

CS-381: Introduction to the Analysis of Algorithms (Fall 2019)

Instructor: Professor Jeremiah Blocki (jblocki@purdue.edu)

Office: LWSN 1165

Lecture: 1:30 PM-2:20 PM at LILY G126 on Monday, Wednesday and Friday

Recommended Textbooks:

- Algorithm Design by J. Kleinberg, E. Tardos. Pearson Education. (Latest Edition)
- Introduction to Algorithms by T. Cormen, C. Leiserson, R. Rivest, and C. Stein, McGraw-Hill (Latest Edition)

Office Hours: TBD

Course Website: https://www.cs.purdue.edu/homes/jblocki/courses/381_Fall19/index.html

Teaching Assistant(s): TBD

Course Outline: The course gives a broad introduction to the design and analysis of algorithms. The course plans to follow the topics outlined below; changes and adjustments may be made during the semester. See the course website for updates.

Prerequisites: CS 251, CS 182

Requirements and Grading: Students should attend most of the classes and read the text. Some material on the exams may appear only in the text or only in class. There will be one midterm exam and one final exam. There will be six to seven homeworks. Homeworks must be formatted using a word processor (preferably, Latex). The percentage of the total course grade are:

- **Clicker Participation: 5%**
 - You are expected to have your own clicker and have it registered on Blackboard by the first lecture.
 - Clickers will be used in class on a weekly basis. The two lowest clicker scores throughout the semester will be dropped.
 - ***There are no makeup options for missed clicker questions.*** It is your responsibility to attend every lecture and bring your registered clicker to class in order to get credit for clicker questions.
- **Homework: 20%**
 - There will be between 6 to 10 homework assignments. Homeworks must be submitted via Blackboard before the stated deadline.
 - Students are expected to type their assignments using LaTeX, Microsoft Word or another editor of comparable quality. Submitted files should be Acrobat (.pdf) files (no .docx, .rtf, .txt, .html, etc). There are multiple tools online to convert files to .pdf.
 - If you would like to include a hand drawn figure in your solutions it is your responsibility to scan the figure and include it in your pdf.
 - We will only grade the latest file you upload. We recommend that you double check to ensure that the .pdf file was uploaded properly.

Late Homework The following penalties apply for late homeworks:

- Late reports turned in within 24 hours of the deadline will receive a 10-point penalty e.g., if you received 82 (out of 100) points then your final score for the assignment would be 72.
 - Reports turned in 24 hours late, but within 48 hours of the deadline will receive a 25-point penalty e.g., if you received 96 (out of 100) points then your final score for the assignment would be 71.
 - Homeworks turned in more than two days after the deadline will not be accepted and will be counted as a zero.
 - The official submission time will be determined by the Gradescope server's we recommend submitting at least *15 minutes* before the deadline.
 - We cannot revert a late-submission to an earlier version.
- **Midterms: (40%=20%+20%)**
 - There will be two evening midterms, each accounting for 20% of the overall course grade. Both midterms will be 90 minutes and are closed book (no books, no laptops, no cell phones, no smart watches, no calculators, etc...).
 - You are allowed to prepare one single-sided A4 page of hand-written notes for each midterm.
 - Each midterm will cover a subset of the course lectures, which will be announced in advance.
 - Dates, times and locations will be announced on the course website.
- **Final Exam: 35%**
 - There will be a cumulative final exam covering material from the whole course. The date and time of the final exam is set by the university and not by the course instructor. It could be scheduled on the very last day of the finals week. Do not make travel plans before the final exam schedule is released.
 - The final is closed book (no books, no laptops, no cell phones, no calculators etc...). You are allowed to prepare one double-sided A4 hand-written page of notes for the final exam.
 - Taking the final exam is a requirement for passing the course.

Summary Note: There will be no makeup for any exams, unless in conformity with university policy.

Grading and Regrading: For a re-grade on homework or an exam you may submit a regrade request on Gradescope. The request will be automatically directed to the TA (or instructor) who graded that question. You must submit the re-grade request 14 days from the date when the assignment was returned. There will be no re-grading after this period.

- Re-grade requests should only be submitted when you are confident that the grader made a mistake miss-understood your solution. Regrade requests deemed to be excessive/frivolous may result in a one-point penalty.
 - When making a regrade request you should clearly explain what you think the grader missed (the explanation is *not* an opportunity to expand upon the answer you already submitted).

- We generally recommend that you talk with a TA or with a classmate before submitting a regrade request.
- A re-grade request may mean that the entire assignment/exam may be re-evaluated. Scores may go up or down.
- Please be patient while waiting for a TA to re-grade an assignment.
- If you disagree with the result of a re-grade request you may appeal to the course instructor.
 - If the instructor agrees with you then you will automatically receive a 2-point bonus for your trouble.
 - If the instructor agrees with the TA (the most common outcome) then you will automatically receive a 2-point penalty.

Homeworks and Exams

Homework Assignments: There will be weekly or biweekly problem sets. Assignments will be generally due at 11:59 PM on the posted deadline. You are responsible to complete the entire homework assignment. The assignments will be posted on the course web page. You must turn in a digital copy of your homework assignment on Gradescope.

