CS 3345.005.25F Data Structures and Foundations of Algorithmic Analysis
Fall 2025
Syllabus (Version 1)

Course Information

Course Number/Sections:	CS 3345.005.25F
Course Title:	Data Structures and Foundations of Algorithmic Analysis
Term:	Fall 2025
Days & Times:	Tuesday & Thursday: 1:00pm - 2:15pm & Make up time slots
Location:	ECSW 1.355

Professor Contact Information

Professor:	Dr. Yvo G. Desmedt
Office Phone:	(972) 883-4536 [1]
Email Address:	Yvo.Desmedt@UTDallas.edu **(not efficient: see further)**
Office Location:	ECSS 4.411
Office Hours:	Tuesday 2:30pm-3:30pm and by appointment (see further for details)

Grader/TA

Vijaya Sai Latha Pulipati VijayaSaiLatha.Pulipati@UTDallas.edu will be the grader in this course. Information about the TA will be provided later during the semester.

Course Prerequisites and/or Corequisite

- **Prerequisites**:
  - CE 2305 or CS 2305 or TE 2305 with a grade of C or better, and
  - CE 2336 or CS2 336 or TE 2336 with a grade of C or better, and
- **Prerequisite or Corequisite:**
  - CS 3341 or SE 3341 or ENGR 3341. (Same as CE 3345 and SE 3345 and TE 3345)
  - CS/CE/TE 2305 with a grade of C or better, and
  - Math 2414 or Math 2419.

Course Description

Analysis of algorithms including time complexity and Big-O notation. Analysis of stacks, queues, and trees, including B-trees. Heaps, hashing, and advanced sorting techniques. Disjoint sets and graphs. Course emphasizes design and implementation.

[1] This is no longer a real telephone, but has been replaced by MS Teams.

Course Goals and Objectives

Understanding data structures and algorithms, both from a computational complexity and programming viewpoint is an essential aspect of computer science.
The learning objectives include:

- Asymptotic notations, recurrences, algorithm analysis
- Lists, stacks, queues, hashing, priority queues
- Binary search trees, balanced binary search trees
- Graphs, depth-first search, topological ordering
- Breath-first search, Dijkstra's algorithm
- Algorithms of Prim and Kruskal, disjoint-set union find problem

Required Textbooks and Materials

Data Structures and Algorithm Analysis in Java, by Mark Allen Weiss, Published by Addison-Wesley, 2011, (Third Edition).

Grading Policy

The grade depends on the understanding of the material covered in class and on the correctness of answers to questions on quizzes and on homeworks.

homeworks:	2%
programming:	15%
first quiz:	25%
second quiz:	25%
third quiz (cumulative):	**33%**

All quizzes will be during class time. **Quiz 2 will be on November 18 and Quiz 3 on December 9.** The date of Quiz 1 will be announced well in advance.

Makeup quizzes will not be given except for documented emergencies or other extreme circumstances.

Your letter grade

Dynamic curving is used, which works as follows:

> at the end of the semester, all total grades, i.e., numbers, are sorted. The difference between the sorted grades is computed. The biggest differences are used as decide the grades, i.e., students whose total number grade is almost the same, end up with the same letter grade.

Advantages:

- if a student has 90.1% and another has 89.9%, they both end up with the same letter grade.
- if an exam is much harder than the instructor estimated, then all (most) students get lower grades. However, it has minimal impact on the letter grade of the students.
- the approach compensates automatically for having a lenient or tough grader.

Warning

Some of the questions and homeworks might be difficult. To compensate for this, the instructor does not require students to obtain 70% to get a C grade.

Students not doing well will receive an e-mail after the 1st quiz. Moreover, statistics about each quiz will be revealed to the students.

Course & Instructor Policies

Class attendance: students *must* attend class. Students who have a medical reason, or other valid emergency reason are exempt.

Besides the textbook, personal notes and other references are used during the class presentations. Although there is a significant overlap with the textbook most material will be presented in a didactic way, some different from the textbook. **Students who regularly attend class may do better on quizzes.**

e-mail:

UTD's move to Microsoft's Outlook, resulted in several complains from students. Microsoft states:

> Email messages in your Microsoft Outlook 2010 Inbox and other mail folders can be organized by date and arranged by Conversation. When Conversations is turned on, messages that share the same subject appear as Conversations that can be viewed expanded or collapsed. You can quickly review and act on messages or complete Conversations.

To turn this off (and get the by date option), see:

https://support.office.com/en-us/article/View-email-messages-by-conversation-0eeec76c-f59b-4834-98e6-05cfdfa9fb0

The instructor strongly recommends students to use the date option, i.e., turn Conversation off.

Homework and Programming Assignments:

- **assignments:** Homework and programming assignments may be given via eLearning or via e-mail.
- **returning assignments:** Whether students need to return assignments via eLearning or in-person in class, will be decided by the grader.
- **Late work policy:** Students who return their assignment too late will be penalized as follows:
  - If a student is late, but turns the solution to the assignment in before the start of the next class the student's grade will be multiplied with 0.9.
  - If a student waits longer, then the student receives no credit! The assignment will be corrected.

