

course syllabus

Course # LAI 676
The Pedagogy of Programming
Version 0. Last updated August 27, 2026

Instructor Name: Dr. Christopher Proctor
Class Day and Time: Remote / Asynchronous
Number of Credits: 3
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Office Location: Foster 361b
Office Hours: By appointment



Course Description

This introductory course on computer programming simultaneously teaches beginners the fundamentals of computer programming while using that learning experience as a context for developing K-12 pedagogical content knowledge of how programming is most effectively taught and learned, and practicing these skills with K12 students. The primary audiences for the course are: future CS teachers, future teachers interested in interdisciplinary CS, experienced teachers who are new to CS, and experienced CS teachers. The course is also suitable for graduate students in the social sciences, arts, and humanities who want to use computational methods in research or art. This course has no prerequisites.

Learning Outcomes and Program Goals

Course Learning Outcomes

Students will demonstrate content knowledge, specifically with regard to:

- **Computational thinking.** Learning how to structure problems so that computers can help solve them, and using computers as partners in thought.
- **Impacts of computing.** Understand how specific mechanisms of technical systems shape individual and civic life.
- **Networks and system design.** Understand the structure and function of computing systems we rely on every day.

Students will demonstrate pedagogical content knowledge, specifically with regard to:

- **Metacognitive reflection on learning.** Introspection on students' own learning processes to better understand the processes of disciplinary identity formation, the influence of the learning environment, and the importance of feedback and assessment.
- **Teaching with computational media.** Pedagogical strategies for supporting learning environments in which students can build personal relationships with powerful ideas through open-ended, interest-driven projects.

Program Goals

This course's learning outcomes are closely aligned with the UB CS Teacher Preparation Program's **CS Content Knowledge outcomes** (which are themselves aligned with the core concepts outlined in New York's Computer Science and Digital Fluency Standards). The course also focuses on several of the UB CS Teacher Preparation Program's **CS Pedagogical Content Knowledge outcomes**.

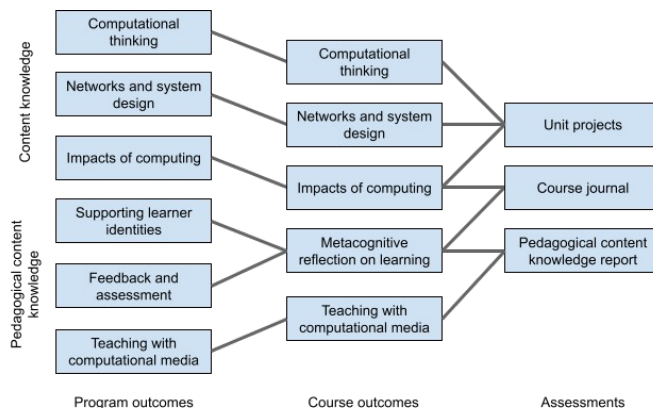


Figure 1. Alignment of program outcomes, course learning outcomes, and assessments. Instructional methods for each assessment are described below.

LAI 676: The Pedagogy of Programming is part of all of UB's CS Teacher Preparation tracks, and will be of interest as an elective for teacher preparation candidates in other areas as well as doctoral students interested in computing education or the learning sciences. For students enrolled in one of UB's CS Teacher Preparation tracks, this course provides 30 hours of field experience (Initial, Initial/Professional, or UB Teach tracks) or practicum (Advanced Certificate for in-service teachers).

Mode of Instruction:

Online, asynchronous, with optional (but strongly encouraged) collaboration with peers.

Required Text and Materials:

There are no texts required to be purchased for this course. All are accessible from the course website. You will need access to the following infrastructure:

- For programming:
 - Either a computer running Mac OS, Windows, Linux, or Unix, on which you have administrator access (chromebooks and iPads are not sufficient).
- For collaboration and asynchronous office hours:
 - A discord account.
- You will also need a stable Internet connection. If any of these pose a challenge for you, please contact Dr. Proctor.

Course Requirements:

The Pedagogy of Programming is structured as a course-within-a-course. Students will simultaneously participate in an introductory CS course at three levels:

- **As students** learning CS for the first time,
- **As experienced teachers in another subject** reflecting on their experience to build pedagogical content knowledge,
- And (for students enrolled in the Advanced Certificate in CS Education) **as novice CS teachers**, practicing their emergent pedagogical content knowledge.

