COURSE SYLLABUS

Introduction to Artificial Intelligent

Course code: 220059

1. General information

Course type		Number of credits	Number of learning periods
General	☐	Theory: 02	Theory: 30
Basic	☐	Exercise: 00	Exercise: 00
Specialized	☑	Practice: 01	Practice: 30
Required	☑		
Elective	☐		

Learners:

Level	Bachelor
Discipline	Information Technology

Course requirements:

Prerequisites	Programming techniques
	Statistics and data analysis
Parallels	None
Other requirements	None

2. Learning resources

Books	[1] Russell S. & Norvig P. (2010). *Artificial Intelligence: A Modern Approach, 3rd edition.* Prentice-Hall.
	[2] Goodfellow I., Bengio Y. & Courville A. (2016) *Deep Learning.* MIT Press.
References	[3] Denis R. (2018). *Artificial Intelligence By Example*. Packt.
	[4] Denis R., Matthew L., Rahul K., Abhishek N., Amir Z., Ankit D. (2018). *Python: Beginner's Guide to Artificial Intelligence: Build*

	applications to intelligently interact with the world around you using Python. Packt.
Other learning materials	[5] http://aima.cs.berkeley.edu/ [6] https://www.deeplearningbook.org/

3. Course description

The course provides students specialized knowledge related to Artificial Intelligence (AI) such as knowledge representation and reasoning, searching, machine learning and natural language processing. The course also aims to provide opportunities to practice professional skills which are implementation of AI projects using Python programming language, and development deep learning projects. Additionally, the course develops students' appropriate awareness and attitude on the usage and the impact of AI in modern social life.

4. Course learning outcomes (CLOs)

After finishing the course, students will be able to:

		Satisfy LOs of the program	*Satisfy LOs of the ABET*
❖ *Topic 1: Disciplinary Knowledge and Reasoning*			B.1.1
L1.	Identify problems which can be solved by using AI.	*1.3.7*	B.1.2 B.1.3
L2.	Present basic concepts and techniques of AI		B.1.4
L3.	Utilize basic algorithms of machine learning and deep learning		B.1.5 B.1.6
❖ *Topic 2: Personal and Professional Skills and Attributes*			
L4.	Problem identification and formulation	*2.1.1*	
L5.	Solution and recommendation	*2.1.5*	
L6.	Trade-offs, judgment and balance in resolution	*2.3.4*	
❖ *Topic 3: Interpersonal Skills: Teamwork and Communication*			
L7.	Team operation	*3.1.2*	
L8.	Oral presentation and inter-personal communications	*3.2.6*	

❖ *Topic 4: Conceiving, Designing, Implementing and Operating Systems in The Enterprise, Societal and Environmental Context – The Innovation Process*			
L9.	The Impact of Engineering on Society	*4.1.2*	
L10.	Society's Regulation of Engineering	*4.1.3*	

5. Course content:

Course content	CLOs	Number of learning periods		
		Theory	*Practice*	*Others*
Chapter 1. Introduction	**L1**	**3**	**0**	**0**
1.1. Introduction to AI				
1.1.1. What is AI?				
1.1.2. Foundations and concepts of AI				
1.2. The history of AI				
1.2.1. Stages of AI				
1.2.2. AI systems in early stages				
1.2.1. AI winters: Causes and Effects				
1.3. Intelligent Agents				
1.4. Modern AI and deep learning				
1.5. Applications of modern AI				
▢ *Personal and Professional Skills and Attributes*				
▢ *Interpersonal Skills: Teamwork and Communication*				
▢ *CDIO in the enterprise, societal and environmental context*	L9 (I)			
Chapter 2. Solving Problems and Searching	**L2**	**6**	**5**	

2.1. Solving problems and AI				
2.2. Problem representation by State-space Search				
2.3. Uninformed Search Strategies				
2.4. Informed Search Strategies				
2.5. Local Search and Optimization Problems				
2.6. Constraint Satisfaction Problems				
2.7. Adversarial Search and Games				
2.8. Examples of solving problems: VLSI design, scheduling, etc.				
□ *Personal and Professional Skills and Attributes*	L4(U) , L5 (U), L6 (U),			
□ *Interpersonal Skills: Teamwork and Communication*	L7(U), L8 (U)			
□ *CDIO in the enterprise, societal and environmental context*				
Chapter 3. Knowledge Representation and Reasoning	L2	6	5	
3.1. Logic and reasoning				
3.2. Knowledge representation and reasoning with propositional logic				
3.3. Knowledge representation and reasoning with first-order-logic				
3.4 Approximate inference and probabilistic reasoning				
3.5. Bayes' rule and its use				
3.6. Bayesian network and reasoning on Bayesian network				

