UB Computer Science Education Handbook

Dr. Chris Proctor

2025-2026 (Version 2.0.0)

University at Buffalo

Contents

Introduction

Welcome to the Computer Science Education Program at UB's Graduate School of Education. This program offers multiple paths to New York State teacher certification in Computer Science. Graduates will join a community of practice committed to providing high-quality CS learning opportunities as well as transforming our education system to make it more just and equitable.

It is an exciting time to be involved in K12 computer science education. Our society is starting to come to terms with the technological change brought about by computers over the last half century and accelerated by recent advances in artificial intelligence. If it were ever possible to imagine that technology would offer a straightforward path toward a bright future, the last few years have demonstrated how computers are deeply implicated in our society's inequities and violence.

At the same time, our identities, relationships, and worlds are built upon computational technologies. Youth today live new kinds of digital lives which were unimaginable to previous generations; our schools need to adapt to meet their needs and welcome their identities and experiences. A more just and democratic society depends on informed and engaged participation. Today, that means cultivating vibrant and diverse cultures of computational literacy rooted in the communities and cultures served by our schools. We look forward to building this community together.

If you have any questions, please do not hesitate to contact me at chrisp@buffalo.edu.

Sincerely,

Chris Proctor, PhD

Faculty and staff

Up-to-date list of faculty and staff in UB's Department of Learning and Instruction can be found on the department's faculty directory and staff directory webpages.

Errors and omissions

The Department of Learning and Instruction's website provides definitive information on admissions, program requirements, and policies; in case of a discrepancy between this handbook and the LAI website assume the latter is correct.

This handbook was written by Dr. Chris Proctor, with substantial feedback and input from Dr. Beth Etopio, Dr. Erin Kearney, and Dr. Anne Izydorczak. Thanks to Dr. J. Ben Schafer and Dr. Michelle Friend for the feedback they provided as external program reviewers. Any errors are the sole responsibility of Dr. Proctor.

We strive to keep this document accurate and up-to-date. Please contact Dr. Chris Proctor (chrisp@buffalo.edu) with any errors, omissions, or outdated information. Pull requests to this handbook's GitHub repository will be very warmly welcomed.

Structure of this handbook

This handbook is designed for many audiences: prospective students, current students, professors and program coordinators, and colleagues from other departments and institutions.

Prospective students should start by reviewing the tracks offered in this program and identifying a track which matches their needs.

Current students looking for details about requirements, courses, and policies should start with the chapter on their track.

Faculty and colleagues from other departments or institutions may want to start by reading about the program's vision and goals to understand how a single vision and set of program outcomes guide the organization of our tracks, courses, and assessments.

Vision and goals

Program vision

UB's Computer Science Education Program prepares graduates to be effective teachers to all of their students, supporting their intellectual growth, future opportunities, and ability to use CS to further their existing goals. Graduates will join a community of practice committed to redesigning schools and the discipline of K12 CS so they better reflect the priorities, values, and cultures of the communities they serve while incorporating what we know about equitable teaching and learning in the digital age.

Program outcomes

Every track in the Computer Science Education Program is oriented to the same program outcomes. However, curricular emphasis on each outcome varies across tracks because different tracks expect incoming students to already have certain competencies. For example, the Advanced Certificate track expects incoming students to have a strong foundation in pedagogical knowledge, while the UB Teach, Initial, Professional, and Initial/Professional tracks expect incoming students to have a strong foundation in CS content knowledge.

The program outcomes are aligned with New York's Computer Science and Digital Fluency Standards, New York's requirements for teaching a special subject, the New York Teaching Standards (See Appendix I), as well as CSTA's Standards for CS Teachers (See Appendix II).

CS Content Knowledge

The content knowledge outcomes of UB's Computer Science Education Program are aligned with four of the five core concepts defined by New York's Computer Science and Digital Fluency Standards. The final concept, "Digital literacy," is addressed in the pedagogical content knowledge outcomes below.

- CK1: Impacts of computing
- CK2: Computational thinking
- CK3: Networks and system design
- CK4: Cybersecurity

Pedagogical Knowledge

Pedagogical knowledge outcomes for CS teachers are defined by New York's requirements for teaching a special subject. Several of New York's PK standards are addressed by PCK and L standards in UB's program outcomes.

- PK1: Human development
- PK2: Learning
- PK3: Supporting students with disabilities
- PK4: Language acquisition and literacy
- PK5: Curriculum and instruction
- PK6: Professional practice and obligations

Pedagogical Content Knowledge

Pedagogical content knowledge is knowledge of how a specific discipline is learned and how it can be effectively taught. The outcomes below are the central pedagogical practices emphasized by UB's Computer Science Education Program.

- PCK1: Computing as a literacy
- PCK2: Supporting learner identities
- PCK3: Shaping the learning environment
- PCK4: Teaching with computational media
- PCK5: Feedback and assessment

Leadership

In many cases, computer science teachers will be helping to lead and design the courses, departments, and fit of computer science within the school. UB's Computer Science Education Program acknowledges how the pandemic has surfaced and exacerbated long-standing inequities while opening the potential for substantial change in the structure of schools and their roles within communities and within the economy, which CS is well-positioned to help lead.

- L1: Equity and opportunity
- L2: Connected learning
- L3: Interdisciplinary connections
- L4: Design and research

Summative assessments

New York state teacher certification exams

Passing scores on the following NYSTCE exams are required for initial certification. These exams will be required for graduates of the UB Learns Track, the Initial Certificate Track, and the Initial/Professional Certificate Track.

- Educating All Students (EAS) test
- Content Specialty Test (CST) in CS

The NYSTCE content specialty exam in CS is expected to be available starting summer 2025. New York has historically waived exam requirements for those who complete programs prior to the release of exams.

Teacher Performance Assessment Portfolio

Teacher candidates in the UB Learns Track, the Initial Certificate Track, and the Initial/Professional Certificate Track are required to complete the Teacher Performance Assessment Portfolio.

UB's Teacher Performance Assessment Portfolio is aligned with the New York Teaching Standards. Please see Appendix II for an alignment of program outcomes with the New York Teaching Standards.

