COURSE SYLLABUS
CSC10013 – FUNDAMENTALS OF PROGRAMMING FOR ARITIFICIAL INTELLIGENCE

1. GENERAL INFORMATION

Course name:	Fundamentals of Programming for Artificial Intelligence
Course name (in Vietnamese):	Cơ sở lập trình cho Trí tuệ nhân tạo
Course ID:	CSC10013
Knowledge block:	Fundamentals
Number of credits:	4
Credit hours for theory:	45
Credit hours for practice:	30
Credit hours for self-study:	90
Prerequisite:	None
Prior-course:	None
Instructors:	

2. COURSE DESCRIPTION

This course is designed to introduce students to the fundamental programming concepts necessary for artificial intelligence (AI) applications, using Python as the primary programming language. Students will begin with foundational programming constructs including variables, control structures (if-else statements, loops), and functions. They will then advance to more complex topics crucial for AI such as data handling and the utilization of libraries like NumPy for data manipulation. In addition to technical skills, the course emphasizes critical thinking and problem-solving in AI programming contexts. Students will engage in hands-on projects that require them to apply their learning to solve real-world problems, fostering both individual and collaborative skills. They will also practice

presenting their work and solutions in English, enhancing their communication and teamwork abilities in a professional setting.

3. COURSE GOALS

At the end of the course, students are able to

ID	Description	Program LOs
G1	Describe and use basic programming concepts in Python	1.2.1
G2	Describe and use libraries essential for AI programming such as NumPy	1.2.1
G3	Implement and utilize basic AI algorithms and data structures.	1.2.1, 1.3.1
G4	Develop Python programs using AI libraries to solve real-world problems.	1.2.1, 1.3.1
G5	Explain AI programming concepts and solutions in English.	2.4.3, 2.4.5
G6	Demonstrate team-work and presentation skills.	2.2.1, 2.2.2, 2.3.2

4. COURSE OUTCOMES

CO	Description	I/T/U
G1.1	Describe basic programming concepts in Python	I, T
G1.2	Manipulate input and output	I, T, U
G1.3	Use control flow statements in Python	I, T, U
G2.1	Apply Python for handling basic data structure like list, tuple, string and dictionary	I, T
G2.2	Describe and utilize Python libraries like NumPy for data	I, T

	manipulation	
G3.1	Use and manipulate lists and multi-dimensional lists in Python	I, T, U
G3.2	Describe and implement linked-list.	I, T, U
G3.3	Describe and manipulate structured files in Python such as csv, json...	I, T, U
G4.1	Describe and implement basic AI algorithms using Python	I, T
G4.2	Organize Python program across multiple files.	I, T
G5.1	Explain AI concepts and programming solutions in English	U
G6.1	Demonstrate team-work and presentation skills.	U

5. TEACHING PLAN

ID	Topic	Course outcomes	Teaching/Learning Activities (samples)
1	Programming Overview - Programming: concepts, languages, environments. - Algorithm: concepts, notations, complexity. - Python overview: history, program structure. - Basic units: variables/constants, data-types, expressions. - Input output statements	G1.1, G1.2, G5.1	Lecturing, Demonstration HW1
2	Control Flow Statements - Conditions: if-else	G1.3, G4.1, G5.1, G6.1	Lecturing, Demonstration QZ1, HW2

	- Loop statements: while, for		
3	Functions in Python - Basic concepts - Arguments and Parameters - Function Execution Flow - Advanced Function Concepts	G1.3, G4.1, G5.1, G6.1	Lecturing, Demonstration QZ2, HW3
4	Data Structures: List, Dictionary, Tuple, Set - Basic concepts - Manipulation Methods - Function with Data Structures	G2.1, G3.1, G5.1	Lecturing, Demonstration, Case-study QZ3, HW4
5	Strings and Text File Operations	G2.1, G3.1, G5.1	Lecturing, Demonstration QZ4, HW5
6	Recursion and Dynamic Programming.	G4.1, G5.1, G6.1	Lecturing, Demonstration QZ5, HW6
7	Advanced Data Structures: Linked List, Stack, Queue	G3.2, G4.1, G6.1	Lecturing, Demonstration QZ6, HW7
8	Introduction to NumPy	G2.2, G4.1, G5.1	Lecturing, Demonstration, Case-study HW8
9	Advanced Operations with NumPy	G2.2, G4.1, G5.1	Lecturing, Demonstration HW9
10	Processing Structured Files	G3.3, G4.2, G5.1, G6.1	Lecturing, Q&A, Group discussion HW10

For the practical laboratory work, there are 10 weeks which cover similar topics as it goes in the theory class. Each week, teaching assistants will explain and demonstrate key ideas on the corresponding topic and ask students to do their lab exercises on computers either in the lab or at home. All the lab work submitted will be graded. There would be a final exam for lab work.

6. ASSESSMENTS

ID	Topic	Description	Course outcomes	Ratio (%)
A1	**Assignments**			**30%**
A11	Homework: HW1-HW10	Homework are programming problems assigned at the end of each session, do it at home and submit online.	G1.1, G1.2, G1.3, G2.1, G2.2, G3.1, G3.2, G3.3, G4.1, G4.2	10%
A12	Lab-work: LW1–LW10	Lab-work are programming problems presented and guided during lab session.	G1.1, G1.2, G1.3, G2.1, G2.2, G3.1, G3.2, G3.3, G4.1, G4.	10%
A13	Quiz: QZ1-QZ6	Quiz are quick tests at the beginning of each session.	G1.3, G2.1, G2.2, G3.1, G3.2, G4.1, G5.1	10%
A2	**Exams**			**70%**
A21	Lab midterm exam	In-class programming exam on computer		10%

A22	Lab final exam	In-class programming exam on computer		10%
A23	Midterm exam	Closed book exam. Describe the understanding of different topics, analyze & program to solve problems		10%
A24	Final exam	Closed book exam. Describe the understanding of different topics, analyze & program to solve problems		40%

7. RESOURCES

Textbooks

- Fundamentals of Python: First Programs, 2nd Edition, Kenneth A. Lambert, Cengage 2019.
- Think Python: How to Think Like a Computer Scientist. Downey, Allen B., O'Reilly, 2012 (http://www.greenteapress.com/thinkpython/)

8. GENERAL REGULATIONS & POLICIES

- All students are responsible for reading and following strictly the regulations and policies of the school and university.
- Students who are absent for more than 3 theory sessions are not allowed to take the final exam.
- For any kinds of cheating and plagiarism, students will be graded 0 for the course. The incident is then submitted to the school and university for further review.
- Students are encouraged to form study groups to discuss course topics. However, individual work must be done and submitted on your own.