Ontario eSecondary School
Course Outline
2024-2025

Ministry of Education Course Title: Introduction to Computer Science	
Ministry Course Code: ICS3U	
Course Type: University	
Grade: 11	
Credit Value: 1.0	
Prerequisite(s): None	
Department: Computer Studies	
Course developed by: Brad Strassburger	**Date: October 1st, 2024**
Length: One Semester	**Hours:** 110
This course has been developed based on the following Ministry documents: 1. *Technological Education (2009)* 2. *Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools (2010)* 3. *Learning for All (2013)*	

COURSE DESCRIPTION/RATIONALE

This course introduces students to computer science. Students will design software independently and as part of a team, using industry-standard programming tools and applying the software development life-cycle model. They will also write and use subprograms within computer programs. Students will develop creative solutions for various types of problems as their understanding of the computing environment grows. They will also explore environmental and ergonomic issues, emerging research in com- puter science, and global career trends in computer-related fields.

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, including one-dimensional arrays, in computer programs;
- A2. demonstrate the ability to use control structures and simple algorithms in computer programs;
- A3. demonstrate the ability to use subprograms within computer programs;
- A4. use proper code maintenance techniques and conventions when creating computer programs.

B. Software Development
By the end of this course, students will:
- B1. useavarietyofproblem-solvingstrategiestosolvedifferenttypesofproblemsindependently and as part of a team;
- B2. design software solutions to meet a variety of challenges;
- B3. design algorithms according to specifications;
- B4. apply a software development life-cycle model to a software development project.

C. Computer Environment and Systems
By the end of this course, students will:
- C1. relate the specifications of computer components to user requirements;
- C2. use appropriate file maintenance practices to organize and safeguard data;
- C3. demonstrate an understanding of the software development process.

D. Topics in Computer Science
By the end of this course, students will:
- D1. describe policies on computer use that promote environmental stewardship and sustainability;
- D2. demonstrate an understanding of emerging areas of computer science research;
- D3. describe postsecondary education and career prospects related to computer studies.

COURSE CONTENT

Unit	Length
Unit 0: Welcome and Intro	1 hours
Unit 1: Topics in Computer Science	15 hours
Unit 2: Programming Basics	12 hours
Unit 3: Fundamental Concepts	20 hours
Unit 4: Advanced Topics	27 hours
Unit 5: VPython	20 hours
Unit 6: Culminating and Exam	15 hours
Total	**110 Hours**

UNIT DESCRIPTIONS

Unit 0 - Welcome and Introduction
Students will learn about what the course is about, what they can expect from each unit, and an overview of the major assignments in the course.

Unit 1 - Topics in Computer Science
In this unit you will learn about a wide variety of topics in computer science. You will start by learning about computer hardware and where the technology may be going followed by looking at educational and career opportunities that are available in computer science. Lastly you will look at the basic construction of computer programs. Throughout this unit you will have questions to work on and quizzes that act as checkpoints for your learning, followed by two major assessments.

Unit 2 - Programming Basics
In this unit you will learn the basic concepts in computer programming. You will learn about the fundamental components that make up a computer program as well as look at approaches to troubleshooting when programs are not working properly. There will be a checkpoint programming assignment as well as a quiz to ensure your understanding. It is important that you complete all exercises to ensure that you fully understand and are able to apply concepts. You will finish the unit with a short programming assignment.

Unit 3- Fundamental Concepts
In this unit you will expand on the basic concepts to create more complex selections and optimize your code through counting structures and the building of function blocks. You will also learn how to make basic GUI interfaces that will be used for the next unit as well. There will be two check in points with a quiz and your first GUI program. The unit will conclude with a quiz and major program and a conference with your teacher.

Unit 4 - Advanced Topics
In this unit you will expand on the concepts that we have covered so far by including concepts in error trapping, and utilizing the built-in functions in various python libraries. We also look at lists and how they can be used and manipulated, as well as how they can be used for storage and reading external data. There will be two concept quizzes that will act as checkpoints for your understanding as well as two assignments in this unit.

Unit 5 - VPython
In this unit you will learn about the Visual Python programming extension and library. You will apply the concepts that you have learned in previous units including repetition and the use of functions. You will complete two assignments for this unit as well as two check-in assessments.

Unit 6 - Culminating Project
In this unit you will propose a final programming project that covers the major concepts learned in the course. You will also have the opportunity to complete exam review prior to making arrangements and completing your exam.

TEACHING AND LEARNING STRATEGIES

In this course, students will experience the following activities.

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.

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:
- 70% 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.
- 30% 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 final project. The final evaluation is an opportunity for the student to demonstrate comprehensive achievement of the overall expectations for the course.

