

# CS 325H Analysis of Algorithms

4 credits

Winter 2019

OSU catalog course description including pre-requisites/co-requisites: Recurrence relations, combinatorics, recursive algorithms, proofs of correctness. **Prerequisites:** CS 261 and (MTH 232 or CS225)

**Instructor:** Julianne Schutfort

**Meeting:** TTh 12-1:20pm in Milam Hall 033

**Office:** KEC 1103

**Office Hours:** Posted on Canvas weekly

**E-mail:** [schutfoj@engr.oregonstate.edu](mailto:schutfoj@engr.oregonstate.edu)

**Textbook:** *Introduction to Algorithms* by Cormen, Leiserson, Rivest, Stein, 3<sup>rd</sup> Edition.

**Canvas:** Announcements, office hours, weekly homework assignments, group activities, readings and other course information will be placed on Canvas.

## **Course Content:**

- Analyzing algorithms for correctness and running time.
- Divide and Conquer and the use of recurrences to analyze recursive algorithms.
- Dynamic Programming
- Linear programming
- Graph Algorithms
- Complexity Classes
- Heuristics and Approximation Algorithms

## **Measureable Student Learning Outcomes:**

At the completion of this course, students will be able to:

1. Use  $O$ ,  $\Omega$ ,  $\Theta$  and simple recurrences to analyze time complexity of iterative and recursive algorithms.
2. Prove the correctness of algorithms.
3. Implement recursive, iterative and heuristic algorithms.
4. Prove that a problem is NP-complete using reductions.

## **Course Policies:**

**Incompletes** – There will rarely be cases where an incomplete is appropriate. I will only consider giving an incomplete grade for emergency cases such as a death in the family, major disease, or child birth, while also having a passing grade. If you have a situation that may prevent you from completing the coursework, let me know as soon as you can.

## **Grading:**

Scores for coursework items will be posted on Canvas as they are graded. Feedback will be provided when available. You will turn in all coursework items through **both** Canvas and TEACH **before 23:59 (TEACH server time, Pacific Time Zone)** on the date they are due (generally Sunday unless otherwise specified), be sure you give yourself an hour or more to submit coursework. To

receive a passing grade in this course you must demonstrate at least basic proficiency in each of the following course work item grading categories:

**Grade Evaluation:** Your course grade will be based on the following:

Homework	60%
Activities	20%
ICPC Problems/Presentation	20%
<b>TOTAL</b>	<b>100%</b>

**Homework:**

There are seven homework assignments that include both written and programming problems. Students can discuss the homework questions with each other but must independently write up a solution. Assignments are to be individually submitted in Canvas (written assignment) and TEACH (program code) **by 11:59pm** on the due date. A subset of the homework problems will be graded. Assignments that are not neatly written up using a word processor/text editor will not be graded.

**Activities:**

There are seven in-class activities. Activities will be completed in groups during class and are due at the end of class. Activities will be graded for correctness and students should come to class prepared.

**ICPC-based Problems & Presentations:**

Students will solve a minimum of four ICPC-style problems from the UVA's Online Judge site. You may work in pairs on the problems but however each person must turn in a copy of the problems solved. For each of the paradigms greedy, dynamic programming, and graph algorithms, you must solve at least one problem. Do not solve problems that were explicitly discussed in class. In addition to proof that you have submitted correct solutions to an online judge (e.g. screenshot of your user page showing correctly submitted solutions), you will prepare a written report that includes:

- the statement of the problem and a link to the online judge where it is hosted
- an explanation of your solution including clear and concise pseudocode.
- a proof or argument that your solution is correct
- an asymptotic analysis of the running time of your algorithm
- your code

You will give a presentation of your results the last week of class.

## **Grading Policies and Scale:**

- 1) Any requests for extensions/special accommodations must be made in advance, in writing (email).
- 2) Homework and Projects will be accepted up to 1 day late for a 10% penalty.
- 3) Any **disagreement in scoring** must be addressed within one week of the work being graded.

