Mechanical Engineering Technology - Diploma

PLAR Candidate Guide

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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

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 be a registered student at Sask Polytech and accepted into the program. Proof of English language proficiency may be required for some applicants. 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 corequisites for each course. Discuss with your PLAR contact person how to deal with courses with corequisites.

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 Services once you have signed approval on your PLAR Application Form. The PLAR fee will be added to your student account.
6. **Finalize** 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		
CAD 101	CAD Drafting	
COMP 113	Spreadsheets for Engineering Technology	
DRFT 114	Drafting Principles	
ENGM 191	Applied Mechanics: Statics	
FMEC 100	Fluid Mechanical Energy Concepts	
MAT 110	Mathematics for Engineering Technologies	Arts & Sciences
MECH 100	Mechanical Engineering Concepts and Applications	
SEM 101	Technology	
Semester 2		
ELEC 279	Basic Electricity	
ENGM 101	Strength of Materials	
ENGM 180	Materials of Engineering	
FMEC 101	Fluid Transport and Energy Systems	

COURSE CODE	COURSE NAME	Delivered by another department/program
MAT 111	Calculus for Engineering Technology	Arts & Sciences
SEM 107	Engineering Software Applications	
TCOM 110	Workplace Communications	Arts & Sciences
TCOM 111	Technical Communications	Arts & Sciences
Semester 3		
CNTR 206	Automation Control Applications	
CAD 103	CAD Modelling 1	
CLTR 200	Culture and Diversity	Arts & Sciences
FMEC 102	Piping Analysis and Modeling	
MACH 191	Machine Shop Technology	
WELD 387	Welding for Technologists	
Semester 4		
CAD 201	Advanced Drafting/CAD Modeling 2	
ENGM 193	Applied Mechanics – Dynamics	
ENGM 280	Mechanical Design 1	
HYDR 283	Fluid Power	
MANU 200	Fabrication	
SEM 208	Industry Engagement	
THER 201	Vapour Systems and Heat Transfer	
Semester 5		
ENGM 200	Finite Element Modelling	
ENGM 201	Mechanical Design 2	
ENGM 202	Engineering Design and Development 1	
HVAC 200	HVAC Fundamentals	

COURSE CODE	COURSE NAME	Delivered by another department/program
INST 206	Sensors and Networks	
PROJ 216	Project Management and Contracts	
THER 202	Energy System Alternatives and Management	
Semester 6		
CNTR 203	Process Controls	
CAD 102	Building Mechanical Modelling	
ENGM 203	Engineering Design and Development 2	
HVAC 201	Building Performance Modeling	
PROJ 288	Capstone Project	

CAD 101 - CAD Drafting

You will focus on the concepts of computer-assisted drafting (CAD). Extensive hands-on training and lecture sessions will provide the knowledge you need to produce industrial standard CAD drawings, use 2D drafting and draw from 3D models. You will follow standard conventions while improving your skill and efficiency in using a CAD system.

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 computer-assisted drafting (CAD) software environment.			
2. Construct drawings to conform to CAD Standards.			
3. Perform basic editing and drawing creation techniques.			
4. Demonstrate annotation techniques for engineering drawings.			
5. Construct templates for standardization of drawing output.			
6. Perform advanced editing and drawing creation techniques.			
7. Apply advanced drawing techniques.			
8. Manage CAD generated data.			
9. Create 3D drawings.			

COMP 113 - Spreadsheets for Engineering Technology

You will gain an intermediate knowledge of electronic spreadsheets. You will use spreadsheet functions and tables to process information, construct charts based on engineering data, solve advanced numerical problems, and implement custom functions.

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 spreadsheet software environment.			
2. Use spreadsheet functions to process information.			
3. Construct charts using engineering data.			
4. Solve advanced numerical problems.			
5. Use table functionality to store and manipulate data.			
6. Implement customized functionality.			