Academic Integrity

Copy-pasted code, even with variable name changes, is not acceptable.

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in the student's scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Academic Calendar: Draft

Day	Topic	Material
8/26	Syllabus & Introduction	
8/28	Discrete Math Review	**Rosen** & pp. 3-8,
9/2	Analysis of Algorithms	pp. 29-32, pp. 45-48
9/4	Linked List, Stacks, Queues	pp. 58-60, p. 76, 79, pp. 83-84, 85-87, p. 93
9/9	**Review Java**, Chapter 3	p. 61, 63, p. 95
9/11	Trees: binary & search	pp. 101-113, pp. 115-119
9/16	AVL Trees, Traversals	pp. 123-132, p. 145
9/18	B trees, B+ trees, Hashing	pp. 147-152, wikipedia, pp. 171-172, p. 174, p. 179, 188, 193
9/23	Hashing and Heaps	p. 195, 205 and l13a.pdf, pp. 225-232, 234-235
9/25	Leftist Heap, Binomial tree	Notes, pp. 240-245, p. 252
9/30	Binomial queues	pp. 253-259, p. 261
10/2	Insertion sort, Merge Sort	p. 272, pp. 282–284, p. 288 & **Rosen**
??/??*	Quiz 1	
10/9	Heap Sort, Quicksort & Lower Bounds	pp. 278–280, Notes, pp. 288-291, p. 294, pp. 302-304
10/14	External sorting & Graphs	pp. 316-317, pp. 359-361
10/16	Graphs, Topological Sort, Dijkstra Algorithm	pp. 359-364, **Rosen**
10/21	Shortest Path, Activity Graph	pp. 372-377, pp. 366-370, pp. 380-384
10/23	Pert Graph & Review	Notes
10/28	Network Flow & Prim's Algorithm	pp. 386-392, pp. 393-397
10/30	Depth First Search, Euler Circuits, NP	pp. 399-401, 406-409, Notes, pp. 415-416
11/4	Biconnectivity, Strong Components, Relations	pp. 402-404, 409-412, Notes
11/6	Disjoint Set Class, Kruskal, Techniques	pp. 331-341, pp. 397-399, p. 429, 448, 462, Notes, 474, 486
11/11	Huffman Codes	pp. 433-439
11/13	Fibonacci revised & Review	pp. 463-464
11/18	Quiz 2	
??/??^{M}	Multiplying Matrices & Backtracking (maze)	pp. 466-468, Notes
12/2	Suffix Arrays & Trees	pp. 560-566
12/4	Review	
12/9	Quiz 3	

Table 1: Schedule so far. **Rosen:** Discrete Mathematics and Its Applications, by author: Kenneth H. Rosen, Publisher: McGraw Hill, Eight edition. **Review Java:** https://www.geeksforgeeks.org/java/
*: the date of the quiz has not yet been finalized.
^{M}: the class will be moved to a date and time agreed by the students.

Recommendations

Related to:
Assignments: students are strongly encouraged to make as many homeworks and programs as possible. **Warning: Students copying other students homeworks and/or programs will be ill prepared for the quizzes**. To avoid this, students should make their own homework. This will also allow the TA/grader to figure out the progress (or lack) being made by the student.
Analysis of algorithms: The instructor expects the students to understand the material in depth. This is a very important part of this course.
Retaking the class: Students who are retaking this course should study *significantly more* than when taking this course the first time.

Class Recordings

Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly **prohibited from audio and video recording any part of this course**, except that snapshots of the blackboard, or of the screen, are allowed. Such snapshots may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these university requirements is a violation of the Student Code of Conduct.

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, A to Z Guide, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3, and in Title V, Rules on Student Services and Activities of the university's Handbook of Operating Procedures. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/882-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. The student is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Email Use

Due to massive spam Email is no longer an efficient way to communicate. Therefore, students are *discouraged* to e-mail the instructor. Better ways to communicate with the instructor, are during office hours.

Due to the massive spam, students sending e-mail should not expect an immediate reply. A reply may be given in class, or by e-mail typically *several days to a week* after the student sent the e-mail.

Moreover, email raises some issues concerning security and the identity of each individual in an email exchange. **The instructor considers email from students *only* if it originates from a UTD student account**. E-

mail sent from Gmail, Hotmail, etc., will likely bounce. UTD furnishes each student with a free email account that is to be used in all communication with university personnel.

Office Hours

Office hours will be held in-person. Note that office hours may be canceled occasionally.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's Handbook of Operating Procedures.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called *the respondent*). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the deal will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:

The University of Texas at Dallas, SU 22
PO Box 830688
Richardson, Texas 75083-0688
(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify the professor of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated. The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment. If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or the designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.