

# **IE4483 Artificial Intelligence & Data Mining**

Professor Tan Yap Peng

Office: S1-B1a-16

Phone: 6790 5872

E-mail: [eyptan@ntu.edu.sg](mailto:eyptan@ntu.edu.sg)

**School of Electrical & Electronic Engineering**

# Learning Objective and Outcome

## Learning Objective

This course aims at to introduce the fundamental theory and concepts of Artificial intelligence (AI) and Data Mining methods, in particular state space representation and search strategies, association rule mining, supervised learning, classifiers, neural networks, unsupervised learning, clustering analysis, and their applications in the area of AI and Data Mining

## Learning Outcome

Upon completion of this course, students should be able to understand 1.) the use of state representation of problems and strategies for search; 2) the concepts of state space search and heuristic search algorithms; 3) basic data mining concepts/algorithms for association rule mining; 4) basics of machine learning models and algorithms; 5) applications of data mining and AI to wide range of data analysis including association, classification, clustering, prediction, etc.

# Topics to be Covered

- Introduction to Machine Learning
- Classification and Decision Trees
- Nearest Neighbor Classifiers
- Support Vector Machines
- Neural Networks



# Course Materials

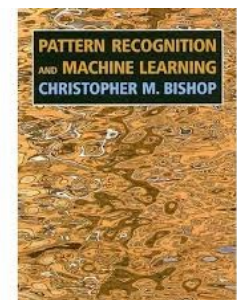
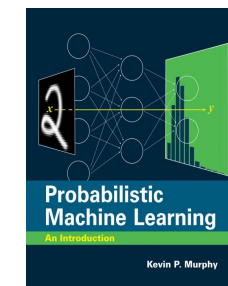
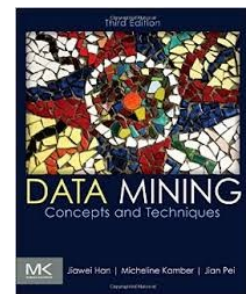
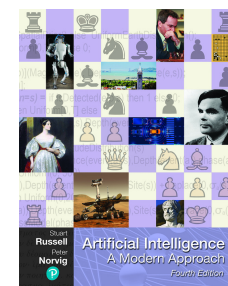
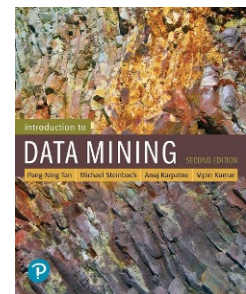
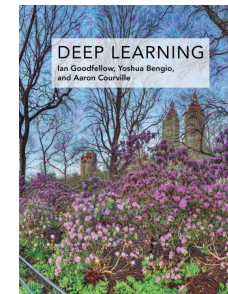
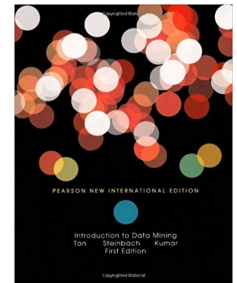
## Textbooks:

- George F. Luger , “Artificial Intelligence : Structures and Strategies for Complex Problem Solving,” 6<sup>th</sup> Ed., Addison-Wesley, 2009. (Q335.L951)
- Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, “Introduction to Data Mining”, Pearson, 1<sup>st</sup> Ed. (2005), or New International Ed. (2013), 2<sup>nd</sup> Ed. (2019)
- Ian Goodfellow, Yoshua Bengio and Aaron Courville, “[Deep Learning](#),” MIT Press, 2016. (Q325.5.G651)

## References:

- S. Russell and P. Norvig, “Artificial Intelligence A Modern Approach,” 4<sup>th</sup> Edition, Prentice Hall, 2020.
- Jiawei Han, Micheline Kamber, and Jian Pei, “Data Mining: Concepts and Techniques”, 3<sup>rd</sup> Edition, Morgan Kaufmann (2011).
- Kevin P. Murphy, “[Probabilistic Machine Learning - An Introduction](#),” The MIT Press, 2022.
- Christopher M. Bishop, “[Pattern Recognition and Machine Learning](#),” Springer, 2006

Lecture slides and homework questions are available from the course site at <https://ntulearn.ntu.edu.sg>.



# Prerequisite Knowledge

- Undergraduate-level calculus and linear algebra.
- Basics of optimization (e.g., argmin, variable, norms)
- Familiar with at least one programming language, e.g., Python, C / C++, etc.

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- Your understanding and co-operation will be much appreciated.

# Schedule & Assessments

## Lectures:

- 10:30am- 11:20am, Wednesday, LT22
- 10:30am- 12:20pm, Friday, LT22

## Assessments:

- Assignments (10%): Two Homework Assignments
- Quiz (10%): Wednesday, 14 Sep 2022 (6:30pm-7:30pm)
- Project (20%): Week 6 – Week 13
- Final Exam (60%)

## Weekly Discussions:

- Conducted by TA – LT or online (Week 2 – Week 13)
- Submission of Assignments/Project – online submission