Syllabus

CPTS350 Syllabus

WSU Catalog Description: 350 Design and Analysis of Algorithms 3 Course Prerequisite: CPT S 223 or 233, with a C or better; CPT S 317 with a C or better; admitted to the major or minor in Computer Science, Computer Engineering, Electrical Engineering, Software Engineering, or Data Analytics. Analysis of data structures and algorithms; computational complexity and design of efficient data-handling procedures.

Textbook and Reference:
Thomas H. Cormen, Charles E. Leiserson, Ron L. Rivest, and Clifford Stein, Introduction to Algorithms, third edition, 2009

Instructor: Zhe Dang, Associate Professor of EECS.
EME 135, 335-7238, zdang@wsu.edu

TAs: Mohammed Mustafa Hossain (m.hussain@wsu.edu) and Daoce Wang (daoce.wang@wsu.edu) (TAs dont have office hours)

Lectures: MWF 12:10--13:00. Click "Zoom" on the left panel to see the class meetings (use **passcode 157786** to join).

Midterm Exam: March 5

Final Exam: May 6, 1:00--4:00pm

Office hours (through zoom personal meeting with passcode **157786**.) T, T, 2:30--3:30pm and additional (bonus) office hours Sunday 12:00noon -- 4pm (may be earlier depending on the number of students seeking help). Please use the following information to join my personal Zoom Meeting during the office hours:

Important Note: Both internal and external WSU meeting attendees must be signed into Zoom to join the meeting.

Please refer to this guide on Joining WSU Zoom Meetings before trying to join the meeting:
https://confluence.esg.wsu.edu/display
/KB/Zoom+-+Joining+Meetings+and+Best+Practices

Join from PC, Mac, Linux, iOS, or Android: https://wsu.zoom.us
/j/6899130473?pwd=bVBNQlc3d3V6dThqWC9aR1FSMnJZUT09

Meeting ID: 689 913 0473
Passcode: 157786

Join from WSU Conference Room System (Polycom)

1. ***Using the touch panel, or remote control, select 'Place a Call'***
2. ***Enter the IP Address including periods: 162.255.37.11***
3. ***Press the pound key twice '##'***
4. ***Enter the Meeting ID: 689 913 0473***
5. ***Press 'Call'***
6. ***Enter Passcode: 157786***

Join from Conference Room System with SIP

6899130473@zoomcrc.com

Share Screen/Content Wirelessly

Go to https://share.zoom.us and enter Meeting ID: 689 913 0473

Phone Call (long distance)

+1 646 558 8656

+16465588656,,6899130473# US (One Tap Mobile Call)

Find your international phone number: https://wsu.zoom.us/u/ah7apR1ax

For technical support with WSU conference rooms, contact your local IT team

For support or feature requests, please go to https://its.wsu.edu/wsu-video-

conferencing-services/

Homework: There is one set of written homework per week (in most cases). Each set of homework involves design and/or analysis of algorithms and some of the homework problems are very difficult. Be prepared to spend a lot of time on homework. I will collect your solutions usually on Mondays just before the classes. Absolutely no late homework will be accepted (unless under special circumstances that are allowable by wsu policies like illness etc.) .

Project: **there is one implementation project that uses Python EDA package to do graph search. Make sure that you have a working Python environment installed on your computer at the beginning of the semester!**

Lecture Notes: Even though I put all the old notes online, you need still take your own notes. This is because I often add new materials and examples in this course. Y

Exams: both midterm and final exams are in-class. Make-up exams are only available under special circumstances that are allowable by wsu policies like illness etc.

Learning Outcomes

1. Understand fundamental techniques in designing algorithms and knowing how to analyze them. Course material covers advanced sorting algorithms, advanced graph algorithms, design techniques (divide and conquer, dynamic programming, greedy method), amortized analysis, intractibility, probabilistic algorithms, and other selected topics. 2. In particular, you will also learn how to put your ideas in a natural language (English) and in a mathematical language (symbols, formulas, etc.). I am going to use your hw solutions and exams/project to evaluate how much you have met the expected outcomes. In general, a C grade can be expected when you satisfactorily reach the outcomes.

Students should expect to spend a minimum of 9 hours per week for each online 3-credit course, engaged in the following types of activities: reading, listening to/viewing media, discussion, or conversation in the LMS or other academic technology, conducting research, completing assignments and reviewing instructor feedback, studying for and completing assessments, etc.

Weekly Topics(some topics take two weeks; I may also make

micro adjustments to topics):
1. What is an algorithm? Fundamentals
2. Worst-case and average time complexities
3. Comparison-based sorting: lower complexity bound
4. Quick_Select: complexity analysis
5. Optimal Sort: complexity analysis
6. Divide and conquer: Karatsuba algorithm and closest pair algorithm
7. Dynamic programming: LCS algorithm and a generalized LCS algorithm, applications in bioinformatics
8. Greedy algorithms: Huffman code and analysis
9. Amortized analysis: aggregate method, accounting method, potential method
10. Basic graph algorithms and analysis: DFS, BFS, topological sort, minimal spanning tree, shortest path
11. Advanced graph algorithms and applications: SCC, machines/programs as graphs, search over symbolic graphs
12. Number-theoretic algorithms: RSA and security protocols
13. NP-completeness, many-to-one reduction, SAT, 3SAT

All lectures will be recorded and all lecture notes will be uploaded.

