Course Name: Data Structures
Course Number: CS 261 (Section 400)
Credits: 4
Instructor names: Laurel Hopkins
Instructor emails: hopkilau@oregonstate.edu

Course Description
Abstract data types, dynamic arrays, linked lists, trees and graphs, binary search trees, hash tables, storage management, complexity analysis of data structures. Lec/rec.
Prerequisites: (CS 162 with C or better or CS 165 with C or better) and (CS 225 [C] or MTH 231 [C])

Course Format
This course will be delivered via Canvas, Slack, and Piazza, your online learning community, where you will interact with your classmates and with the instructor and TAs. Within the course site you will access the learning materials, tutorials, and syllabus; discuss issues; submit assignments; and take exams.
- **Slack channel:**
  Workspace: class-cs261-400-w20
  Login URL: https://oregonstate.enterprise.slack.com/
- **Piazza forum**:
  https://piazza.com/oregonstate/winter2020/datastructurescs_261_400_w2020
- To preview how an online course works, visit the Ecampus course demo:
  https://ecampus.oregonstate.edu/course-demo/

Communication
All office hours will be held over Slack. Slack may also be used to informally discuss class material with students and the instructional team. However, please post all course-related questions on our Piazza forum so that the whole class may benefit from our conversations.

Please contact the instructors privately for matters of a personal nature. We will do our best to reply to course-related questions within 48 hours (responses may take longer over the weekend). We will strive to return your assignments and grades for course activities to you within 7 days of the due date.

Course Credits
This course combines approximately 120 hours of instruction, online activities, and assignments for 4 credits.

Technical Assistance

If you experience errors or problems while in your online course, contact 24-7 Canvas Support through the Help link within Canvas. If you experience computer difficulties, need help downloading a browser or plug-in, or need help logging into a course, contact the IS Service Desk for assistance. You can call (541) 737-8787 or visit the IS Service Desk online: https://oregonstate.teamdynamix.com/TDClient/Requests/ServiceDet?ID=22911

Course Learning Objectives

At the completion of the course, students will be able to...

1. **Describe** the properties, interfaces, and behaviors of basic abstract data types, such as collection, bag, indexed collection, sorted collection, stack, and queue.
2. **Read** an algorithm or program code segment that contains iterative constructs and **analyze** the asymptotic time complexity of the algorithm or code segment.
3. **State** the asymptotic time complexity of the fundamental operations associated with a variety of data structures, such as vector, linked list, tree, and heap.
4. **Recall** the space utilization of common data structures in terms of the long-term storage needed to maintain the structure, as well as the short-term memory requirements of fundamental operations, such as sorting.
5. **Design** and **implement** general-purpose, reusable data structures that implement one or more abstractions.
6. **Compare** and **contrast** the operation of common data structures (such as linear structures, priority queues, tree structures, hash tables, maps, and graphs) in terms of time complexity, space utilization, and the abstract data types they implement.

Learning Resources

There is no required textbook for this course. Reading and learning materials are provided via Canvas. However, you may wish to reference the optional textbook listed below.

- **Optional C reference book**: "The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie or *Any reference book to C programming language*

Evaluation of Student Performance

Scores for worksheets, programming assignments, and exams will be posted on Canvas as they are graded. If you want to know your grade, use the following weights.

- 1% – Syllabus Quiz
- 15% – Worksheets
- 29% – Programming Assignments
- 25% – Midterm
- 30% – Final

Worksheets (15%)

Each week, you will be given 2-8 worksheets to complete in a group setting through online discussion. These worksheets are very important to your understanding of the material and often contain additional reading material as well as exercises (problems, coding, etc.).

The purpose of these worksheets is to enhance the lectures using hands-on learning. In most cases, completion of the worksheet will be the first step of the upcoming assignment. Worksheets are designed to be finished in 1-2 hours.

Worksheets are graded primarily based on participation and effort, rather than correctness. If you have made a reasonable effort to complete a worksheet (evidenced by the minutes that your group will submit on Canvas) you will receive full credit for it. **You are responsible for joining a worksheet group by yourself on Canvas**.

Please refer to *Week 1 Individual Worksheet* under the Assignments Tab on Canvas for instructions on joining a group.

Please remember that if your group doesn't submit the minutes on Canvas, you will not receive any grade for it.

Completing the worksheets within groups is truly rewarding. Solving the worksheet problems together often helps the students to learn how to work in teams. You may find yourself involved in group work not only in later courses you take in this program but also in the career you chose in future. Put your best effort to make the teamwork successful.

