Electrical Engineering Technology Diploma

PLAR Candidate Guide

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

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 pre-requisites and co-requisites

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 corequisites 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 assessment 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** a detailed Assessment Plan with your assigned assessor**.**
7. **Complete** assessment before your PLAR registration expires.

E. PLAR contact person

Contact the person below to arrange a consultation **after** you have read this guide and general PLAR information **and** rated yourself for each course (see next session). 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.

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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
Semester 1		
CADD 120	Computer Aided Drafting 1	
ENGE 120	Basic Electricity	
LABS 120	Basic Electricity Lab	
MAT 110	Mathematics for Engineering Technologies	Arts & Sciences
PHYS 101	Engineering Physics	
SAFE 112	Safety and Code Book Regulations	
SEM 101	Technology Seminars	
STAT 200	Statistics for Technology	Arts & Sciences
TCOM 102	Workplace Communication	Arts & Sciences
Semester 2		
CLTR 100	Diversity	
DGTL 221	Digital Logic Circuits	
ELTR 221	Semi-Conductor Electronics	

COURSE CODE	COURSE NAME	Delivered by another department/program
ENGE 201	Direct Current Machines	
ENGE 220	Alternating Current Circuits	
LABS 200	Direct Current Machines Lab	
LABS 221	Alternating Current Circuit Lab	
LABS 222	Semi-Conductor Electronics Lab	
MAT 112	Differential Calculus for Engineering Technologies	Arts & Sciences
COOP 101	Co-Operative Work Term	
Semester 3		
CNTR 230	Industrial Machine Controls	
DSGN 225	Power Transmission and Distribution	
ELTR 223	Industrial Power Electronics 1	
ENGE 202	Alternating Current Machines	
INST 225	Instrumentation	
LABS 201	Alternating Current Machines Lab	
LABS 224	Industrial Power Electronics LAB 1	
LABS 230	Industrial Machine Control Lab	
MAT 210	Integral Calculus for Engineering Technologies	Arts & Sciences
SEM 208	Engineering Seminars 3	
COOP 201	Co-Operative Work Term	
Semester 4		
COAP 232	Computer Programming	
COMP 246	SCADA Systems	
ENGE 231	Transformers	
ENVR 206	Energy Resource Management	

COURSE CODE	COURSE NAME	Delivered by another department/program
PROJ 287	Project Management	
MAT 211	Advanced Mathematics for Engineering Technologies	Arts & Sciences
TCOM 103	Technical Communication	Arts & Sciences
COOP 301	Co-operative Work Term	
Semester 5		
CNTR 231	Control Systems	
DSGN 209	Electrical Systems Design	
ELTR 228	Industrial Power Electronics 2	
ENGE 232	Power System Protection	
LABS 227	Industrial Power Electronics Lab 2	
LABS 232	Power System Protection Lab	
PROJ 206	Capstone Project	
TCOM 104	Applied Research in Technology	Arts & Sciences

CADD 120 – Computer Aided Drafting 1

You will develop fundamental computer aided drafting (CAD) skills using industry-standard software. You will construct two-dimensional geometric construction, dimensioning and drawing output.

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. Demonstrate the Computer Aided Drafting (CAD) software and drawing environment.			
2. Demonstrate the use of foundational commands of CAD software.			
3. Construct basic geometric objects and annotations.			
4. Apply file management techniques and drawing templates.			
5. Perform editing techniques.			
6. Create drawings for output.			
7. Construct basic blocks.			
8. Employ hatching.			
9. Manage raster images.			

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

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**
10. Review system units of measurement, unit conversions, and mathematical notations.			
11. Explain the basic electrical principles, quantities, symbols, and units.			
12. Explain Direct Current (DC) cells configurations, electrical instruments, and measurement of electrical quantities.			
13. Examine resistive electrical circuits.			
14. Examine Ohms Law and Power Law equations.			
15. Examine Kirchhoff Current and Voltage Laws.			
16. Analyze complex electrical circuits using various circuit analysis techniques.			
17. Analyze complex electrical circuits using Network Theorems.			
18. 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 MAT 110
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. 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 or 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

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. 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.			

