



# Canada World Education

## TEJ2O Course Outline

<b>Course: Computer Engineering/Robotics</b>			
<b>Grade:</b> 10	<b>Type:</b> U C M O E	<b>Credit Value:</b> 1 <b>Credit hours:</b> 110	<b>Course code:</b> TEJ2O <b>Dept:</b> Technology
<b>Online:</b> Y	<b>Face to face:</b>	<b>Online and Face to Face:</b> Y	
<b>Teacher:</b> J.F. Michaud		<b>Development date:</b> Sept. 2020	
<b>Course Reviser:</b> J.F. Michaud <b>Date:</b> November 2020		<b>Prerequisites:</b> none	
<b>Resources Required:</b> electronic device with internet access <b>Text book:</b> none required <b>Supplementary resources:</b> Internet Platform contains CWE developed resources for this course unless otherwise stated in lessons			
<b>Ministry Curriculum Documents:</b> <ul style="list-style-type: none"><li>- The Ontario Curriculum Grades 9 and 10 Technological Education 2009 Growing Success – Assessment, Evaluation and Reporting in Ontario Schools-2010</li><li>- Learning for All – A Guide to Effective Assessment and Instruction for All Students, Kindergarten to Grade 12, 2001</li><li>- Environmental Education: Scope and Sequence of Expectations, 2017</li><li>- Course Descriptions and Prerequisites, Grades 9 to 12, 2018</li><li>- Equity and Inclusive Education in Ontario Schools: Guidelines for Policy Development and Implementation</li><li>- Financial Literacy: Scope and Sequence of Expectations, Grades 9-12, 2016</li><li>- First Nations, Métis, and Inuit Connections – Scope and Sequence of Expectations, 2016</li><li>- Health and Safety: Scope and Sequence of Expectations, Grades 9–12, 2017</li></ul>			
<b>Course Description</b> <p>This course introduces students to computer systems, networking, and interfacing, as well as electronics and robotics. Students will assemble, repair, and configure computers with various types of operating systems and application software. Students will build small electronic circuits and write computer programs to control simple peripheral devices or robots. Students will also develop an awareness of related environmental and societal issues, and will learn about secondary and postsecondary pathways and career opportunities in computer technology and robotics.</p>			
<b>Overall Curriculum Expectations</b> <b>A. COMPUTER TECHNOLOGY FUNDAMENTALS</b>			



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By the end of this course, students will:

- A1. identify and describe the functions of, as well as important advances related to, electronic and computer components;
- A2. demonstrate a basic understanding of computer networks and their components;
- A3. demonstrate a basic understanding of binary numbers and digital logic.

## **B. COMPUTER TECHNOLOGY SKILLS**

By the end of this course, students will:

- B1. install and configure the hardware and operating system of a workstation, and use file-management techniques effectively;
- B2. construct and test simple interfaces and other electronic circuits;
- B3. assemble and configure a simple computer network;
- B4. install and use a variety of software;
- B5. apply fundamental programming concepts to develop a variety of simple programs, including a program to control an external device.

## **C. TECHNOLOGY, THE ENVIRONMENT, AND SOCIETY**

By the end of this course, students will:

- C1. identify harmful effects of the widespread use of computers and associated technologies on the environment, as well as agencies that reduce these effects;
- C2. identify effects of the widespread use of computers and associated technologies on society.

## **D. PROFESSIONAL PRACTICE AND CAREER OPPORTUNITIES**

By the end of this course, students will:

- D1. follow appropriate health and safety procedures when assembling, using, and maintaining computer systems;
- D2. demonstrate an understanding of ethical and security issues related to the use of computers;
- D3. identify various careers related to computer technology, and describe the education and/or training required for them.



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## Outline of course content :

<b>Unit: 1</b> Computer Technology Fundamentals	Hours: 15
<b>Unit: 2</b> Computer Technology Skills	Hours: 25
<b>Unit: 3</b> Technology, the Environment, and Society	Hours: 20
<b>Unit: 4</b> Robotics Technology	Hours: 35
<b>Unit: 5</b> Professional Practice and Career Opportunities	Hours: 5
Culminating activity	Hours: 10
	<b>Total hours: 110</b>

**All components of the course are delivered online**

## Mark reporting

Student marks will be posted online so that parents and students can see student progress and current marks through a secure reporting software.