DRFT 114 - Drafting Principles

You will study the basic theory and skills needed to generate graphic representation of an idea, concept, or entity. You will produce drawings according to a mechanical drafting standard, utilizing proper and effective views (e.g. orthographic, isometric, auxiliary, and/or sectional) and dimensioning, including specialty notations (e.g. fit tolerances, fastener and thread descriptions).

Credit unit(s): 4.0
Prerequisites: CAD 101, MECH 100
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 basic drafting concepts.			
2. Introduce descriptive languages used to describe objects.			
3. Discuss file management strategies.			
4. Complete freehand engineering sketches.			
5. Generate orthographic and isometric drawings.			
6. Plan engineering drawing title blocks.			
7. Construct engineering drawings.			
8. Apply dimensions to engineering drawings.			
9. Construct sectional view drawings.			
10. Apply fit tolerances.			
11. Use fastener and thread descriptions.			
12. Construct auxiliary views.			

ENGM 191 - Applied Mechanics: Statics

You will study how to use basic algebra and trigonometry to determine the forces in stationary machine and equipment members. The course content includes force systems, center of gravity, static friction and moment of inertia, and the application of these principles to engineering problems.

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. Demonstrate the solution method for engineering problems.			
2. Analyze forces, vectors, and resultants.			
3. Calculate the magnitude and direction of moments and couples.			
4. Evaluate unknown forces in two-dimensional equilibrium problems.			
5. Evaluate unknown forces in static structures and machines.			
6. Evaluate unknown forces in three-dimensional equilibrium problems.			
7. Determine the centroid and center of gravity of objects.			
8. Calculate the moment of inertia of objects.			
9. Evaluate unknown forces in frictional equilibrium problems.			

FMEC 100 - Fluid Mechanical Energy Concepts

You will study typical primary / simplified thermal fluid systems and associated mechanical / electrical components / devices. This course will provide you with the foundational concepts necessary for describing common fluid (media)properties, pressure, energy, as well as device efficiency / performance, and economics. You will assess the implications of energy transfer or specific system configuration / design as seen through developed pressure, force, temperature changes, or stability. You will be introduced to aspect of heattransfer (e.g.: conduction and convection) and related thermal system characteristics (e.g., thermal mass, insulation R-value, etc.).

Credit unit(s): 4.0
Prerequisites: ENGM 191, MECH 100, 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. Describe the basic forms of energy and energy transfer and/or conversion in mechanical, fluid, and/or electrical systems.			
2. Examine fundamental thermal-fluid system terminology, media, and properties within energy systems.			
3. Examine fluid pressure.			
4. Differentiate velocity, volume, weight, and mass flow rate of fluids.			
5. Analyze closed (non-flow) and open (flow) processes and systems with conservation of energy principles.			
6. Analyze energy consumption, power, economics, and efficiency for common thermal-fluid-electrical devices and systems (e.g. motors, engines, pumps, heaters).			
7. Use software and equipment specification sheets for evaluation and selection purposes.			
8. Calculate forces and stability / equilibrium conditions within thermal-fluid systems.			
9. Examine the heat transfer modes of conduction and convection.			

MECH 100 - Mechanical Engineering Concepts and Applications

You will examine a variety of mechanical, electrical, fluid, thermal, etc. components and devices (simple systems) and associated methods to communicate, characterize, and/or measure system aspects. Through a "hands-on" experiential learning process, you will identify and develop practical competencies representative of a practicing mechanical engineering technologist.

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. Use measuring devices and engineering units for technical applications.			
2. Identify engineering relationships through experimentation.			
3. Investigate dependencies of variables in engineering equations.			
4. Manipulate mechanical and electrical devices and/or tools.			
5. Demonstrate documentation and associated communication of work.			

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.			

ELEC 279 - Basic Electricity

You will explore the fundamentals of direct current (DC) and alternating current (AC) measurement and circuitry, which includes series and parallel circuits. You will also examine common associated devices used in industrial environments. A laboratory program is an integral part of this course.