PHYS 101 – Engineering Physics

You will study circular and simple harmonic motion. You will apply vectors and Newton's laws in linear and rotational systems. You will investigate work, power, mechanical energy, momentum, and impulse. You will study the properties of heat and temperature, and the laws of thermodynamics. This course is intended to build critical thinking and problem-solving skills.

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. Solve problems involving circular motion.			
2. Apply Newton's laws to linear and rotational force systems.			
3. Analyze work, power, and the conservation of mechanical energy.			
4. Solve problems involving momentum and impulse.			
5. Solve problems involving waves and simple harmonic motion.			
6. Solve problems involving temperature, thermal energy, and heat.			
7. Examine the laws of thermodynamics.			

SAFE 112 – Safety and Code Book Regulations

Your studies will focus on using Canadian Electrical Code (CEC) to select basic wiring circuits commonly found in industrial plants. You will study Occupational Health and Safety (OH&S) regulations and standard practices in electrical workplaces.

Credit unit(s): 1.0
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. Review Occupational Health and Safety regulations and workplace standards.			
2. Select materials and tools needed to simulate a basic circuit containing a three-phase motor and the installation of a three-phase motor that conforms to the Canadian Electrical Code (CEC).			
3. Interpret structure of CEC.			

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

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. 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

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. 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

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. 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.			

CLTR 100 - Diversity

You will examine the elements of cultural, gender and disability diversity in Canada and the processes that promote inclusion. You will explore elements of Indigenous culture with a view to understanding both historical elements and contemporary issues in Canada. Your studies will also provide opportunities to participate in various cultural practices.

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. Examine the diverse Canadian identity.			
2. Describe diversity and social inequality in Canadian society.			
3. Examine the impact of colonization and treaties on Indigenous peoples.			
4. Examine contemporary realities and resilience of Indigenous people in Canada.			
5. Explore cultural events.			
6. Promote inclusion.			

DGTL 221 - Digital Logic Circuits

You will be introduced to number systems and American Standard Code for Information Interchange (ASCII) and Binary Coded Decimal (BCD) codes. You will analyze the characteristics of gates and truth tables. You will design counters, registers, and sequential circuits.

Credit unit(s): 2.0
Prerequisites: EMGE 120 LABS 120 ELTR 221
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. Convert base numbers, Binary Coded Decimal (BCD) and American Standard Code for Information Interchange (ASCII) codes.			
2. Analyze the characteristics of gates and truth tables.			
3. Design Boolean equations for logic diagrams and multi-level and multi-output logic gate networks.			
4. Analyze combinational logic circuits.			
5. Evaluate flip-flops and design counters and registers using gates and flip-flops.			
6. Design counters, registers and sequential circuits.			

ELTR 221 – Semi-Conductor Electronics

Your studies will focus on semiconductor diodes and bipolar transistors. You will examine several diode circuits and applications as well as analyze Bipolar-Junction Transistor (BJT) amplifier circuits.

Credit unit(s): 3.0
Prerequisites: ENGE 120 LABS 120 MAT 110
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. Explain semiconductor theory.			
2. Explain the characteristics and operating principles of the standard diodes.			
3. Examine diode circuits and their applications.			
4. Evaluate Bipolar-Junction-Transistor (BJT) circuits.			
5. Explain Class A, AB, B, C and D transistor circuits.			

ENGE 201 – Direct Current Machines

You will study the principle of magnetism as well as the principles and characteristics of the operation and application of Direct Current (DC) generators and motors. You will investigate the construction of electrical machines. Your studies will also include an introduction to the windings used in DC electrical machines.

