# **Course Syllabus**

|  | **Course** | CS4349-001 |
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| **Course Title** | Advanced Algorithm Design and Analysis |
| **Professor** | Ovidiu Daescu |
| **Term** | Spring 2021 |
| **Meetings** | 10:00-11:15Am, MW, Online (Modality 4) |

## Professor’s Contact Information

| **Office Phone** | 972-883-4196 |
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| **Other Phone** | Optional Phone Contact Number |
| **Office Location** | ECSS 4.708 |
| **Email Address** | daescu@utdallas.edu |
| **Office Hours** | W 12-1PM, on BlackBoard. Additional office hours by request. |
| **Other Information** | Course information (lecture notes, homeworks, announcements) will be posted on the public course webpage at: https://personal.utdallas.edu/~daescu/teaching.html |

## Course Modality and Expectations

| **Instructional Mode** | 4 (virtual at established day/time): <https://www.utdallas.edu/fall-2020/fall-2020-registration-information/> |
| --- | --- |
| **Course Platform** | BlackBoard Collaborate |
| **Expectations** | Learn for knowledge. |
| **Asynchronous Learning Guidelines** | Try to select asychronous instruction only if you cannot manage attending at established day/time for the course. If you chose to take the exams in asynchronous mode you should notify me 10 dys before the exam; I will conduct the exam one on one with you at an agreed time and your exam will have different problems from the one given in synchronous mode. For info about asynchronous learning see link at: <https://www.utdallas.edu/fall-2020/asynchronous-access-for-fall-2020/> |

**COVID-19 Guidelines and Resources**

The information contained in the link lists the University’s COVID-19 resources for students and instructors of record.

Please see <http://go.utdallas.edu/syllabus-policies>

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**Classroom Conduct Requirements Related to COVID-19**

UT Dallas requires that all students must wear a face covering that covers the nose and mouth in all university buildings and classrooms. To help protect the health and safety of students, instructors, and the University community, students who choose not to wear a face covering may not attend class in person but may attend a course remotely. Anyone attending class in person without a face covering will be asked to put one on or leave. Instructors may end the class if anyone present refuses to appropriately wear a face covering for the duration of class. Students should also be sure they are at least six feet away from their fellow students and faculty, and seated in a seat that is designated to ensure that distance. Students who either refuse to wear face coverings appropriately or to adhere to other social distancing protocols may face disciplinary action for [Student Code of Conduct](https://policy.utdallas.edu/utdsp5003) violations. Students who are unable to comply with the university policies including wearing a face covering should consult the [Comets United](https://www.utdallas.edu/fall-2020/) webpage for further instructions.

Students who have tested positive for COVID-19 or may have been exposed should not attend class in person and should instead follow required disclosure notifications as posted on the university’s website (see “[What should I do if I become sick](https://www.utdallas.edu/coronavirus/faq/#students)?” webpage)

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## Class Attendance

The University’s attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected regardless of modality. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes. These attendance requirements will not be used as part of grading (see Class Participation below for grading information).

In-person participation records may be used to assist the University or local public health authorities in performing COVID-19 occurrence monitoring. Please note – in-person attendance requires consistently adhering to University requirements, including wearing a face covering and other public safety requirements related to COVID-19, as presented in this syllabus. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](https://policy.utdallas.edu/utdsp5003).

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## Class Participation

## Regular class participation is expected regardless of course modality. Students who fail to participate in class regularly are inviting scholastic difficulty. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](https://policy.utdallas.edu/utdsp5003).

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**Class Recordings**

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings 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](https://policy.utdallas.edu/utdsp5003).

***NOTE: if the instructor records any part of the course, then the instructor will need to use the following syllabus statement:***

The instructor may record meetings of this course. Any recordings will be available to all students registered for this class as they are intended to supplement the classroom experience. Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings 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. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law. Failure to comply with these University requirements is a violation of the [Student Code of Conduct](https://policy.utdallas.edu/utdsp5003).

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**Class Materials**

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in 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](https://policy.utdallas.edu/utdsp5003).

