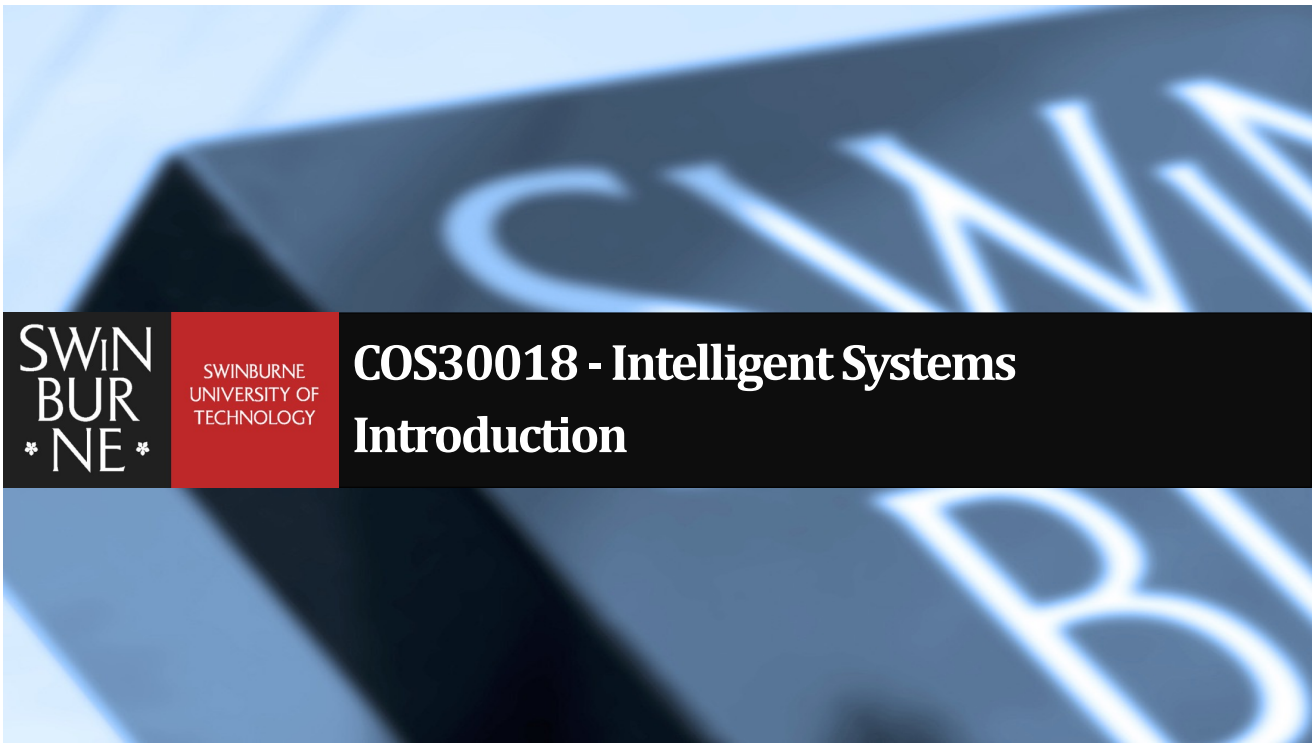

Overview

- Staff Information
- Lectures/Tutorials
- Unit Learning Outcomes
- Course Content
- Assessment
- Lecture Schedule
- Relevant Resources

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Staff Information

- **A/Prof Bao Vo (Lecturer, Convenor)**
  - Email: bvo@swin.edu.au,

- **Tutors:**
  - **Mr Khoa Pham**
    - Email: duykhoapham@swin.edu.au
  - **Dr Ru Jia**
    - Email: rjia@swin.edu.au
  - **Ms Feixue Yan**
    - Email: fyan@swin.edu.au

Lectures/Tutorials

- **Lectures**
  - **When:** Monday 18:30-20:30
  - **Where:**
  - On campus (BA302) in Weeks 1, 5, 6, and 12.
  - In Weeks 2, 3, 4, 7, 8, 9, 10, and 11: we will run an interactive session on Collaborate Ultra (on Canvas) – Live Online.