Credit unit(s): 3.0
Prerequisites: ENGE 120 LABS 120 MAT 110 PHYS 101 LABS 200
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. Examine several principles of magnetism and electromagnetism in relation to electrical machines.			
2. Describe the construction of rotating electrical machines.			
3. Compare armature windings configurations of Direct Current (DC) machines.			
4. Examine the operation, characteristics, and performance of DC generators.			
5. Describe the process of paralleling DC generators.			
6. Examine the operation, characteristics, and performance of DC motors.			
7. Analyze the parameters, ratings, regulation, and efficiency of DC machines.			

ENGE 220 – Alternating Current Circuits

You will learn the principles and analysis methods of Alternating Current(AC) single and three phase circuits. You will study AC voltage and current, impedance and phasor algebra and AC circuits configurations. Your studies will also include AC power, resonance and AC measuring instruments and balanced and unbalanced loads of three-phase systems.

Credit unit(s): 4.0
Prerequisites: ENGE 120 LABS 120 MAT 110 LABS 221
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. Analyze the characteristics of an Alternating Current (AC) waveform.			
2. Examine basic AC elements and phasors.			
3. Evaluate series, parallel and series-parallel AC circuits.			
4. Solve for electrical quantities in complex electrical circuits.			
5. Evaluate the three forms of power in single-phase AC circuits.			
6. Examine three-phase AC Circuits.			
7. Design single-phase AC circuits.			

LAB 200 – Direct Current Machines Lab

You will examine magnetic properties and conduct tests on various types of Direct Current(DC) motors and generators. You will study how DC machines operate and understand their underlying principles and characteristics. You will examine the characteristics of DC machines using computer simulation software.

Credit unit(s): 2.0
Prerequisites: ENGE 120 LABS 120 MAT 110 ENGE 201
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. Demonstrate safety in the lab.			
2. Conduct demonstrations of magnetic properties.			
3. Evaluate the characteristics of Direct Current (DC) machines by using computer simulation software.			
4. Examine the characteristics of DC generators.			
5. Examine the characteristics of DC motors.			

LABS 221 – Alternating Current Circuit Lab

In this laboratory-based course, you will identify Alternating Current (AC) electrical quantities, build electric circuits, and use instruments to measure electrical quantities in single phase and three-phase AC circuits. You will perform several labs to validate theoretical concepts, electrical laws, and network theorems.

Credit unit(s): 3.0
Prerequisites: ENGE 120 LABS 120 MAT 110 ENGE 220
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. Recognize parameters of a sinusoidal waveform.			
2. Measure electrical quantities in single-phase Alternating Current (AC) circuits.			
3. Demonstrate phase sequence.			
4. Measure electrical quantities in three-phase AC circuits.			
5. Use power measuring instruments in three-phase circuits.			
6. Build electric circuits.			

LABS 222 – Semi-Conductor Electronics Lab

You will verify theoretical concepts by working with electronic circuits commonly found in electronic equipment. You will perform experiments on standard diodes and Bipolar Junction-Transistor (BJT) amplifier circuits.

Credit unit(s): 2.0
Prerequisites: LABS 120 ELTR 221
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. Measure V-I characteristic curves using diodes.			
2. Build the waveforms of diode circuits.			
3. Troubleshoot the rectified Direct Current (DC) power supply using half-wave, full-wave rectified configurations.			
4. Measure Bipolar-Junction-Transistor (BJT) Parameters.			
5. Construct BJT Amplifiers.			

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

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. 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.			

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

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. 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.			

CNTR 230 – Industrial Machine Controls

You will be studying the magnetic control of Direct Current (DC) and Alternating Current (AC) motors including the functions, requirements, and components of control systems. You will become familiar with developing and modifying motor starters, controllers and protection auxiliary devices pertaining to pressure, flow, level, and limit. You will also study Programmable Logic Controller (PLC) controls using processors with interfacing PLC's to electronic drives.

