CIT 5940 Data Structures and Software Design

Spring 2024

Instructor

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Course Description

This course focuses on data structures, software design, and advanced Java. The course starts off with an introduction to data structures and the basics of the analysis of algorithms. Important data structures covered include arrays, lists, stacks, queues, trees, hash tables, sets, maps, and graphs. The course also focuses on software design and advanced Java topics such as software architecture, code understandability, and multithreading.

Course Learning Objectives

- Apply the appropriate data structure to solve a given problem.
- Modify a data structure to solve a given problem.
- Apply best-practice principles to design and implement a high quality software system.

Course Prerequisites

Students in this course are expected to have completed or waived CIT 591.

Course Textbook

Required
Data Structures and Algorithms in Java, 6th Edition
ISBN: 978-1-118-77133-4

Grading & Assessment

You **must attempt all graded assignments** to pass the course. If you have any questions or concerns about grading or progress in the course, please reach out to the instructor. This course will use a variety of assessments to determine whether you

understand and can apply the key concepts and skills that the course teaches. This includes:

Type	%	Description
Concept Comprehension Quizzes	13%	There are thirteen quizzes (one per module), providing an opportunity to review the concepts you will need for the homework.
Individual programming assignments	45%	There are seven individual programming assignments that will follow most modules and will be automatically graded.
Peer Reviews	2%	There are two required Peer Reviews to be completed after assignments 2 and 4.
Projects	25%	There is a solo project and a group project which will be your final programming assignments. These projects have manually graded components. For the group project, you will develop a piece of software as part of a team.
Timed Exam	15%	There is one timed exam. This will be a timed exam using live online proctoring at the end of the course.

Please read the instructions for each assignment very carefully!

The assignment of weighted averages to letter grades will likely be as follows:

100	A+
93-100	A
90-93	A-
87-90	B+
83-87	B
80-83	B-
77-80	C+
73-77	C
70-73	C-

60-70	D
under 60	F

Note that this may change slightly after final grading is completed.

Late Policy/Extensions

The instruction staff is committed to your success and understands how challenging it can be to learn online while balancing other commitments. Despite students' best intentions, sometimes life gets in the way and a little extra time to complete an assignment may be necessary.

If you need extra time on an assignment, you can obtain an extension for extenuating circumstances. If an extension is not approved, an assignment that is turned in late will receive a grade reduction of 10% of the total possible points per day for up to 5 days. After the 5th day, no credit will be given and you will no longer be able to submit to the assignment through Canvas. For extensions please fill out the extension request form linked in the Course Resources module in Canvas. Please fill out this form for any and all extension requests you wish to submit. These extension requests must be submitted at least 24 hours before the assignment deadline. Extension requests beyond 48-hours will require extreme extenuating circumstances to be considered and approved. If your request is granted, you will see updated deadlines reflected in Canvas by Tuesdays at 5 pm ET.

Late penalties for quizzes in the course will be waived within 24 hours of completing the quiz. This will provide you with the opportunity to retake previous quizzes to enhance your understanding, prepare for the end-of-semester exam, and further your knowledge. While there are no late penalties for these quizzes, it's important to note that they will still be graded, and we strongly recommend that you complete them by their assigned due date.

Regrade Requests

Regrade requests are handled on a case-by-case basis and are allowed up to 1 week after the grades are released. Requests must be created through a private post on Ed Discussion." Requests must be appropriately tagged with the "regrade" category, otherwise, your regrade will not be processed. Regrade requests may take up to a week to process at the discretion of the faculty. When submitting a regrade request, please explain (in detail) why you feel the grading is incorrect.

Extra Credit

Extra credit opportunities may be added at the discretion of the faculty member. If you do not complete extra credit, it will not count against you. Please note that any extra credit earned is not immediately visible in Canvas.

Other Course Activities

The following activities are not mandatory, but will greatly support your success on the graded assignments.

Discussion Forum

Discussion forums (on Ed Discussion) are designed to give you optional extra practice with the material and to see examples of how your classmates are thinking and working.