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. Describe the nature of electricity			
2. Analyze electrical circuits utilizing the three electrical properties of voltage, current and resistance.			
3. Solve the power and energy in an electrical circuit.			
4. Analyze series circuits.			
5. Analyze parallel circuits.			
6. Analyze electrical circuits that contain both series and parallel elements.			
7. Determine the characteristics of alternating current.			
8. Describe relays, contactors, and starters, and variable frequency drives.			
9. Assemble logic control circuits.			
10. Use sensors.			
11. Assemble data acquisition systems.			

ENGM 101 - Strength of Materials

You will study the relationship between the external applied loads and the induced internal stresses in various structural members. You will also learn design and analysis techniques of axially loaded members, and beams. You will learn design and analysis techniques for torsionally loaded members, columns, and pressure vessels. You will consider the impact of multiple loading situations on the stress of structural members.

Credit unit(s): 4.0
Prerequisites: ENGM 191
Corequisites: ENGM 180
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 basic concepts of strength of materials.			
2. Design members under direct stress.			
3. Calculate deformation under axial loads and thermal stress.			
4. Calculate shearing forces and bending moments in beams.			
5. Analyze stresses and deflections in beams due to bending.			
6. Design members for torsional shear stress and torsional deflection.			
7. Analyze general combined stress states and Mohr's circle.			
8. Analyze stress and buckling loads in columns.			
9. Analyze the design of pressure vessels.			
10. Design bolted connections to provide appropriate strength for structural members.			

ENGM 180 - Materials of Engineering

You will develop a practical understanding of the fundamental structure, properties, and supplied forms of common engineering materials. The course content will assist you in the evaluation and selection of materials suitable for given design requirements. You will focus on iron and iron alloys (steels), complimented with examination of other metals / alloys (aluminum, copper, etc.), ceramics, polymers, composite, and hybrid materials. You will also include areas and applications such as material corrosion, as well as non-destructive examination and material testing.

Credit unit(s): 4.0
Prerequisites: ENGM 191
Corequisites: ENGM 101
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 how material structure, prior treatment, and operating environment determines and / or influences engineering material properties.			
2. Apply material properties (physical, mechanical, and chemical) in representative engineering (industrial, manufacturing, construction, etc.) situations.			
3. Differentiate common supplied forms of engineering materials.			
4. Identify the properties, application, and nomenclature of iron and iron alloys (steels).			
5. Identify the properties, application, and nomenclature of non-iron metals and alloys.			
6. Identify the properties, application, and nomenclature of polymeric materials.			
7. Identify the properties, application, and nomenclature of ceramic materials.			
8. Identify the properties, application, and nomenclature of composite and hybrid materials.			
9. Examine common corrosion mechanisms, and methods of corrosion protection.			
10. Describe non-destructive examination methods for material evaluation.			
11. Select materials for an application based on product or design requirements.			

FMEC 101 - Fluid Transport and Energy Systems

You will focus on liquid and compressed gas transport and energy (power) systems. You will examine the operational characteristics, performance, and economics of compressors and gas turbine engines. You will also develop competency in analyzing piping systems, as well as classification and evaluation of associated components and equipment (e.g. pipes, fittings, pumps); this will include relevant industry design codes and standards.

Credit unit(s): 4.0
Prerequisites: MAT 110, FMEC 100
Corequisites: MAT 111
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 specific thermal-fluid system media, properties, processes, and devices.			
2. Examine closed (non-flow) and open (flow) processes with conservation of energy principles and characterizing process variables / equations.			
3. Analyze fundamental compressor operational characteristics.			
4. Improve the performance of industrial compressed air systems.			
5. Analyze gas turbine power (Brayton) cycles.			
6. Apply conservation of energy principles (Bernoulli's equation) to simple fluid flow systems.			
7. Characterize fluid flow regimes.			
8. Calculate specific energy (pressure) losses due to flow characteristics and physical system details (pipe sizes, fittings, valves).			
9. Analyze series and parallel piping systems with relevance to industry codes and standards.			
10. Select an appropriate pump (or equivalent / similar device) based on system characteristics.			
11. Analyze transient and unsteady flow processes.			

