Course Syllabus for 2110531

1. Course Number: 2110531
2. Course Credit: 3 (3-0-6)
3. Course Title: Data Science and Data Engineering Tools
4. Department   Computer Engineering
5. Semester   First Semester
6. Academic Year   2025
7. Instructor   Peerapon Vateekul, Ph.D.

                                              Natawut Nupairoj, Ph.D.

                                              Veera Muangsin, Ph.D.

8. Condition   -
9. Status   Elective
10. Curriculum   Computer Engineering
11. Degree   M.Eng., M.Sc.
12. Hours/Week   3-Hour Lecture & Lab
13. Course Description

      Data Science is the study of the discovery of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases, and other branches of computer science, along with a good understanding of the craft of problem solving. Data Engineering is the study of how to engineer or process data, i.e., data cleansing, data storing, etc. There are three main parts in this course:

- Data analysis: Machine Learning techniques
- Data engineering: Data exploration & preparation
- Data visualization: Storytelling via data

14. Course Outline

    14.1. Learning Objectives

- Describe what Data Science and Data Engineering are and the skill sets needed
- To be able to explore and understand collected data
- To be able to analyze data by applying traditional machine learning techniques
- To be able to visualize data in relation to spatial and temporal points of view

    14.2. Learning Contents

- Section1 on Tue 1PM-4PM, Building ENG3 Room 417
- Section5 on Sat 1PM-4PM, Building ENG4 Room 18-16
- *** Please bring your laptop to the class ***
- Students need to attend the class on-site at least 80% (at least 12 weeks) as a mandatory criterion to "pass" this course.

#	Tue (1PM-4PM)	Sat (1PM-4PM)	Topics	Professor	Module
1	05-Aug-25	09-Aug-25	Introduction, Pandas, Data Prep	Aj.Peerapon	DS1
2	12-Aug-25	16-Aug-25	Traditional ML (1)	Aj.Peerapon	DS2
3	19-Aug-25	23-Aug-25	Traditional ML (2)	Aj.Peerapon	DS3
4	26-Aug-25	30-Aug-25	Deep Learning (1); CNN, RNN (LSTM, GRU)	Aj.Peerapon	DS4
5	02-Sep-25	06-Sep-25	Deep Learning (2); Transformer	Aj.Peerapon	DS5
6	09-Sep-25	13-Sep-25	Advanced topics (Generative AI) + Model monitoring (MLflow)	Aj.Peerapon	DS6
7	16-Sep-25	20-Sep-25	Guest speaker	Aj.Peerapon	DS7
	23-Sep-25	27-Sep-25	Midterm Exam Week (22 - 26 Sep 2025)		
8	30-Sep-25	04-Oct-25	Data visualization (Graduation Week 29 Sep - 1 Oct) - Online	Aj.Veera	VIZ1
9	07-Oct-25	11-Oct-25	Python visualization	Aj.Veera	VIZ2
10	14-Oct-25	18-Oct-25	Graph analysis & spatial analysis	Aj.Veera	VIZ3
11	21-Oct-25	25-Oct-25	Big data architecture + data storage (Graduation Week: October 2 – 4, 2025)	Aj.Natawut	DE1
12	28-Oct-25	01-Nov-25	Web scraping	Aj.Natawut	DE2
13	04-Nov-25	08-Nov-25	Data ingestion	Aj.Natawut	DE3
14	11-Nov-25	15-Nov-25	Big data processing (Spark)	Aj.Natawut	DE4
15	18-Nov-25	22-Nov-25	MLOps: Orchestration (Airflow) and serving (FastAPI, Seldon Core)	Aj.Natawut	DE5
	25-Nov-25	29-Nov-25	Final Exam Week (24 Nov - 8 Dec 2025) Final Exam on Sat 2 Dec 2025		

14.3. Method: Lecture and Lab

14.4. Learning Media: PowerPoint presentation, Zoom

14.5. Evaluation

- Module1 Assignment (data analytics) 15%
- Module2 Assignment (data engineering) 15%
- Module3 Assignment (data visualization) 5%
- Midterm Exam (Kaggle) 15%
- Project 15%
- Attendance 5%
- Final Exam 30% (Lab Test)

15. Reading List
    15.1.   Required Text: N/A
    15.2.   Electronic Media or Websites: N/A
16. LMS
    16.1.   MyCourseVille: "Agentic"
    16.2.   Discord: https://discord.gg/Z2CFD4g42H
    16.3.   Github: https://github.com/pvateekul/2110531_DSDE_2025s1