

Introduction

ETC3123 Artificial Intelligence for Engineering Applications

Dr Richard Wong

Course Learning Outcomes

Topics

Lecture Plan

Delivery

Activity

Course Learning Outcomes

- ▶ **CLO1** Evaluate appropriate optimisation algorithms for a specific engineering problem.
- ▶ **CLO2** Apply appropriate automation techniques to automate an engineering process.
- ▶ **CLO3** Construct a data-driven predictive model for a specific engineering application.
- ▶ **CLO4** Develop a pattern recognition algorithm for object recognition.

	Weightage	CLO1	CLO2	CLO3	CLO4
Assignment	20				✓
Test	10	✓		✓	
Graded Labs	10		✓	✓	
Final Examination	60	✓	✓	✓	✓

- ▶ Pattern recognition
 - Feature extraction
 - Dimensionality reduction
 - Deep learning
- ▶ Sequential data prediction
 - Autoregressive models
 - Deep learning
- ▶ Automation
 - Robotic process automation
 - Tabu search
 - Reinforcement learning

- ▶ Optimisation
 - Simulated annealing
 - Evolutionary algorithms for multi-objective optimisation
- ▶ Simulation
 - Knowledge-based systems
 - Fuzzy systems
 - Machine learning

Lecture Plan

Week	Lecture (Mon)	Lab (Wed)	Lab (Fri)	Remark
1 28/09	Introduction	-	-	
2 05/10	[PR] Problem Formulation	-	-	
3 12/10	[PR] Feature Extraction (PCA, Autocorrelation)	Recap on Python	Recap on Python	
4 19/10	[PR] Traditional, Random Forest, Deep Learning	Pattern Recognition	Pattern Recognition	Asgm start
5 26/10	-	-	-	26.10 Sultan Selangor's Silver Jubilee
6 02/11	[SD] Problem formulation, Autoregressive Models, Deep Learning	Predictive Analytics (Graded)	Predictive Analytics (Graded)	
7 09/11	-	-	-	09/11 Deepavali
16/11 – 20/11 Mid-sem break				
8 23/11	[AM] Problem Formulation + Robotic Process Automation	Automation (Graded)	Automation (Graded)	Asgm deadline 23/11 Test 1
9 30/11	[AM] Tabu Search, Reinforcement Learning	Optimisation	Optimisation	
10 07/12	[OM] Problem formulation, Simulated Annealing	-	-	11/12 Sultan of Selangor's Birthday
11 14/12	[OM] Multi-Objective Optimisation Algorithms	Simulation	Simulation	
12 21/12	[SL] Introduction	-	-	25/12 Christmas Day
13 28/12	[SL] Knowledge Based Systems, Fuzzy Systems, Machine Learning	-	-	28/12 Test 2 01/01 New Year's Day
14 04/01	Summary + Revision	-	-	
	PR Pattern recognition	SD AM	AM Sequential data prediction	
	OM Optimisation	SL		



Lecture · Monday · 1200 – 1400 · NX-3-5

Lab · Group 1 · Friday · 1430 – 1630 · UW-2-3

Lab · Group 2 · Wednesday · 1600 – 1800 · UE-2-16

Which of the domains apply in the following context? Provide a high-level description of how these domains are applicable to the context.

Autonomous Vehicle/AGV Navigation
(Robotics & Automation)

Bridge Infrastructure Crack Detection
(Computer Vision & Inspection)

Pattern Recognition

Sequential Data Prediction

Automation

Optimisation

Simulation

Smart Grid Power Demand Forecasting
(Sensors & Time-Series)

Aircraft Wing Lightweight Design
(Generative Design & Structures)



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Thank you