Credit unit(s): 3.0
Prerequisites: DGTL 221 LABS 230
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. Describe the types of control systems.			
2. Develop manual starters for Direct Current (DC) and Alternating Current (AC) motors.			
3. Design control circuits using auxiliary devices.			
4. Evaluate protective devices.			
5. Analyze automatic starters and control circuits for polyphaser motors.			
6. Design a Programmable Logic Controller (PLC) system for starting and controlling AC/DC motors by using field devices.			

DSGN 225 – Power Transmission and Distribution

Your studies will focus on identifying the difference between power transmission and distribution systems. You will study the impedance calculations of each component in a power system. You will study the nature of power system faults and their clearing. You will study the principles of symmetrical components applied to the problem of fault current calculation in the case of three-phase symmetrical, line-to-line and line-to-ground faults. You will also assess the total harmonics distortion (THD) in a power system.

Credit unit(s): 4.0
Prerequisites: ENGE 220
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. Evaluate the difference between transmission and distribution systems.			
2. Analyze structures used on transmission and distribution lines.			
3. Construct a single-line diagram for transmission, distribution, and utilization system.			
4. Calculate the impedances of power systems devices using MVA-based method in per unit representation.			
5. Draw graphical voltage profile presentation for power systems.			
6. Prepare sequence impedance networks.			
7. Calculate power system symmetrical fault currents in different types of fault situation.			
8. Assess the total harmonic distortion (THD) and power factor problems in a power system.			

ELTR 223 – Industrial Power Electronics 1

You will study Field Effect Transistors (FETS) and operational amplifier circuits. You will analyze the characteristics Junction Field Effect Transistor (JFETS) and Metal Oxide Silicon Field Effect Transistors (MOSFET). You will also study the passive and active filters as well as feedback and relaxation oscillators.

Credit unit(s): 3.0
Prerequisites: ELTR 221 LABS 224
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. Analyze the characteristics and operation of Field Effect Transistors (FETs).			
2. Examine operational amplifiers.			
3. Analyze passive and active filters.			
4. Examine feedback oscillators.			
5. Examine relaxation oscillators.			

ENGE 202 – Alternating Current Machines

You will study the principles, operation, and the application of various types of Alternating Current (AC) motors and AC generators. You will examine the construction and operation of induction generators and special types of motors.

Credit unit(s): 3.0
Prerequisites: ENGE 220 LABS 221 ENGE 201 LABS 200 MAT 112 LABS 201
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. Describe the different types of Alternating Current (AC) motors and generators.			
2. Explain the characteristics of AC motors and generators.			
3. Explain the working principles of AC motors and generators.			
4. Assess the value of the application of AC motors and generators.			
5. Describe the process of paralleling alternators.			

INST 225 - Instrumentation

You will study and use the manufacturers' user manual to independently perform tests on several test equipment. You will safely use test equipment to take precise measurements, analyze data and propose recommendations on your findings.

Credit unit(s): 2.0
Prerequisites: ELTR 221 LABS 221 LABS 222
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. Read manufacturers' user manual.			
2. Use relay testing equipment.			
3. Measure harmonics and power.			
4. Perform transformer testing.			
5. Perform testing on power systems and protective devices.			
6. Propose recommendations from testing data.			

LABS 201 – Alternating Current Machines Lab

You will examine induction and synchronous motors as well as, Alternating Current (AC) generators. You will perform detailed analysis of paralleling alternators under varying loads and operating conditions. You will use computer simulation software to study the characteristics of AC machines.

Credit unit(s): 2.0
Prerequisites: ENGE 201 LABS 200 ENGE 220 LABS 221 MAT 112 ENGE 202
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. Demonstrate lab safety.			
2. Evaluate the characteristics of Alternating Current (AC) machines with the use of computer simulation software.			
3. Analyze the characteristics of AC motors using testing procedures.			
4. Analyze the characteristics of AC generators using testing procedures.			
5. Demonstrate the synchronizing process of AC generators			

LABS 224 – Industrial Power Electronics Lab 1

You will conduct experiments on Field Effect Transistors (FETs), operational amplifiers, filters, and oscillator circuits.

