<VTCE ARTIFICIAL INTELLIGENCE SHORT COURSES>

SYLLABUS

< PYTHON DEVELOPER FOR AI>

1. **Subject name: Python Developer for AI**
2. **Subject code: AIP**
3. **Class hours: 45 hours**
4. **Pre-requisites:** No specific requirements
5. **Subject's description:** This subject provides learners the basics of Python Programming, the Object-Oriented Programming in Python, the way of making a packages and modules by Python and the skill of visualizing data.Besides, this subject helps learners understand Maths in AI including Algebra, Calculus and Probabilities/Statistics. These things are very important in AI Careers and Opportunities. Learners will have many Labs and Practices on Data Science Problems to apply the knowledge and improve Problem-Solving skills. These things are also very important in AI Applications and Deployments.

6. **Purpose of Subject:**

   After finishing this subject, learners can archive:
   - Understand Python Variables and Operators
   - Understand Python Data Types
   - Understand Python Conditions and Loops
   - Understand Python Functions
   - Understand how to input and output data
   - Know how to build Class, Object, Modules and Packages
   - Have ability to visualize data
   - Understand and Solve Algebra Maths
   - Understand and Solve Calculus Maths
   - Understand and Solve Probabilities&Statistics Maths

7. **Learning outcomes:**

No.	Learning	Description of expected learning outcomes	LO Weight

	Outcome		(100%)
1	G1	Understand Python Variables and Operators	5(%)
2	G2	Understand Python Datatypes	5(%)
3	G3	Understand Python Conditions and Loops	5(%)
4	G4	Understand Python Functions	10(%)
5	G5	Understand how to input and output data	10(%)
6	G6	Know how to build Class, Object, Modules and Packages	10(%)
7	G7	Have ability to visualize data	10(%)
8	G8	Understand and Solve Algebra Maths	15(%)
9	G9	Understand and Solve Calculus Maths	15(%)
10	G10	Understand and Solve Probabilities & Statistics Maths	15(%)

8. Subject Requirements

❖ **Student's learning attitudes:**

- Students should fully attend the class, participate in discussion during class, ensure the time for self-study to consolidate knowledge of the subject.
- Students need to seriously complete the test, assignment, final presentation/ projects with a confident, honest and creative attitude.
- Minimum participation accounting for 75% of the class hours is the prerequisite for the module evaluation.

❖ **Teaching and learning activities:**

- Instructor represents and organizes discussion sections in class. The Instructor must make sure to introduce 100% of the content of Lesson's Slides or Textbook provided by VTCA.
- The course has examinations and homework to train students' self-study ability and self-research before class, do group exercises to be able to apply their knowledge in analyzing and solving problems. And other exercises relate to the topics in lessons.
- The Instructor needs to emphasize real-life common problems/incidents realities and solutions/preventions and control.

9. Subject's outline:

Abbreviations: Theoretical (T), Practical (P)

Lesson (Hour)	Type (T/P)	Lesson's Title	Lesson's Topic	Test
Lesson 1 (3 hours)	P	Python Variables and Operators	• Number and Boolean • String and Date • Decimal, Fraction, Statistics and Math Module • Arithmetic and Comparison Operators • Problem Solving : Stock Market Analysis	Lab 1
Lesson 2 (3 hours)	P	Python DataTypes	• Series and List • Array and Matrix • DataFrame • Problem Solving : BigMartSales Prediction	Lab 2
Lesson 3 (3 hours)	P	Python Conditions and Loops	• Condition Statement • Loop Statement • Iterators • Problem Solving : Cross Selling and Up Selling Problem	Lab 3
Lesson 4 (3 hours)	P	Python Functions	• Global and Local Variables • Anonymous Function • Problem Solving : Marketing Attribution Models	Lab 4 Homework 1
Lesson 5 (3 hours)	P	Python Input and Output Handling	• Console and File Handling • JSON and XML Handling • Error/Exception Handling • Problem Solving : Read/Write Object Detection Results	Lab 5

Lesson 6 (3 hours)	P	Python Class/Object, and Modules/Packages	• Class Constructor, Inheritance and Polymorphism • Module and Package Construction • Problem Solving : Object Detection Package	Lab 6
Mid-Term (3 hours)	P	Mid-Term Examination	• Python Variables and Operators • Python DataTypes • Python Conditions and Loops • Python Functions • Python Input and Output Handling • Python Class/Object, and Modules/Packages	Midterm Assignment
Lesson 7 (3 hours)	P	Python Visualization	• Data Cleansing, Filtering and Aggregation • Univariate Data Visualization • Bivariate/Multivariate Data Visualization • Problem Solving : Risk Detection by Visualization	Lab 7
Lesson 8 (6 hours)	P	Python Algebra Maths	• Matrix and Vector Arithmetic Operations • Inverse and Transpose • Equation System Solving • Covariance and Correlation Matrix • Eigen Values and Eigen Vectors • Principle Component Analysis • Singular Value Decomposition • Problem Solving : User-Item Recomendation	Lab 8 Homework 2
Lesson 9 (6 hours)	P	Python Calculus Maths	• Linear and Nonlinear Functions • Derivatives and Finding Extreme Points • Gradient Descent • Loss Function • Problem Solving : Loss Optimization in Game Rate Prediction	Lab 9

Lesson 10 (6 hours)	P	Probabilities and Statistics Maths	• Descriptive Statistics • Inferential Statistics • Conditional Probability and Bayes Rules • Distribution Estimation • Markov Chains • Problem Solving : Marketing Campaigns Analysis	Lab 10 Homework 3
Final Exam (3 hours)	P	Final Examination	• Python Visualization • Python Algebra Maths • Python Calculus Maths • Probabilities and Statistics Maths • Problem Solving	Final Assignment

10. Student Assessment

Complete all required course assessment laboratories, quizzes, homework assignments and exam/presentation/projects with following weights (total : 100%):

Test	Weight (100%)	Description	Type of Assessment	Number of Questions/ Exercises/ Problems	Scope of knowledge
Homework 1	10 %	Python Variables and Operators Python DataTypes Python Conditions and Loops	Practice	3 Exercises	Lesson 1, 2, 3
Homework 2	10 %	Python Visualization Python Algebra Maths	Practice	3 Exercises	Lesson 7,8
Homework 3	10 %	Python Calculus Maths Python Probabilities and Statistics Maths	Practice	3 Exercises	Lesson 9,10
Mid-Term Assignment	30 %	Python Variables and Operators Python DataTypes Python Conditions and Loops	Practice	3 Exercises	Lesson 1-6

		Python Functions Python Input and Output Handling Python Class/Object, and Modules/Packages			
Final Assignment	40 %	The final test requires all knowledges and problem-solving skills.	Practice	3 Exercises	Lesson 1-10

❖ **Mark Evaluation:** Follow chapter 4 of Training Regulation .

11. Teaching and Learning Materials

- Text book:
  - [1] Heinold. B. A Practical Introduction to Python_Programming
  - [2] Rossum. G.V. Python Tutorial
  - [3] Andrew and Harrington .N. Hands-on Python Tutorial
- References:
- Online materials:
  - [1] https://www.guru99.com/python-tutorials.html
  - [2] https://www.programiz.com/python-programming/first-program
  - [3] https://www.tutorialspoint.com/python/index.htm

12. Change Control History:

Version	Date	Author	Description
0.0	05/06/2021	Tran Anh Tuan	First Version

Head of Department	Author