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## General Course Information

| **Pre-requisites, Co-requisites, & other restrictions** | CS3305 with a grade of C or better and CS/SE/CE/TE 3345 |
| --- | --- |
| **Course Description** | Asymptomatic analysis, recurrences, and graph algorithms. Algorithm design techniques such as greedy method, dynamic programming, and divide-and-conquer. Issues from computational complexity. Course emphasizes a theoretical approach. |
| **Learning Outcomes** | |  | | --- | | See at the end. | |
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| **Required Texts & Materials** | Introduction to Algorithms, T.H. Cormen, C.E. Leiserson and R.L. Rivest, Third Edition, Mc Graw Hill. |
| **Suggested Texts, Readings, & Materials** | Additional material will be provided in class or posted on the class web site. |

## Assignments & Academic Calendar

*[Topics, Reading Assignments, Due Dates, Exam Dates]*

| **Insert Week Number OR Range of Dates for week** | Topics will be covered in the order below. Timeframe is variable so make sure you follow the lectures (TBD=to be determined) |
| --- | --- |
| TBD | Introduction, recurrences and Master Theorem (Chapters 2-4). |
| TBD | Iterative, Divide-and-Conquer and Prune-and-Search algorithms   * 1. Linear time median selection algorithm.   2. Convex hull and closest pair of points in the plane. |
| TBD | Dynamic Programming   * 1. Chapter 15 and   2. All pairs shortest paths (Chapter 25) and other optimal path problems.   3. 0/1-knapsack problem. |
| TBD | Greedy Method   * 1. Chapter 16 and   2. Minimum spanning tree (MST).   3. Shortest Paths. |
| TBD | Graph algorithms and applications (Chapters 22-25) |
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| Insert Exam Date(s), Time(s) |  |
| 03/08 | 10AM |
| 05/03 | 10AM |
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## Course Policies

| **Grading (credit) Criteria** | Homework: 20%, Midterm1 : 40%, Midterm 2: 40% |
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| **Make-up Exams** | If a student is unable to take the examinations on their scheduled dates, he/she should inform the instructor well in advance. Makeup examinations will be scheduled only if the student has a valid medical excuse |
| **Extra Credit** | Your final grade (Final1) will be based on your score in Homeworks, Midterm1, and Midterm2. If you are not happy with your performance you can take a comprehensive Final exam (Final2), during the final exam week, as scheduled by the University. In this case, your final grade will be calculated from the average of Final1 and Final2 |
| **Late Work** | All homeworks should be submitted by their due date in order to be considered for full credit.  Exceptions can be made for valid medical reasons. Late submissions are not permitted once the graded homework has been returned to students, or the solution to the homework has been provided (whichever is earlier). |
| **Special Assignments** | None |
| **Class Attendance** | Strongly encouraged |
| **Classroom Citizenship** | Learn for knowledge, be respectful of others. |
| **Comet Creed** | *This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:*  *“As a Comet, I pledge honesty, integrity, and service in all that I do.”* |
| **Academic Support Resources** | *The information contained in the following link lists the University’s academic support resources for all students.*  *Please go to* [*http://go.utdallas.edu/academic-support-resources*](http://go.utdallas.edu/academic-support-resources)*.* |
| **UT Dallas Syllabus Policies and Procedures** | *The information contained in the following link constitutes the University’s policies and procedures segment of the course syllabus.*  *Please go to* [*http://go.utdallas.edu/syllabus-policies*](http://go.utdallas.edu/syllabus-policies) *for these policies.* |

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| |  |  |  |  | | --- | --- | --- | --- | |  |  | **CS** |  | |  | **Class learning objectives** | **outcome** |  | |  | Ability to use asymptotic notations, solve recurrences, algorithm analysis  Ability to design, analyze and prove correctness of algorithms using D&C | a,e  a,c,e |  | |  | Ability to design, analyze and prove correctness of algorithms based on Greedy techniques | a,c,e,k |  | |  | Ability to design, analyze and prove correctness of algorithms based on Dynamic Programming techniques | a,c,e,k |  | |  |  |  |  | |  | Ability to design, analyze and prove correctness of graph algorithms | a,c,e |  | |  |  |  |  | |  |  |  |  | |  | **CS Outcomes**  (a) an ability to apply knowledge of mathematics, science, and engineering;  (b) an ability to design and conduct experiments as well as to analyze and interpret data;  (c) an ability to design a system, component, or process to meet desired needs;  (d) an ability to function on multidisciplinary teams;  (e) an ability to identify, formulate, and solve engineering problems;  (f) an understanding of professional and ethical responsibility;  (g) an ability to communicate effectively;  (h) the broad education necessary to understand the impact of engineering solutions  in a global/societal context  (i) a recognition of the need for and ability to engage in lifelong learning;  (j) a knowledge of contemporary issues; and,  (k) an ability to use the techniques, skills, and modern engineering tools necessary for  engineering practice |  | | |  |  |  |  | |  |  |  |

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The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.