SEM 107 - Engineering Software Applications

You will examine technical documentation production techniques and use software to solve engineering focused problems. You will receive an introduction to other relevant software and programming techniques that will be further utilized in upper level courses and in industry. You will utilize concepts and applications related to the Internet of Things (IoT). Emerging trends in mechanical engineering will be presented as time permits.

Credit unit(s): 2.0
Prerequisites: COMP 113, MAT 110, MAT 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. Produce technical documentation.			
2. Use engineering calculation software to solve advanced numerical problems			
3. Develop software algorithm solutions to engineering problems.			
4. Discuss new ideas and current trends in engineering technology.			

CAD 102 - Building Mechanical Modelling

You will include the basics of designing, modelling, and documenting in a mechanical building modelling environment - Mechanical Electrical Plumbing (MEP). You will create a building model and supporting documentation with the fully parametric building modeler.

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. Use the user interface, parametric objects, families, and projects templates.			
2. Create a basic building with walls, floors, roofs, windows, and door.			
3. Modify model components.			
4. Manage elevation, section, and 3D views.			
5. Apply dimensions and constraints.			
6. Create ducting and piping systems and associated schedules.			

CAD 103 - CAD Modelling 1

You will focus on the basics of three-dimensional computer-assisted drafting (CAD) modelling, using techniques to create a single manufactured part. As well, you will develop an understanding of additive manufacturing, and 3D print a part you have designed.

Credit unit(s): 2.0
Prerequisites: CAD 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**
1. Describe methods of constructing a 3D model.			
2. Construct sketches, parametric dimensions, and constraints.			
3. Develop models using sketched features.			
4. Generate placed features.			
5. Demonstrate editing and modifying features.			
6. Create a 3D printed part.			

FMEC 102 - Piping Analysis and Modeling

You will produce design and construction documentation for an industrial process / piping system. You will analyze system performance and operational characteristics, as well as select associated components / devices using specialized software. You will develop and communicate design and / or fabrication intent with typical schematic and CAD-based system models and associated drawings.

Credit unit(s): 2.0
Prerequisites: FMEC 101, CAD 101, DRFT 114
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 piping network system and associated components / devices with software.			
2. Produce schematic representations of piping network systems in accordance with defined parameters and standards.			
3. Produce a 3D CAD representation of a piping network system.			
4. Produce design and construction documentation for piping systems.			

MACH 191 - Machine Shop Technology

You will gain an understanding of machine shop principles and practices. This course will serve as a foundation for further studies in manufacturing. In addition to lectures and demonstrations, you will receive extensive hands-on experience.

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. Apply principles of metrology.			
2. Perform machine shop operations.			
3. Describe machining processes.			
4. Describe computer numerical control machining.			
5. Explain machining costs.			

SHOP 186 - Mechanical Components and Systems Lab

You will focus on the application and operation of the components and systems rather than their use in the design process. You will work with and disassemble or assemble some of the components (others will be demonstrated for you). Some of the items you will investigate include bearings, shafts, chain belt and gear drives, hydraulic pumps, motors and cylinders, pneumatic systems, conveyors, and pneumatic and hydraulic flow and pressure control valves.

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. Describe bearings and seals.			
2. Install bearings and seals.			
3. Describe drives, pneumatics, and conveyors.			
4. Describe hydraulics.			
5. Assemble hydraulics.			

WELD 387 - Welding for Technologists

You will observe and perform welding, thermal cutting and metal forming operations. You will develop an understanding of processes rather than skill. Supervised hands-on training will help you develop an understanding of Shielded Metal Arc Welding, Gas Metal Arc Welding, Flux Cored Arc Welding, Gas Tungsten Arc Welding, Oxy-Fuel Welding and Submerged Arc Welding. Your metal cutting activities will include Oxy-fuel Cutting and Plasma Arc Cutting. You will perform metal forming activities on a plate roll, press brake and structural roll.