## Mark breakdown

Evaluations Throughout the course: 70% of final grade

Final Evaluation: 30% of final grade

The term work and Exam will be broken down in the following skill Categories:

Knowledge and Understanding	25%
Thinking	25%
Communication	20%
Application	30%

The activities completed during the course will account for the following percentages:

Assignments	35%
Quizzes	15%
Tests	20%
Summative	30%

## Achievement levels

<b>Level 1 50-59%</b>	<b>Level 2 60-69%</b>	<b>Level 3 70-79%</b>	<b>Level 80-100%</b>
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## Teaching and Learning Strategies

Teachers use a variety of teaching strategies to maximize student learning. The following teaching strategies will be used in this course:

Teacher will utilize instruction that both responds to the characteristics of a diverse group of students and is precisely tailored to the unique strengths and needs of each student can be achieved using the principles and guidelines associated with three instructional approaches:



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- 1) Universal Design for Learning (UDL),
- 2) differentiated instruction, and
- 3) the tiered approach to prevention and intervention. (Learning for All, Kindergarten to Grade 12: For more info please see <http://www.edu.gov.on.ca/eng/general/elemsec/speced/LearningforAll2013.pdf>)

What are UDL-aligned strategies? <https://goalbookapp.com/toolkit/strategies>

- UDL-aligned strategies are instructional methods and tools used by teachers to ensure that ALL students have an equal opportunity to learn. All of our strategies are aligned with Universal Design for Learning (UDL) guidelines. These guidelines help you to select strategies that remove barriers in instruction so that all students can achieve their learning goals.

- Differentiated Instruction is based on the idea that because students differ significantly in their interests, learning styles, and readiness to learn, it is necessary to adapt instruction to suit these differing characteristics. Teachers can differentiate one or a number of the following elements in any classroom learning situation (Tomlinson, 2004): the content of learning (what students are going to learn, and when); the process of learning (the types of tasks and activities); the products of learning (the ways in which students demonstrate learning); the affect/environment of learning (the context and environment in which students learn and demonstrate learning). (<http://edugains.ca/newsite/di/index.html> )

Teaching and learning strategies adopted should be appropriate to the course type and should reflect an appropriate balance of theoretical components, practical applications for the course and appropriate to the range of student learning.

Helping students become self-directed.

In order to address the unique learning styles of students in this course, a variety of activities and learning experiences should be offered, including, but not restricted to: questioning, demonstrations, role-plays, simulations, co-operative group learning, brainstorming, discussion, peer coaching, interviewing, reflective writing, reflective thinking exercises, concept mapping, reading, tutoring, direct instruction, one-on-one teaching, and experiential learning.

Teachers will find ways throughout the course for students to make authentic learning connections with their other courses, the school, local community and the world at large. **Examples of teaching strategies:**

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| <ul style="list-style-type: none"><li>• Brainstorming</li><li>• Be the teacher</li><li>• Case Studies</li><li>• Computer technology – reports,</li></ul> | <ul style="list-style-type: none"><li>• Media Presentation</li><li>• Peer feedback</li><li>• Planning and writing analytical pieces of work</li></ul> |
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<p>spreadsheets, flow charts , data bases, electronic presentation;</p> <ul style="list-style-type: none"> <li>• Conferences</li> <li>• Documentaries/Videos /Ted Talks/Video critique</li> <li>• Flexible Grouping</li> <li>• Focus Groups–Informal discussions based on focus questions</li> <li>• Formal Debates/Informal debates</li> <li>• Graphic Organizers</li> <li>• Group critique</li> <li>• Group Discussions</li> <li>• Independent Study</li> <li>• Informal Debates</li> <li>• Internet Based Research/Investigation</li> <li>• Interview</li> <li>• Investigative and inquiry questions</li> </ul>	<ul style="list-style-type: none"> <li>• Provide specialized vocabulary</li> <li>• Reading: read for meaning</li> <li>• Reading: to develop the ability to use specialized vocabulary</li> <li>• Research Project –individual</li> <li>• Research Project-group</li> <li>• Role-play</li> <li>• Seminar</li> <li>• Skype interviews</li> <li>• Socratic Teaching</li> <li>• Structured discussion</li> <li>• Think-Pair Share</li> <li>• UDL-Aligned Strategies (see <a href="https://goalbookapp.com/toolkit/strategies">https://goalbookapp.com/toolkit/strategies</a>)</li> <li>• Write or give a personal perspective in discussions</li> </ul>
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## Assessment & Evaluation of Student Performance

### Assessment & Evaluation

The primary purpose of assessment and evaluation is to improve student learning and to help students assume responsibility for their learning.

