, e, f, h

2.3 Application of systematic engineering synthesis and design processes – Indicators Exposed: a, b, c

2.4 Application of systematic approaches – Indicators Exposed: e

3.1 Ethical conduct and professional accountability – Indicators Exposed: a, b, c, d

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 Exposed: c

3.4 Professional use and management of information – Indicators Exposed: a, b, c

3.5 Orderly management of self, and professional conduct - Indicators Assessed: a; Exposed: b, c, d, e, f

3.6 Effective team membership and team leadership – Indicators Exposed: a, b, c, d, e, f

Timetable of activities

Wk	Lecture	Homework	Tute And Lab	Assessment
01	Introduction; IT Infrastructure	read 2 sample design documents, work on A1	>>>blank<<<	>>>blank<<<
02	Enterprise Network Architecture IT Infrastructure		• design your network architecture • install Oracle VM VirtualBox on your computer (if using your own	QZ02 (2 mks)

			computers)		
03	Concept: virtual computers, virtualisation, and virtual network within the same host	design your network architecture, continuously work on A1

read: relevant manuals on VirtualBox and software installation and configuration, continuously work on A1 | • design your network architecture
• set up various virtual computers and install the needed software | QZ03 (2 mks)

Friday: A1 report (12 mks), the initial design | |
| 04 | IT Infrastructure – hosts: servers, infrastructure and application servers (DNS, DHCP, DC, AD and LDAP) | continuously read when needed, work on A2 | • set up various virtual computers and install the needed software | QZ04 (4 mks): lab & fming grp

Friday: A1 peer review (8 mks) | |
| 05 | web server, email server, database server, and file server etc. | continuously read when needed, continuously work on A2 | • set up various virtual computers and install the needed software | QZ05 (6 mks): lab & IP addr etc. | |
| 06 | host based security measures | continuously read when needed, continuously work on A2 | • set up various virtual computers and install the needed software | QZ06 (2 mks) | |

07	cisco routers and switches and IOS	continuously work on A2 read "Cisco_Commands_Cheat_Sheet.pdf" read Cisco manuals	• set up various virtual computers and install the needed software	QZ07 (2 mks) Friday: A2 report (20 mks), the hosts
08	teaching free	teaching free		teaching free
09	network design revisit	refine your network design, continuously read when needed, work on A3	• planning to set up cisco routers and switches • familiarise cisco routers and switches • set up cisco routers and switches	QZ09 (2 mks) Friday: A2 peer review (5 mks)
10	network based security measures and beyond (firewalls, network segmentation, auditing, and penetration test)	continuously read when needed, continuously work on A3	• set up cisco routers and switches • connect host to the network	QZ10 (6 mks): lab & network plan
11	cybersecurity topics: iptables, ClamAV, SpamAssassin, Nessus, Snort, log analysis,	continuously read when needed, continuously work on A3	• set up cisco routers and switches • install the needed software	QZ11 (2 mks)

	backup, and honeypot etc.		• connect host to the network	
12	other issues - insource, outsource, data centres, auditing, professionalism, and ethics etc.	continuously read when needed, continuously work on A3	• set up cisco routers and switches • install the needed software • connect host to the network	QZ12 (2 mks)
13	Summary	continuously work on A3 if needed	continuously work on A3 if needed	Friday: A3 report (20 mks), the network
14	>>>blank<<<	>>>blank<<<	>>>blank<<<	Friday: A3 peer review (5 mks)

Unit resources

Required texts

Various online resources, suggestions and recommendations to be provided; your reading varies according to your knowledge, skills, and backgrounds.

Materials and equipment

The lab, 6B37 (Network Engineering and Cybersecurity Lab), has adequate resources for every student enrolled in this Unit to fulfil the Learning Outcomes and complete assessments. The needed materials and equipment described below will provide you with significant convenience, although not essential. The support to your own devices from the teaching team will be on the "best effort" base within the limits of the team's workloads, and cannot be guaranteed. Please note that the teaching team does not have the access to Mac computers, and the support to Mac users are limited.

[the base line] We strongly recommend you to use the powerful PCs in Lab 6B37 on campus for your hands-on activities. You will then need a portable storage device, a thumb drive or a portable hard disk, of at least 80 G for this Unit. If you take this approach, you can continue your work on any computer with VM VirtualBox installed so long you can connect your portable storage device to it. Please note that the storage space on the Internet, e.g., OneDrive, Google drive, or Dropbox etc., does not work, because of the volume of the data being transmitted and

the network transmission latency.

[for convenience] You may user own laptop computer having at least 16 G main memory and 80 G secondary storage space. You will install Oracle VM VirtualBox on your computer. Oracle VM VirtualBox runs on any platform, Windows, Mac, and Linux. Therefore, it doesn't matter which platform you prefer. However, you will have to prepare to solve any problems or issues encountered. As explained at the beginning of the document, "you will be guided to find out the solutions to your questions and problems, rather than being given readily applicable answers".

Downloading the required software will consume a large amount of Internet data. If you do not have unlimited Internet data, please do not download through your own Internet connections. You can download the needed software en masse when you are on campus connected to the University network. Alternatively, you can download the software at a public library or other places where they provide the Internet access to the public.