Recitation

Recitations are weekly live sessions in which you will have the opportunity to:

- Get practice applying concepts from videos and readings
- Get directed help to clear up any misunderstandings
- Build a community with other students
- Prepare to work on programming assignments

During the session,TAs will do a short review of concepts introduced during the module, and give you a chance to work through the week's recitation activity. During the recitation the review of concepts will be recorded, however, the activity portion will not be recorded.

Open Office Hours

The professor will hold two Open Office Hours each week. It's live sessions in which the professor will:

- Introduce extended topics related to each module
- Answer Common questions on Ed
- Get practice with solving coding problems
- Q&A

Open Office Hours will be recorded and uploaded to the Class Recordings tab in Canvas within about 24 hours of the live session ending.

Proof of attendance of at least one Open Office Hour can be submitted to **Extra Credit: Open Office Hours** in Canvas. This attendance can be at any point during the semester and will result in extra credit worth 0.5% towards your final grade. Please review the assignment in Canvas for specific instructions.

Additional Segments

The instructor may add additional optional segments, such as tutorial videos, to support the class as needed.

Creating an Inclusive Environment

All members of the course community – the instructor, TAs, and students – are expected to work together to create a supportive, inclusive environment that welcomes all students, regardless of their race, ethnicity, gender identity, sexuality, religious beliefs, physical or mental health status, or socioeconomic status. Diversity, inclusion, and belonging are all core values of the MCIT Online program, the instruction staff, and this course. **All participants in this course deserve to and should expect to be treated with respect by other members of the community.**

Discussion boards, messaging channels, recitations, office hours, and group working time should be spaces where everyone feels welcome and safe. In order to facilitate a welcoming environment, students of this course are expected to:

- Exercise consideration and respect in their speech and actions
- Attempt collaboration and consideration, including listening to opposing perspectives and authentically and respectfully raising concerns, before the conflict
- Refrain from demeaning, discriminatory, or harassing behavior and speech

All members of the course community are expected to be familiar with and abide by the University's guidelines on general conduct and sexual harassment:

- University Code of Conduct: https://catalog.upenn.edu/pennbook/code-of-student-conduct/
- University Sexual Harassment Policy: http://www.upenn.edu/affirm-action/introsh.html

Students should also be familiar with other University guidelines regarding personal conduct:

- Conduct & Personal Responsibility guidelines in Pennbook: https://catalog.upenn.edu/pennbook/#policiesbytopictext

- University Principles of Responsible Conduct: http://www.upenn.edu/audit/oacp_principles.htm

If you are a victim of, witness, or are otherwise affected by unacceptable behavior:

- In cases of sexual harassment or assault, please consult DPS Special Services (https://www.publicsafety.upenn.edu/about/special-services/sensitive-crimes/ at 215-573-3333; this is a confidential resource.
- To report other bias incidents, contact the Penn Office of Diversity: https://diversity.upenn.edu/diversity-at-penn/bias-motivated-incident-report
- For other violations of the code of student conduct, the Center for Community Standards and Accountability has an incident reporting form at https://csa.upenn.edu/community-standards/refer-caserequest-consultation

If you are unsure which office to contact, please contact the instructor or any Penn Engineering Online Learning staff member.

Getting and Giving Help

TA and Instructor Support

TAs will hold weekly private live drop-in office hours. Live drop-in private office hours are indicated on the course calendar and held through Waitwhile.TAs will help a queue of students on a first-come-first served basis and meet one on one with students.

Your instructor will be available during two Open Office Hour sessions a week, and for private office hours by request. Request these by emailing pennengonline@seas.upenn.edu.

Discussion Forum

The discussion forum is meant to be a collaborative space where you can ask questions and get answers from classmates and members of the instruction staff. Although most students will use the forum for homework-specific questions, you are encouraged to also ask questions about course content from the videos and reading assignments.

Students are also encouraged to answer other students' questions, as long as they do not reveal specific details about their own solutions to homework assignments (see Collaboration Guidelines below).

When posting public questions in the discussion forum to ask for help with a programming assignment, please do not share your code, as you may unintentionally give away a solution.