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. Describe the oxy-fuel processes and their applications.			
2. Describe the gas metal arc welding process and its applications.			
3. Describe the flux cored arc welding process and its applications.			
4. Describe the shielded metal arc welding process and its applications.			
5. Describe the gas tungsten arc welding process and its applications.			
6. Describe the submerged arc welding process and its application.			
7. Describe the plasma arc cutting process and its applications.			
8. Describe press brake procedures.			
9. Describe plate rolling procedures.			
10. Describe procedures for rolling structural members.			

CAD 201 - Advanced Drafting/CAD Modelling 2

You will include techniques to model three dimensional objects. As well, you will create assembly models, and then learn the various ways to document assembly/disassembly procedures and assembly analysis techniques. You will also build sheet metal parts and create folded and flat pattern drawings.

Credit unit(s): 4.0
Prerequisites: CAD 103, DRFT 114
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. Construct drawings to conform to computer-assisted drafting (CAD) Standards using 3D modelling software.			
2. Create a 3D model of an assembly.			
3. Prepare assembly model documentation.			
4. Analyze a design.			
5. Create models for sheet metal parts.			
6. Construct Assembly Modelling and Documentation Project.			

ENGM 193 - Applied Mechanics - Dynamics

You will focus on kinematics and kinetics. In kinematics, you will analyze the geometry of rectilinear, circular and general plane motions. In kinetics, you will analyze the forces and movements associated with motion using Newton's laws, the work-energy-power method, and the impulse-momentum method. You will learn how to solve engineering problems involving motion only and the forces causing that motion. You will analyze machine element linkages and vibrations using manual methods and computer software.

Credit unit(s): 4.0
Prerequisites: ENGM 191
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 rectilinear motion of bodies.			
2. Analyze angular motion of bodies.			
3. Calculate values for velocity, distance and acceleration of moving bodies in plane motion.			
4. Use Newton's three laws of motion to describe inertia.			
5. Analyze moving bodies using the concept of work, energy and power.			
6. Analyze moving bodies using the method of impulse and momentum.			
7. Analyze motions involving linkages using computer software.			
8. Discuss mechanical vibration.			

ENGM 280 - Mechanical Design 1

You will examine techniques used in the design, analysis, selection, and specification of various machine components. The influence of specific loading and operating conditions will be explored and accommodated. The primary system components to be examined include shafts, belt and chain drives, wire rope, bolted connections, and springs.

Credit unit(s): 4.0
Prerequisites: ENGM 180, WELD 387, MACH 191, SHOP 186, ENGM 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**
1. Apply fundamentals of mechanical design.			
2. Design members to ensure sufficient fatigue strength under cyclic loads.			
3. Select sheaves, bushings, and belts for V-belt drives.			
4. Select sprockets, bushings, and chains for roller chain drives.			
5. Design wire rope drives with context to primary components (e.g.: wire rope, sheaves, winch drums).			
6. Examine threaded fasteners for bolted gasketed joints.			
7. Design helical compression springs.			
8. Examine characteristics of bills of materials for purchased parts.			

HYDR 283 – Fluid Power

You will be introduced to hydraulic and pneumatic components, circuits and standard symbols. The course will include design problems involving sizing and selecting hydraulic components for typical applications. Your lab work will provide you with hands-on exposure to hydraulic pumps, motors, cylinders and various types of control valves.

Credit unit(s): 4.0
Prerequisites: FMEC 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**
1. Apply the basic concepts of fluid power.			
2. Categorize hydraulic pumps.			
3. Categorize hydraulic actuators.			
4. Analyze hydraulic system valves.			
5. Interpret fluid and filtration selection.			
6. Choose fluid conduits.			
7. Examine ancillary hydraulic devices.			
8. Explain maintenance procedures.			
9. Discuss pneumatic systems.			

MANU 200 - Fabrication

You will develop an understanding of manufacturing systems, as well as competency in the selection and application of suitable fabrication and manufacturing processes. You will focus will be on metal bulk material (cold) deformation / removal, cutting, welding, and heat treatment. You will also examine process economics, quality assurance principles, and characterize quality problems with statistical analysis. You will reference governing industry best practices and technical standards will be referenced throughout.