Mid-term and final marks are determined through evaluations or Assessments of Learning, which typically occur towards the end of a unit and end of the term. During the learning process, information about a student's learning is gathered and used by the teacher and student to inform decisions that affect goal setting and teaching in the classroom. The data gathered as Assessment as Learning and Assessment for Learning do not carry a mark weight, but do play a crucial role in student success as they help inform the teacher about each student's progress. All types of assessments allow teachers to provide descriptive feedback that is clear, specific, meaningful, and timely to support improved learning and achievement.

Learning Skills and Work Habits (responsibility, organization, independent work, collaboration, initiative, self-regulation) will be reported by a letter (E = Excellent, G = Good, S = Satisfactory, N = Needs Improvement). These skills and habits support a high level of success in meeting the course expectations in addition to contributing to the development of positive life and work skills for the future.

### Assessment FOR Learning

<b>Observation</b>	<b>Conversation</b>	<b>Product</b>
<ul style="list-style-type: none"> <li>• Class discussions</li> <li>• Demonstrations</li> <li>• Informal debate</li> </ul>	<ul style="list-style-type: none"> <li>• Brainstorming</li> <li>• Debate</li> </ul>	<ul style="list-style-type: none"> <li>• 3-Minute Pause</li> <li>• Assignments</li> </ul>



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<ul style="list-style-type: none"> <li>● Performance tasks</li> <li>● Presentations</li> <li>● Role Play</li> </ul>	<ul style="list-style-type: none"> <li>● Focused Conversations</li> <li>● Oral pre-tests</li> <li>● Oral quizzes</li> <li>● Interviews</li> <li>● Pair work</li> <li>● Group work</li> <li>● Portfolio conferencing</li> <li>● Student teacher conferences</li> </ul>	<ul style="list-style-type: none"> <li>● Diagnostic Assessment</li> <li>● Exit tickets</li> <li>● Graphic organizers</li> <li>● Homework</li> <li>● Journals/Letters/Emails</li> <li>● Know, WonderLearn (KWL)</li> <li>● Learning Logs</li> <li>● Presentation (PPT/Prezi..)</li> <li>● Problem solving</li> <li>● Quiz/problem solving</li> <li>● Vocabulary notebook</li> <li>● Project</li> <li>● Practical task</li> </ul>
<p><b>Assessment AS learning</b></p>		
<p><b>Observation</b></p> <ul style="list-style-type: none"> <li>● Checklist/Feedback for group discussion</li> <li>● Peer rating on presentations</li> <li>● Teacher anecdotal feedback</li> <li>● Teacher feedback for a task</li> <li>● Teacher rating for a task</li> <li>● Whole class discussion</li> </ul>	<p><b>Conversation</b></p> <ul style="list-style-type: none"> <li>● Student teacher conversations</li> <li>● Questioning</li> <li>● Moderated group discussions</li> <li>● Peer-Oral feedback</li> </ul>	<p><b>Student Product</b></p> <ul style="list-style-type: none"> <li>● Entrance tickets</li> <li>● Graphic organizers-KWL</li> <li>● Journal</li> <li>● Peer assessment</li> <li>● Peer editing checklist</li> <li>● Pre-tests/Diagnostic tests</li> <li>● Quizzes</li> <li>● Reflections</li> <li>● Rough drafts</li> <li>● Self assessment</li> <li>● Self-proofreading using a checklist</li> <li>● Practical task</li> </ul>
<p><b>Assessment of Learning</b></p>		
<p><b>Observation</b></p> <ul style="list-style-type: none"> <li>● Class discussions</li> <li>● Demonstrations</li> <li>● Informal debate</li> <li>● Performance tasks</li> </ul>	<p><b>Conversation</b></p> <ul style="list-style-type: none"> <li>● Brainstorming</li> <li>● Debate</li> <li>● Focused Conversations</li> </ul>	<p><b>Product</b></p> <p>3-Minute Pause</p> <ul style="list-style-type: none"> <li>● Assignments</li> <li>● Diagnostic Assessment</li> </ul>



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<ul style="list-style-type: none"> <li>● Presentations</li> <li>● Role Play</li> </ul>	<ul style="list-style-type: none"> <li>● Oral pre-tests</li> <li>● Oral quizzes</li> <li>● Interviews</li> <li>● Pair work</li> <li>● Group work</li> <li>● Portfolio conferencing</li> <li>● Student teacher conferences</li> </ul>	<ul style="list-style-type: none"> <li>● Exit tickets</li> <li>● Graphic organizers</li> <li>● Homework</li> <li>● Journals/Letters/Emails</li> <li>● Know, WonderLearn (KWL)</li> <li>● Learning Logs</li> <li>● Presentation (PPT/Prezi..)</li> <li>● Problem solving</li> <li>● Quiz/problem solving</li> <li>● Vocabulary notebook</li> <li>● Project</li> <li>● Practical task</li> </ul>
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## Considerations for Program Planning

### Instructional Approaches

Technological education involves knowing and doing and teaching and learning approaches should address both areas. Technological education involves knowing and doing and teaching and learning approaches should address both areas.