Credit unit(s): 2.0
Prerequisites: LABS 222 ELTR 223
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. Measure parameters of Field Effect Transistors (FETs).			
2. Build FETs amplifiers.			
3. Measure parameters of operational amplifier.			
4. Construct passive and active filter circuits.			
5. Construct relaxation and feedback circuits.			

LABS 230 – Industrial Machine Controls Lab

You will examine the magnetic control of Direct Current (DC) and Alternating Current (AC) motors including the functions, requirements, and components of control systems. You will use a Programmable Logic Controller (PLC) ladder logic program to control DC and AC motors.

Credit unit(s): 2.0
Prerequisites: LABS 222
Corequisites: CNTR 230
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. Compare two-wire and three-wire control circuits.			
2. Troubleshoot shunt motor starter in both forward and reverse controls for Direct Current (DC) and Alternating Current (AC) motors.			
3. Practice forward and reverse jogging of DC and AC motors.			
4. Demonstrate the operations of dynamic breaking and plugging to stop DC and AC motors.			
5. Design a Programmable Logic Controller (PLC) ladder logic program to start DC and AC motors.			
6. Design a PLC ladder logic program for a 3-phase Wye to Delta reduced voltage starter.			

MAT 210 – Integral Calculus for Engineering Technologies

You will gain knowledge of integral calculus topics applicable to engineering technologies. You will study algebraic and transcendental integrals, differential equations 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 112
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. Examine the indefinite and definite integral.			
2. Calculate integrals of functions.			
3. Analyze technical problems with integration.			
4. Calculate integrals with the use of advanced techniques.			
5. Analyze first-order differential equations.			

SEM 208 – Engineering Seminars 3

You will engage with local industry and visit various manufacturing or industrial facilities. The course will include inviting local experts to present and share their expertise.

Credit unit(s): 1.0
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. Observe engineering applications in practice at local facilities.			
2. Discuss new ideas and current trends in engineering technology.			

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

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. 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.			

COAP 232 – Computer Programming

You will explore the use of C++ language with an Object-Oriented Programming (OOP) approach to solve power system problems. Your studies will focus on the fundamentals of program writing using C++ language to analyze and implement programs related to electrical engineering technology.

Credit unit(s): 3.0
Prerequisites: CNTR 230 DGTL 221 MAT 110
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 use of software technology for C++ Programming.			
2. Define the use of flowcharts and pseudocode.			
3. Contrast various variables used for I/O and temporary locations.			
4. Develop decision-making concepts used in programming.			
5. Develop loops, arrays, functions, structures, pointers, and linked lists.			
6. Develop data storage and data base techniques.			

COMP 246 – SCADA Systems

You will be introduced to Supervisory Control and Data Acquisition (SCADA) Systems. Your studies will include communication protocols, network systems, contrast of remote terminal units and Programmable Logic Controllers (PLC). You will create a complete SCADA Human Machine Interface application.

Credit unit(s): 3.0
Prerequisites: CNTR 230 DGTL 221 LABS 230
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. Compare a Programmable Logic Controller (PLC) and a Remote Terminal Unit (RTU).			
2. Evaluate protocols used for communication.			
3. Identify a Supervisory Control and Data Acquisition (SCADA) system to determine its function.			
4. Create a digital input/output (I/O) value from a PLC and display it on a local SCADA computer.			
5. Create an analog I/O value from a PLC and display it on a local SCADA computer.			
6. Evaluate the use of a Proportional-Integral-Derivative (PID) block within the PLC.			
7. Design a complete SCADA application Human Machine Interface (HMI) to acquire remote data and control a remote station using a PLC.			
8. Communicate directly with a SMART device instead of through a PLC.			
9. Apply industry standard for automated substations International Electrotechnical Commission (IEC) 61850.			

