



Ontario eSecondary School Course Outline 2026-2027

Ministry of Education Course Title: Computer Science	
Ministry Course Code: ICS4U	
Course Type: University	
Grade: 12	
Credit Value: 1.0	
Prerequisite(s): ICS3U: Introduction to Computer Science	
Department: Computer Studies	
Course developed by: Brad Strassburger	Date: December 1st, 2024 Revised: August 1, 2026
Length: One Semester	Hours: 110
This course has been developed based on the following Ministry documents: 1. <i>Technological Education (2009)</i> 2. <i>Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools (2010)</i> 3. <i>Learning for All (2013)</i>	

COURSE DESCRIPTION/RATIONALE

This course enables students to further develop knowledge and skills in computer science. Students will use modular design principles to create complex and fully documented programs, according to industry standards. Student teams will manage a large software development project, from planning through to project review. Students will also analyze algorithms for effectiveness. They will investigate ethical issues in computing and further explore environmental issues, emerging technologies, areas of research in computer science, and careers in the field.

OVERALL CURRICULUM EXPECTATIONS

A. Programming Concepts and Skills

By the end of this course, students will:

- A1. demonstrate the ability to use different data types and expressions when creating computer programs;
- A2. describe and use modular programming concepts and principles in the creation of computer programs;
- A3. design and write algorithms and subprograms to solve a variety of problems;
- A4. use proper code maintenance techniques when creating computer programs.

B. Software Development

By the end of this course, students will:

- B1. demonstrate the ability to manage the software development process effectively, through all of its stages – planning, development, production, and closing;
- B2. apply standard project management techniques in the context of a student-managed team project.

C. Designing Modular Programs

By the end of this course, students will:

- C1. demonstrate the ability to apply modular design concepts in computer programs;
- C2. analyse algorithms for their effectiveness in solving a problem.

D. Topics in Computer Science

By the end of this course, students will:

- D1. assess strategies and initiatives that promote environmental stewardship with respect to the use of computers and related technologies;
- D2. analyse ethical issues and propose strategies to encourage ethical practices related to the use of computers;
- D3. analyse the impact of emerging computer technologies on society and the economy;
- D4. research and report on different areas of research in computer science, and careers related to computer science.

COURSE CONTENT

Unit	Length
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Unit 0: Welcome and Intro	1 hours
Unit 1: Topics in Computer Science	10 hours
Unit 2: Programming Basics	10 hours
Unit 3: Basics of Object Oriented Programming	10 hours
Unit 4: Advanced Object Oriented Programming	18 hours
Unit 5: GUI's	15 hours
Unit 6: Data	15 hours
Unit 7: Games	15 hours
Unit 8: Final Task	15 hours
Total	110 Hours

UNIT DESCRIPTIONS

Unit 1 - Topics in Computer Science

In this unit you will learn about a number of topics in computer science. You will start by learning about computer security and ethical issues, as well as environmental impacts. From here you will look at options in post-secondary education and have the opportunity to research emerging technologies. Throughout this unit you will have questions to work on and a quiz that acts as checkpoints for your learning, followed by a major report and meeting with your teacher.

Unit 2 - Java Programming Basics

In this unit you will review the basic programming concepts covered in the grade 11 course, but will introduce you to the use of java. You will look at input, output, variables, a variety of math functions, and repetition. In this unit you will find two quizzes that will act as checkpoints as well as two graded assignments.

Unit 3 - Basics of Object Oriented Programming

In this unit you will be introduced to some of the main concepts in object oriented programming (OOP). These concepts can be a little abstract but are fundamental to moving forward in the rest of the course. You will look at the basic elements of OOP such as classes and objects, as well as how to share traits between objects and methods. You will also learn about how to use our "robot" interface which will hopefully help to make the process easier to learn. In this unit there will be two check in activities, one quiz and one small assignment. Your project for this unit will require you to create a robot world and have your robot execute tasks in it.