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

Weight

Course Work	70
Knowledge/Understanding (K)	17.5
Thinking/Inquiry (T)	17.5
Communication (C)	17.5
Application (A)	17.5
Final	**30**
Culminating Project (K5, T5, C5, A5)	20
Final Exam (K2.5, T2.5, C2.5, A2.5)	10

TERM WORK EVALUATIONS (70%)

Evaluation Item	Description	Category	Weight
Unit 1 Career Options Presentation	Students will explore career opportunities in computer technology fields.	K, T, C, A	10
Unit 1 Unit 1 Project (essay)	Students will write a brief essay with their opinion as to what the technology of the future will look like.	K, T, C, A	
Unit 2 Debugging Program	Students will look correct programs and explain the errors in the program	K, T, C, A	15
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 Quiz	Students will complete an online quiz	K, T, C, A	15
Unit 3 Unit 3 Project	Students will create a GUI and math functions to determine the mathematical values.	K, T, C, A	
Unit 4 Manipulating Lists Assignment	Students will use tools to manipulate and organize lists of data.	K, T, C, A	15
Unit 4 Unit 4 Project	Students will create a version of the classic board game MasterMind.	K, T, C, A	
Unit 5 Keyboard Input Program	Students will create a program that uses keyboard and mouse input.	K, T, C, A	15
Unit 5 Unit 5 Project	Students will use Visual Python to create a 3D version of the game Pong.	K, T. C. A	

FINAL EVALUATIONS (30%)

Evaluation Item	Description	Category	Weight
Final Project	Final Programming Project	K, T, C, A	20
Final Project	Exam	K, T, C, A	10

AAL/AFL/AOL TRACKING SHEET

Unit 1: Topics in Computer Science

AAL	AFL	AOL
Computer Hardware Questions	History of Computers Quiz	Career Options Presentation
Computer Science vs Engineering Questions	Computers and the Environment Quiz	Unit 1 Project (essay)
Emerging Technologies Questions	Teacher Meeting	
Post-Secondary Options Questions		
Software Development Life Cycle Questions		
Problem Solving and Planning Questions		

Unit 2: Programming Basics

AAL	AFL	AOL
Output Activity	Input and Variables Activity	Debugging Program
Input and Variables Exercises	Unit 2 Quiz	Unit 2 Project
Debugging Activity		
Selection Activity		

Unit 3: Fundamental Concepts

AAL	AFL	AOL
Advanced Selection Activity	Concepts Quiz #1	Unit 3 Quiz
User Defined Function Activity	Introduction to tKinter program	Unit 3 Project
Introduction to tKinter Activity	Teacher Meeting	
Counted Repetition Activity		
Uncounted Repetition Activity		

Unit 4: Advanced Topics

AAL	AFL	AOL
Error Checking Activity	Concepts Quiz #2	Manipulating Lists Assignment
Built-In Functions Activity	Concepts Quiz #3	Unit 4 Project
Lists Activity		
Manipulating Lists Activity		
Search and Sort Activity		
Data Analysis Activity		
External Data Activity		

Unit 5: VPython

AAL	AFL	AOL
Introduction to VPython Activity	Bouncing Ball Activity	Unit 5 Project
Basic Movement Activity	Concepts Quiz #4	
Keyboard Input Activity		
Canvas and Clearing Objects Activity		

Unit 6: Cumulative Assessments

AAL	AFL	AOL
Exam Review	Project Proposal	Culminating Project
		Exam

CONSIDERATION FOR PROGRAM PLANNING

PLANNING PROGRAMS FOR STUDENTS WITH SPECIAL EDUCATION NEEDS
Classroom teachers are the key educators of students who have special education needs. They have a responsibility to help all students learn, and they work collaboratively with special education teachers, where appropriate, to achieve this goal. Special Education Transformation: The Report of the Co-Chairs with the Recommendations of the Working Table on Special Education, 2006 endorses a set of beliefs that should guide program planning for students with special education needs in all disciplines. Those beliefs are as follows: All students can succeed. Universal design and differentiated instruction are effective and interconnected means of meeting the learning or productivity needs of any group of students. Successful instructional practices are founded on evidence-based research, tempered by experience.

PROGRAM CONSIDERATIONS FOR ENGLISH LANGUAGE LEARNERS
Ontario schools have some of the most multilingual student populations in the world. The first language of approximately 20 percent of the students in Ontario's English language schools is a language other than English. Ontario's linguistic heritage includes several Aboriginal languages; many African, Asian, and European languages; and some varieties of English, such as Jamaican Creole. Many English language learners were born in Canada and raised in families and communities in which languages other than English were spoken, or in which the variety of English spoken differed significantly from the English of Ontario classrooms. Other English language learners arrive in Ontario as newcomers from other countries; they may have experience of highly sophisticated educational systems, or they may have come from regions where access to formal schooling was limited. When they start school in Ontario, many of these students are entering a new linguistic and cultural environment.

THE ROLE OF TECHNOLOGY IN THE PROGRAM
Information and communications technologies (ICT) provide a range of tools that can significantly extend and enrich teachers' instructional strategies and support students' language learning. ICT tools include multimedia resources, databases, Internet websites, digital cameras, and word-processing programs. Tools such as these can help students to collect, organize, and sort the data they gather and to write, edit, and present reports on their findings. Information and communications technologies can also be used to connect students to other schools, at home and abroad, and to bring the global community into

the local classroom. Whenever appropriate, therefore, students should be encouraged to use ICT to support and communicate their learning.

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.