Credit unit(s): 4.0
Prerequisites: ENGM 180, ENGM 101, MACH 191, SHOP 186, WELD 387
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 manufacturing systems, design for manufacturing, and material selection methodology.			
2. Discuss quality management systems and principles.			
3. Use measurement techniques, tolerances, and statistical analysis for the application of quality control.			
4. Compare hot, warm, isothermal, and cold metal forming processes (including relevant machines and tooling).			
5. Calculate the forces, power, economics, and design (dimensional) accommodations related to specific metal forming processes.			
6. Examine the application and economics of common metal machining operations.			
7. Compare metal casting processes.			
8. Compare polymer shaping processes.			
9. Describe metal cutting processes and associated equipment.			
10. Calculate the weld size required for various weldment loading conditions.			
11. Use heat treatment to modify specific material properties.			
12. Describe additive manufacturing processes and materials.			

SEM 208 – Industry Engagement

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. Recognize engineering applications in practice at local business and / or facilities.			
2. Discuss new ideas and current trends in engineering technology.			

THER 201 – Vapour Systems and Heat Transfer

You will investigate steam-based systems for process heating, as well as primary power (electrical) generation. You will examine typical refrigeration cycles, media, and equipment. You will also investigate and apply the principal modes of heat transfer (conduction, convection, and radiation) to determine thermal resistances and related energy losses / gains. You will examine methods to limit or enhance heat transfer, as well as evaluate heat exchanger operation and performance.

Credit unit(s): 4.0
Prerequisites: FMEC 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**
1. Determine vapour properties and characteristics.			
2. Examine steam energy systems and power (Rankine) cycles.			
3. Examine methods of mechanical cooling via refrigeration cycles and devices.			
4. Relate the primary modes of heat transfer (conduction, convection, and radiation).			
5. Calculate conductive heat transfer and thermal resistance for one dimensional, steady state systems.			
6. Examine transient (non-steady) heat transfer systems.			
7. Examine convective heat transfer in common applications and environments.			
8. Analyze methods to enhance or limit heat transfer from surfaces and bodies.			
9. Evaluate typical heat exchanger configuration, operation, and performance.			

CNTR 203 – Process Controls

You will be introduced to aspects of industrial process control (i.e.: control variables and terminology, process characteristics, final control elements, controllers, and control schemes). You will model process characteristics as well as tune and configure controllers for a variety of process applications. Laboratory and simulation exercises will supplement your study of process characteristics, final control elements and PID controllers.

Credit unit(s): 2.0
Prerequisites: INST 206
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 process control loop.			
2. Determine process characteristics common to control systems.			
3. Select control valves and associated equipment.			
4. Determine a control mode.			
5. Use controllers.			
6. Describe advanced control concepts.			

ENGM 200 – Finite Element Modeling

You will gain experience using finite element modelling (FEM) software by applying several programs to the solution of typical analysis problems. You will develop an appreciation of the power and limitations of FEM by comparing computer-produced results with experimentally derived data and alternative classical methods of stress analysis.

Credit unit(s): 3.0
Prerequisites: ENGM 101, CAD 201, FMEC 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. Describe how the finite element modelling (FEM) is used in the product design process.			
2. Determine forces, stresses and deflections for trusses, plates, and frames using FEM.			
3. Determine stress concentrations and distributions for simple mechanical components.			
4. Determine modal shapes and frequencies for simple parts using FEM.			
5. Analyze heat transfer and thermal stress for simple parts using FEM.			
6. Demonstrate basic computational fluid dynamics (CFD) techniques.			

ENGM 201 – Mechanical Design 2

You will examine the techniques used in design, analysis, and selection of various machine components. Components you will study include shafts, belt and chain drive components, bearings, motors, couplings, gears, clutches, and brakes. A capstone course activity is the design of a bulk material conveyance system.