Programs in technological education should involve an open, collaborative, activity-based approach to teaching that accommodates students' interests, aspirations, and learning styles.

The study of current events related to technologies in various industries, including emerging technologies, should inform the technological education curriculum, enhancing both the relevance and the immediacy of the program.

### Health and safety in Technological education

Before using any piece of equipment or any tool, students must be taught and be able to demonstrate knowledge of how the equipment or tool works and of the procedures they must follow to ensure its safe use. Personal protective gear must be worn as required.

### The role of Information and Communications Technology in Technological Education

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.



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All students must be made aware of issues of Internet privacy, safety, and responsible use, as well as of the potential for abuse of this technology, particularly when it is used to bully or promote hatred.

## **Planning Technological Education Programs for Students with Special Needs**

In any given classroom, students may demonstrate a wide range of strengths and needs. Teachers plan programs that recognize this diversity and give students performance tasks that respect their abilities so that all students can derive the greatest possible benefit from the teaching and learning process.

In planning technological education courses for students with special education needs, teachers should begin by examining the current achievement level of the individual student, the strengths and learning needs of the student, and the knowledge and skills that all students are expected to demonstrate at the end of the course, in order to determine which of the following options is appropriate for the student:

- no accommodations or modified expectations; or
- accommodations only; or
- modified expectations, with the possibility of accommodations; or
- alternative expectations, which are not derived from the curriculum expectations for a course and which constitute alternative programs and/or courses.

## **Program Considerations for English Language Learners**

In planning programs for students with linguistic backgrounds other than English, teachers need to recognize the importance of the orientation process, understanding that every learner needs to adjust to the new social environment and language in a unique way and at an individual pace.

During their first few years in Ontario schools, English language learners may receive support through one of two distinct programs from teachers who specialize in meeting their language-learning needs:

English as a Second Language (ESL)

English Literacy Development (ELD)

## **Antidiscrimination Education in Technological Education**

Consideration should be given to a variety of strategies for communicating and working with parents and community members from diverse groups, in order to ensure their participation in such school activities as technology fairs, plays, and teacher interviews.

Offering choices from a range of instructional activities or allowing students to select their own projects can help motivate all the students in a classroom by acknowledging the differences in their experiences, attitudes, and interests.

## **Environmental Education in Technological Education**





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In each of the technological education courses, the expectations in the Technology/Industry Practices, the Environment, and Society strand allow students to develop critical thinking skills and an understanding of responsible practice with respect to the environmental implications of the technology they are studying. Students analyze the impact of technology on the environment and learn about the safe handling and disposal of materials and substances used in the development of products and the provision of services.

Students will be expected to actively engage in developing and implementing strategies to reduce, reuse, and recycle materials and products, and will learn about government agencies and community partners that have developed relevant opportunities to support such practices.

## **Literacy, Mathematical Literacy, and Inquiry/Research Skills**

In all technological education courses, students are required to use appropriate and correct terminology, and are encouraged to use language with care and precision in order to communicate effectively.

The technological education program also builds on, reinforces, and enhances mathematical literacy. For example, clear, concise communication often involves the use of diagrams, tables, and graphs, and many components of the technological education curriculum emphasize students' ability to interpret and use symbols and charts. Students are also required to take accurate measurements, produce plans to specified dimensions, and use metric and imperial systems of measurement, as required in their particular area of study.

The ability to locate, question, and evaluate information allows a student to become an independent, lifelong learner.

## **Program Planning Characteristics**

- knowledge and skilled based
- developmentally appropriate to the learner
- inquiry based
- holistic, taking the whole student attributes such as cognitive, emotional, social and physical.
- transformational, helping students grow and reach their potential
- inclusive, engaging all students
- differentiated to meet students learning and motivational needs
- well documented, information shared on an ongoing basis with students and parents

## **Technological Devices:**

Any device with windows 8 or newer will work on the software used for all courses.



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For Online courses Electronic devices are necessary to access the course content and lessons. However, it is strongly recommended that students use other means such as paper and pencil when comprehension skills are required.

CWEC supports the use of technology to enhance learning, but the use of such electronic technology in the classroom is at the discretion of the teacher. Working together we can ensure the appropriate use of technology by all members of our school community.