UNIVERSITY OF CANBERRA

Introduction to Digital Forensics

Unit code and version	9074.5
Unit offering option	212707
Study level	Level 2 - Undergraduate Intermediate Unit
Credit points	3
Faculty	Faculty of Science and Technology
Discipline	Academic Program Area - Technology
Unit offering details	Semester 1, 2023 , ON-CAMPUS , UC - Canberra, Bruce
Unit convener name and contact details	Unit Convenor: A/Prof Wanli Ma, email: Wanli.Ma@canberra.edu.au
Administrative contact details	Student Central Building 1, Level B E: Student.Centre@canberra.edu.au T: 1300 301 727

Academic content

Unit description

This unit provides a general introduction to the concepts, theories, principles, and practice of digital forensics. Topics include data acquisition and validation, forensic methodologies, file systems examination, graphics file investigation, network and email investigation, legal issues, professionalism and ethics, and also the current development in the field. This unit is self-contained. Therefore, it also covers the required basics of IT systems and forensic sciences. 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 9075 Introduction to Digital Forensics G.

Learning outcomes

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

1. Describe the role of digital forensics in criminal investigations, corporate investigation and auditing, and IT security operation:
2. Explain how data are stored on a local computer, remotely on the Internet, and also the general structures of the local computer and the Internet;
3. Apply current industry best-practices to the analysis of digital evidence when given some hypothetical and real case scenarios;
4. Undertake basic digital forensic investigation, from data acquisition and validation to evidence discovering, analysing, validating, and

presenting, by using a variety of digital forensics tools; and

5. 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
   - 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
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

None.

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:

- Specialist advice TECH
- Security operations SCAD
- Digital forensics DGFS
- Personal data protection PEDP
- Information assurance INAS
- Storage management STMG

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

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

Content Schedule	Assessment Schedule			

wk	lecture	required reading	lab activity with submission & marks	online quiz	assignment
01	Introduction: unit rules, student support, the overview of digital forensics, and ethics	Nelson et al, Ch 1, 2 & 16 ACS Code of Ethics			
02	Introduction to computer systems, OS and file systems	Stallings, Ch 1, 2 & 12			
03	Processing crime and incident scenes (digital)	Nelson et al, Ch 4	running virtual machines (2 mks)		
04	Data Acquisition	Nelson et al, Ch 3	operating DiskView (2 mks)		Friday: A1 (10 mks) – ethics, professional integrity & group pledges
05	Working with Windows and CLI systems, part 1	Nelson et al, Ch 5	FTK Imager & restoring (2 mks)	Quiz 1 (10 mks)	
06	Working with Windows and CLI systems, part 2	Nelson et al, Ch 5	DiskView/WinHex & cluster # (2 mks)		
07	Introduction to forensic science and the legal systems	N/A			

08	class free period				
09	Graphics files	Nelson et al, Ch 8	NTFS MFT records (2 mks)		Friday: A2 (15 mks) – file system investigation
10	Email and social media	Nelson et al, Ch 11	BMP file (2 mks)	Quiz 2 (15 mks)	
11	Working with Linux systems	Nelson et al, Ch 7			
12	Mobile Device, IoT, and cloud	Nelson et al, Ch 12 & 13	group presentation (6 mks) - graphics and email investigation presentation marking X2, (2 mks in total)		
13	Other topics and future development ethics; Summary	Nelson et al, Ch 10 & 16		Quiz 3 (5 mks)	Friday: A3 (15 mks) – research report
14				Quiz 4 (10 mks)	
marks in total: individual marks: 69 marks group marks: 31 marks			20 mks (indv 14 mks + group 6 mks) lab activities: 12 mks (indv) presentation: 6 mks (group)	40 mks (indv)	40 mks (indv 15 mks + group 25 mks) A2: 15 mks (indv) A1 and A3: 25 mks (group)

	presentation marking: 2 mks (indv)			

Unit resources

Required texts

required textbook: Nelson, B., Phillips, A. and Steuart, C. (2019) Guide to Computer Forensics and Investigations, 6th edn, Course Technology, Cengage Learning. The University of Canberra Library has limited copies of the textbook.

required textbook (Chapter 1, 2 & 12 only): Stallings W (2018) Operating systems: internals and design principles, 9th edn, Pearson, Boston (or 6th, 7th, or 8th Edition), Pearson/Prentice Hall. The University of Canberra Library has limited copies of the textbook.

Materials and equipment

The on-campus labs have the 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.

[for convenience] You will need a laptop computer of at least 16 G main memory and 50 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".

[the base line] If you do not have a laptop computer, you can rely on the PCs in the labs on campus. 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.

[data to be downloaded] Downloading the required software and packages 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.

