

PROGRAM-SPECIFIC COMPETENCIES

- ELECTRICAL ENGINEERING

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

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

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

POWER AND ENERGY SYSTEMS

Demonstrates knowledge of power and energy systems fundamentals and their integration within the modern electrical grid and community

- + Applies the fundamental science associated with electricity
- + Understands the generation, transmission, distribution and processing of energy
- + Considers the characteristics of an energy system in requirements gathering
- + Devises improvements in energy usage utilizing alternative systems
- + Outlines the fault tolerant, reliable operation of power systems
- + Plans research and development of new energy systems

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