

CS 3310/5310, Spring 2022

Teaching and Learning Programming

General Information

Time and Place: This class does not have any regularly scheduled, whole class, face-to-face meetings scheduled as of the start of the semester. If you feel that you and your classmates would benefit from an online meeting, whether a one-off or a regularly scheduled meetup, please reach out to me.

Class Websites:

- <http://www.cs.uni.edu/~schafer/cohort3/TLP/> (most lesson materials)
- Blackboard (Grades and Competency Demos)

Credit Hours: Three (3). This course meets the Course Credit Hour Expectation outlined in the Course Catalog.

Instructor: Dr. Ben Schafer

Email: schafer@cs.uni.edu

Course Information

Course Description

Enhances understanding of programming, addresses elements of program quality, and examines the pedagogy of programming instruction. Topics include program quality, goals of programming instruction; teacher beliefs about programming content and pedagogy; inclusive, supportive, and equitable practices; curricular alternatives; and assessment-based instructional planning.

Course Learning Outcomes

By the end of this semester students taking this course should be able to meet the following objectives:

- Identify programming fundamentals and discuss prerequisite relationships
- Analyze programming language considerations for a classroom
- Explain the program design process
- Identify aspects of quality programming
- Recognize the presence/absences of quality elements and suggest improvements
- Discuss their teaching/learning beliefs related to programming instruction
- Identify learning considerations
- Discuss supportive practices in general and in the context of a specific scenario/classroom
- Apply programming based considerations to instructional design

2011 ISTE Teaching Standards Addressed

1. **Knowledge of content** - Computer Science Educators demonstrate knowledge of Computer Science content and model important principles and concepts.
 - a. Demonstrate knowledge of and proficiency in data representation and abstraction
 - i. Effectively use primitive data types
 - b. Effectively design, develop, and test algorithms
 - i. Using a modern, high-level programming language, construct correctly functioning programs involving simple and structured data types; compound Boolean expressions; and sequential, conditional, and iterative control structures
 - ii. Design and test algorithms and programming solutions to problems in different contexts (textual, numeric, graphic, etc.) using advanced data structures
 - iii. Analyze algorithms by considering aesthetics, and correctness
 - iv. Demonstrate knowledge of two or more programming paradigms

2. **Effective teaching and learning strategies** - Computer Science Educators demonstrate effective content pedagogical strategies that make the discipline comprehensible to students.
 - a. Plan and teach computer science lessons/units using effective and engaging practices and methodologies
 - i. Select a variety of real-world computing problems and project-based methodologies that support active and authentic learning and provide opportunities for creative and innovative thinking and problem solving
 - ii. Demonstrate the use of a variety of collaborative groupings in lesson plans/units and assessments
 - iii. Design activities that require students to effectively describe computing artifacts and communicate results using multiple forms of media
 - iv. Develop lessons and methods that engage and empower learners from diverse cultural and linguistic backgrounds
 - v. Identify problematic concepts and constructs in computer science and appropriate strategies to address them
 - vi. Design and implement developmentally appropriate learning opportunities supporting the diverse needs of all learners
 - vii. Create and implement multiple forms of assessment and use resulting data to capture student learning, provide remediation, and shape classroom instruction
3. **Effective learning environments** - Computer Science Educators apply their knowledge of learning environments by creating and maintaining safe, ethical, supportive, fair, and effective learning environments for all students.
 - a. Design environments that promote effective teaching and learning in computer science classrooms and online learning environments and promote digital citizenship
 - i. Promote and model the safe and effective use of computer hardware, software, peripherals, and networks
 - ii. Plan for equitable and accessible classroom, lab, and online environments that support effective and engaging learning
4. **Effective professional knowledge and skills** - Computer Science Educators demonstrate professional knowledge and skills in their field and readiness to apply them.
 - a. Participate in, promote, and model ongoing professional development and life-long learning relative to computer science and computer science education
 - i. Identify and participate in professional computer science and computer science education societies, organizations, and groups that provide professional growth opportunities and resources
 - ii. Demonstrate knowledge of evolving social and research issues relating to computer science and computer science education
 - iii. Identify local, state, and national content and professional standards and requirements affecting the teaching of secondary computer science

Required Materials

We will use parts of "Teaching Tech Together: How to make lessons that work and build a teaching community around them" by Greg Wilson (ISBN 978-0-367-35297-4).

Having said that, no single textbook fits our needs. Required readings and other materials will also be selected from legally available resources on the internet or from instructor produced materials.

