

CS 7301.007 Advanced Design and Analysis of Algorithms – Fall 2016
MW 10:00-11:15am

Instructor: D.T. Huynh

Office: ECSS 3.801

Office Hours: Mon/Wed. 11:15 – 12:15pm
(For an appointment please email huynh@utdallas.edu)

Teaching Assistant: TBA

Course Prerequisites: CS 5343 (Data Structures) or equivalent

Contents Description:

1. Introduction
(Algorithms, asymptotic notation, recurrence relations...)
2. Sorting and Order Statistics
(Heapsort, Quicksort, Median & Order Statistics...)
3. Algorithm Design Techniques
(Divide-and-Conquer, Dynamic Programming, Greedy technique...)
4. Algorithms Involving Sets and Sequences
(Binary Search Trees, Pattern Matching, Union-Find...)
5. Graph Algorithms
(Graph Search, Minimum-Cost Spanning Trees, Shortest Paths, Network Flows...)
6. Geometric Algorithms
(Basic geometric algorithms incl. Convex Hull, Closest Pairs ...)
7. Algebraic Algorithms
(Polynomials, Matrix Multiplication, Fast Fourier Transform...)
8. Linear Programming
(Simplex Method, Duality...)
9. NP-Completeness
(Polynomial-time reducibilities, NP-completeness, Cook's Theorem, NP-complete problems)

Course Description:

The study of efficient algorithms for various computational problems. Algorithm design techniques. Sorting, manipulation of data structures, graphs, matrix multiplication, and pattern matching. Complexity of algorithms, lower bounds, NP completeness. Prerequisite: CS 5343 (3-0) S

Course Objectives:

Asymptotic notations, recurrences, algorithm analysis. Divide and conquer algorithms. Greedy algorithms. Dynamic programming algorithms. Graph algorithms. Flow networks. NP-completeness.

Required Textbooks and Materials:

T. Cormen, C. Leiserson, R. Rivest & C. Stein.: “Introduction to Algorithms”, MIT Press, (3rd edition) 2009.

Copies of class notes, HW assignments and solutions will be uploaded on UTD **eLearning**

Suggested Further Reading Materials:

Sipser, M.: “Introduction to the Theory of Computation”, Thomas Course Technology, 2nd Edition, 2013.

Arora, S & Barak, B.: “Computational Complexity: A Modern Approach”, Cambridge University Press, 2009.

Vazirani, V.: “Approximation Algorithms”, Springer 2003.

Assignments and Academic Calendar/Grade Scale:

- Homework assignments 10%
(Solutions of HW problems will be posted on eLearning.)
(HW assignments are due in class on the date given. **Late HWs will not be accepted.** If you are not able to attend a class, you’re responsible for any announcements/handouts. HW assignments can be found on eLearning.)
- Exam #1 (85 minutes) 25% Wednesday, Oct. 5, 10:00 am
- Exam #2 (85 minutes) 30% Wednesday, Nov. 9, 10:00 am
- Exam #3 (120 minutes) 35% Monday, Dec. 12, 10:00 am (Tentative)

Course and Instructor Policies:

- No comprehensive final exam will be given. Students are required to have two photo IDs during the exams.
- Students are encouraged to discuss HW problems. However, your submission must be your own work. Anyone caught cheating on HWs will receive zero credit.
- If you decide to stop attending class, be sure to drop the course since you will not be dropped automatically.
- Any student wishing to contest a grade on a HW should contact the TA.
- Exams #1 and #2 will be returned to students after the grades are announced. Students have a window of 2 weeks to review their exams. Your request to re-grade your exam paper must be submitted in writing. After this 2-week period, no request for regarding will be considered.
- Exam #3 will be kept by the instructor for one semester. Anyone wishing to review his/her exam #3 can make an appointment with the instructor or see him during his OHs.
- All exams will be graded by the instructor. HWs will be graded by the TA.

Field Trip Policies

N/A

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, 972/883-6391).

Academic Integrity

The faculty expects from its student 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 his or her 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.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

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 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 dean 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.

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 SSB 3.200 in the Student Service Building. Office hours are Monday - Thursday, 8:00a.m. to 6:00p.m.; and Friday, 8:00a.m. to 5:00p.m.

The contact information for the Office of Disability Services is:

Office: SSB 3.200

The University of Texas at Dallas

800 W. Campbell Rd, SSB 32

Richardson, Texas 750803-0688

(972) 833-2098(voice or TTY)

Email: studentaccess@utdallas.edu

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 his or her professors of the need for such and 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.

Off-Campus Instruction and Course Activities

Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address given below. Additional information is available from the office of the school dean.

(<http://www.utdallas.edu/BusinessAffairs/Travel-Risk-Activities.htm>)

These descriptions and timelines are subject to change at the discretion of the Professor.