

# COMP 7021 KNOWLEDGE REPRESENTATION AND REASONING

**Credit Points** 10

**Legacy Code** 301315

**Coordinator** Yan Zhang ([https://directory.westernsydney.edu.au/search/name/Yan Zhang/](https://directory.westernsydney.edu.au/search/name/Yan%20Zhang/))

**Description** Knowledge representation and reasoning is one of the fundamental components of Artificial Intelligence. Students will learn the principles and methodologies that are used to represent and reason about human knowledge effectively in formal computational models, and eventually solve complex tasks using computer systems. This subject covers logic foundations of knowledge representation and reasoning, Answer Set Programming approaches for declarative problem solving, intelligent agent modelling, diagnostic and probabilistic reasoning. The subject plays an important part in preparing students for career paths as AI engineers, robotics engineers and intelligent software engineers.

**School** Computer, Data & Math Sciences

**Discipline** Artificial Intelligence

**Student Contribution Band** HECS Band 2 10cp

Check your fees via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Postgraduate Coursework Level 7 subject

**Pre-requisite(s)** INFO 7002 Advanced Topics in Artificial Intelligence OR

COMP 7015 Programming Proficiency AND INFS 7007 System Analysis Database Management Systems OR

MATH 7012 Programming for Data Science AND MATH 7016 The Nature of Data

## Restrictions

Students must complete 60 credit points before enrolling into this Subject

## Learning Outcomes

On successful completion of this subject, students should be able to:

1. Critically analyse the logic foundations of knowledge representation and reasoning in Artificial Intelligence.
2. Represent and reason about intelligent systems, based on the essentials and advancement of non-monotonic reasoning mechanisms.
3. Develop Answer Set Programming as a declarative programming language and use its applications in various complex problem solving domains.
4. Adapt formal languages based on Answer Set Programming to represent complex domains including robotic planning and diagnostic agents.
5. Evaluate and analyse different knowledge reasoning systems, by applying theories and principles of knowledge representation and reasoning.

6. Undertake independent research project that includes defining, formalising and specifying, and implementing system prototypes for real-world applications.

## Subject Content

1. Logical Foundations for Knowledge Representation and Reasoning
2. Knowledge Representation and Non-monotonic Reasoning
3. Answer Set Programming: Syntax and Semantics
4. Declarative Problem Solving Using Answer Set Programming
5. Algorithms for Computing Answer Sets
6. Modelling Dynamic Domains
7. Planning and Diagnostic Agents
8. Probabilistic Reasoning

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

| Type            | Length                                                      | Percent | Threshold | Individual/<br>Group Task |
|-----------------|-------------------------------------------------------------|---------|-----------|---------------------------|
| Quiz            | 2 hours                                                     | 30      | N         | Individual                |
| Practical       | 5 hours per practical                                       | 30      | N         | Individual                |
| Applied Project | 1000 words (report + programming) + 15 minutes presentation | 40      | Y         | Individual                |

## Prescribed Texts

- Gelfond, M., & Kahl, Y. (2014). Knowledge representation, reasoning, and the design of intelligent agents. New York, NY: Cambridge University Press.

## Teaching Periods

## Spring (2024)

### Melbourne

#### On-site

**Subject Contact** Yan Zhang ([https://directory.westernsydney.edu.au/search/name/Yan Zhang/](https://directory.westernsydney.edu.au/search/name/Yan%20Zhang/))

View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=COMP7021\\_24-SPR\\_MB\\_1#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=COMP7021_24-SPR_MB_1#subjects))

### Parramatta - Victoria Rd

#### On-site

**Subject Contact** Yan Zhang ([https://directory.westernsydney.edu.au/search/name/Yan Zhang/](https://directory.westernsydney.edu.au/search/name/Yan%20Zhang/))

View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=COMP7021\\_24-SPR\\_PS\\_1#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=COMP7021_24-SPR_PS_1#subjects))