ENGE 231 - Transformers

Your studies will focus on the construction, principles, characteristics, operation, and application of various types of transformers.

Credit unit(s): 3.0
Prerequisites: ENGE 201 ENGE 220 LABS 221
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. Describe the construction of transformers.			
2. Explain the operation of transformers.			
3. Analyze the characteristics of transformers.			
4. Characterize the various types of transformers.			
5. Illustrate the characteristics of transformers.			

ENVR 206 – Energy Resource Management

You will examine the major components of energy resource management including supply, demand, economics, regulation, and the environment. Your studies will include an examination of the regional, national, and global viewpoints on energy resource management. You will differentiate conventional and alternative energy systems and explore the concepts and principles behind successful energy management. A key outcome of this course will be the ability to estimate energy resource management economics including levelized costs, pay-back periods, and pollution mitigation costs. The course will prepare you to assess various energy resource management options given the current energy transition involving increasing energy demand within a carbon constrained future.

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. Identify the major components of an energy resource management system.			
2. Examine how the major components of energy resource management are interrelated.			
3. Differentiate between conventional and alternative energy systems.			
4. Examine energy demand, sourcing, and distribution on a regional, national, and global scale.			
5. Evaluate the influences of politics and economics on energy resource management.			
6. Evaluate the impacts of conventional and alternative energy sources from an environmental perspective.			
7. Examine the challenges and benefits of the energy resource management system transitions in a carbon constrained future.			
8. Examine energy resource management from the perspective of remote and/or Indigenous communities.			

MAT 211 – Advanced Mathematics for Engineering Technologies

You will gain knowledge of advanced mathematical topics applicable to engineering technologies. You will study series expansions, differential equations, and Laplace and Fourier transforms. This course is intended to further build problem solving and critical thinking skills, and to demonstrate the modelling of physical systems with differential equations.

Credit unit(s): 3.0
Prerequisites: MAT 210
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. Examine the series expansions of functions.			
2. Analyze second-order differential equations.			
3. Examine the Fourier and Laplace transform.			
4. Solve differential equations with Laplace transforms.			
5. Analyze physical systems with Laplace transforms.			

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): 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 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.			

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

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. 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 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

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. 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.			

CNTR 231 – Control Systems

Your studies will focus on signal and system properties in a control system. You will use LaPlace transform applications to convert mathematical models into electrical systems, analysis time-domain and frequency-domain. You will construct frequency response for second order systems.

Credit unit(s): 2.0
Prerequisites: ENGE 120 DGTL 221 MAT 211
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. Identify feedback control systems.			
2. Convert mathematical models into various mechanical and electrical systems.			
3. Evaluate feedback characteristics of second order systems.			
4. Analyze system performance of second order systems.			
5. Use Root of Locus and Bode plot methods to predict stability of a control system.			

DSGN 209 – Electrical Systems Design

You will study the principles of electrical design and regulations governing electrical installations as stipulated by the Canadian Electrical Code (CEC). Your studies of electrical distribution design for residential, commercial, institutional, and industrial occupancies will focus on the electrical service, distribution, load centers, protection devices and related equipment used on the job. Your studies will also include the designing of the lighting systems both manually and using an appropriate software.

Credit unit(s): 4.0
Prerequisites: CADD 120, ENGE 220, SAFE 112
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. Describe principles and process of electric systems design for different occupancies.			
2. Estimate the total electrical load for a project.			
3. Describe the characteristics and measurement of light and different light sources and their relationship with the function and environment of the space.			
4. Identify different factors that affect the illumination, use of natural light and the energy saving on lighting design.			
5. Design lighting for interior and exterior spaces both manually and using appropriate software, including the selection of appropriate fixtures, and determination of 6. quantity and their placements.			
7. Design power distribution for occupancies.			
8. Select appropriate service and utilization voltages for occupancies.			
9. Develop feeders, protection, and coordination for equipment.			
10. Design panelboards, switchboard, and unit sub-station.			
11. Assess emergency systems in electrical distribution system.			
12. Design electric circuits for auxiliary services.			
13. Appraise the electric system design with reference to Canadian Electric Code, other regulations, and environmental consideration.			

