Design and Manufacturing Engineering Technology

PLAR Candidate Guide
Prior Learning Assessment and Recognition (PLAR)

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Prior learning credit options at Saskatchewan Polytechnic

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

How to navigate this document

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

Contents of this guide

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

A. PLAR fees

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

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

B. PLAR eligibility and options

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

Course prerequisites and corequisites

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

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.

> **Tim Muench, Program Head**
> Design Manufacturing Engineering Technology
> Saskatchewan Polytechnic
> Phone: 306- 659-4361
> Email: muench@saskpolytech.ca

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	Credits
Year 1 – Semester 1		
CAD 101	CAD Drafting	3
COMP 113	Spreadsheets for Engineering Technology	3
DRFT 290	Basic Drafting	4
ELTR 287	Computer Hardware	
ENGM 191	Applied Mechanics: Statics	4
MAT 110	Mathematics for Engineering Technologies	4
SEM 101	Technology Seminars	4
Year 1 – Semester 2		
CAD 104	Parametric Part Modelling	2
ENGM 101	Strength of Materials	1
ENGM 180	Materials of Engineering	
MAT 111	Calculus for Engineering Technologies	
MTRX 101	Mechatronics 2-Programming	

COURSE CODE	COURSE NAME	Credits
MTRX 102	Mechatronics 3-Electronics	
TCOM 110	Workplace Communications	
THER 101	Thermo-Fluid Fundamentals	
Year 1 – Semester 3		
CAD 105	Advanced Drafting and Assembly Modelling	
CAD 200	Assembly Modeling and Project	
MACH 191	Machine Shop Technology	
MANU 100	Introduction to Computer Numerical Control (CNC)	
SHOP 186	Mechanical Components and Systems Lab	
TCOM 111	Technical Communication	
WELD 387	Welding for Technologists	
Year 2 – Semester 4		
CAD 287	Computer Aided Manufacturing 1	
DSGN 280	Mechanical Design 1	
ENGM 193	Applied Mechanics - Dynamics	
MANU 201	Additive Manufacturing Engineering	
MANU 290	Manufacturing 1 - Metals	
MTRX 200	Manufacturing Networking Systems	
MTRX 201	Production Management and Mechatronics Project	
THER 200	Thermo-Fluid Systems 2	
Year 2 – Semester 5		
CAD 288	Computer Aided Manufacturing 2	
DSGN 207	Engineering Research and Technical Proposal	

COURSE CODE	COURSE NAME	Credits
DSGN 282	Mechanical Design 2	
ENG 291	Concurrent Engineering 1	
ENG 292	Finite Element Modeling	
MANU 202	Manufacturing 2-Plastics	
MANU 203	Quality Assurance	
MANU 291	Advanced Manufacturing	
PROJ 287	Project Management	
Year 2 – Semester 6		
CAD 298	Engineering Seminars	
CLTR 200	Culture and Diversity	
DSGN 208	Concurrent Engineering 2	
DSGN 283	Mechanical Design Project	
MANU 204	Advanced Manufacturing Project	
PROJ 218	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):	CAD 181

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 290 – Spreadsheets for Engineering Technology

You will apply the basic theory and skills needed to generate graphic representation of an idea, concept, or entity. You will apply descriptive geometry and its applications to develop orthographic drawings, dimensioning and pictorial drafting. You will construct auxiliary views and sectional views

Credit unit(s):	4.0
Pre and Co Requisites:	None
Prerequisites:	none
Corequisites:	none
Equivalent course(s):	DRFT 174 DRFT 181 GRPH 190

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. Plan engineering drawing title blocks.			
4. Discuss file management strategies.			
5. Complete freehand engineering sketches.			
6. Generate orthographic drawings.			
7. Construct engineering drawings.			
8. Apply dimensions to engineering drawings.			
9. Construct sectional view drawings.			
10. Apply Fit tolerances.			
11. Produce fastener drawings.			
12. Construct auxiliary views.			