Unit 4 - Advanced Object Oriented Programming

In this unit you will expand your knowledge of object orientation programming (OOP). These concepts are at the heart of OOP and will allow you to make much more complex programs. We will continue to utilize the robot classes to help make concrete connections to these concepts. In this unit there will be two check-in quizzes as well as two assignments. You will conclude the unit with another teacher meeting.

Unit 5 - GUI's

In this unit you will learn about the creation and use of GUI's as well as how to implement arrays in Java. These concepts will likely be review from your grade 11 course, it will just be a matter of learning the java syntax. You will have one check in quiz and one major assessment for this unit.

Unit 6 - Data

In this unit you will learn about basic data access and storage using external files. You will also look at sorting methods and how they can be used. Finally you will look at basic statistical methods for data analysis. In this unit there will be one quiz which will act as a check in as well as one major assessment.

Unit 7 - Games

In this unit you will learn about the basics of game development. You will start by learning how to draw primitive shapes on a frame and will then look at planning a game. You will also look at how coding can be made to imitate computer choice and how to implement this in simple games. There will be one final quiz for the course which will act as a check in and will not count towards your final grade. You will then complete a unit project of creating a simple game to play against the computer.

Unit 8 - Final Task

In this unit you will complete a final programming project that covers the major concepts learned in the course.

TEACHING AND LEARNING STRATEGIES

In this course, students will experience the following activities.

Participation activities are seven standardized, course-wide prompts (Teach the Teacher, Concept in Action, Spot the Error, Concept Connections, Take a Position, Claim/Support/Question, and a culminating Course Takeaways video) embedded at set points throughout the course. They build metacognitive engagement with unit concepts and contribute to the course's participation grade.

Presentations with embedded videos are utilized to outline concepts, explain theory with the use of examples and practice questions, and incorporate multi-media opportunities for students to learn more (e.g. online simulations, quizzes, etc.).

Reflection is an opportunity for students to look back at concepts and theories with new eyes, to relate theory to practice, and to align learning with their own values and beliefs.

Discussions with the instructor are facilitated through video conferencing, discussing the concepts and skills being studied. This enables two-way communication between the student and the instructor, to share ideas and ask questions in dialogue. This also helps to build a relationship between the student and instructor.

Practical extension and application of knowledge are integrated throughout the course. The goal is to help students make connections between what they learn in the classroom and how they understand and relate to the world around them and their own lives. Learning becomes a dynamic opportunity for students to be more aware that their learning is all around them and enable them to create more meaning in their lives.

Individual activities/assignments assessments are completed individually at a student's own pace and are intended to expand and consolidate the learning in each lesson. Individual activities allow the teacher to accommodate interests and needs and to assess the progress of individual students. For this reason, students are encouraged to discuss IEPs (Individual Education Plans) with their teacher and to ask to modify assessments if they have a unique interest that they feel could be pursued in the assessment. The teacher plays an important role in supporting these activities by providing ongoing feedback to students, both orally and in writing.

ASSESSMENT, EVALUATION, AND REPORTING

Assessment: The process of gathering information that accurately reflects how well a student is achieving the identified curriculum expectations. Teachers provide students with descriptive feedback that guides their efforts towards improved performance. These assessments are not for marks.

- In assessment for learning (AFL), teachers provide students with descriptive feedback and coaching for improvement.
- In assessment as learning (AAL), teachers help students develop their capacity to be independent, autonomous learners who are able to set individual goals, monitor their own progress, determine next steps, and reflect on their thinking and learning.

Evaluation: Assessment of Learning (AOL) focuses on evaluation which is the process of making a judgment about the quality of student work on the basis of established criteria over a limited, reasonable period of time.

Reporting: Involves communicating student achievement of the curriculum expectations and Learning Skills and Work Habits in the form of marks and comments as determined by the teacher's use of professional judgment.

Assessment & Evaluation at OES: Triangulation of Learning

In alignment with the Ontario Ministry of Education's *Growing Success* policy, student achievement across all high school courses at Ontario eSecondary School (OES) is evaluated through the **triangulation of evidence: observations, conversations, and student products**.