Programming Assignments (29%)
There are a total of 5 programming assignments to be completed for this course.
- Assignments include writing a computer program and sometimes written answers to questions.
- Assignments are to be turned in **before 23:59** on the date they are due.
- Programs are evaluated on how well they solve the assigned problem (adhering to program specification), as well as the proper formatting and use of comments.
- **Programming assignments must compile on FLIP server. You will not receive any grade if your assignment doesn't compile there.**
- You must turn in your assignments through both the Canvas and TEACH website. 15% of the grade will be deducted if you do not submit it to both sites. When resubmitting an assignment, you must resubmit **all files** to both Canvas and TEACH. 15% of the grade will be deducted if you do not resubmit all files to both sites.
- Files must be submitted **unzipped** on both Canvas and TEACH
- If you have a problem with an assignment grade, you must contact the teaching assistant who graded your assignment, through EMAIL within **one week** of receiving your grade. No grade will be updated after that period. **Please note that, near the end of the term, there may not be a full week between when your assignment is returned and the last day of the term. We may not be able to address grading concerns after the term has ended.**

Exams (55% Total)
- There are 2 total exams for this course.
- The midterm is given in **Week 6** and the final in **Week 11**. Please check the actual dates provided in **Course Content** section of this document, or on Canvas. You will

have a 5-day time window to take each exam. No extension will be allowed outside those windows.

- Exams only test knowledge of the course material, not Stack Overflow or anywhere else on the Internet
- The midterm and final are both designed to take 110 minutes maximum.
- **Exams must be submitted only to Canvas**.
- For some exam questions, you will be given the option of uploading your answer as a PDF. If the upload fails, you must ask your exam proctor to send the PDF(s) to the instructor by email. You must destroy the PDF(s) after the submission. Besides Canvas, you may not access websites during exams.

Letter Grade
We will use the following grading structure to calculate your final grade.

Grade	Percent Range
A	92.6 to 100
A-	89.6 to 92.5
B+	86.6 to 89.5
B	82.6 to 86.5
B-	79.6 to 82.5
C+	76.6 to 79.5
C	72.6 to 76.5
C-	69.6 to 72.5
D+	66.6 to 69.5
D	62.6 to 66.5
D-	59.6 to 62.5
F	59.5 or below

**REMINDER: A passing grade for core classes in CS is a C or above. A C- (below 72.6) is not a passing grade for CS majors.

Course Policies

Late Work Policy
You can turn in one assignment late (up to 2 days) without any penalty. 15% deduction for each day late policy will be applied to your second late submission and so forth. Any assignment that is submitted after the 48 hours late window will not be graded, hence you will receive 0 points.

Makeup Exams
Preparing makeup exams requires a significant effort on the part of the instructor. Consequently, makeup exams will not routinely be given. Makeup exams will be given only for missed exams excused in advance by the instructor. For missed exams that can be anticipated ahead of exam time, advance permission from the instructor to miss the exam

will be necessary. Excused absences will not be given for airline reservations, routine illness (colds, flu, stomach aches), or other common ailments. Excused absences will generally not be given after the absence has occurred, except under very unusual circumstances. Regrades of exams will be performed when there is an error and the student requests it. All requests for regrading must be made within 3 class days of the day the exam is returned. After that period of time, grades will be fixed and will not be changed.

(Writing attribution: BB 450 instructor Kevin Ahern)

Incompletes

In this online program, there will rarely be cases where an incomplete is appropriate. The instructor 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 completed at least 60% of all coursework. If you have a situation that may prevent you from completing the coursework, let the instructor know as soon as you can.

(Writing attribution: CS 162 instructor Joseph Jess)

Proctored Exams

This course requires that you take the 2 exams under the supervision of an approved proctor. ProctorU is an allowed option for this course. It is entirely **your responsibility** to secure and schedule a proctor before the exam due date. It is very important to submit your proctoring request as early as possible to avoid delays. Please remember that late exams will not be allowed due to not having scheduled a proctor early enough. Registration for proctored exams is available online and there is generally a small fee associated with exam proctoring.

- **More information about proctoring**: https://ecampus.oregonstate.edu/services/proctoring/
- Assistance with proctoring: ecampustesting@oregonstate.edu or 541-737-9281

Guidelines for a Productive and Effective Online Classroom

Students are expected to conduct themselves in the course (e.g., on discussion boards, email) in compliance with the university's regulations regarding civility. Civility is an essential ingredient for academic discourse. All communications for this course should be conducted constructively, civilly, and respectfully. Differences in beliefs, opinions, and approaches are to be expected. In all you say and do for this course, be professional. Please bring any communications you believe to be in violation of this class policy to the attention of your instructor.

Active interaction with peers and your instructor is essential to success in this online course, paying particular attention to the following:

- Unless indicated otherwise, please complete the readings and view other instructional materials for each week before participating in the discussion board.
- Read your posts carefully before submitting them.
- Be respectful of others and their opinions, valuing diversity in backgrounds, abilities, and experiences.

- Challenging the ideas held by others is an integral aspect of critical thinking and the academic process. Please word your responses carefully, and recognize that others are expected to challenge your ideas. A positive atmosphere of healthy debate is encouraged.

Statement Regarding Students with Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval, please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Expectations for Student Conduct

Student conduct is governed by the university's policies, as explained in the Student Conduct Code. Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the university's regulations regarding civility.

Academic Integrity

Students are expected to comply with all regulations pertaining to academic honesty. For further information, visit Student Conduct and Community Standards, or contact the office of Student Conduct and Mediation at 541-737-3656.