ELTR 287 – Computer Hardware

You will perform computer component installation and troubleshooting operations. You will be able to communicate with others about computer systems and related hardware.

Credit unit(s):	4.0
Pre and Co Requisites:	None
Prerequisites:	none
Corequisites:	none
Equivalent course(s):	**COHS 190**

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 personal computer components and function.			
2. Examine tool use and safety.			
3. Select computer components for system assembly.			
4. Discuss preventative maintenance.			
5. Discuss operating systems and CAD applications.			
6. Examine basic networking hardware installation, maintenance and troubleshooting.			
7. Examine laptop computers.			
8. Examine mobile devices.			
9. Examine printers.			
10. Evaluate system security.			
11. Discuss modern communications and professionalism.			
12. Demonstrate advanced troubleshooting..			

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):	3.0
Prerequisites:	none
Corequisites:	none
Equivalent course(s):	ENGM 190, ENGM 191CE, MECA 120

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. Demonstrate the solution method for engineering problems.			
8. Analyze forces, vectors, and resultants.			
9. Calculate the magnitude and direction of moments and couples.			
10. Evaluate unknown forces in two-dimensional equilibrium problems.			
11. Evaluate unknown forces in static structures and machines.			
12. Evaluate unknown forces in three-dimensional equilibrium problems.			
13. 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.			

MAT 110 – Mathematics for Engineering Technologies

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

Credit unit(s): 4.0
Prerequisites: none
Corequisites: none
Equivalent course(s): MAT 101, MAT 110CE, MATH 182, MATH 193

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.			

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): ENGM 181   ETHC 183   ORTN 120   SEM 104

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.			

CAD 104 – Parametric Part Modelling

You will produce part drawings using three-dimensional (3-D) Computer Aided Drafting (CAD). You will study solid model construction methods.

Credit unit(s): 2.0
Prerequisites: CAD 101, DRFT 290
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 three-dimensional (3-D) model.			
2. Develop models using sketched features.			
3. Generate placed features.			
4. Create advanced parts.			
5. Demonstrate editing and modifying features.			
6. Construct drawings to conform to Computer Aided Drafting (CAD) standards using 3-D modelling software.			

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, ENGM 180
Corequisites: none
Equivalent course(s): ENG 192, ENGM 289

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): ENG 191   ENGM 288

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.			

MAT 111 – Calculus for Engineering Technologies

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

Credit unit(s):	4.0
Prerequisites:	MAT 110
Corequisites:	none
Equivalent course(s):	CALC 181, CALC 190, MAT 111CE, MAT 246

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 derivative through the study of slopes and limits.			
2. Calculate derivatives of functions.			
3. Use first and second derivatives to graph functions.			
4. Analyze technical problems involving rates of change and optimization.			
5. Examine the indefinite and definite integral.			
6. Calculate integrals of functions.			
7. Analyze technical problems with integration.			
8. Solve first-order differential equations.			

MTRX 101 – Mechatronics 2 – Programming

You will develop fundamental programming skills including creating algorithms and developing structured programs. You will construct modular programs, develop conditional and decision structures and develop loop structures. You will create programs to integrate mechanical and electronic systems.

Credit unit(s):   4.0
Prerequisites: COMP 113, MTRX 100
Corequisites: MTRX 102
Equivalent course(s):   none

Use a checkmark (✓) to rate yourself as follows for each learning outcome **Competent:** I can apply this outcome without direction or supervision. **Learning:** I am still learning skills and knowledge to apply this outcome. **None:** I have no knowledge or experience related to this outcome.	Competent	Learning	None
1. Create algorithms.			
2. Develop structured programming.			
3. Construct modular programs.			
4. Develop conditional and decision structures.			
5. Develop loop structures.			
6. Examine hardware in mechatronic systems.			
7. Examine event handling in mechatronic systems.			
8. Use a programming development environment.			
9. Construct programs for mechatronic systems.			
10. Construct programs for mechatronic systems.			