Vision statement

Additionally, candidates will articulate their vision for K-12 computer science education and how they intend to pursue it. This is intended to be a practical document, useful for writing an employment

cover letter, starting an organization, and writing grants. The practice of drafting, workshopping, and sharing vision statements will also be the foundation of an ongoing community of practice. The vision statement should address:

- A definition of computer science, explaining who this definition will serve and why they might find it valuable.
- A design for computer science education, justified in terms of why it is the right design for those it will serve. The scale of the design could vary, from how one CS course might be integrated into a school to how CS could be embedded into a community, a career, or a broader project of activism.
- A roadmap for how this might be achieved. This should be realistic and actionable.

Continuous improvement

The CS Teacher Preparation Program will engage in a process of continuous improvement, collecting and anaylzing data around program outcomes and engaging in regular self-assessment and external evaluation in dialogue with all program stakeholders. Data collected will include matriculation and graduation statistics, student course evaluations, and course summative assessments aligned with program outcomes. These processes will center on two annual retreats, one at the beginning of the academic year and one toward the end of the academic year. All program faculty and staff will be invited, as well as representatives of partner schools and communities and external colleagues also involved in CS teacher preparation. These retreats will provide opportunities to surface issues and consider program-level changes which could address them.

Tracks

The UB Computer Science Education Program offers several tracks designed to meet the needs of different students. If the diagram below has a path from where you are to where you want to be, we have a track for you.

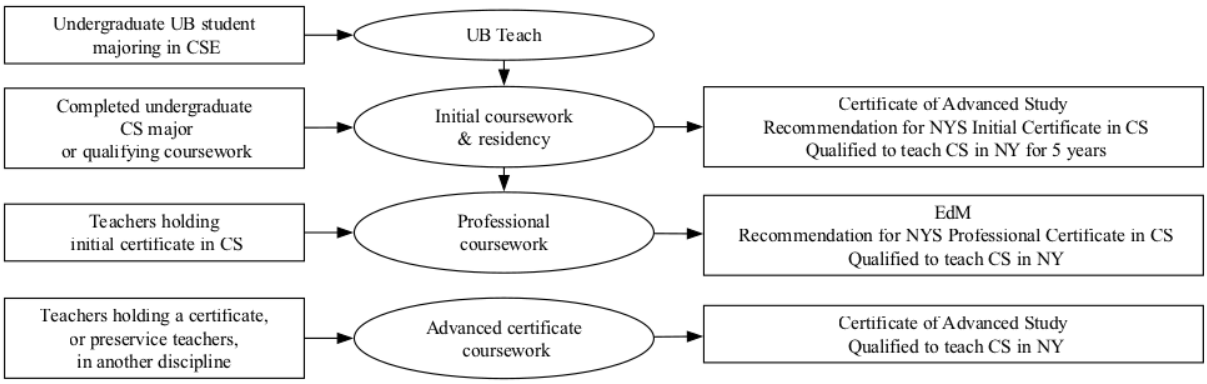

Figure 1: All tracks of the CS Education Program

For those with an undergraduate major in computer science (or meeting coursework prerequisites), the Initial Certificate Track provides a Certificate of Advanced Study and a recommendation for a NYS Initial Certification in CS. This track requires 36 credit hours. The Initial Certificate track requires 18 units of coursework, followed by a year-long residency in which teacher candidates are placed in classrooms under the supervision of a cooperating teacher.

The Professional Certificate Track requires an additional year of coursework. Graduates earn an EdM degree and recommendation for a NYS Professional Certification in CS. This track requires 30 credit hours, and can be completed in one year of full-time study.

The Initial/Professional Certificate Track combines initial and professional certification and requires fewer credit hours than completing the programs separately. This track requires 48 credit hours and is typically completed in two years of full-time coursework. The second year is a residency in which teacher candidates are placed in classrooms under the supervision of a cooperating teacher.

UBTeach is a combined bachelor's degree, EdM, initial, and professional certification, completed in five years. (UBTeach is not yet available for CS education.)

For teachers holding a certificate in another discipline, or for preservice teachers working toward certification in another discipline, the Advanced Certificate Track for In-Service Teachers provides qualification to teach CS in New York public schools. This track requires 15 credit hours, and is designed for working professionals to complete at their own pace.

UB Teach Track

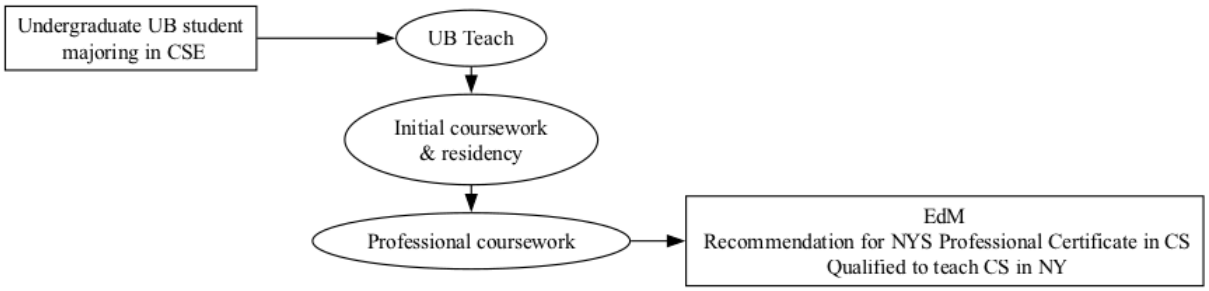

Figure 2: The UB Teach Track

UB Teach CS will be a combined bachelor's degree, EdM, initial, and professional certification, all completed in five years. The first three years are focused on CSE coursework; the last two years are focused on teacher preparation coursework. The final year of the program is a yearlong residency placement in a school.

The UB Teach Track in CS is not yet available. Prospective students interested in UB Teach CS are invited to contact Dr. Chris Proctor (chrisp@buffalo.edu) for the latest updates on the program. General information about UB Teach is available at the UB Teach program website.

