

# DSC 5101 – Computer Programming in DSAI

## HO 00 - Course Outline

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# Semester Learning Plan

- Study Program: Masters in Data Science and Artificial Intelligence
- Course ID: DSC 5101
- Course Name: Computer Programming in Data Science and Artificial Intelligence
- Credits: 3
  - Class: 150 minutes
  - Lab activities: 150 minutes
  - Face-to-face: 16 weeks
  - Minimum attendance: 80%
- Lecturer: Prof. Dr. Opim Salim Sitompul, M.Sc.
- Prerequisite: None

# Course Description and Objective

- This course is a laboratory course that provides students with the computer programming background required for success in data science and artificial intelligence.
- In this course, students will learn how to program data science and artificial intelligence related problems using Python programming language.

# Course Description and Objective

- Huge interest in the Python programming language is driven by several factors [1]:
  - its use in schools with the Raspberry Pi platform,
  - its ability to be used for DevOps scripts,
  - its use in data science and machine learning and
  - the language itself.

# Learning Outcomes

- Upon successful completion of the course, students will be able to
  - ① Prepare data for further analysis using data analytic tools
  - ② Manipulate data sets programmatically
  - ③ Perform exploratory data analysis programmatically
  - ④ Apply basic text processing techniques to unstructured data sets
  - ⑤ Visualize data sets effectively
  - ⑥ Perform basic statistical analyses programmatically
  - ⑦ Build data-driven predictive models

# Reference books

- A Beginners Guide to Python 3 Programming
  - John Hunt
  - Springer Nature Switzerland AG, Switzerland, 2019
- Advance Guide to Python 3 Programming
  - John Hunt,
  - Springer Nature Switzerland AG, Switzerland, 2019
- Python Data Science Handbook
  - Jake VanderPlas
  - O'Reilly, California, 2016
- Hands-On Machine Learning with Scikit-Learn \$ TensorFlow
  - Aurelién Gérón
  - Wiley, 2014

# Reference books

- Python tutorials available online
- Jupyter notebook tutorials available online
- Numpy tutorials available online
- Pandas tutorials available online
- Nltk tutorials available online
- Matplotlib tutorials available online
- Visdom tutorials available online
- Scikit-learn tutorials available online
- Pytorch tutorials available online



# Teaching and Learning Methods

- 1 Use of online tutorials: Students will make use of online tutorials for self-learning.
- 2 Laboratory sessions: Students will be required to perform a series of exercises and submit a lab report.
- 3 Homework: Several homework exercises requiring students to apply the knowledge acquired from lab and discussion will be assigned and graded.
- 4 Individual Project Assignment: Each student is required to submit individual project report in completion of the assignment.

# Weekly Course Planning

## I Fundamentals

- 1 Python programming Basics
- 2 Using Function
- 3 Using Class

## II Working with data

- 4 Numerical computation using numpy
- 5 Data manipulation using pandas
- 6 Exploratory data analysis
- 7 Text processing with nltk

## III Data visualization

- 8 Matplotlib
- 9 Pandas
- 10 Visdom

# Weekly Course Planning

## IV Statistics

- 11 Random variables
- 12 Probability distributions
- 13 Hypothesis testing using scipy and statsmodels

## V Machine learning tools

- 14 Scikit-learn
- 15 Pytorch
- 16 Keras

# Evaluation System

Table 1: Grading Components

<b>Programming Home Works</b>	20%
<b>Mid Term Exam</b>	20%
<b>Final Exams</b>	20%
<b>Individual Project Assignment</b>	30%
<b>Total:</b>	100%

# Evaluation System

Table 2: Grading System

		A	$\geq$	80
75	$\leq$	B+	$<$	80
70	$\leq$	B	$<$	75
65	$\leq$	C+	$<$	70
60	$\leq$	C	$<$	65
50	$\leq$	D	$<$	60
		E	$<$	50

- **Notes:**
- If grade obtained are in **C+**, **C**, **D**, and **E** categories, students must take Retest in the following semester.

# Compiler/IDE

- Python IDLE (latest version supporting Scikit Learn + Keras)
- Jupyter Notebook
  - <https://jupyter.org/install>
- PyCharm
  - <https://www.jetbrains.com/pycharm/>

# Programming Assignment

- Using USU e-learning
  - <https://elearning.usu.ac.id/>
  - Filename upload: NIM\_?????.py, NIM\_?????.ipynb
- Filename Example:
  - 2070321??\_A01a.py, 2070321??\_A01a.ipynb, etc.
  - Please send only program source codes, not zip, rar, etc.
- Remark:
  - Send your assignment within time range provided, late submission will not accepted.

# Academic Integrity

- In Class Conduct
  - Obstructive and/or annoying behaviors are not allowed in this class.
- Mobile phone policy
  - All mobile phones must be off or silence during class.
  - Use only laptop browser to access Internet for required resources.
- Academic Integrity
  - Academic Violation (such as plagiarism, cheating, copying, etc.) are not allowed in this class in what so ever conditions.
  - Students who are found violate this rules will be given low semester grade and will be expelled from this class.
  - You are expected to do your own work assignments as well as exams and programming.
  - Helping other students or receiving help from other students while debugging program are OK; however, writing modification and/or copying source code for/from other students are considered violation.



# References I



Hunt, J., A Beginners Guide to Python 3 Programming, Springer Nature Switzerland AG, Switzerland, 2019.



Hunt, J., Advance Guide to Python 3 Programming, Springer Nature Switzerland AG, Switzerland, 2019.