Credit unit(s): 4.0
Prerequisites: ENGM 193, ENGM 280, MANU 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. Design shafts for power transmission.			
2. Select plain surface bearings.			
3. Select rolling contact bearings.			
4. Select motors for power transmission.			
5. Select keys and flexible couplings.			
6. Select gear speed reducers.			
7. Design clutches and brakes.			
8. Design a bulk material conveyance system.			

ENGM 202 – Engineering Design and Development 1

You will develop a solution to a targeted technical (mechanical engineering-centric) problem by applying a complete engineering design and development process. Starting with the development of a technical proposal and application of research findings, you shall proceed through a comprehensive design, analysis, and documentation cycle. Successful course resolution requires incorporation of multiple elements from the overall MET program curriculum.

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. Develop an engineering technical proposal for a mechanical system or prototype.			
2. Apply an engineering design and development cycle, including work methodologies and problemsolving processes, to a mechanical system or prototype.			
3. Evaluate the technical and economic feasibility of alternate solutions.			
4. Design a complex system / prototype.			
5. Prepare manufacturing and fabrication documentation.			
6. Present research and design outcomes in conformance to engineering technical standards.			

HVAC 200 – HVAC Fundamentals

You will be introduced to the field of heating, ventilation, and air conditioning (HVAC) engineering. You will investigate the processes of conditioning moist air and what is required to maintain an indoor space with regards to comfort, indoor air quality, health, and ventilation. You will explore a variety of building envelope assemblies and components and evaluate their performance. You will develop competency in the calculation of building heating and cooling loads, as well as design of air distribution systems. You will explore the variety of components used in HVAC systems and discuss emerging HVAC technologies, energy conservation techniques, and industrial applications

Credit unit(s): 4.0
Prerequisites: THER 201, CAD 102
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 properties of moist air.			
2. Analyze basic psychrometric processes related to air conditioning systems.			
3. Analyze building heating, ventilation, and air conditioning (HVAC) system design, using psychrometric analysis for both summer and winter conditions.			
4. Characterize the criteria for comfort, indoor air quality, and health of indoor spaces.			
5. Calculate the ventilation rates of indoor spaces using American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) methods.			
6. Evaluate the performance of a variety of building envelope assemblies and components.			
7. Calculate heating and cooling loads for a building using ASHRAE methods.			
8. Design air distribution systems for various applications.			
9. Compare common commercial HVAC components and systems used in industry.			
10. Discuss emerging HVAC technologies and available energy conservation techniques.			
11. Discuss HVAC applications in industrial settings.			

INST 206 – Sensors and Networks

You will develop foundational competency in process instrumentation, with perspective to the fields of Process Controls and Maintenance Management /Reliability Engineering. You will examine a variety of instrumentation devices and sensors, along with associated process signals and conditioning, measurement characteristics, as well as industrial communication protocols and networks. Laboratory exercises will supplement your study of pneumatic, electronic, digital and microprocessor-based measurement devices, signal transmitters, and communication methods.

Credit unit(s): 4.0
Prerequisites: ELEC 279 or CNTR 203
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. Draw piping and instrumentation diagrams using ISA standards.			
2. Apply analog signal conditioning and transmission techniques.			
3. Apply digital signal conditioning techniques.			
4. Describe digital signal conditioning techniques.			
5. Use standard industrial network protocols.			
6. Describe standard industrial network protocols.			
7. Compare methods of temperature measurement.			
8. Compare methods of force and motion measurement.			
9. Compare methods of pressure and level measurement.			
10. Examine vibration monitoring equipment used in reliability centered maintenance (RMC) programs.			

PROJ 216 – Capstone Project

You will examine primary aspects of project management, spanning project initiation through to close out. Core project management processes and tools are examined as applicable to the major stages of a project life cycle. You will develop competency in developing and managing project schedules and resources with software. You will also identify contract documents and legal obligations / practices typical to engineering and industry activities in Canada.

