ENG 346
Data Structures and Algorithms for Artificial Intelligence
Course Overview

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Agenda

- Introduction
- Importance of Data Structures and Algorithms
- Syllabus review
- Test for current knowledge
- Methodology
- Course materials review: Coursebook and other resources
- Assignments, exams, and project
- Office hours and communication channels
- Encouraging questions and motivation

BSc, Bilkent University, Computer Engineering, 1996
MSc, Bilkent University, Computer Engineering, 1999
MSc, Gebze Technical University, Entreshp. & Innov. Man., 2024
PhD, Gebze Technical University, Computer Engineering, 2023

HAVELSAN

- 1996 – Development of HVL Firewall (The 1st in Turkey)
- 2001 – Developer in various projects: TuAF IS, MELTEM, etc.
- 2010 – YGO Product Manager
- 2014 – Move to HVL Istanbul Office ☺
- 2014 – Systems Engineer
- 2016 – R&D Project Coordinator

ICF International Coaching Federation

- Nov 2022 – ICF Certified Pro. Coach

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Introduce yourself

- Your name
- Your department
- Your expectations from the course
- Your skill of AI knowledge

Course Overview

Why Data Structures and Algorithms

- Data structures are vital in handling and manipulating large datasets in fields like machine learning and data science.
- Algorithms are used for data analysis, pattern recognition, and more.
- Code efficiency, e.g., optimizations in searching and sorting, which is critical for software performance.
- Structural approach to problem solving
- Critical Thinking and Problem-Solving Skills: Encourages to break down complex problems into manageable components.
- Code reusability, i.e., reusable code components, which can be used across various projects, saving time and effort.
- Resource management, i.e., efficient use of system resources like memory and processing power.
- Problem classification, understanding different types of problems so that choosing appropriate solutions.
- Foundation for advanced topics, such as artificial intelligence, cryptography, and database management systems.
- Interviews and Job Opportunities

Purpose and Outcomes

Purpose of the course	This is a course designed to *enhance advanced Python programming, data structures, and algorithm skills* necessary for developing software, coding, and conducting group work in the field of data science and artificial intelligence
Learning outcomes	• Ability to perform basic data structures and algorithm design and analysis • Ability to collaborate in software development • Possessing skills in current software development technologies

Methodology

- Face-to-face lectures,
- Active participation expected,
- Hands-on coding,
- Homeworks: Individual work expected,
- Project: May be group project based on the project idea,
- One midterm exam,
- One final exam.

Grading

- Quiz: 15
- Homework: 15
- Midterm Exam: 20
- Projects: 20
- Final Exam: 30
- **Total: 100**

Schedule

Week #	Topic	Assessment
Week 1	Basic Python Concepts	
Week 2	Object-Oriented Programming	HW1
Week 3	Arrays, Linked Lists, Maps	
Week 4	Stacks and Queues	HW2
Week 5	Tree Algorithms	
Week 6	Sorting Algorithms	HW3
Week 7	Advanced Python Libraries	
Week 8	Python Libraries	Midterm exam
Week 9	UI Development with Python	HW4 + Project proposals
Week 10	Introduction to Data Science	
Week 11	Introduction to Machine Learning	HW5 + Project proposals presentations
Week 12	Data Cleaning and Preprocessing	
Week 13	Data Analysis and Visualization	HW6
Week 14	Final Projects	
Week 15	-	
Week 16	Final exam	Final project presentations

Textbooks and Other Resources

Textbooks	• Goodrich, Michael T., Roberto Tamassia, and Michael H. Goldwasser, *Data structures and algorithms in Python,* John Wiley & Sons Ltd, 2013.
	• Grus, Joel, *Data science from scratch: first principles with python,* O'Reilly Media, 2019.
Recommended	• https://www.kaggle.com/learn
	• https://www.coursera.org/learn/python-data
	• https://www.coursera.org/learn/python-data-analysis

Office Hours and Communication

- No office. We can talk between and after the lectures.
- Reach me at kince@gtu.edu.tr

MS Teams Access

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