Likewise, even when posting privately, please do not post your entire code and ask the instruction staff to debug it for you or tell you what's wrong with it; the goal is for you to be able to resolve such issues on your own, though the instruction staff will be happy to give general advice for troubleshooting and debugging.

It is highly encouraged that you create a public post when discussing information that could benefit a wider audience such as assignment and course logistics, or content-related questions. If you wish to create a public post without having your name attached to it you can create a public post anonymously. Please be aware, course staff reserves the right to flip private posts to public and change your identity to anonymous if the post does not contain sensitive information and our course staff believes the content of your post could be beneficial to other students.

Collaboration Guidelines

In the professional world of software development, collaboration—including using code that others have written—is both practical and ubiquitous.

However, to prepare for entering that professional context, you need to develop a full set of software development skills so that you are both able to create your own code and evaluate the quality of someone else's code that you might use.
In the context of this course, independent work and evaluation are critical. **Do not collaborate with others on individual graded assignments unless it is explicitly indicated.** The inappropriate collaboration will be considered cheating and considered under Penn's Code of Academic Integrity.

Discussion forums and recitations ***are*** collaborative—please take advantage of those times to work with your colleagues. For general communication with your colleagues, use your Slack channels or Slack direct messages.

There will be two peer code review opportunities released after the late submission period has passed for assignments 2 and 4. Each peer review will be worth 1 percentage point of your final grade and full credit will be given as long as you contribute. We encourage you to participate in these reviews in order to get some experience evaluating and analyzing other's code, and to get some detailed feedback on your own. Any feedback you give or receive will not change any grades you or your peers have already been given for those assignments.

Forming study groups to understand the material is also a good idea, as long as you stay on the conceptual level and are *not* collaborating on the graded assignments directly.

Note: When in doubt always ask the instructor or TA first, to avoid any potential collaboration that can lead to academic dishonesty.

Do not cheat. **Please note that searching for solutions online is the same as cheating**. **Posting solutions online is also considered cheating.** If you are caught posting solutions or code to a **publicly accessible location** (like StackOverflow or GitHub), it will be considered cheating. If you discover publicly viewable solutions for the assignments of this course, please report them to the course staff immediately. If you do use GitHub (or similar cloud-based code management system) to set up a remote code repository, **YOU ARE REQUIRED TO KEEP THAT REPOSITORY PRIVATE**.

You can further read Penn's Code of Academic Integrity page on this subject matter, as well as the SEAS Graduate Student guidelines on the code of ethics.

Acceptable Use Of AI

In this course, we recognize that AI tools and technologies have become increasingly powerful. AI can be a valuable tool to aid your understanding of fundamental course topics. Acceptable uses of AI in this context include:

- Using AI to clarify and expand upon your understanding of course materials.
- Using AI to help you better comprehend complex concepts presented in course materials.
- Utilizing AI as a supplementary resource for research and information gathering.

Unacceptable Use of AI

While AI can be a helpful tool for learning, it is crucial to use it ethically and responsibly. Unacceptable uses of AI in this course include:

- Using AI to generate code to complete programming assignments.
- Using AI to complete peer reviews.
- Using AI to create comments for any homework submissions.
- Presenting AI-generated content as your own work.

Consequences of Violating the AI Policy

Violations of this AI policy will be taken seriously and will follow the same consequences stated in the Plagiarism Policy below.

Plagiarism Policy and Consequences of Violating the AI Policy

The first instance of homework plagiarism will be handled by the instructor and may include escalation to the Center for Community Standards and Accountability.

Second instances or exam plagiarism will be turned over immediately to the University of Pennsylvania Center for Community Standards and Accountability.

Regardless of previous work in the course, the penalty for plagiarism is the failure of the course (regardless of current course average), and potential permanent notation on your academic record that will follow you to all future academic institutions and possibly future employers. If you are unfamiliar with what constitutes plagiarism at Penn, visit Penn's Code of Academic Integrity.

Recording Notice

Public office hours, recitations, and other live events will be recorded, used, and may be made available to class participants during the current semester as well as students who take the class in future semesters.