Instructor Interaction

In addition to office hours, when it is possible, students can also call/text the instructor's cell phone number (**509-338-5089**) for immediate help on lectures, hws, etc. This is a theory course so person-to-person communication is essential if you have difficulties. Attendance is mandatory (at least you shall watch videos of each lecture).

COVID-19 Policy

Students are expected to abide by all current COVID-19 related university policies and public health directives, which could include wearing a cloth face covering, physically distancing, self-attestations, and sanitizing common use spaces. All current COVID-19 related university policies and public health directives are located at **https://wsu.edu/covid-19/**. Students who do not comply with these directives may be required to leave the classroom; in egregious or repetitive cases, students may be referred to the Center for Community Standards for university

disciplinary action.

Grading

Midterm (30%), Final (40%), HW and project (30%). I do not grade on curve. I do not mind if the entire class gets an A or the entire class fails. This is a theory course so it is extremely important not to miss any lectures. Here is the formula that I use to calculate your letter grade: A grade on the homeworks/project /exams is a rational number between 0 and 1. There are two exams: a midterm and a final. The course grade g is computed as h*0.3+m*0.3+f*0.4, where h, m, and f are, respectively, the grades for homeworks/project, the midterm, and the final. The final letter grade of the course is roughly assigned as follows:

Letter grade A when the g is in [0.9, 1];

Letter grade A- when the g is in [0.87, 0.9);

Letter grade B+ when the g is in [0.83, 0.87);

Letter grade B when the g is in [0.80,0.83);

Letter grade B- when the g is in [0.77,0.80);

Letter grade C+ when the g is in [0.73,0.77);

Letter grade C when the g is in [0.70,0.73);

Letter grade C- when the g is in [0.67,0.70);

Letter grade D+ when the g is in [0.63,0.67);

Letter grade D when the g is in [0.60,0.63); and,

Letter grade F when the g is less than 0.60.

Incomplete Grade Policy (Academic Rule 90h)

Incompletes are granted only with permission of the instructor and are subject to the following guidelines:

1. Students must request an incomplete in writing or by e-mail from the instructor before the end of the semester.
2. The request must be signed and dated by the student (or identified by student's e-mail address), and must explain the reasons behind the request for the incomplete.
3. In order to be considered for an incomplete, **there are two main conditions:**
    1. A student must complete a minimum amount of the assigned course work. Specifically, a student must complete 75 percent of the course

work.
2. A student must have a mathematical possibility of passing the class. A passing grade is 60 percent or above for the entire course.

4. If extraordinary circumstances (e.g., family emergency, serious illness) are involved and are documented to the instructor's satisfaction, the professor/ instructor retains the discretion to grant an incomplete even if the minimum conditions outlined in item 3 above are not met.

If an incomplete is granted, the standard WSU policy applies (i.e., ALL work must be completed within one full year from the end of the enrollment semester at issue, unless a shorter time is specified by the instructor. Otherwise, an automatic grade of "F," or failing, will be entered on the student's transcript).

Credit Hour Equivalent

Academic credit is a measure of the total minimum time commitment required of a typical student in a specific course. For the WSU semester system, one semester credit is assigned for a minimum of 45 hours of student effort. See Academic regulation 27.

Students should expect to spend a minimum of 9 hours per week for each online 3-credit course engaged in the following types of activities; reading, listening to/viewing media, discussion conversation in the LMS or other academic technology, conducting research, completing assignments and reviewing instructor feedback, studying for and completing assessments, etc.

The **Graduate Student Rights and Responsibilities** document describes procedures for channeling graduate student complaints, grievances, and concerns to faculty, staff and administrators for appropriate action. In conjunction with this document, graduate students must adhere to the Graduate School's Policies and Procedures available on the Graduate School's website: http://gradschool.wsu.edu /policies-procedures/. While these rights and responsibilities outline the complaint process, s tudents are encouraged to use the Graduate School Deans for guidance and advice on conflicts that may arise at any point during their course of study at the University. https://gradschool.wsu.edu/rights-and-responsibilities/

Academic Integrity

Academic integrity is the cornerstone of higher education. As such, **all members of the university community share responsibility for maintaining and promoting the principles of integrity in all activities, including academic integrity and honest scholarship.** Academic integrity will be strongly enforced in this course. Violation of WSU's Academic Integrity Policy (identified in Washington Administrative Code (WAC) 504-26-010(3) and -404) may result in penalties up to and including failing the assignment, exam, quiz, course requirement, or the course itself and students will not have the option to withdraw from the course pending an appeal, and will be reported to the Office of Community Standards.

