



UNSW Course Outline

COMP9814 Extended Artificial Intelligence - 2024

Published on the 12 Sep 2024

General Course Information

Course Code : COMP9814

Year : 2024

Term : Term 3

Teaching Period : T3

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Computer Science and Engineering

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Postgraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

As for COMP9414 but in greater depth and breadth.

Relationship to Other Courses

This course is taught along with COMP3411. See COMP3411 outline at <https://ecos.unsw.edu.au/preview?id=10223>

Course Learning Outcomes

Course Learning Outcomes

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Echo 360

Learning and Teaching in this course

This course is taught along with COMP3411. See COMP3411 outline at <https://ecos.unsw.edu.au/preview?id=10223>

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
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Assessment Details

General Assessment Information

This course is taught along with COMP3411. See COMP3411 outline at <https://ecos.unsw.edu.au/preview?id=10223>

Grading Basis

Standard

Requirements to pass course

Please be aware that the COMP3411/9814 exam has a hurdle of 40% in order to approve the course. Therefore, this course has a double-pass requirement.

Course Schedule

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

General Schedule Information

Week 1 Introduction

- 1.1 History of AI
- 1.2 Agents
- 1.3 Knowledge representation
 - 1.3.1 Feature-based vs iconic representations
 - 1.3.2 Logic
 - 1.3.3 Learning rules

Week 2 Search

- 2.1 Uninformed search
- 2.2 Informed search
- 2.3 Informed vs uninformed

Week 3 Neural Networks

- 3.1 Neurons - biological and artificial
- 3.2 Single-layer perceptron
- 3.3 Linear separability
- 3.4 Multi-layer networks
- 3.5 Backpropagation
- 3.6 Neural engineering methodology

Week 4 Rewards instead of goals

- 4.1 Elements of reinforcement learning
- 4.2 Exploration vs exploitation
- 4.3 The agent-environment interface
- 4.4 Values functions
- 4.5 Temporal-difference prediction

Week 5 Metaheuristics

- 5.1 Asymptotic complexity
- 5.2 Classes of problems
- 5.3 Linear programming
- 5.4 Search space
- 5.5 Metaheuristics with and without memory
- 5.6 Population-based methods

Week 7 Computer vision

7.1 Image processing

7.2 Scene analysis

7.3 Cognitive vision

Week 8 Language processing

8.1 Formal languages

8.1.1 Chomsky's hierarchy

8.1.2 Grammars

8.2 Regular expressions

8.3. Minimum edit distance and words

8.4 Natural languages: N-gram models

Week 9 Reasoning with uncertain information

9.1 Confidence factors

9.1 Probability and probabilistic inference

9.2 Bayes nets

9.3 Fuzzy logic

Week 10 Human-aligned intelligent robotics

10.1 Human interaction and human-in-the-loop robot learning

10.2 Explainability and interpretability

10.3 Safe robot exploration

10.4 Ethics

Course Resources

Recommended Resources

- Poole, D.L. & Mackworth, A. Artificial Intelligence: Foundations of Computational Agents. Second Edition. Cambridge University Press, Cambridge, 2017.
- Russell, S.J. & Norvig, P. Artificial Intelligence: A Modern Approach. Fourth Edition, Pearson Education, Hoboken, NJ, 2021.
- Sutton, R. & Barto, A. Reinforcement Learning: An Introduction. MIT press. 2018.
- Jurafsky, D. & Martin, J. H. Speech and Language Processing. Stanford. 2023.
- Nilsson, N. J. Artificial intelligence: a new synthesis. Morgan Kaufmann. 1998.
- Aloimonos, Y., & Sandini, G. Principles of Cognitive Vision. In Cangelosi, A., & Asada, M. (Eds.).

Course Evaluation and Development

We've used past feedback to make some improvements in this course

Previous students told us:

"Having just two hours a week feels tight given the breadth and depth of information presented"

"The lecture time is too short, so that plenty of content cannot be clearly taught in course."

"2 hours lecture per week is not enough for the course content."

"Letting some people do the assignments in pairs is somewhat unfair. I know some people who did no work on the assignment, their friend did it all and just said a few words on the consultations and got full marks."

"Tutorial session coding tasks are great."

"2 hours tutorial time is fantastic."

"Coding focused tutorials were great. Having to discuss our code was also really helpful."

We have responded to this feedback by:

- This term, we are increasing the lecture time from 2 hours to 3.
- Assignments will be individual this term.
- We are definitively keeping 2-hour tutorials and assignment discussions!

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Francisco Cruz					Yes	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: <student.unsw.edu.au/plagiarism>. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School Contact Information

CSE Help! - on the Ground Floor of K17

- For assistance with coursework assessments.

The Nucleus Student Hub - <https://nucleus.unsw.edu.au/en/contact-us>

- Course enrolment queries.

Grievance Officer - grievance-officer@cse.unsw.edu.au

- If the course convenor gives an inadequate response to a query or when the courses convenor does not respond to a query about assessment.

Student Reps - stureps@cse.unsw.edu.au

- If some aspect of a course needs urgent improvement. (e.g. Nobody responding to forum queries, cannot understand the lecturer)

You should **never** contact any of the following people directly:

- Vice Chancellor
- Pro-vice Chancellor Education (PVCE)
- Head of School
- CSE administrative staff
- CSE teaching support staff

They will simply bounce the email to one of the above, thereby creating an unnecessary level of indirection and a delay in the response.