UNSW Course Outline

COMP9491 Applied Artificial Intelligence - 2024

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General Course Information

Course Code : COMP9491
Year : 2024
Term : Term 2
Teaching Period : T2
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, Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This course presents some advanced topics in various aspects of artificial intelligence such as computer vision, speech and language processing, deep learning, and knowledge representation and reasoning. The course aims to integrate these various aspects of AI and present case

studies where such integration of different methodologies delivers interesting applications. Project development is the major component of this course, to develop a solution to a practical or industry-based problem that requires an integration of more than one type of AI techniques ranging from symbolic AI (e.g. knowledge representation and reasoning) to deep learning, with example applications in computer vision, speech and language processing, etc. Assessment is based on group project development.

Course Aims

This course aims to introduce students to the advanced concepts in artificial intelligence (AI), particularly deep learning and knowledge representation and reasoning, with their applications in domains such as computer vision, language processing, and speech processing. Based on the knowledge acquired through the prerequisite courses and the new knowledge introduced in this course, it gives the students an opportunity to improve their ability to develop an AI solution to a practical or industry-based problem while working in small teams. Such project-based learning helps expose the students to a wide range of advanced AI methodologies and the advantage of method developments that integrate various aspects of AI.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Analyse a complex practical problem and develop a solution that exploits and integrates the advantages of several advanced AI techniques;
CLO2 : Develop an implementation of a solution using AI techniques;
CLO3 : Analyse and evaluate the solution quantitatively and qualitatively providing a clear understanding of how the solution utilises or progresses the current state-of-the-art; and
CLO4 : Explain clearly the problem, solution and implementation with critical analysis of the results and findings.

Course Learning Outcomes	Assessment Item
CLO1 : Analyse a complex practical problem and develop a solution that exploits and integrates the advantages of several advanced AI techniques;	• Project proposal (report) • Presentation of literature review • Project demo • Project report
CLO2 : Develop an implementation of a solution using AI techniques;	• Project demo • Project report
CLO3 : Analyse and evaluate the solution quantitatively and qualitatively providing a clear understanding of how the solution utilises or progresses the current state-of-the-art; and	• Project demo • Project report
CLO4 : Explain clearly the problem, solution and implementation with critical analysis of the results and findings.	• Project proposal (report) • Presentation of literature review • Project demo • Project report

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | Echo 360

Learning and Teaching in this course

As a result of this course, students will:

- analyse a complex practical problem and develop a solution that exploits and integrates the advantages of several advanced AI techniques;
- develop an implementation of the solution;
- analyse and evaluate the solution quantitatively and qualitatively providing a clear understanding of how the solution progresses the current state-of-the-art; and,
- explain the problem, solution and implementation.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Project proposal (report) Assessment Format: Individual	10%	Start Date: Not Applicable Due Date: Week 3
Presentation of literature review Assessment Format: Individual	20%	Start Date: Not Applicable Due Date: Week 5
Project demo Assessment Format: Group	30%	Start Date: Not Applicable Due Date: Week 10
Project report Assessment Format: Individual	40%	Start Date: Not Applicable Due Date: Week 11

Assessment Details

Project proposal (report)

Assessment Overview

A project proposal that's due in week 3 (assessment based on the individual component in the report).

The report will be less than 1 page.

The report will be assessed based on the definition of problem, overall method design and project plan.

Feedback will be given during project consultation sessions.

Course Learning Outcomes

- CLO1 : Analyse a complex practical problem and develop a solution that exploits and integrates the advantages of several advanced AI techniques;
- CLO4 : Explain clearly the problem, solution and implementation with critical analysis of the results and findings.

Detailed Assessment Description

Please see updated assignment spec.

Assignment submission Turnitin type

Not Applicable

Presentation of literature review

Assessment Overview

Presentation to be conducted in week 5 for literature review (assessment based on the individual component in the presentation).

The group presentation will be around 20 minutes total, 5 minutes per presenter.

The presentation will be assessed based on the problem definition and literature review.

Feedback will be given during the presentation.

Course Learning Outcomes

- CLO1 : Analyse a complex practical problem and develop a solution that exploits and integrates the advantages of several advanced AI techniques;
- CLO4 : Explain clearly the problem, solution and implementation with critical analysis of the results and findings.

Detailed Assessment Description

Please see updated assignment spec.

Assignment submission Turnitin type

Not Applicable

Project demo

Assessment Overview

Project presentation and demo to be conducted in week 10 (group mark).

The group presentation will be around 20 minutes total, 5 minutes per presenter

The demo will be assessed based on the technical quality of method design and result evaluation, and quality of presentation.

