

TEJ3M0

Computer Engineering Technology

Overview

In Computer Engineering Technology, we investigate the operation and control of computer hardware. Topics covered will include numbering systems, codes and logic symbols used in computers, electronics, operating systems, the function of peripheral components and the methods of connecting them, programming concepts and networking fundamentals. Students will also learn about the history and development of computing machines.

Achievement

The curriculum in Computer Engineering Technology conforms to the reformed Ontario standards introduced in 1999. Major projects will be assessed using a rubric, a detailed list of the evaluation criteria and performance expectations. Study the rubric carefully, as it indicates what learning and skills you are expected to demonstrate. All criteria will fall within one of the four categories (Thinking, Application, Communication, Knowledge) on which your mark will be based.

The final evaluation will constitute 30 percent of the mark. One component of the final evaluation will be a written examination at midterm.

Evaluation

The marks categories will be weighted as follows:

Thinking	20%
Application	40%
Communication	20%
Knowledge	20%

Term work and final evaluation are weighted as follows:

Term:	70%
Written Exam	10%
Final Project:	20%

Activities

- Students will simulate the operation of digital electronic circuits using computer software (Crocodile Clips).
- Students will assemble electronic circuits using breadboards or printed circuit boards. Students will learn the use of electronic test equipment including digital multimeters.
- Students will assemble a computer and install the operating system.
- Students will build a robot featuring a microcontroller, and program the device to follow a line.

General Expectations

1. Come prepared for the day's learning activities. Always bring your notebook, pen, completed assignments, sense of humour, sense of purpose.
2. Follow instructions the first time they are given. You may debate philosophical issues, not direct instructions.
3. Be nice. Treat everyone and everything with respect and consideration. Be quiet and attentive during lessons and discussions.
4. **The key to success is to have fun everyday by engaging in assigned activities with interest and enthusiasm.**

What You May Not Do

1. Leave the class without the instructor's permission.
2. Leave a mess.
3. Use any equipment without permission or without instruction in its safe and appropriate use.
4. Remove equipment from any classroom without completing the sign-out sheet.

Stern Words About the Use and Abuse of Equipment

Equipment and resources within the department are available for your use, but they are not your property. The resources are maintained, with much effort, by the staff, and paid for by all of us through taxation. You are granted access on the condition that you accept responsibility for its care and appropriate use. Therefore, if you are found to present a danger to other students of the equipment through acts of carelessness or maliciousness, you may be removed from the class. If you are found to have been willfully negligent or destructive, the school may seek financial compensation from you and your family.

Attendance and Participation

Many learning activities in this course involve making something in a cooperative way. If you are absent during a group project you may lose marks proportional to the number of days missed. For example, if a project takes 10 days to complete, an absence of two days may result in the deduction of 20% from the group mark for the absentee.

If you are unavoidably absent due to illness or other legitimate reason, you may make up for lost time by arrangement with the instructor.

Making up for missed days and lost marks is the responsibility of the student.

Materials Fee

All technology students are assessed a materials fee. The money collected helps to defray expenses for photocopying, printing, and materials used in student projects. The fee for Computer Engineering will be twenty dollars (\$20.00), payable in the first week of classes.

Unit 1: Digital Logic and Electronics

Time: 30 hours

Students will learn how to convert between the decimal, hexadecimal, octal and binary systems. A variety of binary codes for alphanumeric data, colours, spatial position, and computer languages will be examined. Students will also learn how to do simple arithmetic using binary numbers.

The design of computer hardware is based on a system of logic devised by the mathematician George Boole in the nineteenth century. The NOT, AND, NAND, OR, NOR, XOR, and XNOR logic gates respond to binary inputs according to defined rules. In ICE300 students will learn how the gates can be combined, using symbols or Boolean algebra, to create control circuits for a variety of operations.

Students will apply their knowledge of binary numbers and digital logic in creating electronic circuits. Circuits will first be simulated on the classroom computers using the software package Crocodile Clips. Students will also build and test logic circuits using integrated circuits in the electronics lab. Emphasis will be placed on correct and safe procedures for the use of electronic equipment

Unit 2: Computer Hardware and Networking

Time: 25 hours

In this unit, students will study the components that make up a desktop computer system. Each member of the class will assemble a computer, install an operating system, add expansion cards and other devices, and install the software drivers necessary to utilize those components.

Students will install a network card and a network operating system, assemble and connect network cables, and learn about the hardware and software necessary for communication between computers locally and globally.

Unit 3: Robotics and Computer Interfacing

Time: 30 hours

Using integrated circuits, motors, electronic sensors, and other components, students will assemble a robot. The "brains" of the robot will be a microcontroller that is programmed by the student. The robot will respond to input from infrared sensors that enable it to follow a line marked on the table.

Unit 4: Computer Software and Programming

Time: 10 hours

Students will use a variety of software programs for research, computer maintenance and electronic circuit simulation.

The focus of the programming unit is to develop the ability to write programs for the microcontroller on the robot. To this end students will learn the fundamental structure and concepts of computer programming, including branch and loop statements, subroutines, constants, variables, expressions and assignment statements. Students will then apply these concepts in the creation of programs to operate the robot they have built.

Unit 5: Technology, Environment and Society

Time: 10 hours

The personal computer 35 years old, but in less than decades it has become pervasive in industrialized societies. This unit will examine the history of the personal computer and challenge students to explore and debate its effects on the individual and society and the environment. Questions relating to the acceptable and ethical use of computers will also be examined.

Unit 6: Professional Practice and Careers

Time: 5 hours

In this unit, students will have the opportunity to identify job possibilities in computer engineering and the educational requirements necessary to pursue those opportunities.