



Computer Engineering Technology

PLAR Candidate Guide

Prior Learning Assessment and Recognition (PLAR)

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Prior learning credit options at Saskatchewan Polytechnic

See [Get Credit for What you Know](#) for important information about all options to get credit for prior learning at Sask Polytech, including PLAR, transfer credit, Canadian Armed Forces credit, and equivalency credit.

How to navigate this document

This document contains links to other document sections or webpages. To return to where you were from another section in this document, press the *ALT* key and *left arrow* key at the same time. To return to this webpage from another webpage, close the other webpage or click back on the browser tab for this document.

Contents of this guide

This guide contains the following specific PLAR information and tools for this program

- A. [PLAR fees](#)
- B. [PLAR eligibility and options](#)
- C. [Dates when PLAR assessment is available](#)
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A. PLAR fees

Fees for PLAR challenges are set to cover our costs for consultation, assessment, and related administrative tasks. PLAR fees are non-refundable and non-transferrable.

The PLAR fees policy is subject to change for each new academic year. Please see the **Cost** section on the [PLAR webpage](#) for current fee information.

B. PLAR eligibility and options

To be eligible for PLAR for courses in this program, you must first apply for admission and be accepted into the program. You must also consult with the [PLAR contact person](#) and be approved for PLAR assessment.

Course prerequisites and corequisites

Some courses have one or more other courses that must be completed first (prerequisite) or at the same time (corequisite). See [course outlines](#) in this guide to identify any pre- or co-requisites for each course. Discuss with your [PLAR contact person](#) how to deal with courses with corequisites.

Block assessment

Some programs may assess a cluster of courses together in one block, which may save you time and effort. Ask the [PLAR contact person](#) whether there are any block assessment options in this program.

C. Dates when PLAR assessment is available

PLAR assessment for this program is available from Sept 1 to June 15 in each academic year.

All PLAR assessments must be completed by June 15 of each academic year.

D. Special directions for this program

1. **Review** the [PLAR process and FAQs](#) and the information in this guide.
2. **Self-rate** your learning for each course using the [Course Outlines](#) in this guide.
3. **Consult** with the [PLAR contact person](#) for PLAR approval. Be prepared to provide your resume, course self-ratings (see [section F](#)), and a partially completed [PLAR application](#). If you are approved for PLAR, the contact person will sign your PLAR application and explain next steps.
4. Apply for admission to the program. See [directions](#) for applying.
5. **Register** for PLAR at [Registration/Enrolment Services](#) once you have signed approval on your [PLAR Application Form](#). The PLAR fee will be added to your student account.
6. **Finalize** an assessment plan with your assigned assessor.
7. **Complete** assessment before your PLAR registration expires.

E. PLAR contact person

Contact one of the Program Heads below to arrange a consultation **after** you have read this guide and [general PLAR information](#) and rated yourself for each course (see next section). Consultation may be by phone, online, or in person. Be prepared to provide your resume, course self-ratings, and a partially completed [PLAR application](#). If agreement is reached to go ahead with PLAR, the contact person will sign approval on your PLAR application and explain the next steps. Admission to the program is required before you can register for PLAR.

Shaun Nanan, Program Head
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F. Self-rating course outlines

Clicking on a course code below opens a page where you can rate yourself on the knowledge and skills assessed for PLAR credit. For Arts & Sciences courses, clicking on the course code opens another PLAR guide. The [PLAR contact person](#) for this program will refer you to another person to discuss PLAR for courses delivered by Arts & Sciences or another program/department.

COURSE CODE	COURSE NAME	Delivered by another department/program
Year 1 - Semester 1		
CAD 100	Computer Aided Design	
COMP 112	Introduction to Computer Programming	
ENGE 120	Basic Electricity	
LABS 120	Basic Electricity Lab	
MAT 110	Mathematics for Engineering Technologies	Arts & Sciences
STAT 200	Statistics for Technology	
TCOM 102	Workplace Communication	Arts & Sciences
Year 1 – Semester 2		
COHS 220	Networking Computers	
DGTL 110	Digital Logic	
DGTL 111	Digital Logic Laboratory	

