

CSC4025Z (2023): Artificial Intelligence

Lecturer: Dr. Jan Buys (ibuys@cs.uct.ac.za)

TA: Sello Ralethe (RLTSEL002@myuct.ac.za)

Course Aims: This course will expose you to foundational concepts and computational techniques in modern Artificial Intelligence and their theoretical underpinnings in logic, search, optimisation and mathematical statistics. You will learn how to select and implement these techniques to solve various real world problems. Topics will include: problem solving, search, machine learning and dealing with uncertainty, neural networks, Bayesian networks, and decision making, with applications from various domains.

Prerequisites: Basic calculus, linear algebra, and probability theory. Basic knowledge of machine learning will be helpful but is not required – everything you need to know will be covered.

The course will run from 11 April to 26 May. The schedule is given below; minor changes may be made during the course.

Lectures: 10:00-11:00 in CS203, on days indicated below and in the honours calendar.

Assessments:

- Assignment 1 (20%): Application of Bayesian networks (Due 8 May)
- Assignment 2 (20%): Application of Neural networks (Due 24 May)
- Exam (60%): 3-hour written exam during the exams block (29 May, 12:30-15:30)

The assignments will be done in groups of 2 or 3. Tutorials to reinforce the material will also be made available: these will not be marked.

Course material: Slides and other resources will be provided with each lecture. There is no prescribed textbook, but some material from the following textbooks will be used:

- Artificial Intelligence: A Modern Approach. Russell and Norvig. 3rd/4th Edition.
- Deep Learning. Goodfellow, Bengio and Courville. Available [online](#).
- Machine Learning: A Probabilistic Perspective. Murphy. Available [online](#) through the UCT library.

Schedule

Week	Monday	Tuesday	Wednesday	Thursday
10 Apr	-	Introduction to AI	Intelligent Agents	Probability
17 Apr	-	Bayesian networks	Bayesian networks	Bayesian networks
24 Apr	Decision networks	Naïve Bayes	Naïve Bayes	-
1 May	-	Logistic regression	Feedforward Neural Networks	Optimization
8 May	Recurrent Neural Networks	Convolutional Neural networks	-	Machine Learning methodology

15 May	Transformers	Large Language Models	-	-
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