The introductory CS course is based on the Making With Code curriculum developed by Dr. Proctor and colleagues (see Proctor, et al, 2020) around the principles of Constructionism. Each unit of this course is structured around labs, problem sets, and a project. Labs are social, collaborative experiences whereas problem sets are designed to check your understanding. Projects are open-ended.

Assignments:

Group Meetings

You are expected to meet weekly in-person or virtually with a small group to collaborate on the labs. Group meetings are assessed by the presence of a commit message made during or just after your group meeting time.

Labs

Each unit starts with a series of labs designed to be done individually or in small groups, which introduce just enough new ideas to get you ready to work on an open-ended project.

Problem Sets

Problem sets are designed to be completed individually to solidify skills and check your understanding.

Projects

Each unit culminates with an open-ended, interest-driven project in which students will apply the skills and knowledge learned during the unit to a project of their own design.

Evaluation criteria

- **Content knowledge.** Does the project demonstrate the skills and knowledge addressed in the unit?
- **Process.** Do the planning and process documents (e.g. pseudocode, sketches, git commits) show an active engagement and monitoring of the project's development?

Commit messages

Throughout the course, reflect on your learning through your commit messages. Your commit messages should address, in whatever format works for you:

- Reflections on what you've been learning, doing, and thinking about this week.
- Reflections on your intellectual, social, and emotional experiences over the week, as well as other facets.
- Reflections on pedagogical structures and practices which mediated your experience as a learner. What might you use in your own teaching practice? What would you change?

Commit messages should also answer any specific questions posed in that week's materials.

Evaluation criteria

- **Specificity.** Do your commit messages regularly document specific experiences, in sufficient detail that they could serve as the basis for later reflection?
- **Iterative growth.** Do your commit messages build on previous entries, developing ideas and opinions?

- **Responsiveness.** Do your commit messages answer the specific questions posed?
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Grading:

Each assignment in the course will receive a letter grade, with grades on an interval scale (e.g. the difference between A and B is the same as the difference between B and C) and no +/- modifiers. A student's course grade is the weighted average of assignment grades, with weights as shown in the table below.

Weight	Assignment category
10%	Group Meetings. Graded on the presence of a commit message during or just after group meeting time.
20%	Labs. Graded on completeness.
20%	Problem sets. Graded on correctness.
10%	Commit messages. See grading criteria above.
40%	Projects. Each project graded according to rubric.
100%	Total.

In the event that a student is unable to complete the course, a grade of Incomplete may be assigned through mutual consent of the instructor and the student. Incomplete grades will follow the university's [Graduate Incomplete Policy](#).

Attendance Policy:

Attendance and participation are expected but are not graded. Similarly, you are expected to complete work on time but there is no grade penalty for lateness. If grades are meant to be a measure of learning or of achievement, I cannot see a justification for lowering grades due to missing class or turning work in late. Instead, I interpret these behaviors as signals that you may be having difficulty in the class, and will check in to see if there is a way I can better support you.

AI Policy

I think it is unethical to create rules you cannot enforce, because it creates an incentive to cheat. Therefore there is no prohibition whatsoever on your use of AI in this course. (This is also in keeping with the course-within-a-course structure: you will face the same dilemma with your own students!)

However, there is increasingly clear evidence that using AI interferes with beginner learning in CS, in the same way that an over-helpful group member might: AI destroys authentic learning opportunities, moments when you are facing a problem of the right difficulty, when you are poised to “level up” your thinking and have a concept “click.”

If you do choose to use AI, I encourage you to do so reflectively, using it as an opportunity to reflect on its role in your learning.

Accessibility Services and Student Resources:

If you have a disability and may require some type of instructional and/or examination accommodation, please inform me early in the semester so that we can coordinate the accommodations you may need. If you have not already done so, please contact the Office of Accessibility Services (formerly the Office of Disability Services) University at Buffalo, 60 Capen Hall, Buffalo, NY 14260-1632; email: stu-accessibility@buffalo.edu Phone: 716-645-2608 (voice); 716-645-2616 (TTY); Fax: 716-645-3116; and on the web at <http://www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html>. All information and documentation is confidential.