COURSE CODE	COURSE NAME	Delivered by another department/program
ENGE 107	Semiconductor Electronics	
ENGE 200	Alternating Current (AC) Basic Electricity	
INST 223	Basic Instruments	
MAT 112	Differential Calculus for Engineering Technologies	Arts & Sciences
TCOM 103	Technical Communication	Arts & Sciences
Co-operative Work Term 1		
COOP 101	Co-operative Work Term	
Year 2 – Semester 3		
CIRC 220	Analog Integrated Circuits	
CLTR 200	Culture and Diversity	Arts & Sciences
COAP 222	Computer Programming	
COMP 221	Computer Hardware Fundamentals	
COMP 222	Microcontroller Programming	
ENGE 221	Robotics and Embedded Systems	
MAT 210	Integral Calculus for Engineering Technologies	Arts & Sciences
Co-operative Work Term 2		
COOP 201	Co-operative Work Term	
Year 2 – Semester 4		
BUS 203	Entrepreneurship for Engineering Technologies	
CNST 220	Construction Techniques	
COMP 207	Computer Interfacing	
COMP 217	Computer Interfacing Laboratory	
INST 229	Electronic Instruments	
MGMT 211	Project Management	

COURSE CODE	COURSE NAME	Delivered by another department/program
PHYS 105	Physics	
PROJ 287	Project Management	
Co-operative Work Term 3		
COOP 301	Co-operative Work Term	
Year 3 – Semester 5		
COAP 300	Artificial Intelligence	
COAP 301	Artificial Intelligence Laboratory	
COMP 227	Process Control Systems	
COMP 301	Software Systems	
COMP 302	Software Systems Laboratory	
CSEC 300	Cybersecurity	
PROJ 222	Capstone Research Project	
TCOM 104	Applied Research in Technology	Arts & Sciences

CAD 100 - Computer Aided Design

You will study basic theory and practice of printed circuit board layout. You will use industry standard software to create circuit diagrams and generate required files to produce printed circuit boards (PCBs). You will use software to simulate and analyze circuits.

Credit unit(s): 0.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.	Competent	Learning	None
1. Create circuit diagrams using electronic design software.			
2. Analyze circuits using simulation software.			
3. Design printed circuit board layout using electronic design software.			
4. Create custom parts and footprints for printed circuit boards (PCBs) using electronic design software.			

COMP 112 - Introduction to Computer Programming

You will develop programs using a general-purpose programming language. You will learn the essentials of game development. You will develop problem-solving skills by constructing algorithms to meet program input and output requirements. You will develop programs that exhibit good structure to ensure easy debugging and maintenance.

Credit unit(s): 3.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Explain terms and methodology employed by modern programming languages.			
2. Choose appropriate predefined data types, operators and input and output (I/O) methods for applications.			
3. Create programs using appropriate decision and branching instructions.			
4. Create programs using appropriate looping instructions.			
5. Create efficient modular structured programs utilizing user-defined functions.			
6. Plan program implementation using various tools.			

ENGE 120 - Basic Electricity

You will study electrical concepts, electrical quantities, units of measurement, resistance, and types of electrical circuits. You will examine Ohms law, Kirchhoff current and voltage laws, network theorems and specific circuit analysis techniques, as well as analyze transient responses in Resistive-Capacitive (RC) and Resistive-Inductive (RL) networks.

Credit unit(s): 4.0
Prerequisites: LABS 120, MAT 110
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Review system units of measurement, unit conversions, and mathematical notations.			
2. Explain the basic electrical principles, quantities, symbols, and units.			
3. Explain Direct Current (DC) cells configurations, electrical instruments, and measurement of electrical quantities.			
4. Examine resistive electrical circuits.			
5. Examine Ohms Law and Power Law equations.			
6. Examine Kirchhoff Current and Voltage Laws.			
7. Analyze complex electrical circuits using various circuit analysis techniques.			
8. Analyze complex electrical circuits using Network Theorems.			
9. Analyze transient responses in Resistive-Capacitive (RC) and Resistive-Inductive (RL) networks.			

LABS 120 - Basic Electricity Lab

You will identify electrical elements, equipment, and instruments. You will build and troubleshoot electric circuits and use instruments to measure electrical quantities. You will perform several labs to validate theoretical concepts, electrical laws, and network theorems.

Credit unit(s): 4.0
Prerequisites: ENGE 120
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Identify electrical components, toolbox items, instruments, and equipment.			
2. Practice resistive circuit building and troubleshooting.			
3. Use Direct Current (DC) Power supplies and electric instruments.			
4. Build different configurations of DC cells.			
5. Apply Ohm's Law to solve electric circuits.			
6. Apply Kirchhoff Current and Voltage Laws to solve electric circuits.			
7. Apply complex circuit analysis techniques to solve electric circuits.			
8. Apply Network Theorems to solve electric circuits.			
9. Perform transient responses in DC Resistive-Capacitive (RC) and Resistive-Inductive (RL) networks.			