ELTR 228 – Industrial Power Electronics 2

You will study the characteristics and operations of a wide range of power electronics devices and systems. You will study variable frequency drive (VFD)s, uninterruptable power supply (UPS) and high voltage direct current (HVDC) systems.

Credit unit(s): 3.0
Prerequisites: ELTR 221 ELTR 223 DSGN 225 LABS 227
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. Explain the characteristics and operation of power switches.			
2. Examine Direct Current (DC) to DC conversion.			
3. Examine Alternating Current (AC) to DC conversion.			
4. Examine DC to AC conversion.			
5. Examine operation of variable frequency drives (VFD)s and uninterruptable power supply (UPS) systems.			
6. Examine high voltage direct current (HVDC) system.			

ENGE 232 – Power System Protection

You will study relaying and protection systems. You will examine numerical relays and instrument transformers. You will analyze the operation and application of various protection schemes for various power system elements. You will examine International Electrotechnical Commission (IEC) 61850 technologies and devices.

Credit unit(s): 3.0
Prerequisites: COAP 232 DSGN 225 INST 225 ELTR 228
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. Explain the principles of system protection and protection relaying.			
2. Examine the principle of operation and application of protection and relays.			
3. Examine instrument transformers and protective devices.			
4. Analyze the principles of operation and application of protection schemes for various power system elements.			
5. Examine International Electrotechnical Commission (IEC) 61850 technologies and devices.			
6. Examine relay testing fundamentals and principles.			

LABS 227 – Industrial Power Electronics Lab 2

You will illustrate and verify the power electronics theoretical concepts. You will perform lab experiments on the characteristics and operations on several power devices and converter systems.

Credit unit(s): 3.0
Prerequisites: LABS 224 ELTR 228
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. Illustrate characteristics of power switches.			
2. Design Direct Current (DC)-DC Converter systems.			
3. Apply Alternating Current (AC)-DC Converter systems.			
4. Build DC-AC Converter systems.			
5. Test operation of VFDs and UPS systems.			

LABS 232 – Power System Protection Lab

You will study protection devices and systems from a practical perspective. You will perform numerical relay testing as well as build and troubleshoot several protection and control schemes for various power systems.

Credit unit(s): 3.0
Prerequisites: COAP 232 DSGN 225 LABS 230 ENGE 232
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. Measure the characteristics of instrument transformers.			
2. Build protection and control schemes for various power systems.			
3. Perform testing on various power protection, control systems and protective devices.			
4. Perform testing on electromechanical and solid relays.			
5. Perform testing on numerical relays.			

PROJ 206 – Capstone Project

You will apply the engineering concepts and principles to develop a significant initiative or project. Working individually or in small groups, you will use interpersonal, problem solving, and project management skills to propose, conceptualize, design, and demonstrate an engineering project that is both significant and relevant to your field of practice. You will manage and schedule the project with minimal direction. You will develop a presentation appropriate for an industry client and demonstrate the communication skills necessary to defend the technical specifications and the relevance of project in relation to the initial engineering problem.

Credit unit(s): 2.0
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. Propose a project and research the technical and design aspects required to complete the project.			
2. Manage scheduling to ensure timely completion of the project.			
3. Collect data required per the project proposal.			
4. Analyze the project and provide solutions to project design.			
5. Prepare a final report.			
6. Defend project conclusions in a technical presentation.			

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

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**
7. Develop a technical proposal.			
8. Apply advanced research skills			
9. Describe the technical problem-solving process.			
10. Employ the problem-solving process in an applied research project.			
11. Present research findings.			