3.7. Applied probabilistic inference for solving problems				
☐ *Personal and Professional Skills and Attributes*	L4(U) , L5 (U), L6 (U),			
☐ *Interpersonal Skills: Teamwork and Communication*	L7(U), L8 (U)			
☐ *CDIO in the enterprise, societal and environmental context*				
Chapter 4. Machine learning – Supervised Learning	**L3**			
4.1. Supervised and Unsupervised learning				
4.2. Regression: Linear regression and Logistic regression				
4.3. Classification				
4.3.1. Classification using k-nearest neighbors (KNN)				
4.3.2. Decision tree				
4.3.3. Support vector machine				
4.4. Evaluation of classification models				
4.5. Apply classification techniques for solving problems				
4.6. Apply classification techniques to solve specific problems such as spam emails classification, object recognition…				
☐ *Personal and Professional Skills and Attributes*	L4(U) , L5 (U), L6 (U),			
☐ *Interpersonal Skills: Teamwork and Communication*	L7(U), L8 (U)			
☐ *CDIO in the enterprise, societal and environmental context*				

Chapter 5. Machine Learning – Unsupervised Learning	**L3**	**3**	**3**	
5.1. Clustering problems				
5.2. K-means algorithm				
5.3. Hierarchical clustering				
5.4. Reinforcement learning				
5.5. Applied clustering for solving problems				
☐ *Personal and Professional Skills and Attributes*	L4(U) , L5 (U), L6 (U),			
☐ *Interpersonal Skills: Teamwork and Communication*	L7(U), L8 (U)			
☐ *CDIO in the enterprise, societal and environmental context*				
Chapter 6. Machine learning - Deep learning	**L3**	**5**	**7**	
6.1. Artificial Neural Networks and Backpropagation Networks				
6.2. Convolution Neural Networks – CNN				
6.3. Recurrent Neural Networks and LSTM				
6.4. Applied deep learning in solving problems				
☐ *Personal and Professional Skills and Attributes*	L4(U) , L5 (U), L6 (U),			
☐ *Interpersonal Skills: Teamwork and Communication*	L7(U), L8 (U)			
☐ *CDIO in the enterprise, societal and environmental context*				
Chapter 7. Issues of AI	**L1**	**1**		
7.1. AI and Enterprises				
7.2. AI and Governments				

7.3. The Ethics of AI				
7.3.1. AI and human work				
7.3.2. AI and Privacy				
7.3.3. Fairness and Bias				
7.3.4 Appropriate applications of AI				
☐ *Personal and Professional Skills and Attributes*				
☐ *Interpersonal Skills: Teamwork and Communication*				
☐ *CDIO in the enterprise, societal and environmental context*	L9-L10 (T)			
Summary of skills in course level				
☐ *Personal and Professional Skills and Attributes*	L4(U) , L5 (U), L6 (U),			
☐ *Interpersonal Skills: Teamwork and Communication*	L7(U), L8 (U)			
☐ *CDIO in the enterprise, societal and environmental context*	L9-L10 (T)			

6. Teaching and learning methods

ID	Teaching method/technique		Description
M1.	Lecturing	☑	
M2.	Questions – Answers	☑	
M3.	Group-based Learning	☑	
M4.	Problem-based Learning	☐	
M5.	Project-based Learning	☑	
M6.	Case studies	☐	
M7.	Role play	☐	

M8.	Demo	☑	
M9.	Simulations	☐	
M10.	Debate	☐	
M11.	Game	☑	
M12.	Brainstorming	☐	
M13.	Think-Pair-Share	☐	

7. Course assessment

ID	Assessment activity		Quantity	Weight	LOs assessed
T1.	Text-based midterm exam	☐			
T2.	Text-based final exam	☐			
T3.	Practice midterm exam	☐			
T4.	Practice final exam	☐			
T5.	Report	☐			
T6.	In-class exercises	☑	*4*	10%	L2, L3, L4, L5, L6
T7.	Homework assignments	☑	*2*	20%	L2, L3, L4, L5, L6
T8.	Question – Answer	☑	1	20%	L1, L2
T9.	Term Project	☑	1	50%	L1-L10
T10.	Final Exam	☐			
Formula for Overall score	(T6*0.1 + T7*0.2 + T8 *0.2 + T9*0.5)				☐

8. Course requirements and expectations

8.1. Requirements on attendance

- Students are responsible for attending all classes. In case of absence due to force majeure circumstances, there must be sufficient and reasonable evidence.

- Students who do not attend more than 20% of the class sections, whether for reason or not, are deemed not to have completed the course and must re-enroll in the following semester.

8.2. Requirements and expectations on student behaviors

- Students must show their respects for teachers and other learners.
- Students must be on time. Students who are late more than five minutes will not be allowed to attend the class.
- Students should not make noise and interfere with others in the learning process.
- Students should not eat, chew gum, and use devices such as cell phones, music players during class hours.
- Laptops and tablets can only be used in class for the purpose of learning.
- Students who violate the above principles will be asked to leave the class and considered absent from the class.

8.3. Requirements on learning issues

Issues related to applying for score reservation, scoring complaints, scoring, exam disciplines are done according to the Learning Regulation of Tra Vinh University.

9. Tentative course instructor

Nguyen Bao An

DEAN	DEPARTMENT HEAD	LECTURER

Nguyen Bao An