OES courses incorporate each of these evidence sources in a variety of ways to provide every student with equitable opportunities to demonstrate their learning:

- **Observations:** Collected through video recordings, interactive digital tools, learning logs, and synchronous task demonstrations.
- **Conversations:** Gathered via teacher-student conferences, oral defenses, virtual check-ins, and reflective feedback dialogues.
- **Products:** Demonstrated through major projects, essays, lab reports, performance tasks, and final assessments.

By evaluating a balanced variety of evidence, OES teachers apply professional judgment to ensure accurate, fair, and comprehensive assessment of each student's progress.

STRATEGIES FOR ASSESSMENT

Assessments are an important part of the learning process. It is the intention that formative and summative assessments provide students with constructive feedback to help them grow in developing their skills. It is also important that students play an active role in monitoring their own learning and skills development through the use of formative activities. It is also important that students bring their own creativity to the unit summative assessments.

ASSESSMENT ACTIVITIES

- ☐ Diagnostic tests
- ☐ Completed templates and graphic organizers
- ☐ Presentations
- ☐ Programming Projects

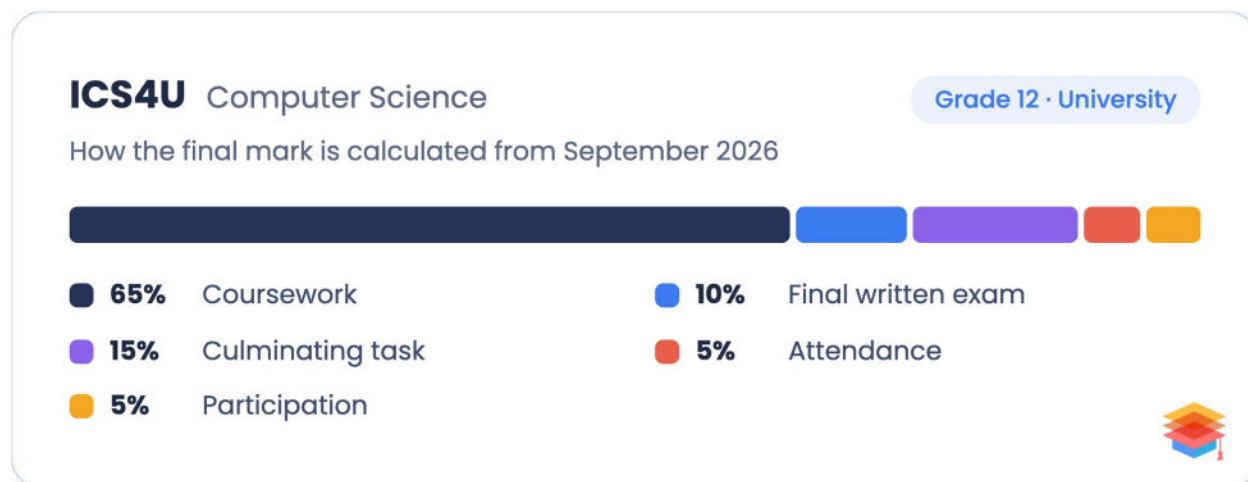
- ☐ Quizzes
- ☐ End of unit conversations (Google Meets)
- ☐ Culminating Programming Project

EVALUATION

The final grade will be determined as follows:

- 65% of the grade will be based on evaluation conducted throughout the course. This portion of the grade should reflect the student's most consistent level of achievement throughout the course, although special consideration will be given to more recent evidence of achievement.
- 25% of the grade will be based on a final evaluation administered at the end of the course. This evaluation will be based on evidence from a culminating task and a final written examination, both comprehensive of the course. The final evaluation is an opportunity for the student to demonstrate comprehensive achievement of the overall expectations for the course.
- 10% of the grade will be based on the student's attendance and participation throughout the course, assessed according to Ministry criteria.

