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 revised Ontario standards introduced in 2009. 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

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 multi-meters.
- Students will assemble a computer and connect the peripheral devices.
- Students will build a robot featuring a microcontroller, and program the device to follow a line.

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%**

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. Be nice. Treat everyone and everything with respect and consideration. Be quiet and attentive during lessons and discussions.

Safety and Decorum

The computer engineering classroom has a number of hazards, both electrical and chemical, which you will be made aware of. It is important that you follow all safety rules for your own safety and that of your classmates. You are expected to act in a mature and responsible manner befitting senior students at all times.

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. You are granted access on the condition that you accept responsibility for its care and appropriate use. Misuse or abuse of the classroom equipment will result in appropriate consequences.

Attendance and Participation

Many learning activities in this course involve making something in a cooperative way. In cases where it is clear that not all students contributed equally to the group project, the marks will be distributed appropriately. If you are unavoidably absent due to illness or other legitimate reason, you may make up for lost time by arrangement with the instructor.

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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 TER3M0 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 Physics. 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. The microcontroller will be programmed using a version of BASIC language, using programming software that is freely available. Students will make download cables to transfer the program from the desktop computer to the microcontroller.

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 is now almost 40 years old, and 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.