

# PROGRAM-SPECIFIC COMPETENCIES - COMPUTER ENGINEERING

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Competencies are the skills, knowledge and attributes gained through every work, educational, volunteer and life experience.

UVic students in the [Computer Engineering](#) program develop the following program-specific competencies. We worked with the Department of Electrical and Computer Engineering to develop this document.

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## PROFESSIONAL PRACTICE

**Behaves in accordance with the standards and code of ethics of the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC)**

- + Prioritizes the safety, health and welfare of public and environmental protection
- + Promotes health and safety within the workplace
- + Undertakes and is responsible for professional assignments only when qualified
- + Maintains confidentiality and avoids a conflict of interest
- + Keeps informed to maintain competence
- + Acts with fairness, courtesy and good faith towards clients, colleagues and others
- + Extends public knowledge and appreciation of engineering

## RELIABILITY, SAFETY AND FAILURE ANALYSIS

**Develops systems that are reliable and effective by mitigating risk and reducing failure**

- + Maintains an awareness of the quality assurance standards and testing procedures
- + Ensures that systems or components perform their required function for the required duration under the stated conditions
- + Maintains a current knowledge and awareness of requisite safety standards
- + Understands the consequences of failure and reduces their impact
- + Establishes the mean time between failures when assessing reliability

## DESIGN

**Gathers requirements, develops models and creates prototypes in a timely and effective manner to increase a project's safety and success**

- + Gathers full requirements for a project
- + Understands the client's needs
- + Models a solution using the appropriate tools
- + Relates and justifies the design process to the client
- + Implements designs that are safe and effective
- + Demonstrates awareness of how the design integrates into its environment

## ENGINEERING TOOLS

**Uses a broad range of Engineering tools, applications and software.**

- + Designs equipment and systems using a variety of software packages
- + Simulates mechanical and electronic systems using the appropriate tools
- + Analyses systems, equipment and data using the correct tools
- + Operates mechanical equipment in a lab or workshop safely and effectively
- + Uses electronics and electrical equipment in a careful and accurate manner
- + Develops software and scripts in a variety of environments and languages
- + Uses computer software and systems in an appropriate manner
- + Understands database concepts and usage and uses them effectively
- + Researches and recommends new tools where existing tools are inadequate
- + Chooses tools based on their comparative strengths and weaknesses

## ENGINEERING KNOWLEDGE

**Understands the broad scope of disciplines that support engineering theory and practice**

- + Demonstrates knowledge of the mathematical fundamentals of engineering
- + Applies the correct statistical methods to analyze and investigate data
- + Understands the supporting natural sciences for their discipline of engineering
- + Maintains a comprehensive knowledge of the engineering fundamentals
- + Demonstrates an understanding of engineering economics
- + Comprehends how engineering specifics integrate into a larger project
- + Studies companion subjects to aid a projects success

**Develops the following competencies specific to the computer engineering program:**

## CONTROL THEORY AND SYSTEMS

**Understands how control systems function and their use**

- + Applies the fundamentals of control theory in the design of dynamic systems
- + Demonstrates an understanding of feedback control systems
- + Identifies design specifications
- + Evaluates system performance
- + Identifies components of a dc servo system and its use in motion control
- + Implements a control system using feedback circuits
- + Demonstrates an understanding of processors and microcontrollers

## CIRCUITS AND ELECTRONICS

**Participates in the design and testing of electronic circuits**

- + Utilizes the fundamental components of electronic circuits
- + Assesses the electrical properties of materials
- + Creates test benches to verify design
- + Explains the property and characteristics of semiconductor structures
- + Uses differential equations to analyze and design circuits
- + Reads and interprets electrical schematics
- + Undertakes research and development of electronic devices
- + Uses electronic test equipment in a safe and reliable manner

## NETWORKS, HARDWARE AND COMMUNICATIONS

### Understands computer networking principles and engineering

- + Understands layered network architecture
- + Uses different digital communication networks to transmit data
- + Works with LANs and WANs
- + Applies different network protocols at different layers
- + Protects networks from unauthorized access using the appropriate policies in conjunction with the underlying computer network infrastructure
- + Identifies mobile wireless communications techniques and issues affecting multimedia quality of service
- + Implements different types of buses, interrupts, families of processors and instruction sets

## SOFTWARE DEVELOPMENT, PRACTICE AND THEORY

### Employs knowledge of software life cycles and developmental phases

- + Works within the different software development lifecycle stages
- + Takes business, product and process requirements into consideration
- + Applies different software development methodologies
- + Implements process improvement models, such as ISO 9000
- + Solves software development problems using formal methods
- + Considers software evolution issues during development

## COMPUTER HARDWARE AND SYSTEMS

### Demonstrates knowledge of the architecture of computer systems and the interrelationship between the OS and the architecture

- + Utilizes the necessary tools to improve system performance
- + Understands the transfer of information from one system component to another
- + Compares performance of similar systems using common metrics
- + Identifies the optimal system for given problem
- + Works with different CPU architectures
- + Uses different operating systems
- + Utilizes different memory management methods