University of Cyprus
Department of Electrical and Computer Engineering
Fall Semester 2023

ECE 325: Iterative Methods

Syllabus

Instructor: Christos Panayiotou
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Website: https://www2.kios.ucy.ac.cy/christos/ece-325-iterative-methods/

Lectures: Tuesday – Friday 3:00-4:30 pm
ΧΩΔ 01 Room 102.

Laboratory: Tuesday 9:00am-12:00pm
ΘΕΕ 01 Room B101.

Ώρες Γραφείου: Τρίτη 4:30-5:30 μ.μ.

Teaching Assistant: Antreas Anastasiou (anastasiou.antreas@ucy.ac.cy)

Course Objectives:

This course covers a broad spectrum of techniques for solving problems using iterative methods. During the course we will study various problems (search, decision, optimization) and we will investigate various algorithmic approaches for solving them. Emphasis will be given to the problem formulation, the precise description of the algorithm that solves the problem, as well as to the analysis of the correctness and efficiency of the algorithms. The objective of the course is to introduce problem solving strategies, mainly through the design of iterative algorithms. The course will introduce specific algorithm design techniques and will provide the tools for analyzing the efficiency of each algorithm.

Prerequisite:

- Students must have completed at least a programming course and a course in data structures (CS 034 and CS 035 or equivalent).

Topics Covered:

1. Introduction

2. Analysis of Algorithms (sets O, Ω, Θ)

3. Brute Force and Exhaustive Search

4. Divide-and-Conquer

5. Fast Fourier Transform

6. Decrease-and-Conquer

7. Transformations

8. Greedy algorithms

9. Dynamic programming

10. Iterative Improvement (Linear Programming)

11. Decision Trees – If time permits

12. P, NP, and NP-complete problems – If time permits

Grading:

Method 1:
    Laboratory Assignments: 15%
    Midterm Exam: 35% (tentative date: 6 October, 2023)
    Final Exam: 50%.
Important Note: To pass the class, students should get at least **50%** in the exams and **50%** in the lab assignments.

Method 2:
    Midterm Exam: 40% (tentative date: 6 October, 2023)
    Final Exam: 60%.

Important Note: A student should get at least **50%** in all lab assignments in order to be eligible to take the final exam.

For the lab assignments, students can work in groups. Each group should send a report via email to the course Teaching Assistant (TA) **before** the given deadline. The group will be examined according to the schedule that will be posted on the course website. During the examination **all** group members should be present. Each group can submit up to **one (1) delayed** assignment but should be examined at a later date which will not exceed two weeks from the assigned deadline. Any other assignment submitted late **will have a 10% per (late) day penalty**.

Important Note: All students that wish to use Method 2 for their grading should send an email to the course instructor with title "**[ECE 325] Method 2**" and should include the name and ID number of the student.

Textbook

Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Addison Wesley, 2007.

Bibliography:

- T. Cormen, C. Leiserson, R. Rivest, C. Stein, "Introduction to Algorithms", 2003.
- S. Dasgupta, C. Papadimitriou, and U. Vazirani, "Algorithms", 2008.
- R. Johnsonbaugh, M. Schaefer, "Algorithms", 2004.
- J. Kleinberg and E. Tardos, "Algorithm Design", 2005.

- S. Baase, "Computer Algorithms: Introduction and Design Analysis", 1988.
- G. Brassard and P. Bratley, "Fundamentals of Algorithmics", 1996.

Academic Honesty: It is acceptable to work together in small groups for study, homework and laboratory assignments. However, work that you turn in under your name must be your own. Cheating will not be tolerated; neither during homework nor during exams.