Lectures/Tutorials

- **Tutorials**
  - CL1-01: Tuesday 10:30-12:30 (ATC627)
  - CL1-02: Tuesday 8:30-10:30 (ATC627)
  - CL1-03: Thursday 14:30-16:30 (BA408)
  - CL1-04: Friday 12:30-14:30 (BA405)
  - CL1-05: Friday 16:30-18:30 (ATC627)
  - CL1-06: Monday 8:30-10:30 (EN302)
  - CL1-07: Friday 14:30-16:30 (TA306)

- **Consultation**
  - We will announce the fixed time you can meet a tutor on campus for consultations

Unit Learning Outcomes

- **Aim:** to introduce students to a range of artificial intelligence techniques
- **Learning Outcomes**
  - **Understand** a range of techniques of **intelligent systems**
    - across artificial intelligence (AI) and intelligent agents (IA);
    - from theoretical & practical perspective
  - **Apply** different AI/IA algorithms to solve practical problems
  - **Design/build** simple intelligent systems based on AI/IA concepts

Recommended Reading

- **Reading**
  - **Russell, S. & Norvig, P.** *Artificial Intelligence: A Modern Approach*. Prentice Hall, 3rd edition/4th edition, 2009
  - **Negnevitsky, M.**, 2005. *Artificial intelligence: a guide to intelligent systems*. Pearson education, 3rd edition.
  - **Wooldridge, M**. *An Introduction to Multi-Agent Systems*. John Wiley & Sons, 2002
  - Lecture slides posted on Canvas + online Internet resources…

Content

- **Topics**
  - Introduction to Intelligent Systems
  - Intelligent agents and multi-agent systems
  - Knowledge representation and reasoning
  - Learning and adaptation
  - Neural networks
  - Evolutionary computing
  - Collective intelligence
  - (Agent methodologies and applications)

Lecture Schedule (Provisional)

Week	Lecture Topic	Date
1	**Topic:** Overview. Definition and scope of IS (AI and IA). Philosophical aspects of AI and IA. **Tutorial:** Getting to know your tutor and teammates; Setting up your computing environment. Java and JADE	Mon 4/08 18:30-20:30 **BA302**
2	**Topic:** Problem-Solving Agents: Search and Constraint Satisfaction Problem. **Tutorial:** Choco (Constraint Solver) and JADE.	Mon 11/08 Live Online
3	**Topic:** Multi-agent systems. Agent interactions (encounters, games). Agent communication. Reaching agreements (negotiations). **Tutorial:** JADE	Mon 18/08 Live Online
4	**Topic:** Introduction to machine learning (ML) **Tutorial:** Introduction to Python & Machine Learning with Python practicals.	Mon 25/08 Live Online
5	**Topic:** Machine learning (ML) algorithms (DT, RF, KNN, PCA) **Tutorial:** Machine Learning with Python practicals & Project assignment.	Mon 1/09 BA302
6	**Topic:** Artificial neural networks and Deep Learning (DL) **Tutorial:** ML/DL with Python practicals & Project assignment.	Mon 8/09 BA302

Lecture Schedule (Provisional)

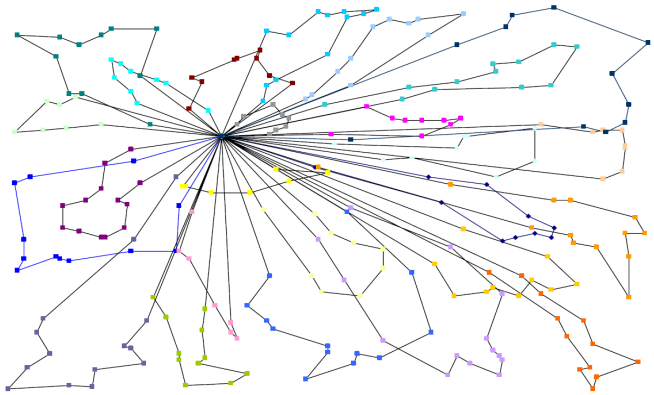
Week	Lecture Topic	Date
7	**Topic:** Computational intelligence. Genetic algorithm and evolutionary computing. **Tutorial:** ML/DL with Python practicals & Project assignment.	Mon 22/09 Live Online
8	**Topic:** Computational intelligence. Fuzzy systems. PSO/ACO. **Tutorial:** EC/GA with PyGad & Project assignment	Mon 29/09 Live Online
9	**Topic:** Advanced topic 1: **Reinforcement learning**. **Tutorial:** Project assignment.	Mon 6/10 Live Online
10	**Topic:** Advanced topic 2: Knowledge Representation and Reasoning (**KRR**) **&** Expert Systems (**ES**) **or** Distributed Constraint Optimization Problems (**DCOP**). **Tutorial:** Project assignment.	Mon 13/10 Live Online
11	**Topic:** Advanced topic 3: Natural Language Processing (**NLP**). **Tutorial:** Project assignment.	Mon 20/10 Live Online
12	**Topic:** Future directions of AI and IA – selected topics and examples. Review of the subject. Sample examination. **Tutorial:** Project assignment.	Mon 27/10 **BA302** (Project Assignment due Sunday 29/10)