Note: Numerical scores will be rounded to the nearest integer

<b>Grade</b>	<b>Average</b>
<b>A</b>	<b>93 or greater</b>
<b>A-</b>	<b>90 - 92</b>
<b>B+</b>	<b>87 - 89</b>
<b>B</b>	<b>83 - 86</b>
<b>B-</b>	<b>80 - 82</b>
<b>C+</b>	<b>77 - 79</b>
<b>C</b>	<b>73 - 76</b>
<b>C-</b>	<b>70 - 72</b>
<b>D+</b>	<b>67 - 69</b>
<b>D</b>	<b>63 - 66</b>
<b>D-</b>	<b>60 - 62</b>
<b>F</b>	<b>less than 60</b>

**Students With Disabilities:** Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

## **Expectations for Student Conduct:**

**Academic Integrity:** Students in academic studies are expected to demonstrate their own knowledge and capabilities. This means that a student will be graded on the work that is clearly their own work and that additional materials will be excluded from consideration of the grading of that submission. Work that is not created by the student or cited by the student, but still submitted will be considered plagiarized material and may result in a failed submission and may result in administrative action.

- You May openly discuss the presented learning materials and participation category materials at any time with any party as long as they explicitly know that it is for an academic assignment,
- You May openly discuss the homework assignments after grading of the item is complete with any party as long as they explicitly know that it is an academic assignment and that the discussion is accompanied by an explanation of any materials presented,
- You MAY openly discuss the meaning of assignments, general approaches, and strategies with other students in the course; you may do this even before the grading date of the assignment has passed.
- You MAY use the Internet and other resources to research how to solve a problem, and you may share what you find for others in the course to learn from, but be sure to cite your sources!

- You **MUST** include a citation in the form of a comment in your source code to indicate the source of any help you received (otherwise you will be claiming that you authored the work, and that is unfair and possibly a misrepresentation of your own direct skills); you should do this even if the source is an instructor or TA. This basically means that a citation will save you from most situations that may get you in trouble with plagiarism, but that I will exclude any work by others from grading consideration,
- You **MUST** write your own code for your assignments; this means that you should take notes on anything you do with others and use your notes instead of any shared code when working on the assignments at hand. If you cite your sources, then instead of confronting you about possible plagiarism, we will grade you based on the work that you authored.

We may use plagiarism-detection software check your code against other code-bases, reduce the likelihood that we will use these tools by citing your sources and recreating the desired behavior by recreating the code you learn from (in the very least it will give you more practice)!

If you are found in violation of any of the above policies, whether you are the giver or the receiver of noncited help, you may be given a zero on the assignment, failed from the course, or receive higher administrative action. The academic dishonesty charge will be documented and sent to your school's dean and the Office of Student Conduct. The first offense may result in a warning; the second offense results in an academic dishonesty charge on your transcript, a disciplinary hearing, and possible expulsion.

**Classroom and online communication:** Students are expected to conduct themselves in a civil manner at all times through any communication media (voice, body language, email, discussion boards, classroom, tutoring sessions, etc.). Students will be expected to treat all others with the same respect as they would want afforded themselves. Disrespectful behavior to others (such as harassing behavior, personal insults, or inappropriate language) or disruptive behaviors (such as persistent and unreasonable demands for time and attention both in and out of the classroom) is unacceptable and can result in sanctions as defined by Oregon Administrative Rules [http://arcweb.sos.state.or.us/pages/rules/oars\\_500/oar\\_576/576\\_015.html](http://arcweb.sos.state.or.us/pages/rules/oars_500/oar_576/576_015.html).

### **Course Evaluation:**

**OSU Student Evaluation of Teaching** – Course evaluation results are extremely important and are used to help me improve this course and the learning experience of future students. Results from the multiple choice questions are tabulated anonymously and go directly to instructors and department heads. Student comments on the open-ended questions are compiled and confidentially forwarded to each instructor, per OSU procedures. The online Student Evaluation of Teaching form will be available toward the end of each term, and you will be sent instructions through ONID. You will login to “Student Online Services” to respond to the online questionnaire. The results on the form are anonymous and are not tabulated until after grades are posted.