Initial Certificate Track

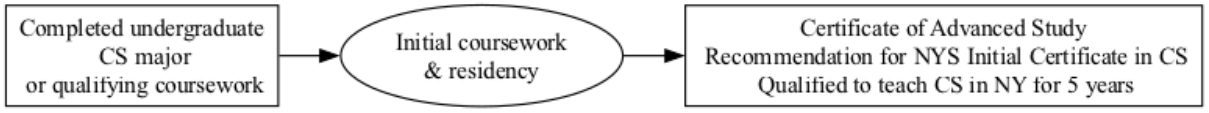

Figure 3: The Initial Certificate Track

Audience

The Initial Certificate Track is suitable for anyone with a content knowledge background in CS who wishes to become a CS teacher. Graduates earn a Certificate of Advanced Study in Computer Science and an institutional recommendation for a NYS Initial Certification in CS, which qualifies the holder to teach CS in New York schools.

Admission requirements

Please see the program web site for updates and details on application.

- **An undergraduate degree** from an accredited institution
- **Content knowledge**:
  - Either an undergraduate major in CS or a related field, or
  - 12 credit hours of CS satisfying the content knowledge program outcomes
- **Test scores**[1]: GRE or MAT scores from tests taken within five years
- **Contact information for two references**
- **Unofficial transcripts from all colleges attended**. (UB transcripts are automatically submitted for current UB students and alumni.)
- **Statement of education and career goals**

Learning outcomes

The Initial Certificate Track learning outcomes are aligned with the overarching CS Education Program outcomes. Incoming students are expected to already have a strong content background in computer science.

- PK1: Human development
- PK2: Learning
- PK3: Supporting students with disabilities
- PK4: Language acquisition and literacy
- PK5: Curriculum and instruction
- PK6: Professional practice and obligations
- PCK1: Computing as a literacy
- PCK2: Supporting learner identities
- PCK3: Shaping the learning environment
- PCK4: Teaching with computational media
- PCK5: Feedback and assessment

Coursework

Students may complete the first-year courses in any order and at any pace. However, the residency year is an integrated experience and courses must be taken as listed.

[1] Graduate Record Exam (GRE) or Miller Analogies Test (MAT) scores are required from tests taken within the last five years—including verbal, quantitative and writing sections. Please use institution code 2925 and department code 3101. While GRE/MAT scores are not demonstrated to be predictive of student success in our program, by statutory regulation we are required to have a standardized admission test score on file as part of your application.

Fall Term 1 (6 credits)

Course	Credits
LAI 605: Critical Computational Literacies	3
LAI 676: The Pedagogy of Programming	3
LAI 698: Instructional Strategies in Inclusive Classrooms	3

Spring Term 1 (6 credits)

Course	Credits
LAI 562: English Language Learners: Emergent Theory and Practices	3
LAI 574: Teaching the Exceptional Learner	3
LAI 611: Methods in Teaching Computer Science, Grades 1-12	3

Fall Term 2: Residency (9 credits)

Course	Credits
LAI 668: Supervised Teaching I	3
LAI 667: Field Experience	3
LAI 515: Action Research to Improve Teaching and Learning	3

Spring Term 2: Residency (9 credits)

Course	Credits
LAI 595: Supervised Teaching II	3
LAI 674: Seminar in Teaching	3
LAI 516: Infrastructure for K12 Computing Education	3

The table below aligns Initial Certificate Track learning outcomes with courses providing summative assessments of this learning.

code	515	516	562	574	595	605	611	667	668	674	676	698
PK1			X	X								
PK2				X								
PK3				X			X					
PK4			X				X					
PK5												X
PK6												X
PCK1						X						
PCK2			X			X					X	
PCK3	X					X	X					
PCK4							X				X	
PCK5							X				X	

Professional Certificate Track

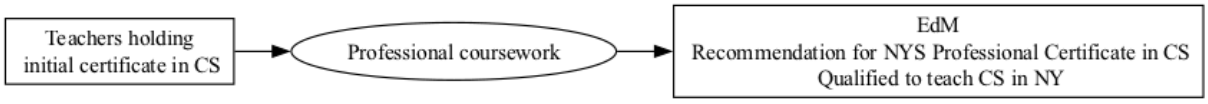

Figure 4: The Professional Certificate Track

Audience

The Professional Certificate Track is available to teachers holding initial certification in Computer Science wishing to earn professional certification. This track requires one year of full-time coursework.

Admission requirements

- **Initial NY teacher certification** in Computer Science
- **Application essay** focused on vision for CS education
- **Recommendation letter** focused on preparation to succeed and potential for impact

Learning outcomes

The Initial Certificate Track learning outcomes are aligned with the overarching CS Education Program outcomes. Incoming students are expected to already have a strong content background in computer science as well as a strong background in pedagogical knowledge. This track emphasizes the synthesis of content knowledge and pedagogical knowledge into CS pedagogical content knowledge and leadership.

- PCK1: Computing as a literacy
- PCK2: Supporting learner identities
- PCK3: Shaping the learning environment
- PCK4: Teaching with computational media
- PCK5: Feedback and assessment
- L1: Equity and opportunity
- L2: Connected learning
- L3: Interdisciplinary connections
- L4: Design and research

Coursework

Coursework consists of 30 credits. Courses may be taken in any order and pace.

Course	Credits
LAI 573: Technology as a Social Practice	3
LAI 605: Critical Computational Literacies	3
LAI 611: Methods in Teaching Computer Science, Grades 1-12	3
LAI 676: The Pedagogy of Programming	3
LAI 677: Survey of Topics in K12 Computer Science	3
LAI 516: Infrastructure for K12 Computing Education	3
Electives	12

Students will choose from the following electives:

- LAI 573: Technology as a Social Practice, recommended for elementary teachers.
- LAI 508: Educational Uses of the Internet, recommended for secondary teachers.

- LAI 686: Critical Computational Literacies Design Studio, recommended for teachers interested in educational technology design.
- DEE 520: Computing Education Research, recommended for teachers interested in participating in research on computing education.
- Graduate-level CSE courses. Recommended for students with strong content background, especially those interested in teaching Advanced Placement courses.
- Other LAI, LIS, or interdisciplinary courses with advisor approval.