MTRX 102 – Mechatronics 3 – Electronics

You will learn the fundamentals of Direct Current (DC) and Alternating Current (AC) measurement and circuitry including Ohm's Law, power and series and parallel circuits. A laboratory program is an integral part of this course. You will use sensors, build data acquisition systems, apply logic control circuits, and use stepper motors in mechatronic systems.

Credit unit(s): 4.0
Prerequisites: COMP 113, MTRX 100
Corequisites: MTRX 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 the nature of electricity.			
2. Analyze electrical circuits utilizing the three electrical properties of voltage, current and resistance.			
3. Identify the power and energy in an electrical circuit.			
4. Identify series circuits.			
5. Identify parallel circuits.			
6. Identify electrical circuits that contain both series and parallel elements.			
7. Describe the characteristics of alternating current.			
8. Use sensors and relays.			
9. Build data acquisition systems.			
10. Apply logic control circuits.			
11. Use direct current and stepper motors.			

TCOM 110 – Workplace Communications

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

Credit unit(s): 1.0
Prerequisites: none
Corequisites: none
Equivalent course(s): TCOM 102

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 job-related interpersonal and oral communication strategies.			
2. Apply workplace writing skills.			
3. Use job search skills.			

THER 101 – Thermo-Fluid Fundamentals

You will study typical primary thermal-fluid systems and their associated mechanical components. You will study media properties, pressure, energy, efficiency, and performance. You will assess the implication of energy transfer or specific systems configuration and design as seen through developed pressure, volume, force, or temperature changes. You will examine devices such as motors, engines and measuring devices.

Credit unit(s):	2.0
Prerequisites:	MATH 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 fundamental thermal-fluid system units.			
2. Describe the basic forms of energy in mechanical, fluid, and/or electrical systems.			
3. Analyze closed and open systems from the perspective of conservation of energy principles.			
4. Examine the primary modes of heat transfer and transient systems.			
5. Solve multiple mode heat transfer systems with heat sources or sinks.			

CAD 105 – Advanced Drafting and Assembly Modelling

You will create customized part and assembly drawings. You will create customized annotation in drawings. You will create assembly models and verify that they operate properly. You will create assemblies with proper tolerances and fits. You will use software tools to create advanced parts.

Credit unit(s): 2.0
Prerequisites: CAD 104
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 advanced annotation features.			
2. Prepare Geometric Dimensions and Tolerances.			
3. Create a three-dimensional (3-D) model of an assembly.			
4. Prepare assembly model documentation.			
5. Create advanced parts using design modelers.			
6. Analyze a design.			

CAD 200 – Assembly Modeling and Project

You will create assigned assembly models and a student selected project and then learn the various ways to document assembly/disassembly procedures. You will apply Geometric Dimensions and Tolerances to the project you have selected. You will produce a set of drawings that would allow for the building of this project. You will produce an animation of the project.

Credit unit(s):   3.0
Prerequisites: CAD 104, CAD 105
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 naming and file structure for engineering drawing project.			
2. Construct organization of project from part to subassembly to assembly.			
3. Construct plastic parts and freeform surface models.			
4. Prepare fully documented drawing set for project.			
5. Prepare animation of project.			

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):	MACH 120

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.			

MANU 100 – Introduction to Computer Numerical Control (CNC)

You will be introduced to the methods of using G and M codes to create a 2-axis program of instructions that will manufacture a part of a Computer Numerical Control (CNC) mill, waterjet and plasma cutter. You will gain hands-on experience using industrial CNC equipment and modern controllers. You will set up raw stock with different machine set-ups and machine metal parts.

Credit unit(s): 1.0
Prerequisites: MTRX 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. Choose correct Computer Numerical Control (CNC) machine tool to create a part from an engineering design document.			
2. Create a CNC program of instructions to machine a part.			
3. Operate waterjet and 3 axis CNC mill to cut parts.			