Your solutions should be *typed* in any text editor you prefer (LaTeX, Word, etc). You will find pointers on LaTeX on the class website. We will use blackboard for submission and evaluation of homework problems. Write your solutions as succinctly as possible while including all the necessary details. Please ask your questions on piazza.com (<https://piazza.com/purdue/fall2019/cs381/home>) and answer your classmate's questions. Students with exceptional participation on Piazza (asking good questions and providing good answers) may receive a small bonus (up to 0.5%) added their clicker participation score.

Some assignments might have an optional problem. The optional problem does not count towards your score, unless your grade will be a borderline case.

If you don't know the answer to a question you will receive 15% of the grade for the problem if you admit it up-front by writing "I don't know how to solve this problem" and nothing else. If your solution is wrong, you get a score of 0 for that problem. This option does not apply to optional problems.

Collaboration Policy: You may collaborate on your homework with your colleagues *from the class*, however you *must* write down the solutions *yourself*, and you must *completely understand* any solutions you submit. *No other sources are allowed and violations will be penalized according to Purdue's integrity policies.* Do not copy another student's homework and do not allow another student copy your homework. Turning in a solution that you could not explain to the instructor is considered cheating.

Discussions with other students should be appropriately acknowledged as follows. Every problem on an assignment must include a Collaborators and Resources (CR) statement: This means every problem on every assignment includes information on collaboration and the use of on-line material. Help from a TA or course instructor does not count as collaboration. The CR statement for each problem should include the following

- Names of students enrolled in the course who collaborated on the problem: Name1,Name2,...
- Names of students not enrolled who provided help: Name1, Name2
- Name of tutor (if applicable):
- On-Line resources consulted and used: URLs (one per line).
- State “none” if there are no resources to cite.
- Problems that do NOT include a CR statement will not be graded.

We expand on homework submission guidelines and grading:

- Assignments are graded for correctness, clarity, conciseness, rigor and efficiency.
- Please use pseudocode to describe an algorithm instead of code from a programming language. Remember: The target audience (grader/TA) is a human and not a compiler!
- Describe your solution in steps. When appropriate include an example to help describe your algorithm.
- Start by describing your main idea and the intuition for your solution.
- When using algorithms and data-structures presented in class describe differences and any adjustments to be done (if any). There is no need to reproduce material seen in class.
- When using material from other sources you must use your own words; DO NOT COPY AND PASTE; clearly cite every source you use.
- When presenting an algorithm, it is generally expected that you will
 - Prove that the algorithm is correct
 - Describe the time complexity (and/or space complexity when relevant) of every major step/task.
 - Analyze the overall time (and/or space complexity).
- Formatting Guidelines: submissions should use a font size of at least 11 points.
- Submission on Gradescope:
 - Gradescope will ask you to highlight the appropriate region of the PDF document for each question. It is your responsibility to highlight the correct region for each question (Failure to comply may result in a penalty).
 - We recommend submitting 15 minutes before the deadline to avoid late penalties.

Missing or Late Work: Homework is due at 11:59PM on the given due date. The late policy for homework is described above (0 to 23.99 hours late = 10 point penalty; 24 to 48 hours late = 25 point penalty; >48 hours late = no credit).

The score for a missed exam is 0. Exceptions will be made to the above policies in case of serious illness or bereavement. If a student has a planned absence for a class when an exam will be given, the student should make arrangement before the planned absence to take the exam early or take a makeup exam after returning to campus.

Academic Integrity

Behavior consistent with cheating, copying, and academic dishonesty is not tolerated. Depending on the severity, this may result in a zero score on the assignment or exam, and could result in a failing grade for the class or even expulsion. Purdue prohibits “dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty.” (Part 5, Section III-B-2-a, University Regulations) Furthermore, the University Senate has stipulated that “the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest.” (University Senate Document 7218, December 15, 1972). You are expected to read both Purdue’s guide to academic integrity (http://www.purdue.edu/purdue/about/integrity_statement.html) and Prof. Gene’s Spafford’s guide (<http://spaf.cerias.purdue.edu/integrity.html>) as well. You are responsible for understanding their contents and how it applies to this class.

Exams: Exams are closed book. You may not use calculators, cell phones, smart watches, computers, cameras, radios, televisions, books, Morse code, signals or sign language during exams. Do not look at other student’s exams or let others see your exam while the exam is in progress. Communicate only with the instructor (or TA) during an exam.

Posting Class Material: Posting material associated with this class (e.g., solutions to homework sets or exams) without the written permission of the instructor is forbidden and may be a violation of copyright.

Purdue’s Honor Pledge: As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.

