**IT 179**

**Introduction to Data Structures**

**Spring 2022**

**Instructor:** Shukri Abotteen

**Office:** Old Union 111

**Office Hours:** T TH 8:30-9:30 am in person; W 2pm-3:30pm; and by appt

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**Catalog Description**

Intermediate computer programming, including elementary data structures such as linked lists, stacks, queues, and binary trees.

**Course Description :**

This course will build upon your introductory programming and design skills from 168. You will learn new programming concepts, such as recursion, expand your understanding of object-oriented design, and be introduced to new tools for programming such as several elementary data structures: linked lists, stacks, queues, and binary trees. We will also continue to hone your testing and debugging skills. Programs will be both larger and more complex than in 168, growing as your skills are growing.

**Objectives:**

Upon completion of IT 179 you should be able to

1. Develop moderately complex computer programs.
2. Employ appropriate object-oriented program design and documentation methods including the design of appropriate OO classes and methods.
3. Implement and use elementary data structures such as linked lists, stacks, queues, and binary trees correctly.
4. Design test data and conduct varying levels of program testing.
5. Trace and write simple recursive methods.

**Textbooks:**

Koffman, E. and Wolfgang, P. (2016). *Data Structures: Abstraction and Design Using Java*.Wiley.

**Course Activities**

**Examinations****:** There will be three examinations, including the final exam, which will be comprehensive. If you are unable to attend an exam due to illness, you must notify me via **email prior** to the date and time of the exam to make arrangements for making up the exam. **There will be no make ups for unexcused absences.**

**Programs:** The center of this course is programming so there will be multiple programming assignments. None of the assignments are designed to be completed overnight. Make sure to read the assignments carefully when they are first assigned and begin design work and programming early. All programs must adhere to the design, coding and documentation standards presented in IT 168 and this course.

Programs will be graded in accordance with the grading standards explained on each programming assignment. **Please note that programs with compilation errors cannot receive a better grade than F** and that A programs must have no execution errors.

**Class attendance:** You are expected to attend the class sessions and be active in the class.

**Class preparation:** You will have reading assignments and videos given to prepare for class. You are expected to read all assigned material and watch any assigned videos **before** class and come prepared to participate in class.

**Quizzes:** There will be regular quizzes in the class, typically given via ReggieNet with a time limit or on paper in class. These will cover the reading assignment as well as topics previously covered in class.

**Evaluation:**

# Final: 20%

### Midterms: 25%

Programs: 40%

Quizzes, attendance, and participation: 15%

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100%

**Important Note**: You must earn at least 70% of the total programming points possible in order to be eligible to earn an A, B, or C in the course. In other words, even if you earn 70% or better in the course overall, you cannot receive a grade higher than a D if your programming percentage is less than 70%.

A – 90% - 100%

B – 80% - 89%

C – 70% - 79%

D – 60% - 69%

F – less than 60%

**Class Policies**

**Late work:**

Programs may be submitted up to 3 days late at a penalty of 10% per day. Except in cases of bereavement or serious illness, they will not be accepted after that. In cases of illness or bereavement, contact me as early as possible and we will work out an appropriate due date for your work to be made up.

Note that the programming assignments are **individual** work. You may **not** work with another student in the course for any reason or under any circumstances on these assignments. Ask any questions you have about the assignment of me.

Email submissions will not be accepted for any reason

**Time:** Programming courses require a significant time commitment. You must be prepared to spend the usual amount of time studying for the course (about 2 hours for each hour spent in class) **plus** additional time in designing, coding, debugging and executing your programs. Remember to reserve time to do the debugging part.

**Academic honesty:** Academic honesty is very important to me and to this university. You are expected to be aware of the student code, including the section on academic dishonesty (cheating and plagiarism). Knowingly turning in work that you did not do is plagiarism. It is both dishonest and unethical. This includes homework and programming exercises. **You are expected to do your own work.** Showing someone else your work is also cheating, even when the other person promises not to copy it. I expect you to discuss your programs with **no one** but me. All instances of cheating in this course will result in a minimum penalty of a zero on the assignment. For major assignments (such as programs and examinations), there will be a one letter grade reduction in the final course grade for all parties involved in addition to the zero on the assignment. Repeated cases of cheating will result in an F in the course. All cases of academic dishonesty will be handled according to university policy as outlined at <https://deanofstudents.illinoisstate.edu/conflict/conduct/code/academic.php> and may result in disciplinary penalties as well as academic penalties.

**Respecting class time:** Class time is very important in this course. Although rare students may be able to learn the course material from the textbook, the vast majority of you need the explanations and examples provided in class. In addition, class time has become more valuable than ever in this environment where it is more difficult to focus, and everything takes longer. Therefore, it is important that you help me to maximize the value of our class time in the following ways:

1. Read and view assigned material before class.
2. Attend class regularly. Attendance is not included in the course grade, but participation is. It’s very difficult to participate when you are not present. Note that you are responsible for everything I say in class whether you’re there or not. This includes verbal clarifications for your programming assignments. Make arrangements with me **in advance** if you must miss class due to participation in a Sanctioned University Activity or to fulfill a religious obligation. Also notify me as early as possible for absence due to illness or bereavement. If you have to miss class due to an [extended illness](https://deanofstudents.illinoisstate.edu/contact/absence/) (3 or more consecutive class days) or a [bereavement](https://deanofstudents.illinoisstate.edu/contact/absence/), the [Dean of Students Office](https://deanofstudents.illinoisstate.edu/) can help. It’s located in Room 387, Student Services Building.
3. Be on time. Class will begin promptly.
4. Be respectful of class time. Pay attention and avoid providing interruptions.