(*Growing Success: Assessment, Evaluation and Reporting in Ontario Schools*. Ontario Ministry of Education Publication, 2010 p.41)



TERM WORK EVALUATIONS (65%)

Evaluation Item	Description	Category	Weight
Unit 1 Future Technology Report	Students will look at emerging technologies and how they can prepare to be part of it.	K, T, C, A	5
Unit 2 Math Part 2 Program	Students will use basic programming functions to solve problems	K, T, C, A	10
Unit 2 Unit 2 Project	Students will complete two programs that require the use of variables and mathematics.	K, T, C, A	
Unit 3 Unit 3 Project	Students will create a program using basic object oriented programming principles.	K, T, C, A	5
Unit 4 Conditional and Predicate Methods Activity	Students will use advanced object oriented programming concepts to write a program for a robot to complete tasks.	K, T, C, A	10
Unit 4 Unit 4 Project	Students will create a program utilizing advanced object oriented programming concepts.	K, T, C, A	
Unit 5 Unit 5 Project	Students will create a program that uses a GUI and arrays to process information.	K, T, C, A	10
Unit 6 Unit 6 Project	Students will create a GUI program that accesses data and performs basic calculations.	K, T, C, A	10
Unit 7 Unit 7 Project	Students will create a scaled down version of connect four.	K, T, C, A	15

FINAL EVALUATIONS (25%)

Final Exam	A final, written examination, covering all curriculum expectations for the course.	K, T, C, A	10
Evaluation Item	Description	Category	Weight
Final Project	Final Programming Project	K, T, C, A	15

ATTENDANCE AND PARTICIPATION (10%)

Attendance	Assessed according to the Ministry's attendance criteria (Growing Success, September 2026 update), based on the proportion of unexcused absences over the course.	N/A	5
Participation	Assessed according to the Ministry's participation criteria (Growing Success, September 2026 update), based on engagement in class discussions and activities throughout the course, including the standardized participation prompts (see Teaching and Learning Strategies).	N/A	5

AAL/AFL/AOL TRACKING SHEET

Unit 1: Topics in Computer Science

AAL	AFL	AOL
Computer Security Questions	Unit 1 Quiz	Future Technology Research
Ethics in Computing Questions	Teacher Meeting: Conversation	
Emerging Technologies Questions		
Post-Secondary and Career Options Questions		

Unit 2: Java Programming Basics

AAL	AFL	AOL
Output Activity	Boolean Operators Quiz	Math Pt2 Assignment
Math Pt1 Activity	Unit 2 Quiz	Unit 2 Project
Boolean Operators Activity		
Math Pt2 Activity: Observation		
Selection Activity		
Repetition Activity		

Unit 3: Basics of Object Oriented Programming

AAL	AFL	AOL
Intro to Robots Activity	Concepts Quiz #1	Unit 3 Project
Inheritance Activity	Creating a Robot World	
Overriding Methods Activity		

Unit 4: Advanced Object Oriented Programming

AAL	AFL	AOL
Instance Variables Activity	Concepts Quiz #2	Conditional Execution and Predicate Methods Assignment
Polymorphism Activity	Concepts Quiz #3	Unit 4 Project
Top Down Design Activity	Teacher Meeting: Conversation	
Conditional Execution and Predicate Methods Activity		
Recursion Activity		
Iteration Activity		
External Data Activity		

Unit 5: GUI's

AAL	AFL	AOL
Introduction to GUI's Activity	Concepts Quiz #4	Unit 5 Project: Observation
Arrays Activity		
2D Arrays Activity		
Canvas and Clearing Objects Activity		

Unit 6: Data

AAL	AFL	AOL
File Access Activity	Concepts Quiz #5	Unit 6 Project
Selection Sort Activity		
Bubble Sort Activity		
Data Analysis Activity		

Unit 7: Games

AAL	AFL	AOL
Introduction to Graphics Activity	Concepts Quiz #6	Unit 7 Project
Developing Simple Games Activity		
AI for Games Activity		

