



BUR OAK SECONDARY SCHOOL
Computer Science

COURSE CODE: ICS4U

MINISTRY CURRICULUM DOCUMENT: *The Ontario Curriculum, Grades 10 to 12: Computer Studies, 2008 (revised)*

MINISTRY PREREQUISITE: ICS3U1

CREDIT VALUE: 1.0

DEPARTMENT: Computer Studies

DEPARTMENT HEAD: Mr. Fernandes

COURSE DESCRIPTION

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.

MINISTRY LEARNING EXPECTATIONS

A. Programming Concepts and Skills

- 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

- 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

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

D. Topics in Computer Science

- D1. Assess strategies and initiatives that promote environmental stewardship with respect to the use of computers and related technologies
- D2. Analyze ethical issues and propose strategies to encourage ethical practices related to the use of computers
- D3. Analyze 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 UNITS

Unit 0: Review

This unit is used to review the concepts presented in the prerequisite course (ICS3U1) including control structures and arrays.

Unit 1: Algorithms

This unit focuses on learning to develop algorithms and analyze their efficiency. Students will explore and compare various searching and sorting algorithms to gain a better appreciation of the impact of their coding decisions.

Unit 2: Recursion

This unit explores the concept of recursion in creating solutions to various problems. Recursive solutions will be used in a variety of applications including areas such as fractals and mazes.

Unit 3: Object-Oriented Programming

This unit focuses on creating programs using an Object-Oriented framework. Students will learn the terminology and components of building Object-Oriented solutions along with a set of best practices.

Unit 4: Software Development

This unit focuses on software development in the creation of larger scale projects. Students may be placed in groups to learn to manage the process through each of the phases. In addition, students will learn and use a variety of project management tools to foster a controlled development environment.

Unit 5: Final Summative Project

Students have the opportunity to use their learning in prior units to create a larger software project. This is a chance for students to show their creativity and develop an application that incorporates a number of features.

Unit 6: Impact of Computers

Students will explore a variety of areas including emerging technologies, post-secondary and career information and the impact of computers on individuals, society and the environment.

TEACHING/LEARNING STRATEGIES

A variety of teaching and learning strategies are used, including:

- Brainstorming – group generation of initial ideas to encourage participation and inclusion
- Collaborative/Cooperative Learning – small group learning providing high levels of student engagement, interdependence and inclusion
- Conferencing – student to student conversation and student to teacher conversation
- Kinesthetic activities - to engage other types of body learning
- Pair Programming - used to both learn and create with partners encouraging communication and sharing
- Problem-Based approach – using a series of steps to solve a problem
- Project-Based approach - students work on comprehensive projects that involve design, planning and testing
- Scaffolding - to build upon concepts in a strategic manner
- Role playing - used to better understand concepts by placing the student in various viewpoints
- Independent Study – students explore and research a topic of interest
- Inquiry – active learning and discovery through posing questions and researching answers
- Report/Presentation – oral and written presentation of researched topic to class
- Teacher modelling/student practice - provide opportunities to students to develop individual confidence
- Whole Group Instruction - used for shared understanding often as an introduction or summary of concepts

ASSESSMENT AND EVALUATION

The primary purpose of assessment and evaluation is to improve student learning. **The Achievement Chart for Computer Studies** will guide all assessment and evaluation.

The **final grade** will be determined as follows:

- **70% based on Assessment of Learning** conducted throughout the course
- **30% based on a Final Summative Project and/or a Final Exam** administered towards the end of the course

<u>Category</u>	<u>Percent</u>
Knowledge and Understanding	25%
Thinking and Inquiry	25%
Communication	25%
Application	25%

Total	100%

Assessment and evaluation is divided into two important parts: a) the grade the student receives on a midterm or final report indicates achievement/ proficiency in Curriculum Expectations, and b) a level of competency that will be assessed and reported in the following areas of Learning Skills and Work Habits: Independent Work, Collaboration, Responsibility, Initiative, Self-Regulation, and Organization. **See the Bur Oak Secondary School Assessment, Evaluation and Communication Policy on Google Classroom

Assessment for/as Learning

- Checklists – for formative teacher/peer/self-assessment
- Computer Programs – focusing on both process, communication, understanding and a final product
- Concept Maps - to make connections of various ideas and create a framework of understanding
- Conversations - discussion between students and/or teacher to share understanding and thought processes
- Demonstrations – show how students are learning and working
- Descriptive Feedback - anecdotal comments with suggestions for improvement
- Observations – seeing how students deal with problems and work in groups to solve problems
- Oral Question and Answer sessions - feedback for both students and teacher regarding understanding
- Performance Tasks - on-computer skill demonstrations
- Quizzes – feedback for both the student and the teacher about a few chosen expectations
- Reflection – tool to encourage students to be more involved in their own learning process
- Rubrics – provide clear expectations of performance at the start of an activity
- Self/Peer Assessment - students take ownership of their learning

Assessment of Learning

- Presentations - involving both oral and/or visual components
- Performance Tasks - on-computer skill demonstrations
- Research Projects - presented in various forms
- Software Projects – focussing on both process and the final product
- Triangulation - using conversations, observations and products together
- Unit Tests – paper and pencil tests used for assessing a variety of skills

Assessment & Evaluation of Student Learning Skills

- Teacher evaluations based on observations
- Student self-assessment
- Student-teacher conferences
- Self-reflection exercises

ACCOMMODATIONS

Assessment, instructional and environmental **accommodations** are provided to individual students as per their **IEP**. Similarly, **adaptations** for **Multi-Language Learners** are provided based upon the student's level of language development, strengths and needs.

The following are general accommodation/adaptation strategies used in this course:

- References and inclusion of recommendations from student IEPs and other records
- Provide adaptive hardware devices and/or software tools (e.g. large screen monitors, personal laptops, specialized software for various needs including electronic texts for easier translation and adoption)
- Provide appropriate environmental accommodations for students with various challenges
- Conferencing with Special Education Staff and students to discuss accommodations to ensure that various aspects of the classroom environment meet the needs of the students to fully participate in the program
- Conferencing with MLL Staff and students to discuss accommodations including providing translations of course content, lists of terms, and other resources as needed
- Strategic grouping of students to encourage peer interaction, support and development
- Flexible scheduling to organize and complete assigned tasks
- Provide examples and templates to give students a more clear framework as needed
- Assist students in dividing larger tasks into smaller more manageable tasks (chunking)
- Provide oral explanations and individual/small group conferencing to ensure understanding of concepts
- Provide alternative selection of problems (for example, adjusting context to a more familiar topic)
- Use of visual aids/manipulatives to assist students as needed
- Provide various enrichment opportunities to enhance learning

CONSIDERATION FOR BOARD INITIATIVES

Throughout the course, consideration will be given to incorporating the following board-wide initiatives into the content, processes and environment:

- Dismantling Anti-Black Racism Strategy
- Indigenous Education and Equity
- Mathematics
- Mental Health
- Modern Learning

RESOURCE MATERIALS

Students will have access to the following resources:

- Computer lab
 - Java Programming Language
 - Eclipse IDE
 - Electronic text, presentations and notes
 - Google Classroom and Apps
 - Other hardware/software tools as needed
- **See the YRDSB Information Technology Acceptable Use Agreement on Google Classroom