Finally, if you choose installing software via the Internet, e.g., when setting up a Linux server, the installation downloads the software on the go. Although you do not explicitly tell your computer to download, it downloads by following your instruction of installing the software via the Internet. The same applies to the installation of applications. If you do not have unlimited Internet data, and you prefer to work at your own place, please plan ahead and download all needed software in their right packages.

Familiarize yourself with the network architecture of the lab 6B37 for better understanding of your hands-on activities. Ask the tutors for any queries regarding the lab.

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

Assignment 3: the network - plan and implementation

Due date

report submission: 11:55pm, Friday, Week 13; peer review: 11:55pm, Friday, Week 14

Weighting

25%

Additional information

further details to be provided on the Canvas site

Assessment details

network setup and cyber security measures

- 13 marks (group, the same for each group member) on the plan and implementation of the network,
- 7 marks (group, the same for each group member) on network-based security measures, and
- 5 marks (individual) on peer review by reading, commenting, and marking 2 reports from other groups.

Addresses learning outcomes

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

- 1. Develop an advanced knowledge of the principles and practices of system and network adminstration;
- 2. Apply the principles and practices of system and network administration to IT infrastructure;

- 3. Formulate solutions to solve the problems related to system and network administration, e.g., software configuration, user management, data storage, networking, security, performance tuning, testing and auditing etc.;

Related 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
   - behave ethically and sustainably in their professional and personal lives
   - 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

Weekly quizzes: on the tasks and topics of the week

Due date

each week except for Week 1 and Week 13, of various marks

Weighting

30%

Assessment details

further details to be provided on the Canvas site

Addresses learning outcomes

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

- 1. Develop an advanced knowledge of the principles and practices of system and network adminstration;
- 2. Apply the principles and practices of system and network administration to IT infrastructure;
- 3. Formulate solutions to solve the problems related to system and network administration, e.g., software configuration, user management, data storage, networking, security, performance tuning, testing and auditing etc.;
- 4. Evaluate the current practice and predict future trends; and
- 5. Demonstrate the important generic skills, such as communication, analysis and inquiry, problem solving, independent and group working, and professionalism and social responsibility.

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- evaluate and adopt new technology

Assignment 1: the initial organisational IT infrastructure design

Due date

report submission: 11:55pm, Friday, Week 3; peer review: 11:55pm, Friday, Week 4

Weighting

20%

Additional information

further details to be provided on the Canvas site

Assessment details

the organisation and its IT needs and initial organisational IT infrastructure design

- 12 marks (individual) on design,
- 8 marks (individual) on peer review by reading, commenting, and marking 3/4 assigned reports from your peer classmates, and

Addresses learning outcomes

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

- 1. Develop an advanced knowledge of the principles and practices of system and network adminstration;
- 2. Apply the principles and practices of system and network administration to IT infrastructure;
- 3. Formulate solutions to solve the problems related to system and network administration, e.g., software configuration, user management, data storage, networking, security, performance tuning, testing and auditing etc.;

Related 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
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

Assignment 2: the hosts (or nodes) - plan and implementation

Due date

report submission: 11:55pm, Friday, Week 7; peer review: 11:55pm, Friday, Week 9

Weighting

25%

Additional information

further details to be provided on the Canvas site

Assessment details

server computers, client desktop computers, mobile devices, data, authentication, and authorisation etc.,

- 13 marks (group, the same for each group member) on the plan and implementation of the nodes,
- 7 marks (group, the same for each group member) on host-based security measures, and
- 5 marks (individual) on peer review by reading, commenting, and marking 2 reports from other groups.

Addresses learning outcomes

- 2. Apply the principles and practices of system and network administration to IT infrastructure;
- 3. Formulate solutions to solve the problems related to system and network administration, e.g., software configuration, user management, data storage, networking, security, performance tuning, testing and auditing etc.;

Related 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
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   - evaluate and adopt new technology

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

To pass this unit, a student MUST meet the following THREE criteria:

- An aggregate marks of 50% is required.
- Must attend and complete the Labs/Tutorials of Week 4, 5, 6, 7, 9, 10, 11, 12 (they contain extensive hands-on activities).
- Submit all the assessment items.

The final grade of a student is determined according to the following table:

85 <= the aggregate mark <= 100	Final grade = HD
75 <=the aggregate mark < 85	Final grade = DI
65 <= the aggregate mark < 75	Final grade = CR
50 <=the aggregate mark < 65	Final grade = P
the aggregate mark < 50	Final grade = FAIL (NX, NC, or NN)

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	hours

lectures: 1 hours/week, Week 1-7 & 9-13	12
tutes/labs: 3 hours/week, Week 2-7 & 9-13 including Weekly Quizzes	33
self-study, ~4 hours/week, 12 weeks	48
Assignment 1	16
Assignment 2	20
Assignment 3	20
self-reflection	1
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 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

A general understanding of computer systems, hardware and software, network, and cyber security.

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

Assessment regime has been readjusted following student feedback and the end-of-semester reviewing of the unit teaching.

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.