Unit 6: Final Assessments

AOL
Final Task
Final Exam

CONSIDERATION FOR PROGRAM PLANNING

PLANNING PROGRAMS FOR STUDENTS WITH SPECIAL EDUCATION NEEDS

OES teachers are the key educators of students with special education needs and have a responsibility to help all students learn. Program planning for students with special education needs is guided by the principles set out in Learning for All: A Guide to Effective Assessment and Instruction for All Students, Kindergarten to Grade 12 (2013): all students can succeed; each student has their own unique patterns of learning; successful instructional practices are founded on evidence-based research, tempered by experience; and universal design and differentiated instruction are effective and interconnected means of meeting the learning or productivity needs of any group of students. Where a student has an Individual Education Plan (IEP), the accommodations identified in the IEP — instructional, environmental, and assessment — are implemented within the course, and the online learning environment is adapted accordingly. The asynchronous structure of OES courses provides built-in flexibility that supports many common accommodations, including extended time for assignments and assessments, breaks as needed, access to assistive technology, and the ability to review instructional material multiple times.

PROGRAM CONSIDERATIONS FOR ENGLISH LANGUAGE LEARNERS

Ontario schools have some of the most linguistically diverse student populations in the world, and OES serves English language learners across Ontario and internationally. English language learners may be Canadian-born or newcomers; they may have experience of highly sophisticated educational systems or may have come from regions where access to formal schooling was limited. In planning this course, teachers consider the strengths and needs of English language learners and provide appropriate adaptations consistent with English Language Learners / ESL and ELD Programs and Services: Policies and Procedures for Ontario Elementary and Secondary Schools, Kindergarten to Grade 12 (2007). Supports within the online environment include modification of instructional language without modification of curriculum expectations, use of visual and multimedia supports, opportunities to replay and review lesson content, extended time where appropriate, and teacher feedback that models academic English. Assessment accommodations, such as granting additional time and permitting the use of bilingual dictionaries, are provided where appropriate.

ENVIRONMENTAL EDUCATION

Consistent with *Acting Today, Shaping Tomorrow: A Policy Framework for Environmental Education in Ontario Schools* (2009) and *Environmental Education: Scope and Sequence of Expectations* (2017), environmental education is embedded across the curriculum rather than treated as a separate subject. Teachers help students acquire knowledge about the environment, develop skills to address environmental issues, and foster attitudes that motivate responsible environmental action. As an online school, OES also models environmental responsibility through paperless course delivery and the elimination of daily commuting. In this course, students consider the environmental dimensions of computing and technology, including energy consumption, electronic waste, and the role of technology in addressing environmental challenges.

EQUITY AND INCLUSIVE EDUCATION

This course is planned and delivered in accordance with Ontario's Equity and Inclusive Education Strategy (2009) and Policy/Program Memorandum No. 119, *Developing and Implementing Equity and Inclusive Education Policies in Ontario Schools* (2013). OES is committed to an inclusive learning environment in which all students feel welcomed, respected, and able to succeed, regardless of ancestry, culture, ethnicity, sex, gender identity, sexual orientation, disability, race, religion, or socio-economic status. In this course, teachers select learning materials that reflect the diversity of Ontario and the wider world, address bias in texts and resources where it arises, and ensure that assessment practices are fair and free of cultural assumptions. Because OES students learn from communities across Ontario, Quebec, and around the world, discussion activities and teacher feedback are moderated to maintain a respectful, harassment-free environment for all learners.

FINANCIAL LITERACY EDUCATION

In accordance with *A Sound Investment: Financial Literacy Education in Ontario Schools* (2010) and current Ministry direction on financial literacy, students are provided with opportunities to build the knowledge and skills needed to make informed financial decisions, understand their roles as consumers and citizens, and think critically about the economic forces that affect their lives. OES also supports students in meeting the Ministry's financial literacy graduation requirement, as described in the OES School Course Calendar. In this course, students consider the economic dimensions of technology, including the costs of hardware, software, and services, licensing models, and the entrepreneurial opportunities associated with technological skills.

