Syllabus
CSED 3320/5320, Data Structures and Algorithms
Fall 2023

Course Information

Time and Place: This course is an online course. Unless you specifically request it, there are not required meeting times. However, I encourage you to meet with me as much as necessary.

Instructor: Dr. Ben Schafer

Email: schafer@cs.uni.edu

Meeting with me: As an online class I can't have the same concept of regular "office hours. My regularly scheduled student hours this fall for my on campus students will be:
- MWF, 10-11 AM – Drop in or by reservation.
- M F, 12-1 PM – Drop in or by reservation.
- MTWTh, 3:00-4:00 – Advanced reservations only.

If you would like to meet with me over zoom during one of those time slots you should first reserve an appointment using my online calendar at least one day in advance.
- https://bit.ly/SchaferScheduler

Then at the appropriate time, you can log on to the following Zoom room:
- https://uni.zoom.us/j/3192732187 [Using the 3-letter name for our campus as the password]

If those times don't work for you, please send me an email and propose a specific alternative. I want to meet with you at a time/place that works for both of us, and I am very willing to work things out.

Credit Hours: Three (3). This course meets the Credit Hour Expectations outlined in the Course Catalog. Students should expect to work approximately 2 hours per week outside of class for every course credit hour. [In other words, you should expect this course to require 9-10 hours of work in a typical week]

Class Websites:
- https://www.cs.uni.edu/~schafer/cohort22/DSA/ (most lesson materials)
- Blackboard (Grades and Competency Demos)

Textbooks
- "Computer Science: An Overview. (13th edition)" Brookshear and Brylow. [The textbook we previously used for FCCS].
- "Problem Solving with Algorithms and Data Structures using Python" Miller and Ranum. [An online textbook]

Computer Use

This is an online course. All of the learning materials and programming environments for this course are available from any computer with a web browser and internet access.

Course Learning Outcomes
The course has three general goals.
1. That students are able to analyze their programs to evaluate computational complexity and use studied algorithms to provide efficient solutions. Such algorithms include: searching and sorting, graphing problems, and string problems.
2. That students are able to explain and use efficient data structures include: stacks, queues, lists, hash tables, trees, and graphs.
3. That students are able to design and implement "medium" sized programs using functional decomposition and be able to select appropriate data structures.

By the end of the course students should be able to complete the following:
- Analyze code to determine its execution-time (big-oh notation) and storage utilization.
- Write recursive functions to traverse data structures
- Write and analyze simple and advanced sorts: bubble, selection, insertion, merge, and quick sorts.
- Write and analyze searching techniques: linear search, binary search, closed-address hashing.
- Use common "linear" data structures using an "array" (i.e., contiguous block of memory) and "linked nodes" as appropriate: stack, queue, and lists
- Explain the implementation of common "tree" data structures
- Trace and program graph algorithms: depth-first search, breadth-first search, Prim's algorithm, Dijkstra's algorithm, and topological sort.

Course Description
Introduction to computer programming through a survey of programming environments used by teachers. Topics include structure of programming, study of several programming environments used by students at a variety of age/ability levels, and end-user programming for teachers.

How Student Performance Will Be Evaluated
Course Grading
I use a grading system drawn from the philosophies of "standards-based grading" and "equitable grading" (https://gradingforequity.org/).

You will earn multiple "grades" in this course. Each of these is a category of understanding that, for simplicity, is recorded as a score from 1-4 with the following meaning:

Score	Meaning
1	UNASSESSABLE - You submitted the deliverables for the activity but what you submitted shows little understanding of the standards of the activity.
2	NEEDS WORK - You have made significant progress towards demonstrating competency but there are limited items that remain unsatisfied.
3	SATISFACTORY - You have "met" the standards of the activity.
4	EXCELLENT - You have "exceeded" the standards of the activity. [You have met the standards of competency and shown considerable understanding/knowledge of the material.

While it might be tempting to view these categories as similar to GPA categories (which is also a 4-point scale) that is not the way they are used or interpreted. See the discussion about final grade assignment for more on this idea.

You will complete four different types of activities this semester.
- "You Do It" Activities (ungraded)
    - We will do a lot of activities that I ask you to complete on your own or with a classmate.
    - In almost all cases these are there as a way to enhance your learning.
        - In most cases, it is the *process* that I am after rather than the results.
    - As such, I may ask you to submit your results, but I prefer not to assign a grade to this. Please keep an eye on the course website and be prepared to submit these activities.
- Programming Activities (combined into a single grade)
    - Some of the activities I want to make sure complete and you actually attempt them to the best of your ability.
    - These activities will be marked as "Programming Activities"
    - These activities will be combined into a single 1-4 grade at the end of the semester
    - You do not need to have the program 100% correct to be considered competent (a 3). In fact, in some cases your code might not even work yet and still be considered competent.
- Competency Demos (Three CDs worth one grade each)
    - These are similar to a quiz or test in other classes that you take.
    - You will complete each competency demo within Blackboard and during class time unless special arrangements were made in advance.
    - Most CDs consists of several questions, individually graded. From these, I will assign a final, single evaluation of the entire CD based on your overall set of responses. This score is not necessarily a simple mathematical average but an assessment of your overall CD.
    - If you are unsatisfied with your grade on any CD, you may talk to me, restudy the material, and attempt a second version of the CD for a (potentially) higher grade.
- Research/Writing Project (two or three deliverables combined into a single grade)
    - Once you have had a chance to fully engage with the content of this course I will ask you to complete two research and writing based projects.
    - Those students enrolled in the graduate version of the course (CSED 5320) will complete one additional writing assignment as part of this grade bundle.
    - I anticipate that you will be able to submit each for an initial grade. If you do not like the grade you earned, you will be provided an opportunity to ask questions, and revise the project(s).