The following diagram aligns Initial/Professional Certificate Track learning outcomes with courses providing summative assessments of this learning.

code	516	573	605	611	676	677
PCK1			X			
PCK2		X	X		X	
PCK3			X	X		
PCK4				X	X	
PCK5				X	X	
L1	X		X			
L2	X		X		X	
L3	X					X
L4	X					X

Initial/Professional Certificate Track

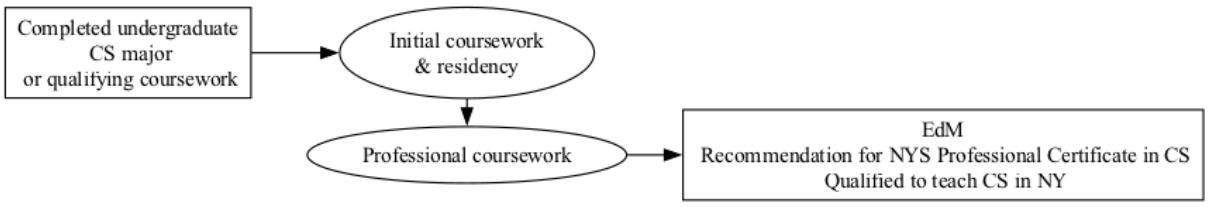

Figure 5: The Initial/Professional Certificate Track

Audience

The Initial/Professional Certificate Track combines the Initial Certificate Track and the Professional Certificate Track, with fewer required credit hours than completing both tracks separately (48 credit hours instead of 60). Graduates earn an EdM dgree and an institutional recommendation for NYS Initial and Professional Certifications in CS, qualifying the holder to teach CS in New York schools. This track generally requires one year of full-time coursework followed by a one-year residency placement in a school.

Admission requirements

The admission requirements for the Initial/Professional Certificate Track are the same as for the Initial Certificate Track. Please see the program web site for updates and details on application.

- **An undergraduate degree** from an accredited institution
- **Content knowledge**:
  - Either an undergraduate major in CS or a related field, or
  - 12 credit hours of CS satisfying the content knowledge program outcomes
- **Test scores**[2]: GRE or MAT scores from tests taken within five years
- **Contact information for two references**
- **Unofficial transcripts from all colleges attended**. (UB transcripts are automatically submitted for current UB students and alumni.)
- **Statement of education and career goals**

Learning outcomes

The Initial/Professional Certificate Track learning outcomes are aligned with the overarching CS Education Program outcomes. Incoming students are expected to already have a strong content background in computer science.

- PK1: Human development
- PK2: Learning
- PK3: Supporting students with disabilities
- PK4: Language acquisition and literacy

[2] Graduate Record Exam (GRE) or Miller Analogies Test (MAT) scores are required from tests taken within the last five years—including verbal, quantitative and writing sections. Please use institution code 2925 and department code 3101. While GRE/MAT scores are not demonstrated to be predictive of student success in our program, by statutory regulation we are required to have a standardized admission test score on file as part of your application.

- PK5: Curriculum and instruction
- PK6: Professional practice and obligations
- PCK1: Computing as a literacy
- PCK2: Supporting learner identities
- PCK3: Shaping the learning environment
- PCK4: Teaching with computational media
- PCK5: Feedback and assessment
- L1: Equity and opportunity
- L2: Connected learning
- L3: Interdisciplinary connections
- L4: Design and research

Coursework

Fall Term 1 (15 credits)

Course	Credits
LAI 551: Childhood Literacy Methods*	3
LAI 605: Critical Computational Literacies	3
LAI 663: Sociocultural Dimensions of Learning and Human Development	3
LAI 676: The Pedagogy of Programming	3
LAI 698: Instructional Strategies in Inclusive Classrooms	3

*Alternate: LAI 552: Middle Childhood/Adolescence Literacy Methods

Spring Term 1 (15 credits)

Course	Credits
LAI 562: English Language Learners: Emergent Theory and Practices	3
LAI 573: Technology as a Social Practice	3
LAI 574: Teaching the Exceptional Learner	3
LAI 611: Methods in Teaching Computer Science, Grades 1-12	3

Course	Credits
LAI 677: Survey of Topics in K12 Computer Science	3

Fall Term 2: Residency (9 credits)

Course	Credits
LAI 668: Supervised Teaching I	3
LAI 667: Field Experience	3
LAI 515: Action Research to Improve Teaching and Learning	3

Spring Term 2: Residency (9 credits)

Course	Credits
LAI 595: Supervised Teaching II	3
LAI 674: Seminar in Teaching	3
LAI 516: Infrastructure for K12 Computing Education	3

The following diagram aligns Initial/Professional Certificate Track learning outcomes with courses providing summative assessments of this learning.

code	515	516	551	562	573	574	595	605	611	663	667	668	674	676	677	698
PK1				X		X				X						
PK2						X				X						
PK3						X			X							
PK4			X	X					X							
PK5																X
PK6																X
PCK1			X					X								

code	515	516	551	562	573	574	595	605	611	663	667	668	674	676	677	698
PCK2			X	X	X			X		X				X		
PCK3	X							X	X							
PCK4									X					X		
PCK5									X					X		
L1		X						X								
L2	X	X						X						X		
L3		X													X	
L4	X	X													X	

Advanced Certificate Track

Figure 6: The Advanced Certificate Track

Audience

The Advanced Certificate Track is designed for New York teachers currently holding a teaching certificate in another discipline, or for preservice teachers currently preparing to teach in another discipline. This program builds on teachers' expertise, experience, identities, and commitments to grow into a new subject area. There are no content knowledge prerequisites, however the program will require teachers to complete college-level CS coursework and will draw on existing pedagogical knowledge and pedagogical content knowledge in their current disciplines.

The Advanced Certificate Track can be completed remotely by working professionals at their own pace. An ongoing context of practice is required, as teachers will design and implement interdisciplinary CS lessons as part of the program.