FIRST NATIONS, MÉTIS, AND INUIT EDUCATION

Program planning in this course aligns with the Ontario First Nation, Métis, and Inuit Education Policy Framework (2007), which supports improved outcomes for First Nations, Métis, and Inuit students and promotes awareness and understanding of Indigenous histories, cultures, perspectives, and contributions among all students. Where appropriate to the curriculum expectations, teachers incorporate Indigenous perspectives, authors, and content, and approach these topics with accuracy and respect, drawing on Ministry-recommended resources. All OES students benefit from opportunities to deepen their knowledge of the histories and contemporary realities of First Nations, Métis, and Inuit peoples, including the legacy of the residential school system and the Truth and Reconciliation Commission's Calls to Action related to education.

THE ROLE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Information and communications technology (ICT) is integral to every OES course: instruction, learning activities, assessment, and teacher-student communication all take place through the school's learning management system. ICT tools — including multimedia lessons, digital texts, simulations, video

conferencing for proctored assessments, and word-processing and productivity software — extend and enrich instruction and allow students to collect, organize, and present their learning in a range of formats. Teachers help students develop digital citizenship skills, including responsible and ethical use of technology, critical evaluation of online sources, protection of personal information, and academic integrity in digital environments, consistent with OES's Acceptable Use, Academic Honesty, and Artificial Intelligence policies as published in the School Course Calendar.

CAREER EDUCATION

Consistent with *Creating Pathways to Success: An Education and Career/Life Planning Program for Ontario Schools* (2013), teachers support students in answering the four questions at the centre of education and career/life planning: Who am I? What are my opportunities? Who do I want to become? What is my plan for achieving my goals? Expectations in this course include many opportunities for students to apply their skills to work-related situations, explore educational and career options, and become self-directed learners. OES guidance staff support students in course selection, postsecondary application planning (including OUAC, CEGEP, and international pathways), and the development of individual pathways plans. This course supports pathways into software development, information technology, computer engineering, digital media, and related technology fields, and these career connections are highlighted throughout the course.

COOPERATIVE EDUCATION AND OTHER FORMS OF EXPERIENTIAL LEARNING

Planned learning experiences in the community, including job shadowing, work experience, and cooperative education, provide students with opportunities to see the relevance of their classroom learning, explore careers of interest, and develop essential workplace skills consistent with *The Ontario Curriculum, Grades 11 and 12: Cooperative Education* (2018). Students may earn up to two cooperative education credits toward their compulsory credit requirements for the Ontario Secondary School Diploma. Students interested in experiential learning opportunities related to this course are encouraged to contact OES guidance staff to discuss options available to them.

HEALTH AND SAFETY

Although OES students learn remotely, health and safety remain integral considerations in program planning. Teachers model and promote safe and healthy practices for online learning, including sound ergonomics, balanced screen time, regular breaks, and strategies that support positive mental health and well-being. OES maintains a safe and respectful virtual learning environment consistent with the school's codes of conduct, bullying prevention expectations, and privacy practices as published in the School Course Calendar, and students are provided with clear channels for reporting concerns to their teachers, guidance staff, or the Principal. Students are taught safe and healthy practices for extended computer work, including sound ergonomics, appropriate breaks, and the safe handling of any equipment used in course activities.

ACCOMMODATIONS

Accommodations will be based on meeting with parents, teachers, administration and external educational assessment reports. The following three types of accommodations may be provided:

- ☐ **Instructional accommodations:** such as changes in teaching strategies, including styles of presentation, methods of organization, or use of technology and multimedia.

- ☐ **Assessment accommodations:** such as allowing additional time to complete tests or assignments or permitting oral responses to test questions.

Other examples of modifications and aids, which may be used in this course, are:

- ☐ Provide step-by-step instructions.
- ☐ Help students create organizers for planning writing tasks.
- ☐ Allow students to report verbally to a scribe (teacher/ student) who can help in note taking.
- ☐ Permit students a range of options for reading and writing tasks.
- ☐ Where an activity requires reading, provide it in advance.
- ☐ Provide opportunities for enrichment.