Syllabus of CTIS 264 - Computer Algorithms
Department of Information Systems and Technologies
2024-2025 Spring

Credits: Bilkent 3, ECTS 5
Contact Hours: 3 hours of lecture per week
Prerequisite(s): CTIS152 and CTIS163
Course Coordinator: Erkan Uçar

Instructor: Erkan Uçar, room C210A, eucar@bilkent.edu.tr office hours: Mon.15:30,Tue.14:30,Thu.10:30

Textbooks:
Required: "Introduction to the Design and Analysis of Algorithms", Levitin, 3rd Edition, ©Pearson, 2012.
Reference: "Introduction to Algorithms", Cormen et.al., ©The MIT Press, 2001 or later editions.

Catalog Description
The analysis of algorithms and problem solving techniques. Major concepts including; sorting, searching, divide and conquer algorithms, dynamic programming, greedy algorithms, graph algorithms and string matching algorithms.

Assessment Methods:

Method	Count	%	
Midterm 1	1	25	In-class written exam.
Midterm 2	1	30	In-class written exam.
Final	1	40	In-class written exam.
Performance	1	5	In-class and Moodle participation.

Minimum Requirements to Qualify for the Final Exam:
Collect 15 points out of 60 points until final exam.

Course Learning Outcomes:

Outcome	Assessment	Program Outcome
Analyze both efficiency and complexity of algorithms and algorithm design techniques.	Midterm 1 Midterm 2 Final	(a)
Construct an algorithm under given memory and space constraints.	Midterm 1 Midterm 2 Final	(b)
Understand and apply well-known algorithms for problem solving.	Midterm 1 Midterm 2 Final	(a) (b)

Weekly Syllabus:

Week	Lecture
1	**Introduction to algorithms:** Syllabus, design & analysis, algorithmic problem solving, important problem types, fundamental data structures.
2	**Analysis of algorithms:** Asymptotic notation.
3	**Analysis of algorithms:** Mathematical analysis of nonrecursive and recursive algorithms.
4	**Brute force:** Sorting, string matching, closest pair algorithms.
5	**Exhaustive search:** TSP, knapsack, assignment algorithms. Graph traversal. MIDTERM1 (Mar.01.Sat.10:00)
6	**Decrease and conquer:** Decrease by a constant / constant factor. Variable size decrease. Partitioning.
7	No classes on Mar.10,11 **Divide and conquer:** Master theorem. Mergesort. Hoare's partitioning, quicksort.
8	**Divide and conquer:** Binary tree algorithms. Closest pair algorithm revisited.
9	**Transform and conquer:** Presorting, AVL trees, heapsort.
10	No classes on Mar.31/Apr.01 **Space and time trade-offs:** Sorting by counting. String search. MIDTERM2 (Apr.05.Sat.13:30)
11	**Space and time trade-offs:** Horspool's algorithm. Hashing.
12	**Dynamic programming:** Coin-row problem, coin-collecting by robot.
13	**Dynamic programming:** Knapsack - revisited. Memoization solution.
14	**Greedy technique:** Minimum spanning tree (MST), Prim's algorithm for MST. No classes on May.01,02
15	**Greedy technique:** Kruskal's algorithm for MST. Dijkstra's shortest path algorithm
16	Review. Classes end on May.13.Tue

FINAL: May 15 - 28 (date t.b.a.)

Grading Scale

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A  : 90.00 - 100.0    B+ : 80.00 - 84.99    C+ : 65.00 - 69.99    D+ : 50.00 - 54.99
A- : 85.00 - 89.99    B  : 75.00 - 79.99    C  : 60.00 - 64.99    D  : 45.00 - 49.99
                      B- : 70.00 - 74.99    C- : 55.00 - 59.99    F  :    0 - 44.99
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Online Course Evaluation

Course evaluation is a valuable source of feedback from the students to the department and the university which can greatly help improve teaching and learning. The greater the level of participation by the students, the more useful and statistically reliable observations and conclusions can be drawn from the evaluation results. Your honest and impartial comments about what works and what doesn't work in the course can help CTIS build on the parts of the course that are strong and improve those that are weak for the next group of students. The course evaluation also provides you the exclusive opportunity to make your opinion count on an important issue – the quality of teaching at CTIS. Please don't forget to complete the online course evaluation form for this course towards the end of the semester.

Academic Dishonesty

In light of its commitment to academic integrity, Bilkent University prohibits acts of misconduct and academic dishonesty. These include, but are not limited to, acts of cheating, plagiarism, and falsification of data, as defined below.

- *Cheating* occurs when an individual uses dishonesty or deception to receive or help others receive professional or academic credit for work she or he did not perform. Cheating includes, among other acts, misappropriation and / or development of the ideas, concepts, designs, or methodology of others without consent; use of materials or devices not permitted by the instructor during exams; taking an exam for another person; resubmitting work previously submitted elsewhere; copying previously published solutions to problems.
- *Plagiarism* is representing the work or ideas of another person as one's own. It frequently involves quoting, cutting / pasting or closely paraphrasing written language without appropriately citing the source of the material through the use of quotation marks, reference notes, or other methods of acknowledgement. An act of plagiarism may be unintentional, and to avoid unintentional plagiarism standard practices of citation should be followed. For detailed instructions regarding standard citation practices, see http://www.plagiarism.org
- *Falsification* is a deliberate misrepresentation in which information, whether in the form of data, written language, images or other media, is either altered or fabricated.

Ref: https://w3.bilkent.edu.tr/bilkent/policy-on-conflicts-of-interest-and-commitment-academic-integrity

Students' Responsibilities

- Come to class on time and prepared.
- Attend lectures & labs and participate in class discussions.
- Ask whatever you do not understand immediately (do not postpone) and make use of office hours.
- Submit all your work thru Moodle on time and with the required format.
- Do not be distracting in-class and keep your mobile devices in silent (no vibrating) mode.
- Read and apply the Academic Integrity Policy of the university.
- Study all course materials and instructor messages carefully.
- Do not use aliases in your emails, put your signature instead.

Instructor's Responsibilities:

- Come to class on time and prepared.
- Find effective ways to communicate course content to the students.
- Be responsive to student questions and encourage participation.
- Communicate all requirements to students very clearly and on time.
- Grade all exams as soon as possible and give clear feedback.
- Enforce the Academic Integrity Policy of the university.
- Treat all students respectfully and equally.