

course syllabus

LAI 677 Survey of Topics in K12 Computer Science

Version 5. Last updated January 26, 2025.

Instructor Name: Dr. Christopher Proctor & Stacy Scheuneman

Class Day and Time: Independent study.

Number of Credits: 3

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Note: In response to several student requests, LAI 677 is available as an independent study in spring 2025. The course format is largely the same as in LAI 676 (labs and projects, distributed via the mwc Terminal utility), but Dr. Proctor will not be actively teaching the course. Students interested in joining the LAI 677 independent study should contact Stacy Scheuneman, who will be coordinating group working sessions.

Course Description

This course provides an overview of the content knowledge topics taught in K12 computer science. Classrooms are considered as nodes within broader learning ecologies, and emphasis is placed on the relevance of topics to interdisciplinary and connected K12 CS pedagogy. This course will be of primary interest to students enrolled in the CS advanced certificate who do not have a formal background in CS, as well as future teachers interested in interdisciplinary CS.

While this course has no prerequisites, a superficial familiarity with Python is required, as code is used as one medium of exploration for these topics alongside articles and lectures. LAI 676, any other prior CS experience, or a willingness to dive in (and attend

additional office hours as needed) will be sufficient. Additionally, this course expects students to have a current or anticipated teaching context in mind, with some familiarity with the specifics of the curriculum and the student population who would be served.

Learning Outcomes and Program Goals

Course Learning Outcomes

- **Impacts of computing.** Understand how specific mechanisms of technical systems shape individual and civic life.
- **Computational thinking.** Learning how to structure problems so that computers can help solve them, and using computers as partners in thought.
- **Networks and system design.** Understand the structure and function of computing systems we rely on every day.
- **Cybersecurity.** Understand the technical aspects of security and privacy, as well as the nature of vulnerabilities. Understand the social, economic, political and military implications of cybersecurity.

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). CS pedagogical content knowledge is not explicitly taught or assessed in this

course, but pedagogical application of CS concepts to students' teaching concepts is used as a facet of understanding, via which students demonstrate what they have learned.

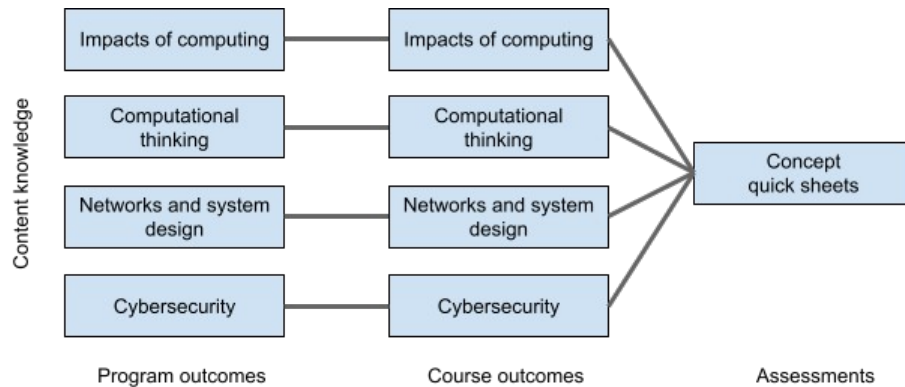


Figure 1. Alignment of program outcomes, course learning outcomes, and assessments. Instructional methods for each assessment are described below.

Mode of Instruction

Online, asynchronous.

Required Text and Materials

All texts and course materials will be accessible from the course website.

Course Requirements

This course is structured as a sequence of independent modules. In each module, students will complete labs, problem sets, and a concept quick sheet at the end. Labs are social, collaborative, hands-on experiences (graded on completion) whereas problem sets are designed to check your understanding (graded on correctness). The concept quick sheet serves as a summative assessment, and is graded according to the criteria below.

Concept quick sheet

The concept quick sheet for each module should be one single-spaced page containing the following sections. It will be hard to fit the expected level of detail onto one page; it is expected that your first draft will need revision to achieve the necessary density.

- **A summary of the topic.** This should include a structural overview summarizing how the concepts within the topic fit together (including a diagram if helpful), a description of specific concepts learned during the module (including key terminology), and a list of additional concepts in this area which you have not yet learned but which feel important. Conclude the summary with an explanation of why this topic is important.
- **A proposal for how this topic could fit into your current (or anticipated) teaching context.** This should contain specific alignment between CS concepts and your content-area standards, outcomes, or emphasis areas; and ALSO alignment between CS concepts and the broader needs, interests, and priorities of your students. Explain where this concept could fit into your curriculum and a justification for this integration.
- **A proposal for how you would teach this topic in your current (or anticipated) teaching context.** This should contain specific connections between concepts and the pedagogy (including teaching materials, lesson structures, and strategies to support students) you would use to support your specific students. You are welcome to propose using the curricular materials used in this course, existing materials, or materials which do not yet exist. Finally, describe any additional training, support, or collaboration you would need to make this happen.

A second page may contain links, implementation notes, and a list of references.

Assessment criteria

- **Specific and accurate understanding of the topic**, including its structure, importance, and the nature of concepts within the topic. Topics and key ideas should be comprehensive of what was explored in class.
- **Specific and justifiable alignment of the topic's concepts with the teaching context**, explaining not just why these concepts *could* be taught in the teacher's current or anticipated teaching context, but how and why they *should*.

- **Specific and feasible proposal for teaching the topic’s concepts**, including connections to the teacher’s current or anticipated student population and why this pedagogical approach might be effective for teaching these concepts to these students.

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
20%	Labs. Graded on completion. A rubric specifying performance levels and grades will be provided with each assignment.
30%	Projects. Projects are graded holistically. A rubric specifying performance levels and grades will be provided with each assignment.
50%	Concept quick sheets. See grading criteria above.
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. Participants in the independent study are expected to join and regularly attend a study group which meets at least once a week. Participants local to UB should plan to meet in person; those who are remote or who have schedules which make in-person meetups impossible should join a remote study group.

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](#).

Public Health Compliance in Classroom setting

As indicated in the [Student Compliance Policy for COVID-19 Public Health Behavior Expectations](#), in our classroom you are required to:

- 1 Obtain and wear masks/face coverings in campus public spaces, including campus outdoor spaces.
- 2 Maintain proper physical distancing in public spaces and must stay six feet apart from one another.
- 3 Stay home if you are sick.
- 4 Abide by New York State, federal and Center for Disease Control and Prevention (CDC) travel restrictions and precautionary quarantines.
- 5 Follow campus and public health directives for isolation or quarantine.
- 6 Should you need to miss class due to illness, isolation or quarantine, you are required to notify the course instructor and make arrangements to complete missed work.
- 7 You are responsible for following any additional directives in settings such as labs, clinical environments etc.

Students who are not complying with the public health behavior expectations will be asked to comply. Should the non-compliant behavior continue, course instructors are authorized to ask the student to leave the classroom. Non-compliant students may also be referred to the Office of Health Promotion to participate in an online public health class to better educate them on the importance of these public health directives for the entire community.