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.			

TCOM 111 – Technical Communication

You will develop technical research, writing, and presentation skills. This course will establish understanding and appropriate application of scientific and technical writing standards (e.g.: IEEE Citation Reference, IEEE Editorial Style Manual). You will examine and produce a variety of technical documents.

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

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 technical documents.			
2. Use correct grammar and technical style.			
3. Create technical documents.			
4. Present technical information.			

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):   WELD 102

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 287 - Computer Aided Manufacturing 1

You will focus on the methods of using computers to help create a code of instructions to manufacture a part on a Computer Numerical Machine (CNC). You will study G and M codes. You will solve practical manufacturing problems using traditional CNC techniques. You will gain hands-on experience using industrial CNC equipment and modern controllers. You will also set up raw stock and configure tooling with different machine set-ups, configurations and machine metal parts.

Credit unit(s): 4.0
Prerequisites: MANU 100, MACH 191
Corequisites: none
Equivalent course(s): WELD 102

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. Categorize Computer Numerical Control (CNC) equipment.			
2. Examine CNC equipment specifications and requirements for differing manufacturing environments.			
3. Examine tooling options for CNC equipment.			
4. Analyze engineering drawings for CNC manufacturability.			
5. Examine standard programming practices for CNC equipment.			
6. Plan CNC toolpaths using engineering software.			
7. Create CNC programs of instruction.			
8. Set up CNC equipment to manufacture parts.			
9. Operate CNC equipment to manufacture parts.			
10. Troubleshoot CNC programs and equipment.			
11. Examine output from CNC equipment for quality improvement.			

DSGN 280 – Mechanical Design 1

You will study the techniques of design, analysis and selecting various machine components including belt and chain drive components, wire rope, springs, fasteners, bolted connections, welded joints and combined stresses. You will study traditional design methods and then use computer solutions extensively to augment the design process.

Credit unit(s): 3.0
Prerequisites: COMP 113, ENGM 101, CAD 105, SHOP 186
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 mechanical design process.			
2. Design members for fatigue strength for mechanical drive systems.			
3. Select belt drives for mechanical drive systems.			
4. Select chain drives for mechanical drive systems.			
5. Select wire rope drives for mechanical drive systems.			
6. Select fastener and bolted connections.			
7. Design helical springs.			

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):   ENGM 290

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.			

MANU 201 – Additive Manufacturing Engineering

You will explore the alternative methods of additive manufacturing. You will build three-dimensional (3-D) models and prepare the design for ease of creation with 3-D print. You will change or orient models to maximize the engineering properties of the finished print. You will examine the assembly of 3-D printed parts. You will produce consumer ready parts by post processing the 3-D prints.

Credit unit(s):	2.0
Prerequisites:	CAD 104, 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. Discuss additive manufacturing.			
2. Build additive manufacturing models in three-dimensional (3-D) software.			
3. Operate rapid prototyping machine.			
4. Examine design alternatives for models based on additive manufacturing processes.			
5. Demonstrate engineering properties, fit, tolerances and errors in additive manufacturing models.			
6. Complete post-processing on additive manufacturing models.			

MANU 290 – Manufacturing 1 - Metals

You will study the merits and limitations of the manufacturing and fabrication industry. You will study the use of engineering principles to solve manufacturing and fabrication problems. You will tour various manufacturing operations to gain a broad view of the different types of manufacturing.

Credit unit(s):	4.0
Prerequisites:	ENGM 101, ENGM 180, MACH 191, 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 the fabrication processes used in producing metal and plastic products.			
2. Employ material property modification techniques (e.g. heat treatment) for metals.			
3. Compare the basic casting processes and where they would be used.			
4. Design molds for casting processes.			
5. Calculate the forces involved in hot metal forming processes.			
6. Compare cold metal forming techniques to other fabrication techniques.			
7. Compare various types of cold metal working machines and tools.			
8. Calculate the forces and power involved in cold metal forming processes.			
9. Compare basic metal machining processes and where they would be used.			
10. Calculate machining time.			
11. Compare basic metal welding processes and where they would be used.			
12. Design fillet welds.			