MAT 110 - Mathematics for Engineering Technologies

You will gain foundational knowledge of mathematical topics applicable to engineering technologies. You will study formula manipulations, factoring of algebraic expressions, geometry and trigonometry, exponents and logarithms, and functions and their graphs. This course is intended to build problem solving and critical thinking skills, and to prepare you for studies in calculus.

Credit unit(s): 4.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Examine measurements, formulas, and functions.			
2. Practice mathematical operations with algebraic expressions.			
3. Apply principles of geometry.			
4. Analyze trigonometric functions and vectors.			
5. Examine systems of linear equations.			
6. Examine algebraic equations and functions.			
7. Analyze exponential and logarithmic functions.			

SEM 101 - Technology Seminars

Your orientation will include discussions regarding the role of technicians/technologists in the workplace and society. You will study time management skills, diversity in the workplace, principles of sustainability and safety requirements.

Credit unit(s): 1.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Develop study and time management skills.			
2. Recognize diversity in the workplace.			
3. Recognize principles of sustainability to work.			
4. Discuss professional ethics, responsibility, and accountability.			
5. Discuss the impact of technology on society.			
6. Describe workplace safety procedures.			

STAT 200 - Statistics for Technology

You will gain knowledge of statistical concepts and techniques applicable to technologies. You will study descriptive statistics, measures of central tendency and dispersion, basic probability, the Central Limit Theorem, and linear regression. This course is intended to build problem solving and critical thinking skills, and to demonstrate the importance of statistics in professional practices

Credit unit(s): 2.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Define statistical terminology and procedures.			
2. Apply measures of central tendency to technical problems.			
3. Apply measures of dispersion and the Central Limit Theorem to descriptive statistics.			
4. Examine basic probability.			
5. Analyze paired statistical data using simple linear regression.			

TCOM 102 - Workplace Communication

You will examine the employability skills required in the workplace. You will discuss the communication process, and practice effective interpersonal communication techniques and conflict resolution. You will use workplace writing and job search skills.

Credit unit(s): 3.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Examine fundamentals of workplace communication.			
2. Discuss conflict resolution techniques.			
3. Apply job-related interpersonal and oral communication strategies.			
4. Apply workplace writing skills.			
5. Use job search skills.			

COHS 220 - Networking Computers

You will be introduced to the role of a network administrator for a computer network. You will analyze network hardware, topologies, protocols, and services. You will install network cabling, operating systems, and applications software.

Credit unit(s): 4.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Describe network and subnet addressing requirements.			
2. Build an unshielded twisted pair network cable.			
3. Install client software and application software.			
4. Analyze network topologies.			
5. Analyze the Application layer services.			
6. Analyze the Transport layer services.			
7. Analyze the Network layer operation.			
8. Analyze the Link layer construction.			
9. Discuss wireless networks.			

DGTL 110 - Digital Logic

You will examine numbering systems; particularly, binary, hexadecimal, and binary coded decimal. You will study logic gates, flip flops, counter, registers, and decoders of various logic families.

Credit unit(s): 2.0
Prerequisites: ENGE 120, LABS 120, DGTL 111
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.	Competent	Learning	None
1. Differentiate between different types of numbering systems.			
2. Analyze basic digital logic gates.			
3. Analyze Boolean algebra and digital theorems.			
4. Analyze combinational logic using digital gates.			
5. Evaluate functions of combinational logic.			

DGTL 111 - Digital Logic Laboratory

You will study logic gates, flip flops, counter, registers and decoders of various logic families as well as design hardware and software required for various programmable devices.

Credit unit(s): 3.0
Prerequisites: ENGE 120, LABS 120, DGTL 110
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze circuits using basic binary gates.			
2. Evaluate binary math functions using basic gates.			
3. Analyze digital theorems using logic circuits.			
4. Analyze K-maps using logic circuits.			
5. Design logic circuits using software.			
6. Analyze combinational logic circuits.			
7. Evaluate functions of combinational logic.			
8. Devise functions of combinational logic using software.			

ENGE 107 - Semiconductor Electronics

You will analyze the characteristics of semiconductor diodes, bipolar transistors, field effect transistors (FET's) and thyristors. You will operate these devices to design and analyze practical analog circuits. You will apply mathematical calculations, computer simulation and laboratory experimentation to evaluate circuits.