OAR 576-015-0020 (2) Academic or Scholarly Dishonesty:
a) Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another.
b) It includes:
   i) CHEATING - use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.
   ii) FABRICATION - falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.
   iii) ASSISTING - helping another commit an act of academic dishonesty. This includes but is not limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any means, including misuse of an electronic device. It is a

violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).

iv) TAMPERING - altering or interfering with evaluation instruments or documents.

v) PLAGIARISM - representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it as one's own.

c) Academic Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another. For further information, visit Avoiding Academic Dishonesty, or contact the office of Student Conduct and Mediation at 541-737-3656. The following two policies apply here:

- OSU policy: https://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/code-of-student-conduct-102218.pdf
- College of Engineering policy: http://engineering.oregonstate.edu/undergraduate-policy-manual#honesty

Additionally, programming assignments in this course are considered Take Home Programming Tests. You must do your own work, entirely.

- You MAY discuss the meaning of assignments, general approaches, and strategies with other students in the course.
- You MAY NOT send the TAs or instructors your code expecting them to debug or fix your code.
- You MAY show your code to the TAs or instructors during office hours for high-level feedback and assistance with debugging.
- You MAY use the Internet to research how to solve a problem.
- You MUST include a citation in the form of a comment in your source code to indicate the source of any help you received (except the TAs).
- You MUST ALSO include a citation if you collaborated with any other student in anyway (both the giver and receiver).
- You MAY share pseudocode, or documentation of any kind with any other student in the course. But you have to mention the name of the collaborator.
- You MAY NOT show your assignment code to another student in the course for any reason.
- You MAY NOT ask another student for help debugging your assignment code.
- You MAY NOT use or copy code from any other source, including the Internet.
- You MUST write your own code for your assignments.

(Adapted from statements provided by Dr.Ronald Metoyer, CS)

Conduct in This Online Classroom

Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the university's regulations regarding civility (http://oregonstate.edu/admin/stucon/regs.htm). 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, inappropriate language) or disruptive behaviors in the course (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 Division 015 Student Conduct Regulations (http://oregonstate.edu/studentconduct/code/index.php).

(Adapted from statements provided by BeckyWarner, SOC)

Ground Rules for Online Communication & Participation

- *Online threaded discussions* are public messages, and all writings in this area will be viewable by the entire class or assigned group members. If you prefer that only the instructor sees your communication, send it to me by email, and be sure to identify yourself and the class.
- Posting of personal contact information is discouraged (e.g. telephone numbers, address, personal website address).
- *Online Instructor Response Policy*: We will check email frequently and will try to respond to course-related questions within 48 hours (responses may take longer over the weekend).
- *Observation of "Netiquette"*: All your online communications need to be composed with fairness, honesty, and tact. Spelling and grammar are very important in an online course. What you put into an online course reflects on your level of professionalism.
- Here are a couple of references that discuss
  - writing online: http://goto.intwg.com/
  - netiquette: http://www.albion.com/netiquette/corerules.html
- Please check the Announcements area and the course syllabus before you ask general course "housekeeping" questions (i.e. how do I submit assignment 3?). If you don't see your answer there, then please contact the instructor.

(Adapted from Jean Mandernach, PSY)

Guidelines for a Productive and Effective Online Classroom

- Piazza is your space to interact with your colleagues related to current topics or responses to your peers' statements. It is expected that each student will participate in a mature and respectful fashion.
- Participate actively in the discussions, having completed the readings and thought about the issues.
- Pay close attention to what your classmates write in their online comments. Ask clarifying questions, when appropriate. These questions are meant to probe and shed new light, not to minimize or devalue comments.
- Think through and reread your comments before you post them.
- Assume the best of others in the class and expect the best from them.
- Value the diversity of the class. Recognize and value the experiences, abilities, and knowledge each person brings to class.
- Disagree with ideas, but do not make personal attacks. Do not demean or embarrass others. Do not make sexist, racist, homophobic, or victim-blaming comments at all.

- Be open to be challenged or confronted on your ideas or prejudices.

(Adapted from a statement provided by Susan Shaw, WS)

Tutoring and Writing Assistance

NetTutor is a leading provider of online tutoring and learner support services fully staffed by experienced, trained and monitored tutors. Students connect to live tutors from any computer that has Internet access. NetTutor provides a virtual whiteboard that allows tutors and students to work on problems in a real time environment. They also have an online writing suite where tutors critique and return essays within 24 to 48 hours. Access NetTutor from within your Canvas class by clicking on the Tools button in your course menu.

The Oregon State Online Writing Suite is also available for students enrolled in Ecampus courses.

Student Evaluation of Courses

The online Student Evaluation of Teaching system opens to students during the week before finals and closes the Monday following the end of finals. Students receive notification, instructions and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the online learning experience for future students. Responses are anonymous (unless a student chooses to "sign" their comments, agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.

Concluding Remark

> "Get your data structures correct first and the rest of the program will write itself."
> —Davids Johnson