Admission requirements

- Either:

    - **Initial or Professional NY teacher certification** in any discipline and
    - **Teaching experience** (minimum one year recommended)
- Or:
    - **Current enrollment in a teacher preparation program**.
- **An ongoing context of practice** (classroom teaching, club)
- **Application essay** focused on vision for CS education
- **Statement justifying preparation for CS coursework**
- **Recommendation letter** focused on preparation to succeed and potential for impact

Learning outcomes

The Advanced Certificate Track for In-Service Teachers learning outcomes are aligned with the overarching CS Education Program outcomes. The Advanced Certificate Track for In-Service Teachers prioritizes CS content knowledge. The Advanced Certificate Track for In-Service Teachers focuses on adapting teachers' existing pedagogical content knowledge to CS.

- CK1: Impacts of computing
- CK2: Computational thinking
- CK3: Networks and system design
- CK4: Cybersecurity
- PCK1: Computing as a literacy
- PCK2: Supporting learner identities
- PCK3: Shaping the learning environment
- PCK4: Teaching with computational media
- PCK5: Feedback and assessment
- L1: Equity and opportunity
- L2: Connected learning
- L3: Interdisciplinary connections
- L4: Design and research

Coursework

The Advanced Certificate consists of five courses and a total of 15 credit hours. Courses may be taken in any order and at any pace.

Course	Credits
LAI 515: Action Research to Improve Teaching and Learning	3
LAI 676: The Pedagogy of Programming	3
LAI 677: Survey of Topics in K12 Computer Science	3
LAI 605: Critical Computational Literacies	3
LAI 516: Infrastructure for K12 Computing Education	3

Students with relevant prior experience may substitute a maximum of one course for another course, with advisor permission. Additionally, students who complete LAI 515 as part of a UB teacher preparation program also satisfy that requirement for the Advanced Certificate Program.

The table below aligns Initial/Professional Certificate Track learning outcomes with courses providing summative assessments of this learning.

code	515	516	605	676	677
CK1				X	X
CK2				X	X
CK3					X
CK4					X
PCK1			X		
PCK2			X	X	
PCK3	X		X		
PCK4				X	
PCK5				X	
L1		X	X		
L2	X	X	X	X	
L3		X			X
L4	X	X			X

Teaching practicum

The Advanced Certificate requires 50 hours of teaching practicum. Students will complete 25 hours of practicum in LAI 515 and an additional 25 hours in LAI 516.

Courses

The following courses fulfill requirements within various tracks of the the Computer Science Education Program. Please refer to the chapters on specific tracks for an overview of which courses are required and available in each.

LAI 508: Educational Uses of the Internet

This class is an exploration of ways the Internet can be utilized in instructional settings. Beyond acquiring hands-on experience with Web searching, using Web-based tools, and developing Web-based modules, we will investigate related technical, pedagogical, cultural, and social issues, to clarify what the Internet means in the context of educational experiences: How might teaching and learning practices change with Internet uses? What is needed for successful experiences using the Internet in education? What new concerns does the Internet bring? How does the Internet relate to the cultural context of the classroom and the cultural background of teacher and learner?

Program outcomes:

- CK1
- CK2
- CK3
- CK4
- PCK2
- PCK3

LAI 515: Action Research to Improve Teaching and Learning

The purpose of this course in action research is threefold: (1) to understand promising practices in the teaching and learning based on current scholarship; (2) to become competent, critical readers of action and interpretive research on teaching and learning; (3) to engage in a small-scale classroom study (or small-group adolescent study) to explore action research as a means of pursuing questions of teaching and learning to improve practice. Emphasis throughout will also be on understanding the assumptions and theories underlying research and drawing implications for teaching and learning in

diverse classroom contexts. This class is appropriate for Ph.D. and Master's students interested in the role of action research to improve classroom practice. (Note: those who are not currently teaching, you will have opportunities to collaborate with currently practicing teachers or developing a practical plan, given your situation.)

Students in the CS teacher preparation program will use this course to design an interdisciplinary CS learning experience, which they will subsequently implement in LAI 516: Infrastructure for K12 Computing Education.

LAI 515 satisfies 25 hours of the 50-hour practicum requirement for the Advanced Certificate Track for In-Service Teachers.

Program outcomes:

- PCK3
- L2
- L4

LAI 516: Infrastructure for K12 Computing Education

This course is the capstone course for all tracks in the Computer Science Education Program. The course focuses on analyzing local, national, and international case studies of computer science at various scales, through the lenses of the program outcomes: content knowledge, pedagogical knowledge, pedagogical content knowledge, and leadership.

LAI 516 satisfies 25 hours of the 50-hour practicum requirement for the Advanced Certificate Track for In-Service Teachers.

Program outcomes:

- L1
- L2
- L3
- L4

LAI 551: Childhood Literacy Methods

Instructional theory and practice focusing on teaching, reading and writing in Grades 1-6 emphasizing: teaching literacy with literature; teaching literacy from reader response, critical, and interactive perspectives; and integrating instruction across content areas. Topics dealing with techniques for improving comprehension and word identification, creating a literate environment, creating interest and

motivation, and creating authentic forms of assessment and evaluation as part of ongoing instruction are explored.

Program outcomes:

- PK4
- PCK1
- PCK2

LAI 552: Middle Childhood/Adolescence Literacy Methods

Instructional theory and practice focusing on literacy in Grades 5-12 emphasizing building literacy in the content areas. Topics dealing with techniques for creating interest and motivation for literacy, study strategies, strategies for building comprehension, constructing meaning, and assessing students' literacy performance are explored.

Program outcomes:

- PK4
- PCK1
- PCK2

LAI 562: English Language Learners: Emergent Theory and Practices

This course is designed for mainstream childhood and early childhood educators preparing to serve English language learners (ELL) - emergent bilinguals (EB). It will focus on the foundations of first and second language acquisition and content learning and the development of bilingualism, biliteracy and biculturalism among ELLs-EBs. The course will examine linguistic, academic, cognitive, and socio cultural domains that impact this development and the identity formation and academic achievement of emergent bilinguals (EB). Participants will gain and understanding of the unique needs of ELLs/EBs and become familiar with research-based content and language-integrated practices that address such needs.