The University at Buffalo and the Graduate School of Education are committed to ensuring equal opportunity for persons with special needs to participate in and benefit from all of its programs, services and activities.

Academic Integrity:

Academic integrity is critical to the learning process. It is your responsibility as a student to complete your work in an honest fashion, upholding the expectations your individual instructors have for you in this regard. The ultimate goal is to ensure that you learn the content in your courses in accordance with UB's academic integrity principles, regardless of whether instruction is in-person or remote. Thank you for upholding your own personal integrity and ensuring UB's tradition of academic excellence.

It is expected that you will behave in an honorable and respectful way as you learn and share ideas. Therefore, *recycled papers, work submitted to other courses, and major assistance in preparation of assignments without identifying and acknowledging such assistance* are not acceptable. All work for this class must be original for this class. Please be familiar with the University and the School policies regarding plagiarism. Read the [Academic Integrity Policy and Procedure](#) for more information. Visit The



Graduate School Policies & Procedures page (<http://grad.buffalo.edu/succeed/current-students/policy-library.html>) for the latest information.

Course Evaluations:

You will have two opportunities to provide anonymous feedback about the course. In the middle of the semester, I will send you a brief questionnaire asking about what activities are contributing to your learning and what might be done to improve your learning. At the conclusion of the semester you will receive an email reminder requesting your participation in the Course Evaluation process. Please provide your honest feedback; it is important to the improvement and development of this course. Feedback received is anonymous and I do not receive copies of the Evaluations until after grades have been submitted for the semester.

Counseling Services:

As a student you may experience a range of issues that can cause barriers to learning or reduce your ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns, or unwanted sexual experiences. Counseling, Health Services and Health Promotion are here to help with these or other issues you may experience. You can learn more about these program and services by contacting:

Counseling Services

120 Richmond Quad (North Campus), 716-645-2720

202 Michael Hall (South Campus), 716-829-5900

<https://www.buffalo.edu/studentlife/who-we-are/departments/counseling.html>

Health Services

Michael Hall (South Campus), 716-829-3316

<https://www.buffalo.edu/studentlife/who-we-are/departments/health.html>

Office of Health Promotion

114 Student Union (North Campus), 716-645-2837

<https://www.buffalo.edu/studentlife/who-we-are/departments/health-promotion.html>

Sexual Harassment/Violence:

UB is committed to providing a safe learning environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and stalking. If you have experienced gender-based violence (intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), UB has resources to help. This includes academic accommodations, health and counseling services, housing accommodations, helping with legal protective orders, and assistance with reporting the incident to police or other UB officials if you so choose. Please contact UB's Title IX Coordinator at 716-645-2266 for more information. For confidential assistance, you may also contact a Crisis Service Campus Advocate at 716-796-4399.

Please be aware UB faculty are mandated to report violence or harassment on the basis of sex or gender. This means that if you tell me about a situation, I will need to report it to the Office of Equity, Diversity and Inclusion. You will still have options about how the situation will be handled, including whether or not you wish to pursue a formal complaint. Please know that if you not wish to have UB proceed with an investigation, your request will be honored unless UB's failure to act does not adequately mitigate the risk of harm to you or other members of the university community. You also have the option of speaking with trained counselors who can maintain confidentiality. [UB's Options for Confidentiality Disclosing Sexual Violence](#) provides a full explanation of the resources available, as well as contact information. You may call UB's Office of Equity,



Diversity and Inclusion at 716-645-2266 for more information, and you have the option of calling that office anonymously if you would prefer not to disclose your identity.

Technology Recommendations

To effectively participate in this course, regardless of mode of instruction, the university recommends you have access to a Windows or Mac computer with webcam and broadband. Your best opportunity for success in the blended UB course delivery environment (in-person, hybrid and remote) will require [these minimum capabilities](#).

You will need regular access to a computer running Mac OS, Windows, Linux, or Unix, on which you have administrator access. In particular, chromebooks and iPads are not sufficient. (In a pinch, you could complete this class using a Raspberry Pi.) You will also need a stable Internet connection. If any of these pose a challenge for you, please contact the instructor.