Course Structure

The course is divided up into several Units which may be subdivided down in to "topics." Each topic will consist of some combination of the following activities

- Readings
 - These will come from either the textbook or from online resources.
- Individual Reflection
 - This activity asks you to think through your own experiences as a novice programmer and as a teacher. It may also ask you incorporate elements of the reading that you completed.
 - You will typically create a document where you answer several questions, make a list of ideas, reflect on some code, etc.
 - You will submit this to me as evidence that you meaningfully completed the activity.
- Small Group Reflection
 - Throughout the course you will be assigned a "small group" of students. The members of your group may change from unit to unit.
 - As a group you will discuss your individual reflections for the week and use your collective wisdom to come up with a small-group reflection (often times VERY similar to the individual reflections but occasionally including some new material).
 - Your group should clearly indicate which of the members of the group actively participated in the discussion and the generation of the group report.
- Individual Responses
 - Once the small group reports are completed you will submit these to a group folder for all to see.
 - I will ask you, as an individual, to read the small group reports from the other group. I will ask you to reflect on what other group came up with that your group did not as well as what was common across the class as a whole.
 - To wrap this all up you will submit a second reflection discussing these issues and wrapping up your "final" thoughts on the topic.

Course Grading

You will earn six grades/scores in this course. Each of these is a 5-0 score based on the idea that an A is worth 5 points, a B is worth 4 points, a C is worth 3 points, a D is worth 2 points, and an F is worth 1 or 0. Think of this as the standard 4 point GPA system with one point added to everything to allow for there to be two levels of F at the end of the semester.

These six grades will consist of:

- 3 Competency Demos (Units 1-3)
 - These are sort of like "mid-term" exams and largely follow the concept of Competency Demos used in our prior course.
 - As in our previous course, you will have an opportunity to retake a competency demo if you are unsatisfied with your grade.

- 1 Final Project
 - This will be a course design project.
 - This will largely serve as the competency demo for Unit 4 but will almost certainly include elements of units 1-3.
 - It will be officially due on Tuesday, May 10th during the final exam period. Because this is a final project there will no opportunity to revise your project after that date. However, there may be opportunities to submit a version earlier than this date for feedback to guide your final deliverable. This will be discussed during Unit 4
- 1 Final Competency Demo
 - This will be a wrap up of the course and offered during the university's scheduled final exam period on Tuesday, May 10th. Because it is the final there is no opportunity to revise/resubmit this material.
- In-Unit Deliverables and Small Group Participation
 - I firmly believe that in order to really learn in this course you need to participate in consistent and ongoing interaction with the material and with your peers. I think you rob yourself, and your peers, if you are not willing to participate in classroom discussions on a daily basis. As such, I will assign some points for this interaction and the daily work.
 - I predict that this course will have ~10 individual deliverables and ~5 small group deliverables other than the ones listed previously. Having said that, this course will evolve and it is hard for me to know for sure what I will collect/mark or not.
 - In MOST cases I will not be assigning differentiated grades on these beyond 1 point each for turned in "on-time" and shows meaningful effort for completion. If I feel that people are abusing this system (that is, people are submitting documents on time but showing the bare minimum of effort) I may modify this policy to have more levels of grading [or simply become very picky about what is needed to get the 1 point of credit]
 - The five-point grade for this section of the course will be assigned based on a formula CLOSE to:

Score	Percent	Score	Percent
5	>90	2.5	65
4.5	85	2	60
4	80	1.5	55
3.5	75	1	25-50
3	70	0	0-25

At the end of the semester you will have had the opportunity to earn up to 30 points (six numerical scores from 0-5). Your overall grade will be based on the sum of these scores and cutoffs no HIGHER than the following:

Score Cutoff	Grade	Score Cutoff	Grade
27.5	A	16.5	C
26.5	A-	15	C-
25.5	B+	13.5	D+
22.5	B	10.5	D
21	B-	9	D-
19.5	C+		F

What I mean by that is that a 27 will be at least an A- but COULD end up an A depending on the circumstances.

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 good. 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.

Absences related to COVID-19 illness, self-isolation, or quarantine.

Faculty must be prepared to have assignment alternatives for individual students who are unable to attend class due to COVID-related health issues. To utilize these alternative assignments, students must report the issue by completing the Panther Health Survey; students directed not to come to campus or who are unable to participate in class due to COVID-19 related illness, self-isolation, or quarantine should utilize the information provided in the survey to have their faculty notified of their need to be absent. These same instruction/assignment alternatives should also extend to field experiences that students may not be able to attend for the same reasons. Questions related to COVID-19 testing should be directed to the Student Health Center COVID line (319) 273-2100, Monday-Friday, 8:00 am - 4:30 pm.

Students who have concerns about an underlying health condition(s) and the risks of attending classes, living in a residence hall, or any other aspect of the educational experience due to COVID-19 should consult with their health care provider. Please connect with Student Accessibility Services as soon as possible to discuss accommodations specific to your access needs.

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.