Credit unit(s): 4.0
Prerequisites: ENGE 120, LABS 120
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze the characteristics and operation of semiconductor diodes.			
2. Analyze rectifier diode circuits.			
3. Construct diode circuits.			
4. Analyze special-purpose diodes.			
5. Analyze the characteristics and operation of bipolar transistors.			
6. Evaluate bipolar transistor circuits.			
7. Construct bipolar transistor amplifier circuits.			
8. Analyze the characteristics and operation of field effect transistors (FETs).			
9. Evaluate FET circuits.			
10. Describe the characteristics and operation of thyristors.			

ENGE 200 - Alternating Current (AC) Basic Electricity

You will analyze the principles and methods of alternating current (AC) circuits. You will evaluate AC voltage and current phasors, reactance, series-parallel circuits, impedance, networks, AC power resonance, and decibel ratios.

Credit unit(s): 4.0
Prerequisites: ENGE 120, LABS 120, MAT 110
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze capacitors, inductors, and sine wave.			
2. Evaluate response of resistance, inductance, and capacitor elements in an alternate current (AC) circuit.			
3. Evaluate series AC circuits.			
4. Evaluate parallel AC circuits.			
5. Compare series, parallel and combinational circuits.			
6. Analyze network theorems.			
7. Evaluate AC power.			
8. Evaluate resonant circuits.			
9. Analyze systems using decibels.			

INST 223 - Basic Instruments

You will be introduced to the units, dimensions, and standards of measurements. You will study the sources of measurement errors, as well as how to estimate them. You will also learn how to identify instrument types and their performance characteristics. You will calculate the required resistors to extend the range of measurements of ammeters, voltmeters, and ohmmeters. You will study direct current (DC) and alternate current (AC) bridges, and their applications in measurements. You will also examine the circuit diagrams of digital multi-meters, frequency meters and oscilloscopes and use them in the lab.

Credit unit(s): 3.0
Prerequisites: ENGE 120, LABS 120
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Name the standard electrical units.			
2. Identify the sources of measurement errors.			
3. Analyze the circuit diagrams of ammeters and voltmeters.			
4. Calculate the average and root mean square values of different waveforms.			
5. Calculate the components of direct current (DC) and alternate current (AC) bridge circuits.			
6. Apply the methods of resistance measurements.			
7. Examine the circuit diagrams of digital frequency meters.			
8. Use an oscilloscope for frequency and phase measurements.			

MAT 112 - Differential Calculus for Engineering Technologies

You will gain knowledge of differential calculus topics applicable to engineering technologies. You will study continuity, limits, algebraic and transcendental derivatives, and their applications. This course is intended to build further problem solving and critical thinking skills, and to demonstrate the importance of calculus in engineering practices.

Credit unit(s): 3.0
Prerequisites: MAT 110
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze limits and continuity of functions.			
2. Examine the derivative through the study of slopes and limits.			
3. Calculate derivatives of algebraic functions.			
4. Use first and second derivatives to graph functions.			
5. Calculate derivatives of transcendental functions.			
6. Analyze technical problems involving rates of change and optimization.			

TCOM 103 - Technical Communication

You will use research skills to find technical information and cite it correctly. You will conduct effective meetings and produce supporting documents. As well, you will discuss technical report purposes and formats, write short technical reports and present technical information.

Credit unit(s): 3.0
Prerequisites: TCOM 102, COM 170
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Conduct research for a technical report.			
2. Use correct grammar and technical style.			
3. Create technical reports.			
4. Conduct meetings.			
5. Present technical information.			

COOP 101 - Co-operative Work Term

Your co-operative education term will provide you with the opportunity to consolidate theoretical and practical concepts learned in the classroom and gain valuable experience in a work setting.

Credit unit(s): 0.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Develop personal employment search skills.			
2. Communicate in the workplace.			
3. Work as a member of the team.			
4. Demonstrate effective work habits.			
5. Become familiar with safe work practices.			
6. Develop personal management skills.			
7. Identify roles and responsibilities of personnel in the workplace.			
8. Assimilate learned theories and concepts in a workplace setting.			
9. Demonstrate essential skills.			

CIRC 220 - Analog Integrated Circuits

You will be introduced to differential amplifiers and be able to identify the characteristics of ideal operational amplifiers (op-amps). You will calculate negative feedback, op-amp frequency responses, comparators, summing amplifiers, integrators, differentiators, active filters, and oscillators.

Credit unit(s): 4.0
Prerequisites: ENGE 107, ENGE 200
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Identify the characteristics of ideal operational amplifiers (op-amps).			
2. Describe the operation of op-amps.			
3. Describe the frequency response of op-amps.			
4. Distinguish the op-amp circuits that perform summation, integration, and differentiation.			
5. Design a low-pass, high-pass, band-pass, and band-stop active filter.			
6. Measure op-amp parameters.			
7. Design an oscillator.			
8. Describe various modulation techniques in a communication system.			