MTRX 200 – Manufacturing Networking Systems

You will study background theory to support an understanding of networking fundamentals and the basics of managing engineering documentation. You will examine Ethernet technology in relation to its use in the Industrial Internet of Things (IIoT). You will discuss the OSI and TCP/IP models, beginning with physical cabling and working up to networking devices. At the completion of the course, you will be able to create and test Local Area Network (LAN) cables, physically cable a LAN, select devices, configure networking parameters and connect computers into a high-speed LAN. You will learn to manage computer systems in an engineering environment. The course introduces the functions of a system operator/manager. You will study the requirements to manage a system of computers in an engineering and manufacturing environment. Classroom and lab experiences will help you install a current network operating system, set up and administer users, groups, hardware and software.

Credit unit(s):   4.0
Prerequisites: ELTR 287
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 introductory networking concepts.			
2. Discuss networking protocols and architecture.			
3. Describe data communications and network services.			
4. Configure a Small Office Network.			
5. Employ network switching and routing.			
6. Plan server installations for engineering applications.			
7. Configure users and file sharing structures.			
8. Examine print services.			
9. Examine network domain services.			
10. Examine system backups.			

MTRX 201 – Production Management and Mechatronics Project

You will study the concepts involved in growing a manufacturing-based company from a small business to a large operation. You will study facility analysis, ordering processes, and dealing with suppliers.

Credit unit(s):	2.0
Prerequisites:	CAD 105, MACH 191, MTRX 101, MTRX 102, 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. Design facility layout.			
2. Develop Lean manufacturing programs.			
3. Analyze Manufacturing Resources Planning (MRP) for use in manufacturing.			
4. Develop supplier chain function.			
5. Integrate multiple mechatronic components and wireless communication into an operational system and troubleshoot electronics / program code to create a functional mechatronics project.			

THER 200 – Thermo-Fluid Systems 2

You will study flowing fluids and typical flow thermal-fluid systems. You will analyze piping systems and evaluate their associated components and equipment. You will examine the impact of pressures of static fluids on structures. You will study buoyancy and stability in relation to fluids. You will study concepts and devices in hydraulics and pneumatics.

Credit unit(s): 2.0
Prerequisites: THER 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 the characteristics and properties of flowing fluids.			
2. Analyze flow processes and systems from the perspective of conservation of energy principles.			
3. Calculate power requirements for a series piping systems.			
4. Determine the buoyancy and stability of floating and submerged objects.			
5. Describe industrial pneumatic and hydraulic systems.			

CAD 288 – Computer Aided Manufacturing 2

You will study how use CAD/CAM software to generate Computer Numerical Control (CNC) codes to operate machine tools in 3, 4 and 5 axis CNC machine tools. You will study methods of creating and importing geometry as wire frame, freeform surfaces or solids. You will use the Computer Aided Manufacturing (CAM) software to create CNC codes to cut the part.

Credit unit(s): 4.0
Prerequisites: CAD 287
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 Aided Drafting (CAD) and Computer Aided Manufacturing (CAM) software features and functions.			
2. Evaluate CAD/CAM software.			
3. Create CAD geometry for toolpath with CAM software.			
4. Select an appropriate process for material and economic considerations.			
5. Develop toolpath programs for various Computer Numerical Control (CNC) equipment.			
6. Use CAM software to simulate cutting procedures.			
7. Select appropriate post processors for CNC equipment.			
8. Set up CNC equipment to create a part.			
9. Design a unique part with multiple operations.			
10. Assess the results of CAD/CAM processes.			

DSGN 207 – Engineering Research and Technical Proposal

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 an oral presentation.