Private office hours will also be offered and are not recorded. Student who do not wish to attend the publicly-recorded office hour may attend the private office hours.

Access to Materials and Content Before and After Graduation

If you would like to retain copies of your submitted assignments, you must download them from Gradescope, Canvas, Codio, and any other platforms that you submit to during the semester in which you are taking that course.

Access to course materials and your submissions is not guaranteed after the completion of a course. Therefore, we recommend that students download any assignments or materials they would like to keep before a course concludes.

Spring 2024 Course Schedule and Important Dates

Dates are subject to change. Please check Ed Discussion for announcements regarding schedule changes.

Monday, 1/15 - Monday, 1/22	Module 1	Topic(s) Intro to Data Structures, Java & JUnit Refreshers	Assignment(s) Module 1 Concept Comprehension Quiz: 1/21 Module 1 Programming Assignment Submission: 1/23
Tuesday, 01/23 - Monday, 01/29	Module 2	Topic(s) LinkedLists, Variations of LinkedLists	Assignment(s) Module 2 Concept Comprehension Quiz: 1/28 Module 2 Programming Assignment Submission: 1/30 Module 1 Extra Credit Submission: 1/26
Tuesday 01/30 - Monday 02/05	Module 3	Topic(s) Analyzing Data Structures, Big-Oh Notation	Assignment(s) Module 3 Concept Comprehension Quiz: 2/4 Module 3 Programming Assignment Submission: 2/6 Module 2 Programming Assignment Peer Review: 2/9
Tuesday 02/06 - Monday 02/12	Module 4	Topic(s) HashSets	Assignment(s) Module 4 Concept Comprehension Quiz: 2/11 Module 4 Programming Assignment Submission: 2/13
Tuesday 02/13 - Monday 02/19	Module 5	Topic(s) Binary Search Trees	Assignment(s) Module 5 Concept Comprehension Quiz: 2/18 Module 4 Extra Credit Submission: 2/20
Tuesday 02/20 - Monday 02/26	Module 6	Topic(s) Self-Balancing Binary Search Trees, Red-Black Trees, AVL Trees	Assignment(s) Module 4 Programming Assignment Peer Review: 2/23 Module 6 Concept Comprehension Quiz: 2/25 Module 6 Programming Assignment Submission: 2/27
Tuesday 02/27 - Monday 03/04	Module 7	Topic(s) Tree Variations, Heaps, Tries	Assignment(s) Module 6 Extra Credit Submission: 3/1 Module 7 Concept Comprehension Quiz: 3/3
Tuesday 03/4 - Monday 03/11	Spring Break		

Tuesday 03/12 - Monday 03/18	Module 8	Topic(s) Graphs	Assignment(s) Module 7 Programming Assignment Submission: 3/13 Module 8 Concept Comprehension Quiz: 3/17
Tuesday 03/19 - Monday 03/25	Module 9	Topic(s) Software Design, Domain Modeling, Software Architecture	Assignment(s) Module 8 Programming Assignment Submission: 3/20 Module 9 Concept Comprehension Quiz: 3/24
Tuesday 03/26 - Monday 04/01	Module 10	Topic(s) Software Design Patterns	Assignment(s) Module 10 Concept Comprehension Quiz: 3/31
Tuesday 04/02 - Monday 04/08	Module 11	Topic(s) Writing Good Code, Refactoring	Assignment(s) Module 11 Concept Comprehension Quiz: 4/7
Tuesday 04/09 - Monday 04/15	Module 12	Topic(s) Software Efficiency, Improving Efficiency	Assignment(s) Solo Project Submission: 4/10 Module 12 Concept Comprehension Quiz: 4/14
Tuesday 04/16 - Monday 04/22	Module 13	Topic(s) Concurrency, Introduction to Threads	Assignment(s) Module 13 Concept Comprehension Quiz: 4/21
Tuesday 04/23 - Monday 04/29	Module 14	Topic(s) Final Exam, Wrap-up	Assignment(s) Group Project Submission: 4/24 Timed Exam: 4/26 - 4/28