CLTR 200 - Culture and Diversity

Your studies will focus on the many dimensions of culture and approaches to promoting inclusion and innovation. You will explore culture in Canadian society as it pertains to Indigenous and immigrant populations. You will also examine the correlation between culture and diversity.

Credit unit(s): 2.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss how cultural dimensions shape the diversity of Canada.			
2. Discuss the prominent dimensions of culture in Canadian society such as tradition, familial relations, and employment.			
3. Describe the interrelationships produced when the dimensions of various cultures interact.			
4. Describe the dimensions of culture as it relates to Indigenous and immigrant populations.			
5. Discuss the correlation between culture, diversity, and innovation.			

COAP 222 - Computer Programming

You will study the design, implementation and testing of programs using a high-level language. You will develop problem-solving skills by constructing algorithms to meet program input and output (I/O) requirements. You will develop programs that exhibit good structure to ensure easy debugging and maintenance. You will utilize object oriented design techniques to produce efficient reusable modules. You will employ predefined and user constructed abstract data types to meet application design goals.

Credit unit(s): 4.0
Prerequisites: COMP 112
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome		Competent	Learning	None
Competent:	I can apply this outcome without direction or supervision.			
Learning:	I am still learning skills and knowledge to apply this outcome.			
None:	I have no knowledge or experience related to this outcome.			
1.	Explain terms and methodology employed by modern programming languages.			
2.	Choose appropriate predefined data types, operators and input and output (I/O) methods for applications.			
3.	Create programs using appropriate decision and branching instructions.			
4.	Create programs using appropriate looping instructions.			
5.	Create efficient modular structured programs utilizing user-defined functions.			
6.	Plan program implementation using various tools.			
7.	Construct programs utilizing user written classes and object oriented design techniques.			
8.	Construct programs utilizing pointers.			
9.	Create programs using abstract data types.			
10.	Implement I/O to various types of files.			
11.	Create programs using advanced object oriented techniques.			
12.	Analyze database queries.			

COMP 221 - Computer Hardware Fundamentals

You will study specific integrated circuits (IC) that make up the personal computer. You will analyze characteristics and addressing techniques for various types of memory, as well as basic computer structure and operation. You will design the logic circuits for memory addressing and input/output (I/O) port decoding. You will examine and interpret the basic central processing unit (CPU) internal control unit, I/O interfacing, and secondary storage systems.

Credit unit(s): 4.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Define various types of memories.			
2. Analyze memory operating characteristic, addressing and computer system implementation.			
3. Construct memory circuits.			
4. Analyze basic central processing unit (CPU) functions within the computer structure.			
5. Discuss basic CPU instruction sets and enhancements.			
6. Analyze industry standard architecture (ISA) bus interfacing.			
7. Analyze secondary storage systems.			
8. Analyze input/output systems.			

COMP 222 - Microcontroller Programming

You will be introduced to embedded microprocessor applications and architecture. You will be introduced to Assembly and C programming languages. You will construct structured C programs for embedded microcontroller projects.

Credit unit(s): 4.0
Prerequisites: COMP 112, DGTL 110, DGTL 111
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Review binary and hexadecimal number systems.			
2. Describe microprocessor architecture and terminology.			
3. Discuss microprocessor addressing structures.			
4. Analyze basic microprocessor program structures.			
5. Assess lower and higher program languages.			
6. Develop a basic program using flow control.			
7. Assess predefined modules and routines of a program.			
8. Design microcontroller programs for specified applications.			

ENGE 221 - Robotics and Embedded Systems

You will study robotics in the field of embedded systems. You will study the various types of sensors and actuators and learn their characteristics, applications, and interfacing circuits. You will learn the methods of applied research. You will also apply your skills by developing a robotic device in a project.

Credit unit(s): 4.0
Prerequisites: DGTL 110, DGTL 111, ENGE 107, COMP 112
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome		Competent	Learning	None
Competent:	I can apply this outcome without direction or supervision.			
Learning:	I am still learning skills and knowledge to apply this outcome.			
None:	I have no knowledge or experience related to this outcome.			
1.	Discuss the history of robotics.			
2.	Describe sensing devices.			
3.	Describe actuator devices.			
4.	Explain wireless peripherals.			
5.	Analyze interfacing circuits.			
6.	Design embedded systems applications for robotic control.			
7.	Design internet of things (IoT) web interfaces.			
8.	Create a robotic device as a project implementing hardware and software design.			