Credit unit(s):	4.0
Prerequisites:	DRFT 290, SEM 101, THER 101, ENGM 180, ENGM 101, MANU 100, CAD 105, CAD 287, DSGN 280, ENGM 193, MTRX 200, THER 200, MANU 201, MTRX 201, MANU 290
Corequisites:	CAD 288, DSGN 282, ENG 291, ENG 292, MANU 202, MANU 203, MANU 291, PROJ 287
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. Select an industrial project.			
2. Discuss the engineering design cycle.			
3. Develop a technical proposal.			
4. Evaluate the feasibility of alternate solutions.			
5. Apply advanced research skills.			
6. Employ the problem-solving process in an applied research project.			
7. Present research findings.			

DSGN 282 – Mechanical Design 2

You will learn the techniques of design, analysis and selecting various machine components. You will study bearings, shafts, springs, couplings, gears, clutches, brakes, and cams. You will examine traditional design methods and then use computer solutions extensively to augment the design process.

Credit unit(s): 4.0
Prerequisites: DSGN 280
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. Select plain bearings for mechanical drive systems.			
2. Select rolling contact bearings for mechanical drive systems.			
3. Select couplings for mechanical drive systems.			
4. Select spur gears for mechanical drive systems.			
5. Select clutches and brakes for mechanical drive systems.			
6. Determine dimensions for shafts.			
7. Select motors for mechanical drive systems.			

ENG 291 – Concurrent Engineering 1

You will create a design from concept to a finished product. As part of the engineering design process, you will integrate a business case, evaluate design concepts, and develop product specifications for your target market. You will concurrently evaluate and refine the design, produce design documentation, and perform design for manufacturing and assembly of the product.

Credit unit(s):	2.0
Prerequisites:	MTRX 101, MTRX 102, MANU 290, MANU 201
Corequisites:	DSGN 282, MANU 202, PROJ 287
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 new product design opportunities.			
2. Formulate product specifications.			
3. Develop cash flow estimates.			
4. Apply project management principles.			
5. Conduct a model presentation that requests funding for project.			
6. Investigate concurrent engineering opportunities.			

ENG 292 – Finite Element Modeling

You will use Finite Element Method (FEM) software to apply several programs to the solution of typical analysis problems. You will examine 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:	CAD 105, 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. Describe how Finite Element Method (FEM) is used in the product design process.			
2. Examine FEM capabilities and limitations.			
3. Evaluate analysis results.			
4. Examine FEM element libraries.			
5. Examine FEM models.			
6. Examine solid models.			
7. Examine advanced modelling techniques.			

MANU 202 – Manufacturing 2-Plastics

You will study different processes for the manufacture of plastics. You will study the preferred method for manufacturing the product based on form and use. You will calculate the costs of completing different processes.

Credit unit(s):	2.0
Prerequisites:	CAD 287, ENGM 101, MANU 201, MANU 290
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 fundamentals of polymers.			
2. Describe the extrusion process.			
3. Describe sheet film and fiber extrusion processes.			
4. Describe the Injection molding process.			
5. Describe the compression and transfer molding processes.			
6. Describe the blow molding, rotational molding, and thermoforming processes.			

MANU 203 – Quality Assurance

You will study quality assurance in a manufacturing environment. You will use statistical sampling and analysis tools used to achieve and verify quality goals.

Credit unit(s):   3.0
Prerequisites: MAT 111, MANU 290
Corequisites: none
Equivalent course(s):   MANU 293

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 customer-focused basic quality concepts.			
2. Discuss quality standards.			
3. Examine quality management.			
4. Solve quality problems using statistical calculations.			
5. Analyze chronic problems using continuous improvement problem solving techniques.			
6. Design for quality.			
7. Analyze quality using Statistical Process Control (SPC).			
8. Analyze supply chain management principles.			
9. Evaluate acceptance based on inspection results.			