Final course grades will be determined using the following evaluation criteria.

Grade	Criteria
A	ALL scores are 3 or 4 AND an overall average of 3.5 or higher
B	An overall average of 3.0 or higher
C	An overall average of 2.50 or higher
D	An overall average of 2.0 or higher
F	Any situation not handled above.

In most situations, grades earned are straight letter grades – no plusses or minuses. Because you have multiple opportunities to retake and earn better grades this isn't as rough as it might sound. However, there are two situations where I may add a plus or a minus:

- If your final project is a grade lower than your overall course grade I reserve the right to add a minus to your grade.
- If your final project is a grade higher than your overall course grade I reserve the right to add a plus to your grade.
- If I feel there are specific and individual circumstances where "mathematically" you earned a grade slightly lower than I feel your overall competence has demonstrated than I reserve the right to add a plus to your grade.

In an effort to be responsive to your needs I reserve the right to modify the structure of this course as we are in progress. If there is significant deviation from the original policies, the new policy will be clearly discussed with you and in a timeframe that gives you a time to plan accordingly.

Final Thoughts
If you are having trouble with a topic in the class please reach out to me early. Do not wait until the situation is out of control. I am very willing to help. However, I have to know you need/want that help.

Additional Policies and Statements
Scholastic Conduct
You are responsible for being familiar with the University's Academic Ethics Policies:

https://www.uni.edu/policies/301

Copying from other students is expressly forbidden. Doing so on CDs will be penalized every time it is discovered. The penalty can vary from zero credit for the copied items (first offense) up to a failing grade for the course. If an assignment makes you realize you do not understand the material, ask a fellow student a question designed to improve your understanding, *not* one designed to get the assignment done. Your final submission for assignments should be **individual, original** work unless otherwise specified. Any substantive contribution to your solution by another person or taken from a publication should be properly acknowledged in writing. Failure to do so is plagiarism and will necessitate disciplinary action. In addition to the activities we can all agree are cheating (plagiarism, bringing notes to a closed book exam, etc.), assisting or collaborating on cheating is cheating. Cheating can result in failing the course and/or more severe disciplinary actions. Remember: Discussing assignments is fine and even encouraged. Copying code or answers is not.

Accessibility
The University of Northern Iowa (UNI) complies with the Americans with Disabilities Act Amendments Act of 2008 (ADAAA), Section 504 of the Rehabilitation Act of 1973, the Fair Housing Act, and other applicable federal and state laws and regulations that prohibit discrimination on the basis of disability. Students with disabilities experiencing a barrier to access should connect with Student Accessibility Services (SAS) to request accommodations. For more information about the accommodation process,

please contact SAS at (319) 273-2677 Relay 711, accessibilityservices@uni.edu, or GIL 118. Additional information is also available at sas.uni.edu.

The Learning Center
The Learning Center @ Rod Library provides free tutoring for a variety of different areas (i.e. writing, math, science, business, Spanish, college reading and learning strategies). The Learning Center @ Rod Library is open for walk-in assistance Monday-Thursday 10am-10pm and is free of charge for all UNI students. If you are unavailable during normal tutoring hours, online tutoring is also available through Smarthinking. You will need your CATID and passphrase to gain access. To access the Smarthinking platform go to **https://tlc.uni.edu/online**. For more information, go to **https://tlc.uni.edu**, email **TheLearningCenter@uni.edu** , call 319-273-6023, or visit the TLC desk located on the main floor of Rod Library.

Free Speech
The University of Northern Iowa supports and upholds the First Amendment protection of freedom of speech and the principles of academic and artistic freedom. We encourage the free and responsible exchange of diverse ideas on our campus. The University is committed to open inquiry and the spirited and thoughtful debate of such ideas.

Office of Compliance and Equity Management
Non-discrimination in Employment or Education
Content in this class has the potential to be disturbing to some individuals based on life experiences. If you ever feel the need to step out of the classroom or decline participation in an activity, please request an alternative learning experience.

UNI Policy 13.02 Discrimination, Harassment, and Sexual Misconduct states: "The University is committed to providing a workplace and educational environment, as well as other benefits, programs, and activities, that are free from discrimination and harassment based on a protected class, as well as retaliation."

Policy 13.02 outlines prohibited conduct and reporting processes. All University employees who are aware of or witness discrimination, harassment, sexual misconduct, or retaliation are required to promptly report to the Title IX Officer or Title IX Deputy Coordinator.

- Title IX Officer Leah Gutknecht, Assistant to the President for Compliance and Equity Management, 117 Gilchrist, 319.273.2846, leah.gutknecht@uni.edu
- Title IX deputy coordinator: Christina Roybal, Sr. Associate Athletic Director Athletics Administration, North DOME 319.273.2556, christina.roybal@uni.edu

If you or someone you know has been harassed or assaulted, you can find the appropriate resources at safety.uni.edu and equity.uni.edu. Resources that provide free, confidential counseling are also detailed at safety.uni.edu.

For additional information, contact the Office of Compliance and Equity Management, 117 Gilchrist Hall, 273-2846, equity@uni.edu.