Assessment

- **Project:** Design and implementation of a simple intelligent system to solve a practical problem
  - **Agent-based & Optimization or Machine Learning system –** built using IS principles/algorithms
  - **Working software** - demonstration
  - **Short project report** (summary of work, architecture, interaction, algorithm/s, result analysis, example)
  - **Video if applicable** (s/w demo)
  - **Assignment Release:** on Canvas
  - **Assignment Progress:** will be checked by your tutor starting Week 3!
    - **If you choose Option C, you will have Weekly Tasks due in Week 3!**
- **Continuous Oral Defence:** Individual Q&A (about the subject matter covered in the lectures)

Project Option A: Delivery Vehicle Routing System

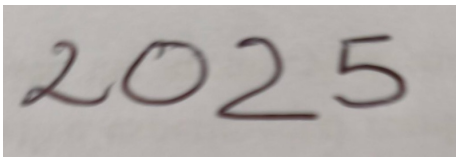
- **Project:** Design and implementation of a simple delivery vehicle routing system involving delivery agents and a master routing agent whose job is to find the optimal routes for the delivery vehicle agents to get their parcels to the receivers.

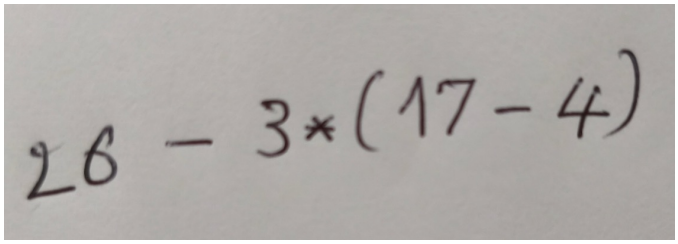


- Interaction Protocols
- Search/optimization
- Dynamic adaptation
- Automated negotiation

Project Option B:
Handwritten Number Recognition System

- **Project:** Design and implementation of a simple machine learning system for recognising handwritten characters & symbols





- Machine learning
- Deep learning
- Computer vision

Project Option C:
Stock Price Prediction System

- **Project:** Design and implementation of a simple machine learning system for predicting stock price of companies on the stock market using real-world datasets.
- You are going to work in a project led by a teaching staff. The project leader will give you starting code for this project. It is quite poor (in terms of programming and performance). We will give you weekly tasks to do to improve this code base (and in the process, you will learn about things such as data processing and deep learning).

- Machine learning
- Deep learning
- Stock price prediction

Project Option D:

Large Language Model (LLM)-powered Autonomous Agents and Multiagent systems

Project: This project aims to implement and demonstrate the capabilities of autonomous agents powered by large language models (LLMs) such as GPTs, Llama's, or Gemini's.

- If you join this project, you will work under the supervision of your project leader who is a teaching staff of this unit and within a team of students (between 3 and 5 students).

- Machine learning
- NLP
- Large language Models
- Generative AI

Other Resources

- **Google OR-Tools/Vehicle Routing Problem:** https://developers.google.com/optimization/routing/vrp
- **Larry**'s page on Traffic Flow Prediction with Neural Networks(SAEs, LSTM, GRU): https://github.com/xiaochus/TrafficFlowPrediction
- **Google** Machine Learning Crash Course: https://developers.google.com/machine-learning/crash-course/
- **AUTOMATED NEGOTIATING AGENT COMPETITION** (ANAC):
  https://www.ijcai-18.org/anac/index.html
  http://web.tuat.ac.jp/~katfuji/ANAC2018/
- JADE tutorials, documentation and guidelines from
  https://jade.tilab.com/documentation/tutorials-guides/

- "Complete Guide to LLM Agents (2025)" by Sarah Chudleigh
  https://botpress.com/blog/llm-agents

TODO this week (for you)

- **Form a team (if you choose Option A or B)**
  - **Team members can be from different tutorials**
  - **To help your tutor easily recognise the members of the team, please fill in the Team Page on Canvas.**
  - **If you can't find a team for yourself, please talk to us ASAP**
  - **Feel free to use the Discussion Board on Canvas**
  - **Discuss within your team to choose a topic**
  - **Teams are to be finalised next week (or Week 3 the latest)**
  - **Topic is to be finalised in Week 3 (with your tutor's approval)!**
- **You can also choose Option C: You will work in a team with your tutor and complete weekly Tasks (first Task is due in Week 3).**

TODO this week (for you)

- **If you want to register for Option D:**
  - **Send an email to bvo@swin.edu.au to register your intention in Week 1**
  - **No registration email can be sent after Week 1.**
  - **If you are not selected, you will be informed within 72 hours of your email so that you can decide on Option A and Option B.**
  - **If you are selected, you will be informed no later than Sunday 10 August 2025 of your team and the next steps.**
  - **Note:** *We are planning to have no more than 3 Option-D teams. Thus, if we have got 3 teams formed earlier then I'll stop taking new registration.*