MAT 210 - Integral Calculus for Engineering Technologies

You will gain a basic background in trigonometry and algebra that is needed to do problem solving in applied areas and to advance to a study of calculus. You will study measurement, computations, algebraic operations, simplifications and solutions, trigonometry, graphing, exponents, and logarithms. This course is intended to meet your needs in the construction stream of engineering technologies.

Credit unit(s): 6.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Apply principles of numerical computation.			
2. Apply algebraic principles to simple expressions and equations.			
3. Apply principles of geometry.			
4. Apply principles of functions to graphs and analytical geometry.			
5. Apply principles of trigonometry and vectors.			
6. Apply algebraic principles to factoring and fractional equations.			
7. Apply principles of ratio, proportion, and variation.			
8. Apply algebraic principles to solve systems of linear equations.			
9. Apply algebraic principles to exponents and radicals.			
10. Apply algebraic principles to solve quadratic equations.			
11. Apply algebraic principles to exponential and logarithmic functions.			

COOP 201 - Co-operative Work Term

Your second co-operative education term will build on the experience gained during your first work placement and provide you with additional opportunities to develop skills and techniques related to your field of studies in a real work setting.

Credit unit(s): 0.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Participate in a personal employment search.			
2. Communicate effectively in the workplace.			
3. Contribute as a member of the team.			
4. Demonstrate effective work habits.			
5. Demonstrate safe work practices.			
6. Display personal management skills.			
7. Identify roles and responsibilities of personnel in the workplace.			
8. Apply learned skills and techniques in the workplace.			
9. Apply essential skills in the workplace.			

BUS 203 - Entrepreneurship for Engineering Technologies

You will learn the specifics of organizing and opening a small business. You will study the process of entrepreneurship from a technology-oriented background.

Credit unit(s): 2.0
Prerequisites: TCOM 102, COM 200
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze methods of identifying business opportunities.			
2. Explore the pros and cons of entrepreneurial opportunities within a technology environment.			
3. Compose market research to identify feasibility of a business idea.			
4. Create a financial plan.			
5. Identify components of a business plan.			
6. Prepare a business proposition.			

CNST 220 - Construction Techniques

Your studies will focus on fundamental construction principles, tools, and safety. You will use tools to measure, layout, cut, drill as well as solder wires, terminals, printed circuit boards (PCBs) and surface mount devices. You will create a PCB starting with a schematic capture computer program. You will then produce a finished PCB using a computerized milling machine that will be used to create a functional microcontroller circuit to satisfy the requirements of an assigned project.

Credit unit(s): 3.0
Prerequisites: CAD 100, COMP
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome		Competent	Learning	None
Competent:	I can apply this outcome without direction or supervision.			
Learning:	I am still learning skills and knowledge to apply this outcome.			
None:	I have no knowledge or experience related to this outcome.			
1.	Discuss shop safety.			
2.	Demonstrate hand tools and basic shop tools.			
3.	Use software to design printed circuit board (PCB) layout drawings.			
4.	Perform soldering and de-soldering on a PCB.			
5.	Demonstrate the final form of a functional PCB.			

COMP 207 - Computer Interfacing

You will design, develop, and debug software for embedded microcontrollers. You will choose and implement appropriate strategies for interfacing microcontroller based systems to various peripherals (including memory, keypads, displays, analog-to-digital (A/D) and digital-to-analog (D/A) converters, switches and different types of transducers).

Credit unit(s): 2.0
Prerequisites: COMP 221, COMP 222, COMP 217
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome		Competent	Learning	None
Competent:	I can apply this outcome without direction or supervision.			
Learning:	I am still learning skills and knowledge to apply this outcome.			
None:	I have no knowledge or experience related to this outcome.			
1.	Describe the internal architecture of a microcontroller.			
2.	Develop embedded microcontroller software.			
3.	Evaluate programs developed for the microcontroller.			
4.	Design interfaces between microcontrollers and memory.			
5.	Design interfaces between microcontrollers and input/output (I/O) devices.			
6.	Design interfaces between microcontrollers, transducers, and actuators.			

COMP 217 - Computer Interfacing Laboratory

You will design, construct, and debug a project based on embedded microcontrollers. Your project will involve interfacing to analog and digital peripherals, keypads, displays, and actuators.

Credit unit(s): 3.0
Prerequisites: COMP 221, COMP 222, COMP 207
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Describe techniques used in interfacing a microcontroller to other system devices.			
2. Determine possible hardware and software problems.			
3. Create project design.			
4. Create project schematic and a parts list.			
5. Create a project prototype.			
6. Write project code.			
7. Debug hardware and software.			
8. Demonstrate project based on embedded microcontrollers.			