Feedback will be provided during the demo session.

Course Learning Outcomes

- CLO1 : Analyse a complex practical problem and develop a solution that exploits and integrates the advantages of several advanced AI techniques;
- CLO2 : Develop an implementation of a solution using AI techniques;
- CLO3 : Analyse and evaluate the solution quantitatively and qualitatively providing a clear understanding of how the solution utilises or progresses the current state-of-the-art; and

- CLO4 : Explain clearly the problem, solution and implementation with critical analysis of the results and findings.

Detailed Assessment Description

Please see updated assignment spec.

Assignment submission Turnitin type

Not Applicable

Project report

Assessment Overview

An individual project report due in week 11 (assessment based on the individual component in the report).

The individual component in the report is about 10 pages.

The report will be assessed based on quality of presentation, demonstrated depth of understanding, and technical quality of the proposed solution and experimental evaluation.

Written feedback with comments will be provided.

Course Learning Outcomes

- CLO1 : Analyse a complex practical problem and develop a solution that exploits and integrates the advantages of several advanced AI techniques;
- CLO2 : Develop an implementation of a solution using AI techniques;
- CLO3 : Analyse and evaluate the solution quantitatively and qualitatively providing a clear understanding of how the solution utilises or progresses the current state-of-the-art; and
- CLO4 : Explain clearly the problem, solution and implementation with critical analysis of the results and findings.

Detailed Assessment Description

Please see updated assignment spec.

Assignment submission Turnitin type

Not Applicable

General Assessment Information

Grading Basis

Standard

Course Schedule

Attendance Requirements

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

General Schedule Information

Week	Lectures, Project consultations & Presentations
1	(Mon) Introduction
	(Wed) Advanced deep learning
2	(Mon) Introduction
	(Wed) Advanced deep learning
3	(Mon - recording) Symbolic AI
	(Wed) Project consultations
4	(Mon) Feedback on proposal
	(Wed) Project consultations
5	(Mon) Project consultations
	(Wed) Presentations
6	***Flexibility week***
7	(Mon) Special topics
	(Wed) Project consultations
8	(Mon) Special topics
	(Wed) Project consultations
9	(Mon) Special topics

	(Wed) Project consultations
10	(Mon) Project consultations
	(Wed) Feedback on presentation

Course Resources

Prescribed Resources

Students are expected to have taken COMP3411 or COMP9414: Artificial Intelligence or COMP9814: Extended Artificial Intelligence; and have taken at least two of other courses in the AI stream: COMP4418: Knowledge Representation and Reasoning, COMP9417: Machine Learning and Data Mining, COMP9444: Neural Networks and Deep Learning, and COMP9517: Computer Vision. A WAM >= 70 is also required. The handbook entry (undergraduate) and handbook entry (postgraduate) require these as pre-requisites for this course.

Recommended Resources

This course does not have a prescribed textbook. Notes and/or slides on each topic will be made available on the class web page. References to the literature may be provided in lectures as relevant to the topic at hand. The following resources may be useful in gaining a more general understanding of various aspects of AI for and beyond this course.

1. Artificial Intelligence: A Modern Approach
   - Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, 2020.
   - http://aima.cs.berkeley.edu/ .
2. General Knowledge Representation and Reasoning
   - Ronald J. Brachman and Hector J. Levesque. Knowledge Representation and Reasoning, Morgan Kaufmann, 2004.
3. Semantic Web
   - Grigoris Antoniou and Frank van Harmelen, A Semantic Web Primer, MIT Press, 2008.
4. Answer Set Programming
   - Bruce Porter, Vladimir Lifschitz, Frank Van Harmelen, Handbook of Knowledge Representation, Elsevier, 2007.
   - Potassco User Guide
5. Deep Learning

- Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016.
- http://www.deeplearningbook.org .

6. Computer Vision Foundation Open Access

- https://openaccess.thecvf.com/menu

7. Speech and Language Processing

- Dan Jurafsky and James H. Martin, Speech and Language Processing, Prentice Hall, 2019.
- https://web.stanford.edu/~jurafsky/slp3/ .

Course Evaluation and Development

Since the first offering of this course in 21T2, we have received some very positive feedback, including the freedom of choosing project topics, a taste of research, clear and broad lecture content, helpful weekly consultations, structure of assessment and timely feedback.

During 24T2, based on the feedback, we will include more diverse content (special topics) during the second half of the term.

Students are encouraged to provide informal feedback during the session and to let us know of any problems as soon as they arise. Student feedback will also be obtained by electronic survey at the end of the course through myExperience.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Yang Song					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 Plagarism

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.