Computer Engineering, Grade 12, University/College Expectations

Theory and Foundation

Overall Expectations

TFV.01 · describe mechanisms for information movement and storage;

TFV.02 · document network configurations and their services;

TFV.03 · explain the operation of sophisticated systems that interact with real-world devices;

TFV.04 · compare high-level and low-level programming languages.

Computer Logic and Electronics

TF1.01 – describe how signed and unsigned numbers are represented;

TF1.02 – explain how to determine memory requirements for information storage;

TF1.03 – describe the function and interaction of a control unit, arithmetic logic unit, and memory registers in a simple central processing unit (CPU);

TF1.04 – use a diagram to illustrate how buses move data and instructions between memory and the CPU;

TF1.05 – analyse the role of flip-flops in the flow of data.

Hardware, Interfaces, and Networking Systems

TF2.01 – explain the function and interaction of the basic components of network configurations;

TF2.02 – identify similarities and differences among several network topologies and protocols;

TF2.03 – explain several computer-controlled systems that interact with real-world devices (e.g., traffic management systems, automotive systems, robotic systems).

Programming Concepts

TF3.01 – describe the constructs of a simple assembly or machine-level language;

TF3.02 – identify similarities and differences among memory addressing techniques;

TF3.03 – compare high-level and low-level commands that perform similar operations.

Skills and Processes

Overall Expectations

SPV.01 · analyse information storage mechanisms;

SPV.02 · use Boolean equations to represent computer logic circuits;

SPV.03 · construct systems and interfaces that use computer programs to interact with real-world devices;

SPV.04 · design effective network configurations;

SPV.05 · develop programs using the software life cycle (problem definition, analysis, design, implementation, testing, and maintenance).

Computer Logic and Electronics

SP1.01 – convert between decimal and binary numbers;

SP1.02 – build flip-flops using simple logic gates from schematics;

SP1.03 – incorporate flip-flops in a clocked circuit to demonstrate information storage;

SP1.04 – use electronic instruments (e.g., multimeter, logic probe) to troubleshoot circuits;

SP1.05 – simplify Boolean equations accurately;

SP1.06 – draw circuits that represent Boolean equations;

SP1.07 – develop truth tables to represent Boolean equations.

Hardware, Interfaces, and Networking Systems

SP2.01 – analyse existing systems designs that use computers and interfaces to send and receive information;

SP2.02 – design an effective system consisting of a computer and interface that integrates input and output devices (e.g., motion sensitive alarm, light-activated switch, LED sign, environmental control);

SP2.03 – construct a system consisting of a computer and interface to communicate with external sources;

SP2.04 – identify networking problems and troubleshooting procedures;

SP2.05 – describe network hardware and software and their relationships.

Programming Practice

SP3.01 – write programs to process input and control output devices through interfaces;

SP3.02 – trace the execution of simple machine-level programs;

SP3.03 – write low-level programs;

SP3.04 – document all programs to a specified standard.

Impact and Consequences

Overall Expectations

ICV.01 · identify issues related to the ethical use of computers;

ICV.02 · explain the importance of postsecondary education, employability skills, and lifelong learning to computer engineering careers;

ICV.03 · describe the use of computer technologies and their impact in the community;

ICV.04 · demonstrate project management skills.

Specific Expectations

IC1.01 – use appropriate presentation software to explain issues relating to computer ethics (e.g., privacy, security, information access);

IC1.02 – describe industry certification designations and requirements;

IC1.03 – analyse the potential impact of emerging technologies on society;

IC1.04 – use time management skills and constructive criticism in project settings;

IC1.05 – communicate the results of projects effectively both orally and in writing;

IC1.06 – use appropriate strategies to avoid potential health and safety problems associated with computer use, such as musculo-skeletal disorders and eye strain.