Program outcomes:

- PK1
- PK4
- PCK2

LAI 573: Technology as Social Practice

This course aims to clarify the roots of, and identify what is at stake in, contemporary conflicts over the development and use of technology. The first half addresses the problem of conceptualizing technology so as best to elucidate its social nature and its involvement in political and cultural processes; the second half applies this conceptual work by analyzing the way technologies and social structures mutually shape one another in a variety of specific institutional settings.

Program outcomes:

- CK1
- PCK2

LAI 574: Teaching the Exceptional Learner

The purpose of this course is to aid in understanding diversity by preparing teachers to offer direct and indirect services to students within the full range of disabilities and special health-care needs in inclusive environments. Students will be provided with techniques designed to enhance academic performance, classroom behavior, and social acceptance for students with disabilities and special needs. Students will learn skills enabling them to (1) differentiate and individualize instruction for students with disabilities and special needs, (2) become familiar with instructional and assistive technologies, (3) implement multiple research-validated instructional strategies, (4) formally and informally assess learning of diverse students, (5) manage classroom behavior of students with disabilities and special needs, and (6) collaborate with others and resolve conflicts to educate students with disabilities and special needs.

Program outcomes:

- PK1
- PK2
- PK3

LAI 595: Supervised Teaching II

Supervised Teaching II completes the residency component of the Initial Certificate Track and Initial/Professional Certificate Track. During this semester, students complete four full days in their residency school, beginning in early January and continuing for 21 weeks. The purpose of this course is to provide a mentored opportunity for student teachers to develop their teaching practice as a co-teacher with an effective, experienced mentor. Designated periods of lead teaching co-taught lessons and solo teaching individually prepared lessons are incorporated.

- Prerequisite: Successful completion of LAI 667 and LAI 668.
- Corequisite: LAI 674.

LAI 605: Critical Computational Literacies

This course centers critical computational literacies as a framework for thinking about how and why we might teach K12 Computer Science (CS). Just as schools participate in broader social systems which shape our lives and which may or may not contribute to a more just and peaceful society, CS is only one part of the work of a school. Our work as CS educators may be constrained by other priorities and stakeholders, and our work can also reshape the work of the school beyond the classroom. We take as our starting point the premise that CS education is currently figured in a way which gives it unusual leverage to reshape K12 educational practice.

This is an interdisciplinary course with no prerequisites. GSE master's and doctoral students, as well as graduate students and advanced undergrads from Computer Science & Engineering, Media Study, Architecture & Planning, or other departments, are warmly welcome.

Program outcomes:

- PCK1
- PCK2
- PCK3
- L1
- L2

LAI 611: Methods in Teaching Computer Science, Grades K-12

Approaches and teaching techniques that effectively prepare students in Grades kindergarten to 12 to meet New York State Standards in computer science. Topics include but are not limited to facilitating students' learning of computer science in ways that address justice, equity and cultural identity, planning of lessons and units, methods of student assessment, development of teaching materials and activities, and provision of differentiated instruction for a diverse student population, including those with special needs. Introduction to state and national professional organizations as resources for continuing professional development in computer science education.

Program outcomes:

- PK3
- PK4
- PCK3

- PCK4
- PCK5

LAI 663: Sociocultural Dimensions of Learning and Human Development

Research in learning sciences supports a view of learning that contends learners construct knowledge in multiple contexts (schools, home, third spaces, etc.) and learn optimally when content and pedagogies are grounded in their socio-cultural environment. In this course, students will investigate and engage with the following principles 1. Learning is contextual and for every individual, learning is a socio-cultural experience grounded in historical and contemporary global and local systems (values, traditions, practices, and relations of power). 2. Learning is an ongoing process that is grounded in multiple environments that the individual experiences throughout life (school, home, and community). 3. Learning is supported by various societal constructs that contribute to the persona

Program outcomes:

- PK1
- PK2
- PCK2

LAI 667: Field Experience

The field experience course is a key component in the Initial Certificate Track and Initial/Professional Certificate Track tracks of the teacher education program that leads to a recommendation for an initial teacher certificate. A primary goal of the fall semester field experience is for preservice teachers to continue to develop their professional identity to support successful teaching experiences. In accordance with NYS education law, this course also addresses the following areas: Arson and fire prevention, the prevention of harassment, bullying and cyberbullying, the means for identifying and reporting child abduction, child abuse, and child mistreatment, the prevention of school-related violence, and the prevention of alcohol and drug abuse.

Throughout the course, students complete 115 hours of observation and participation, 15 of which focus on students with disabilities. Seven additional days of clinical experience are incorporated into the schedule to engage with diverse school communities and to observe/participate across the grade span of the certification level.

Additional learning outcomes include:

- Teacher candidates will connect theory and practice between their developing content and pedagogical knowledge as related to teaching and learning in Western New York preK-12 classrooms, schools, and communities

- Teacher candidates will discuss and write critically about teaching and learning
- Teacher candidates will Identify and analyze the diversity within school cultures and communities with a focus on how instruction is differentiated to meet the needs of all learners
- Teacher candidates will begin to develop a professional identity
- Teacher candidates will build professional relationships and cultivate understandings of the communities their schools serve
- This course is offered in collaboration with the Office of Educator Preparation and is taken in conjunction with LAI 668: Supervised Teaching I.

LAI 668: Supervised Teaching I

Supervised Teaching I is the first residency component of the Initial Certificate Track and Initial/Professional Certificate Track. During this first semester, students complete three full days in their residency school, beginning with the school-based professional development days and ending with the residency school calendar (at least 16 weeks). The purpose of this course is to provide a mentored opportunity for student teachers to develop their teaching practice as a co-teacher with an effective, experienced mentor.

- Prerequisite: Approval of the Residency Application.
- Corequisite: LAI 667: Field Experience.

LAI 674: Seminar in Teaching

Through this course students are provided a focused opportunity to reflect weekly on residency/student teaching experiences, supported as they explore their professional identities as beginning teachers, and assisted in the certification process and job search. These three purposes are met through small-group discussions facilitated by the group's Clinical Experience Coach (CEC) as well as through large-group presentations led by individuals and panels of speakers.

Additionally, the course focuses on completing the program summative assessments.