**ReggieNet:** I will be using ReggieNet to provide course information as well as access to your grades, quizzes, exams, and electronic assignment submission. If you have not used ReggieNet in the past, I encourage you to check out the information on ReggieNet available at <https://ithelp.illinoisstate.edu>.

**Contacting me:** I answer email frequently when I am not in classes, office hours or meetings.

* I answer email frequently. When asking questions about programs via email, please be as specific as possible about your question or bug. If you are asking for help with a bug, explain the problem and the error you’re seeing and zip the program as if you were submitting and attach it to your email. The error you think is in one method may be actually caused by something else entirely, so it can speed my answer significantly if I have the whole program as well as your information.
* **Important: It might take me up to 48 hours to respond to emails especially emails sent on the weekends and holidays. If I do not respond within 48 hours, please resend your email and ensure that you have the correct email address and that your email follows the email policy below.**

***Email Policy and Etiquette (use it for all your classes not only IT179)***

* **Do not wait until the last minute** to request assistance from your professor or lab instructor.
* Always **check the class syllabus** before asking a question about the course.
* Always **sign your email with your full name** and the **specific class**( i.e IT168 followed by the section number -section 13 for example-.
* Be clear in your email and **use a proper subject** for your email to identify the email purpose.
* **Include all relevant details** in your email to quickly get a response to your request.
* **Be Respectful**. Do not address your professors or lab instructors by their first name.
* Double check your email before you send it.
* **Do not email asking for**:
  + A higher grade
  + An extension to the deadline (except for in cases of bereavement or serious illness verified by the dean of student’s office)

[Student Access and Accommodation Services:](https://studentaccess.illinoisstate.edu/faculty_staff/academic/)Any student needing to arrange a reasonable accommodation for a documented disability and/or medical/mental health condition should contact Student Access and Accommodation Services at 350 Fell Hall, (309) 438-5853, or visit the website at [StudentAccess.IllinoisState.edu](https://studentaccess.illinoisstate.edu/).

**Permission required to record:**

Students must obtain written permission from the instructor if they wish either to photograph classroom lectures or discussions or to record them using audio or video devices. This restriction includes visual materials that accompany the lecture/discussion, such as lecture slides, whiteboard notes/equations, etc. Such recordings are to be used solely for the purposes of individual study for students enrolled in the class in that semester. They may not be reproduced, shared in any way (including electronically or posting in any web environment) with those not in the class in that semester. Students with disabilities who need to record classroom lectures or discussions must contact [Student Access and Accommodation Services](https://studentaccess.illinoisstate.edu/faculty_staff/academic/) to register, request and be approved for an accommodation. Students who violate this policy may be subject to both legal sanctions for violations of copyright law and disciplinary action under the University’s [Code of Student Conduct](https://deanofstudents.illinoisstate.edu/conflict/conduct/code/).

**Tentative Schedule**

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| --- | --- | --- | --- | --- |
| Wk | Date | Topics | Reading | Mode(subject to change) |
| 1 | 1/11 | Java review | Appendix A | Online (sync & async) |
| 2 | 1/18 | Multi-dimensional arrays ArrayLists | Ch. 1 | Online (sync & async) |
| 3 | 1/25 | Inheritance and PolymorphismInterfacesAbstract Classes | Ch. 12.1-2.4 | In person |
| 4 | 2/1 | Algorithm Efficiency Abstract Data Types  List ADT |  | Possibly Online (sync & async) |
| 5 | 2/8 | TestingLinked Lists | Ch. 32.5-2.6 | In person |
| 6 | 2/15 | Linked Lists cont. | 2.7-2.10 | In person |
| 7 | 2/22 | ReviewExam 1 (on Thursday 2/24) |  | In person |
| 8 | 3/1 | Stacks | 4.1-4.4 | In person |
| 9 | 3/8 | Spring Break |  |  |
| 10 | 3/15 | Queues | 4.5-4.7 | In person |
| 11 | 3/22 | Recursion | Ch. 5 | In person |
| 12 | 3/29 | Recursion |  | In person |
| 13 | 4/5 | ReviewExam 2(on Thursday 4/7) |  | In person |
| 14 | 4/12 | Binary Trees | 6.1-6.4 | In person |
| 15 | 4/19 | Binary Trees |  |  |
| 16 | 4/26 | Elementary Sorting and review | 8.1-8.4 | In person |
|  | 5/2 | Exam week |  | In person |
|  |  | Command line argumentsLinux introduction | Handout |  |

The final exam time will be announced via my.illinoisstate.edu.  
  
This is a tentative schedule, subject to change. When an exam is listed, that means the exam will most likely fall in that week. Specific exam dates will be determined and announced later.

Videos:

1. Polymorphism video: <https://www.youtube.com/watch?v=7TfYDdpz8wQ>
2. inheritance video: <https://www.youtube.com/watch?v=zt6bR9lPeLg>
3. wrapper classes video: <https://www.youtube.com/watch?v=CeTzxLGvLew&list=PLxThX3jr7iYXWpq89YzUDrUOF2yf6Yhej&index=24>