Cheating includes, but is not limited to, plagiarism and unauthorized collaboration as defined in the Standards of Conduct for Students, WAC 504-26-010(3). You need to read and understand all of the definitions of cheating: http://app.leg.wa.gov/WAC/default.aspx?cite=504-26-010. If you have any questions about what is and is not allowed in this course, you should ask course instructors before proceeding.

Copyright

Any course-related materials, presentations, lectures, etc. are the instructor's intellectual property and may be protected by copyright. The use of University electronic resources for commercial purposes, including advertising to other students to buy notes, is a violation of WSU's computer abuses and theft policy (WAC 504-26-218). Selling class notes through commercial note taking services without written advance permission from the faculty, could be viewed as be as copyright infringement and/or academic integrity violation, WAC 504-26-010 (3)(a,b,c,i).

Academic Regulations

Students enrolled in online courses are subject to the same University academic regulations as on-campus students. For the most accurate and up to date information go to http://registrar.wsu.edu/academic-regulations/.

Discrimination and Harassment Policy

Discrimination, including discriminatory harassment, sexual harassment, and sexual misconduct (including stalking, intimate partner violence, and sexual violence) is prohibited at WSU (See Policy Prohibiting Discrimination, Discriminatory Harassment, Sexual Harassment, And Sex And Gender Based Violence (Executive Policy 15) and WSU Standards of Conduct for Students (Chapter 504-26 WAC).

If you feel you have experienced or have witnessed discriminatory conduct, you can contact the WSU Office of Civil Rights Compliance & Investigation (CRCI) and/or the WSU Title IX Coordinator at 509-335-8288 to discuss resources, including confidential resources, and reporting options. (Visit crci.wsu.edu for more information).

Most WSU employees, including faculty, who have information regarding sexual harassment or sexual misconduct are required to report the information to CRCI or a designated Title IX Coordinator or Liaison. (Visit crci.wsu.edu/reporting-requirements for more info).

Reasonable Accommodations

Students with Disabilities: Reasonable accommodations are available for students with documented disabilities or chronic medical or psychological conditions. If you have a disability and need accommodations to fully participate in this class, please visit your campus' Access Center/Services website to follow published procedures to request accommodations. Students may also contact their campus offices to

schedule an appointment with a Disability Specialist. All disability related accommodations are to be approved through the Access Center/Services on your campus. It is a university expectation that students visit with instructors (via email, Zoom, or in person) to discuss logistics within two weeks after they have officially requested their accommodations.

For more information contact a Disability Specialist on your home campus:

- WSU Global Campus, Pullman, Everett, Bremerton, Puyallup: 509-335-3417, Access Center, or email access.center@wsu.edu
- Spokane: 509-358-7816, Spokane Access Services, or email j.schneider@wsu.edu
- Tri-Cities: Tri-Cities Access Services or email g.hormel@wsu.edu
- Vancouver: 360-546-9238, Vancouver Access Center, or email van.access.center@wsu.edu

Accommodations for Religious Observances or Activities

Washington State University reasonably accommodates absences allowing for students to take holidays for reasons of faith or conscience or for organized activities conducted under the auspices of a religious denomination, church, or religious organization. Reasonable accommodation requires the student to coordinate with instructor on scheduling examinations or other activities necessary for course completion. Students requesting accommodation must provide written notification within the first two weeks of the beginning of the course and include specific dates for absences. Approved accommodations for absences will not adversely impact student grades. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the period of absence.

Safety and Emergency Notification

Classroom and campus safety are of paramount importance at Washington State University and are the shared responsibility of the entire campus population. WSU urges s tudents to follow the “Alert, Assess, Act,” protocol for all types of emergencies and the “Run, Hide, Fight” response for an active shooter incident. Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and ACT in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI’s Run, Hide, Fight video and visit the WSU safety portal.

Full details including campus-specific safety information can be found at https://provost.wsu.edu/classroom-safety/

Lauren's Promise

I will listen and believe you if someone is threatening you.

Lauren McCluskey, a 21-year-old honors student athlete, was murdered on Oct. 22, 2018, by a man she briefly dated on the University of Utah campus. We must all take actions to ensure that this never happens again.

If you are in immediate danger, call 911.

If you are experiencing sexual assault, domestic violence, and stalking, please report it to me and I will connect you to resources or call the National Alternatives to Violence at 877-334-2887 (24-hour crisis hotline).

Any form of sexual harassment or violence will not be excused or tolerated at Washington State University. WSU has instituted procedures to respond to violations of these laws and standards, programs aimed at the prevention of such conduct, and intervention on behalf of the victims.

- **National Resources for Domestic Violence, Sexual Assault, and Stalking:**
- **National Domestic Violence Hotline:** 1-800-799-SAFE and https://www.thehotline.org/help/
- **RAINN (Rape, Abuse & Incest National Network):** 1-800-656-HOPE (4673) and https://www.rainn.org/
- **Victim Connect Resource Center:** 1-855-484-2846 and https://victimconnect.org/
- **Love is Respect – National Dating Abuse Hotline:** 1 (866) 331- 9474
    - Text: 22522 and https://www.loveisrespect.org/
- **Anti-Violence Project Hotline:** 212-714-1141 and https://avp.org/get-help/