LAI 676: The Pedagogy of Programming

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. One primary audience for the course is future CS teachers, or future teachers interested in interdisciplinary CS. The course is also designed for graduate students in the social sciences, arts, and humanities who

want to use computational methods in research or art. Programming topics include variables, data types, control flow, planning, debugging, collaboration, abstraction, and modularization. Pedagogical topics include debugging, misconceptions, formative and summative assessment, and teaching with computational media.

This course has no prerequisites. Graduate students from across the arts and social sciences are warmly welcome.

Program outcomes:

- CK1
- CK2
- PCK2
- PCK4
- PCK5
- L2

LAI 677: Survey of Topics in K12 Computer Science

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.

Program outcomes:

- CK1
- CK2
- CK3
- CK4
- L3
- L4

LAI 686: Critical Computational Literacies Design Studio

This course is an interdisciplinary community of practice focused on designing theoretically-grounded tools for teaching and learning K-12 computer science (CS). CS is becoming a mainstream subject in K-12 education even though how it will be defined and taught are not yet well-established. Developing tools for teaching and learning presents an opportunity to support teacher practice while enacting a vision of K-12 CS as a culturally-sustaining, justice-oriented practice, and imagining ways in which K-12 CS might contribute to broader transformation of our schools and communities. Over the semester, teams of students will articulate a learning goal and then design, build, deploy, and analyze a computational tool in partnership with a school or community organization.

LAI 686 was offered for the first time in spring 2021. The course has not yet been approved by the department as a permanent course, which is why it was offered under the provisional catalog number, 686. The course can be offered three times on a provisional basis before it requires departmental approval.

DEE 520: Computing Education Research

This course will provides students in Engineering Education with strategies and frameworks for understanding computing education research.