Credit unit(s): 2.0
Prerequisites: ENGM 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. Discuss project management concepts.			
2. Demonstrate initiation and planning processes / requirements in a project life cycle.			
3. Demonstrate execution, monitoring, control, and closing processes / requirements in a project life cycle.			
4. Create project documentation using software.			
5. Identify contract documents and legal obligations / practices typical to engineering and industry activities in Canada.			

THER 202 – Energy System Alternatives and Management

You will explore established as well as emerging energy conversion and storage technologies, along with their implications for industry and society. Significant focus is placed on technologies such as hydropower, wind, solar, and hydrogen fuel cells. The production and relevant combustion / conversion processes for fuels (fossil / hydrocarbon, bio-sourced, hydrogen, nuclear) will be investigated. You will also consider methods of energy storage to manage energy use / production. Throughout, you will identify and utilize design principles, industrial standards, analytical software, and governing agencies related to the environmental and economic impact of energy use choices.

Credit unit(s): 4.0
Prerequisites: THER 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 energy systems in context of amenity, service, commodity, source, and supply.			
2. Examine hydropower systems.			
3. Examine wind energy systems.			
4. Examine solar (photovoltaic and thermal) energy systems.			
5. Examine hydrogen fuel cells.			
6. Compare methods of energy storage and distribution.			
7. Examine emerging heat, power, and energy system applications.			
8. Examine the production, storage / transportation, and utilization of conventional (primarily carbonbased) and other fuels (e.g., biofuel, hydrogen, and nuclear).			
9. Demonstrate principles of energy conservation and management for industrial, transportation and residential application.			

CNTR 206 – Automation Control Applications

You will study methods and use devices common to automating industrial operations using programmable devices. You will examine techniques for sequencing events using timers, counters, and comparisons to provide solutions to typical industrial applications. You will develop proficiency in drawing and interpreting piping and instrumentation diagrams (P&IDs). You will implement a small automation project as a capstone course activity.

Credit unit(s): 2.0
Prerequisites: SEM 107, ELEC 279
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 Programmable Logic Controller (PLC) projects using ladder logic programming.			
2. Use input/output devices with a PLC.			
3. Implement timers, counters, as well as comparison and computation functionality in a PLC program.			
4. Interpret piping and instrumentation diagrams (P&IDs) using ISA standard.			
5. Implement a small automation project.			

ENGM 203 – Engineering Design and Development 2

You will construct, test, refine, and present a mechanical system or prototype.

Credit unit(s): 2.0
Prerequisites: ENGM 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. Construct a complex mechanical system or prototype.			
2. Evaluate mechanical system or prototype performance.			
3. Develop improvements to mechanical system or prototype.			
4. Present data from design and performance evaluation.			

HVAC 201 – Building Performance Modelling

You will study the concepts of building information modelling and apply tools to create a model of a building's mechanical system(s). Specific mechanical equipment will be selected from manufacturer's catalogues and incorporated into the model. The model will be used to evaluate the energy performance of the building with regards to heating, cooling, and ventilation.

Credit unit(s): 2.0
Prerequisites: HVAC 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. Discuss Building Information Modelling (BIM).			
2. Design air and hydronic systems of a building with commercial software.			
3. Design a building mechanical room with commercial software.			
4. Evaluate the energy performance of a building with commercial software.			
5. Examine HVAC system control strategies.			

PROJ 288 – Capstone Project

You will develop a comprehensive solution for an industry-sourced engineering problem. Working with an industry client, you will define the project scope and deliverables. You will apply technical skills, develop subject matter specialization, and support your solution through appropriate technical documentation. You will communicate your solution to your industry client via a technical report and a project presentation.

Credit unit(s): 4.0
Prerequisites: PROJ 216, ENGM 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. Apply project management processes and tools in the selection and execution of an industrial project.			
2. Create a solution to an industrial project.			
3. Prepare technical documents in support of project solution.			
4. Produce a technical report to communicate the solutions to the industrial client.			
5. Outline project solution in an oral presentation.			