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/lab activities

Due date

during weekly labs across the whole semester

Weighting

20% in total, distributed across the whole semester

Assessment details

details to be provided in the lectures, tutes/labs, and the Canvas site

Addresses learning outcomes

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

- 1. Describe the role of digital forensics in criminal investigations, corporate investigation and auditing, and IT security operation:
- 2. Explain how data are stored on a local computer, remotely on the Internet, and also the general structures of the local computer and the Internet;
- 3. Apply current industry best-practices to the analysis of digital evidence when given some hypothetical and real case scenarios;
- 4. Undertake basic digital forensic investigation, from data acquisition and validation to evidence discovering, analysing, validating, and presenting, by using a variety of digital forensics tools; and
- 5. 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
   - 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
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

Assignment 1

Due date

23:55, Friday, Week 04

Weighting

10%

Assessment details

Assignment 1 is on ethics, professional integrity & group pledges; details to be provided in the assignment description on the Canvas site of the unit.

Addresses learning outcomes

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

- 1. Describe the role of digital forensics in criminal investigations, corporate investigation and auditing, and IT security operation:
- 2. Explain how data are stored on a local computer, remotely on the Internet, and also the general structures of the local computer and the Internet;
- 3. Apply current industry best-practices to the analysis of digital evidence when given some hypothetical and real case scenarios;
- 4. Undertake basic digital forensic investigation, from data acquisition and validation to evidence discovering, analysing, validating, and presenting, by using a variety of digital forensics tools; and
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  - communicate effectively
  - display initiative and drive, and use their organisation skills to plan and manage their workload
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  - 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
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

Assignment 2

Due date

23:55, Friday, Week 09

Weighting

15%

Assessment details

Assignment 2 is on file system investigation investigation; details to be provided in the assignment description on the Canvas site of the unit.

Addresses learning outcomes

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

- 1. Describe the role of digital forensics in criminal investigations, corporate investigation and auditing, and IT security operation:
- 2. Explain how data are stored on a local computer, remotely on the Internet, and also the general structures of the

local computer and the Internet;

- 3. Apply current industry best-practices to the analysis of digital evidence when given some hypothetical and real case scenarios;
- 4. Undertake basic digital forensic investigation, from data acquisition and validation to evidence discovering, analysing, validating, and presenting, by using a variety of digital forensics tools; and
- 5. 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
   - 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

Assignment 3

Due date

23:55, Friday, Week 13

Weighting

15%

Assessment details

Assignment 3 is a reserach report on the latest development in the field and future trend; details to be provided in the assignment description on the Canvas site of the unit.

Addresses learning outcomes

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

- 1. Describe the role of digital forensics in criminal investigations, corporate investigation and auditing, and IT security operation:
- 2. Explain how data are stored on a local computer, remotely on the Internet, and also the general structures of the local computer and the Internet;
- 3. Apply current industry best-practices to the analysis of digital evidence when given some hypothetical and real case scenarios;
- 4. Undertake basic digital forensic investigation, from data acquisition and validation to evidence discovering, analysing, validating, and presenting, by using a variety of digital forensics tools; and
- 5. 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

3. UC graduates are lifelong learners
- ◦ evaluate and adopt new technology

Quizzes

Due date

Quiz 1: 10 marks in Week 05

Quiz 2: 15 marks in Week 10

Quiz 3: 5 marks in Week 13

Quiz 4: 10 marks in Week 14

Weighting

40% in total, distributed across Quiz 1 to Quiz 4

Assessment details

details to be provided in the lectures, tutes/labs, and the Canvas site

Addresses learning outcomes

- 5. 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
- ◦ take pride in their professional and personal integrity

2. UC graduates are global citizens
- ◦ 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

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, i.e., the final mark, of 50% is required to pass the unit.

85 <= final mark <= 100	final grade = HD
75 <= final mark < 85	final grade = DI
65 <= final mark < 75	final grade = CR
50 <= final mark < 65	final grade = P
0 <= final mark < 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
weekly lecture: 2 hours/week, 12 times	24
weekly tute/lab: 2 hour per tute/lab, 11 times	22
weekly study commitment, in addition to the 2 items above: 4 hours/week, 11 times	44
Assignment 1: 10 hours, 1 time	10
Assignment 2: 15 hours, 1 time	15
Assignment 3: 15 hours, 1 time	15
quizzes: 15 hours, including study and preparation time	15
self-reflection	5
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 lecture and tutorial/lab activities will enhance your understanding of the unit content and therefore the quality of your assessment responses. The lack of the participation and/or without disciplined self-study may result in your inability to satisfactorily pass the 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 basic understanding of computer systems, hardware and software, and programming is desirable, but not essential.

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

The assessment schedule has been revised to reduce the report writing load. Below table has the summary.

item	Semester 1, 2022	Semester 1, 2023
the number of assignments	4	3
the weight of assignments	60%	40%
the weight of lab activities	40%	20%
quizzes in 4 stages	none	40%

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.

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.