Appendices

Appendix I: Alignment of Program Outcomes with New York State Teaching Standards

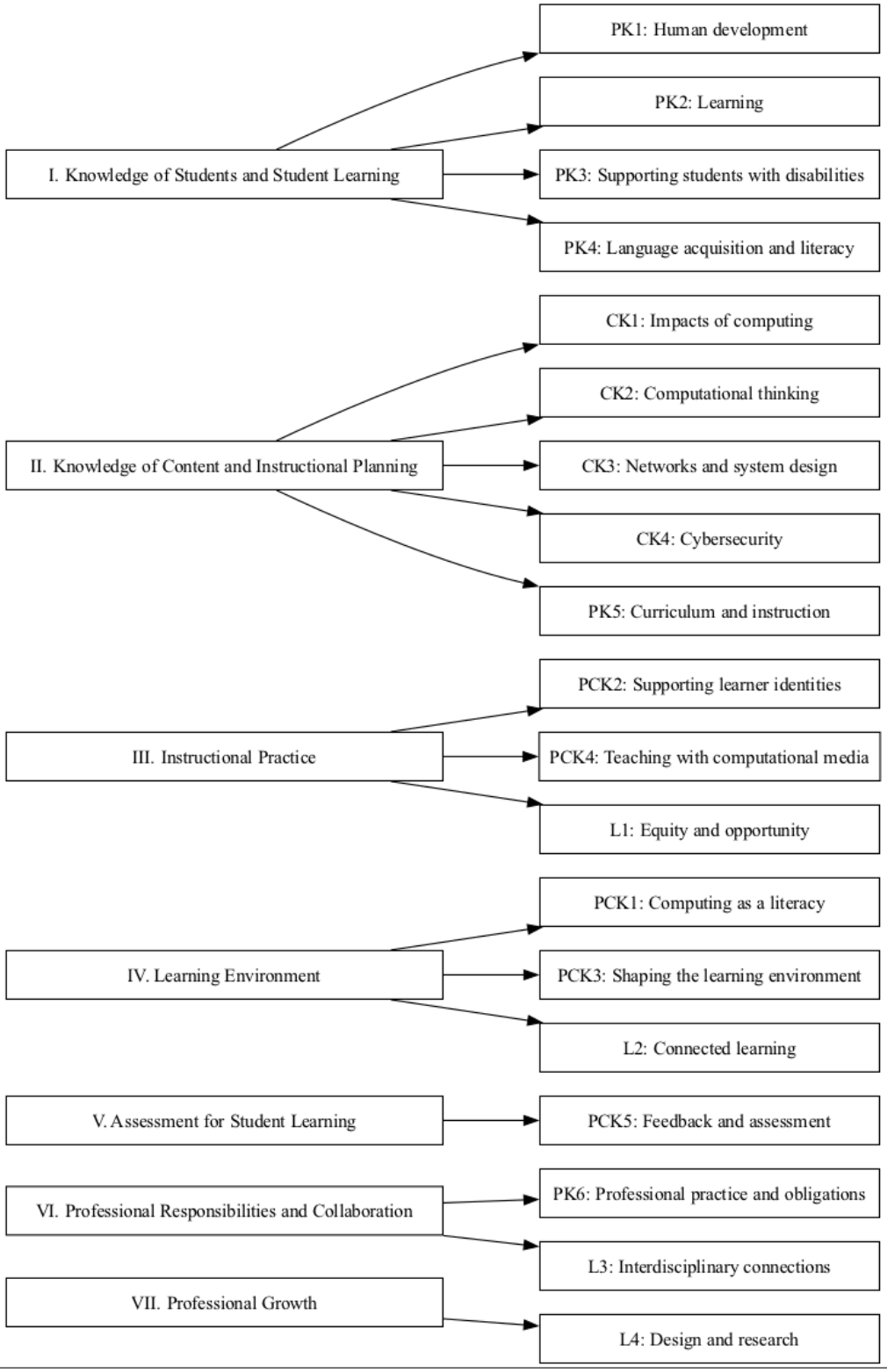

Figure 7: Alignment of Program Outcomes with New York State Teaching Standards

Appendix II: Alignment of Program Outcomes with CSTA Standards

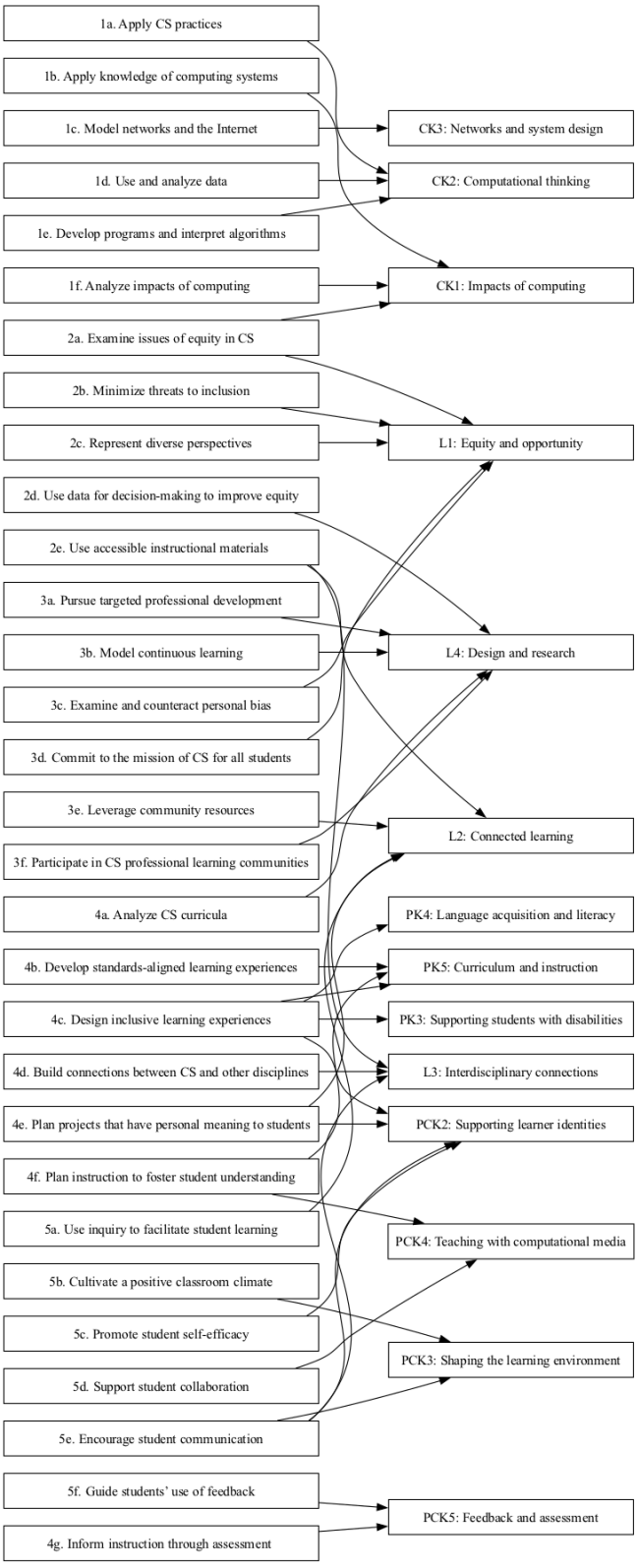

Figure 8: Alignment of Program Outcomes with CSTA Standards

Appendix III: NYSED policy regarding field experiences, practica, and student teaching

The NYSED requirements for certification in a special subject, including CS, require 100 hours of field experiences, then 40 days of student teaching, with the following exception:

> Limited Exemption for candidates with prior teaching experience:
>
> A candidate who is enrolled in a graduate-level program leading to certification in one or more certificates shall be exempt from the requirements for clinical experiences if such candidate satisfies one or more of the following conditions: 1) they have completed a New York State registered teacher preparation program prior to enrollment and hold an Initial and/or Professional certificate 2) hold National Board certification or 3) have at least one year of effective teaching under a valid New York State or out-of-state teaching license or certificate.
>
> Clinical experience requirements for candidates that qualify for the limited exemption:
>
> The clinical experience shall require the candidate to complete at least 50 clock hours of student teaching or practica, where such experiences focus on the applicable program-specific pedagogical core requirements for the special subject certificate and must occur with actual students in the special subject educational settings.

The August 2022 Office of Higher Education Educator Preparation Newsletter clarified that:

> candidates may engage in remote learning with students during their field experiences and student teaching if they are placed in schools that utilize this method of learning, as long as the clinical experiences meet the program requirements and teacher preparation program regulations.

A memo dated December 1, 2022 clarified that “remote learning experiences with students” is appropriate for satisfying practica requirements.

“Practica” and “student teaching” are defined in Section 52.21 of the Regulations of the Commissioner of Education:

> (xi) Practica means structured, college-supervised learning experiences for a student in a teacher education program in which the student teacher practices the skills being learned in the teacher education program through direct experiences with individual students, or with groups of students. These skills are practiced under the direct supervision of the certified teacher who has official responsibility for the students.
>
> (xii) Student teaching means a structured, college-supervised learning experience for a student in a teacher education program in which the student teacher practices the skills being learned in the teacher education program and gradually assumes increased responsibility for instruction, classroom management, and other related duties for a class of students in

> the area of the certificate sought. These skills are practiced under the direct supervision of the certified teacher who has official responsibility for the class.

Appendix IV: Resources for CS Teacher Preparation

- CSTA Guidance for Schools of Education
- Cornell Tech CS Coaching Kit
- CS Teaching Tips
- Teaching Security

Appendix V: History of handbook changes

- 0.0.5 (2021-11-10): First complete draft.
- 0.0.6 (2022-04-11): Updates in response to external reviewer suggestions. Added a section on continuous improvement. Updated recently-approved course descriptions.
- 0.0.7 (2022-04-22): Converted course/outcome alignments to tables, and added program outcomes to course descriptions. Wrote software in the handbook respository to automatically update tables and lists of course/outcome alignments.
- 0.1.0 (2023-02-10): Added provisions for yearlong residency and clarified field experience requirements for the advanced certificate track. Added section numbering for clarity. Reworked the appendices and added missing course descriptions.
- 1.0.0 (2024-09-09): Removed information about SOCE, as the deadline has passed. Revised Advanced Certificate Track to emphasize eligibility of current preservice teachers. LAI 700: CS Capstone has been renamed LAI 516: Infrastructure for K12 Computing Education.