<https://www.purdue.edu/provost/teachinglearning/honor-pledge.html>

Examples of Academic Dishonesty: Examples of academic dishonesty include (but are not limited to):

- Failing to acknowledge a resource/collaborator on a homework assignment.
- Submitting a homework solution which you do not understand (could not explain to a TA/Professor) or which is not written entirely in your own words
- Copying another homework solution or allowing another student to copy your solution
- During an Exam:
 - Looking at other student’s exam or letting another student look at your test
 - Using any electronics (laptops, phone, smart watch, calculator etc...)
- Giving your clicker to another student from class to make it appear that you are in lecture while you are absent (or intentionally using another student’s clicker to make it appear that they attended lecture while absent).

Attendance

Students are expected to be present for every meeting of the classes in which they are enrolled. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts or absences can be anticipated, such as for many University sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible and plan to make up for missed work.

Grief Absence Policy: Purdue University recognizes that a time of bereavement is very difficult for a student. The University therefore provides the following rights to students facing the loss of a family member through the Grief Absence Policy for Students (GAPS). According to GAPS Policy, students will be excused for funeral leave and given the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for missed assignments or assessments in the event of the death of a member of the student's family.

Course Policies

Announcements: Course announcements will be made in class and/or on the Piazza discussion board. You are expected to check the Piazza discussion board regularly for information related to the class.

Piazza Discussion Forum: There will be a discussion forum on Piazza; You are expected to be courteous, respectful, and professional when posting at the discussion forum.

- Piazza is intended for clarification questions of general interest. If you have a general clarification question about a homework assignment or lecture this is the right place to ask.
- If you are not sure whether a posting is appropriate make sure it is private i.e., if you are asking for instructor feedback about a (partial) solution to a homework problem the question should be private.
- Do not use Piazza to post answers to assignments or detailed descriptions of solutions!
- Piazza is not the forum for complaints about an assignment, exam or the class (Please bring any concerns to the attention of the professor).

Conduct and Courtesy: Students are expected to maintain a professional and respectful classroom environment. This includes: silencing cellular phones, arriving on time for class, speaking respectfully to others and participating in class discussion. You may use non-disruptive personal electronics for the purpose class participation (e.g., taking notes).

Correspondence with the instructor: The best way to correspond in this class is by emailing the instructor. Please prefix all course-related emails with the string "CS-381:" to help filter email. The instructor will make every effort to answer promptly (within 48 hours). However, replies could be delayed due to circumstances outside the instructor's control.

Students with Disabilities: Purdue University is required to respond to the needs of the students with disabilities as outlined in both the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 through the provision of auxiliary aids and services that allow a student with a disability to fully access and participate in the programs, services, and activities at Purdue University. If you have a

disability that requires special academic accommodation, please make an appointment to speak with the instructor within the first three (3) weeks of the semester in order to discuss any adjustments.

It is the student's responsibility to notify the Disability Resource Center (<http://www.purdue.edu/drc>) of an impairment/condition that may require accommodations and/or classroom modifications. We cannot arrange special accommodations without confirmation from the Disability Resource Center.

Instructor absence: The instructor will be away for a few classes. Video lectures may be used to supplement missing class periods. If we need to reschedule additional classes, we will do so on an as-needed basis. Our plan is to use video lectures to supplement for any missing class periods.

Emergencies: In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website and/or announced via email. You are expected to read your purdue.edu email on a frequent basis.

Emergency Preparedness: Emergency notification procedures are based on a simple concept: If you hear an alarm inside, proceed outside. If you hear a siren outside, proceed inside. Indoor Fire Alarms are meant to stop class or research and immediately evacuate the building. Proceed to your Emergency Assembly Area away from building doors. Remain outside until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave. All Hazards Outdoor Emergency Warning sirens mean to immediately seek shelter (Shelter in Place) in a safe location within the closest building. "Shelter in place" means seeking immediate shelter inside a building or University residence. This course of action may need to be taken during a tornado, a civil disturbance including a shooting or release of hazardous materials in the outside air. Once safely inside, find out more details about the emergency. Remain in place until police, fire, or other emergency response personnel provide additional guidance or tell you it is safe to leave. In both cases, you should seek additional clarifying information by all means possible: Purdue Home page, email alert, TV, radio, etc. Review the Purdue Emergency Warning Notification System multi-communication layers at http://www.purdue.edu/ehps/emergency_preparedness/warning-system.html. Please review the Emergency Response Procedures at https://www.purdue.edu/emergency_preparedness/flipchart/index.html. Please review the evacuation routes, exit points, emergency assembly area and shelter in place procedures and locations for our building. Video resources include a 20-minute active shooter awareness video that illustrates what to look for and how to prepare and react to this type of incident. See <http://www.purdue.edu/securepurdue/police/video/>

Violent Behavior Policy: Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.

CAPS Information: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and <http://www.purdue.edu/caps/> during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

Nondiscrimination: Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Executive Memorandum No. D-1, which provides specific contractual rights and remedies.

Privacy: The Federal Educational Records Privacy Act (FERPA) protects information about students, such as grades. If you apply for a job and wish to use the instructor as a reference, you should tell the instructor beforehand. Otherwise, the instructor cannot say anything about you to a prospective employer who might call. The instructor is happy to provide references and to write letters of recommendation for his students as needed.

Changes to the syllabus: This syllabus is subject to change. Updates will be posted and dated on the course website.