INST 229 - Electronic Instruments

You will be introduced to the digital storage oscilloscope (DSO), logic analyzer, and spectrum analyzer. Using the DSO, you will experiment with various sampling methods and triggering mechanisms. You will use the logic analyzer in timing and state modes of operation. You will contrast amplitude, frequency, and phase modulation as well as their frequency spectra. You will operate the spectrum analyzer and experiment with the Fast Fourier Transform (FFT) technique in order to display the spectrum of a signal. Your studies will include an introduction to fiber optics components.

Credit unit(s): 2.0
Prerequisites: INST 223
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome		Competent	Learning	None
Competent:	I can apply this outcome without direction or supervision.			
Learning:	I am still learning skills and knowledge to apply this outcome.			
None:	I have no knowledge or experience related to this outcome.			
1.	Analyze different triggering mechanisms and sampling methods used in digital oscilloscopes.			
2.	Differentiate between timing and state modes in logic analyzers.			
3.	Experiment with the different triggering techniques of logic analyzers.			
4.	Analyze the circuit diagram of a swept-tuned spectrum analyzer.			
5.	Calculate the amplitude modulation (AM), frequency modulation (FM), and total harmonic distortion (THD) indices.			
6.	Describe radio frequency (RF) power measurements, components of a fiber optic system and multiplexing of light over fiber cable.			

MGMT 211 - Project Management

You will be introduced to project management. You will examine the basic theory of project planning and control, from project initiation to project close out. You will apply research techniques and various tools to practice project management theory in a variety of projects. You will practice skills using project management software.

Credit unit(s): 2.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Apply principles of the time value of money to cost analysis of projects.			
2. Discuss project management concepts.			
3. Explain the process to initiate a project.			
4. Create a project plan.			
5. Discuss closing requirements of a project.			
6. Use project management software to plan projects.			

PHYS 105 - Physics

Your studies will focus on solving certain physics problems using computational software. You will study vectors, translational and circular motion, work, energy and power, electric forces, electric fields and electric potential and magnetism.

Credit unit(s): 3.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.	Competent	Learning	None
1. Apply calculating, documenting and graphing functions and features with computational software.			
2. Solve problems of vector addition.			
3. Solve problems involving motion.			
4. Solve problems involving work, energy, and power.			
5. Solve problems involving electric forces, potentials and fields and magnetism.			

PROJ 287 - Project Management

You will be introduced to project management. You will examine the basic theory of project planning and control, from project initiation to project close out. You will apply research techniques and various tools to practice project management theory in a variety of projects. You will practice skills using project management software.

Credit unit(s): 2.0
Prerequisites: none
Corequisites: none
Equivalent course(s): MGMT 222

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss project management concepts.			
2. Explain the process to initiate a project.			
3. Create a project plan using project management software.			
4. Explain the methods used to execute a project plan.			
5. Explain monitoring requirements of a project.			
6. Discuss closing requirements of a project.			

COOP 301 - Co-operative Work Term

Your third co-operative education work term will round out the work term experience by adding related work knowledge through the application of theories and practices relevant to your field of studies.

Credit unit(s): 0.0
Prerequisites: none
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Demonstrate personal employment search skills.			
2. Display effective communication skills.			
3. Work as a member of the team.			
4. Apply effective work habits.			
5. Perform safe work practices.			
6. Master personal management skills.			
7. Understand roles and responsibilities of personnel in the workplace.			
8. Apply relevant theories and techniques.			
9. Perform effectively in the workplace.			

COAP 300 - Artificial Intelligence

You will study the concepts and principles of machine learning. You will learn about deep learning algorithms. You will learn about major applications of Artificial Intelligence in various fields.

Credit unit(s): 2.0
Prerequisites: COAP 222, COAP 301
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.	Competent	Learning	None
1. Discuss the concepts and principles of machine learning, including its mathematical aspects.			
2. Discuss the major applications of Artificial Intelligence.			
3. Explain how to formalize a given problem in the language/framework of different AI methods.			
4. Describe neural networks and multi-layer data abstraction.			
5. Discuss quantum bits.			

COAP 301 - Artificial Intelligence Laboratory

You will study the concepts and principles of machine learning. You will implement deep learning algorithms in Tensor Flow and interpret the results. You will learn about major applications of Artificial Intelligence in various fields.