MANU 291 – Advanced Manufacturing

You will create a design from concept to a finished product. As part of the engineering design process, you will integrate a business case, evaluate design concepts, and develop product specifications for your target market. You will concurrently evaluate and refine the design, produce design documentation, and perform design for manufacturing and assembly of the product.

Credit unit(s): 2.0
Prerequisites: CAN 105, ELTR 287, WELD 387, MTRX 101, MTRX 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. Evaluate new product design opportunities.			
2. Formulate product specifications.			
3. Develop cash flow estimates.			
4. Apply project management principles.			
5. Conduct a model presentation that requests funding for project.			
6. Examine concurrent engineering opportunities.			

PROJ – 287 – Project Management

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

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

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.			

CAD 298 – Engineering Seminars

You will investigate advanced features of Computer Aided Drafting (CAD) software used in the program and in local industry. You will attend presentation with local users that will share their product expertise. You will be introduced to incremental upgrades to software. You will receive an introduction to other relevant software.

Credit unit(s): 2.0
Prerequisites: CAD 105, MTRX 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. Integrate advanced software features into design and manufacturing projects.			
2. Operate current software applications.			
3. Implement internet of things (IoT) event triggered text and/or email notification by establishing wireless connection and back-end text and email services.			

CLTR 200 – Culture and Diversity

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

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

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 how cultural dimensions shape the diversity of Canada.			
2. Discuss the prominent dimensions of culture in Canadian society such as tradition, familial relations, and employment.			
3. Describe the interrelationships produced when the dimensions of various cultures interact.			
4. Describe the dimensions of culture as it relates to Indigenous and immigrant populations.			
5. Discuss the correlation between culture, diversity, and innovation.			

DSGN 208 – Concurrent Engineering 2

You will fabricate a product prototype that was designed in the Concurrent Engineering course. You will complete an engineering report and prepare and present a final oral presentation of your project.

Credit unit(s): 1.0
Prerequisites: ENG 291
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 product prototype.			
2. Develop methods of Design for Manufacturing and Assembly (DFMA).			
3. Present a project.			

DSGN 283 – Mechanical Design Project

You will learn how to develop and evaluate several components in the design of a machine. You will select and integrate bearings, shafts, springs, couplings, gears, clutches, brakes, and cams into a comprehensive project.

Credit unit(s):	3.0
Prerequisites:	DSGN 282
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. Select components of a mechanical, gear type power transmission system.			
2. Design the interface fit for multiple components.			
3. Generate component tolerances and limit dimensions on key dimensions.			
4. Verify final design for its intended purpose.			
5. Prepare assembly drawings of project.			
6. Design components not considered in earlier analysis.			
7. Prepare the technical report.			

MANU 204 – Advanced Manufacturing Project

You will use the design documents from the Advanced Manufacturing 291 class to fabricate the fixtures for production manufacturing of your part. Design engineering drawings will be used to source, produce and cost production parts. Waterjet, plasma cutting, laser cutting, and other fabrication tools will be used to prepare parts for final assembly using the programs developed for the robotic welder.

Credit unit(s):	1.0
Prerequisites:	MANU 291, CAM 288
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. Calculate material/labor requirements from design documents bills of materials.			
2. Construct fixture plate.			
3. Assemble project parts.			

PROJ 218 – Capstone Project

You will focus on the application of basic knowledge in the design of "real life" engineering problems from local industries. Based on your knowledge of several previous and concurrent courses, you will study how to select and define a technical project, find design solutions for the problem and then prepare and present your technical solutions to the industrial client.

Credit unit(s):	4.0
Prerequisites:	DSGN 207
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. Select an industrial project.			
2. Conduct a feasibility study on alternate solutions.			
3. Create a solution to an industrial project.			
4. Prepare a set of working drawings.			
5. Produce a technical report to communicate the solutions to the industrial client.			
6. Outline project solutions in an oral presentation.			