Credit unit(s): 3.0
Prerequisites: COAP 222, COAP 300
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Implement classical artificial intelligence techniques, such as search algorithms and minimax algorithm.			
2. Analyze the major technology trends driving deep learning.			
3. Implement deep learning algorithms in Open Source Software Library.			
4. Design intelligent agents.			
5. Examine convolutional neural networks and recurrent neural networks.			
6. Construct fully connected deep neural networks.			

COMP 227 - Process Control Systems

You will study methods and devices to control and automate industrial operations. You will differentiate final control operations and discrete-state control. You will design logic control circuits using Programmable Logic Controllers (PLC). You will also be introduced to supervisory control and data acquisition (SCADA) concepts.

Credit unit(s): 4.0
Prerequisites: DGTL 110, DGTL 111
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Describe final control operation.			
2. Describe discrete-state process control.			
3. Explain the operation of electromechanical relays.			
4. Design Programmable Logic Controller (PLC) timer and counter applications.			
5. Design PLC systems using advanced functions.			
6. Identify trouble-shooting techniques in a PLC system.			
7. Illustrate sinking and sourcing circuit configurations in a PLC system.			
8. Describe a supervisory control and data acquisition (SCADA) system and its function.			

COMP 301 - Software Systems

You will analyze characteristics, issues and solutions pertaining to the design and implementation of operating systems. You will master various aspects of computer system administration.

Credit unit(s): 2.0
Prerequisites: COAP 222, COMP 302
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.	Competent	Learning	None
1. Discuss characteristics of current operating systems.			
2. Analyze various processor-scheduling algorithms.			
3. Analyze process synchronization techniques.			
4. Analyze deadlock detection and prevention strategies.			
5. Assess memory management techniques used in modern operating systems.			

COMP 302 - Software Systems Laboratory

You will analyze characteristics, issues and solutions pertaining to the design and implementation of operating systems. You will master various aspects of computer system administration and write software scripts.

Credit unit(s): 3.0
Prerequisites: COAP 222, COMP 301
Corequisites: none
Equivalent course(s): none

Use a checkmark (✓) to rate yourself as follows for each learning outcome Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.	Competent	Learning	None
1. Create programs utilizing multiple related cooperating processes.			
2. Create programs utilizing multiple cooperating threads.			
3. Analyze various processor scheduling algorithms.			
4. Analyze process synchronization techniques.			
5. Analyze deadlock detection and prevention strategies.			
6. Perform operating system installation and configuration.			
7. Manage system administration using command line tools.			

CSEC 300 - Cybersecurity

You will be introduced to computer and network security concepts. You will gain knowledge on the multiple areas of cybersecurity and its implementation.

Credit unit(s): 04.0
Prerequisites: COHS 220
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss security fundamentals.			
2. Discuss security management issues.			
3. Discuss authentication and access control.			
4. Discuss software threats and attacks.			
5. Assess intrusion detection and prevention.			
6. Analyze cryptographic algorithms and authentication.			
7. Discuss internet security protocols and authentication applications.			
8. Examine wireless network security.			

PROJ 222 - Capstone Research Project

You will apply knowledge you gained in previous semesters. You will conceive and design an original project that incorporates hardware and software. You will research alternative designs, select appropriate strategies, and defend your design choices in a final presentation. You will manage the project scheduling and costs to meet broad goals with minimal direction. You will design, construct and test a working prototype; including, a printed circuit board to illustrate the soundness of your design choices.

Credit unit(s): 4.0
Prerequisites: COAP 222, COMP 207, COMP 217, ENGE 221
Corequisites: TCOM 104
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Conceive a project.			
2. Research technical and design aspects required for completion of the project.			
3. Manage scheduling to ensure timely completion of the project.			
4. Select appropriately between alternative designs.			
5. Formulate evaluation criteria and design goals for the project.			
6. Develop a printed circuit board (PCB) for the project.			
7. Evaluate the performance of the prototype using scientific methods.			
8. Prepare a presentation to defend your thesis.			

TCOM 104 - Applied Research in Technology

You will develop a technical proposal and apply advanced research skills to a technical problem. You will use the technical problem-solving process in an applied research project and present your research findings in a written report and oral presentation.

Credit unit(s): 2.0
Prerequisites: TCOM 103, ENGL 101
Corequisites: none
Equivalent course(s): none

<p>Use a checkmark (✓) to rate yourself as follows for each learning outcome</p> <p>Competent: I can apply this outcome without direction or supervision. Learning: I am still learning skills and knowledge to apply this outcome. None: I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Develop a technical proposal.			
2. Apply advanced research skills			
3. Describe the technical problem-solving process.			
4. Employ the problem-solving process in an applied research project.			
5. Present research findings.			