



# Civil Engineering Technologies (Civil Construction or Water Resources)

## PLAR Candidate Guide

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### Prior learning credit options at Saskatchewan Polytechnic

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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

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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

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

- A. [PLAR fees](#)
- B. [PLAR eligibility and options](#)
- C. [Dates when PLAR assessment is available](#)
- D. [Special directions for this program](#)
- E. [PLAR contact person](#)
- F. [Self-rating course outlines](#)

## A. PLAR fees

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Please see the **Cost** section on the [PLAR webpage](#) for current fee information.

## B. PLAR eligibility and options

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

### Course pre-requisites and co-requisites

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

### Block assessment

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

## C. Dates when PLAR assessment is available

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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

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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, if required for the courses you want to PLAR. See [directions for applying](#).
5. **Register** for PLAR at Registration Services once you have signed approval on your [PLAR Application Form](#).
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.

**Dean Massier** (*Program Head*)  
Civil Engineering Technologies  
Saskatchewan Polytechnic, Moose Jaw Campus  
Phone: 306- 691-8420  
Email: [massier@saskpolytech.ca](mailto:massier@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	Delivered by another department/program
<b>Semester 1</b>		
<a href="#">CADD 120</a>	Computer Aided Drafting	
<a href="#">CONC 120</a>	Concrete Technology 1	
<a href="#">MAT 110</a>	Mathematics for Engineering Technologies	<a href="#">Arts and Sciences</a>
<a href="#">MEAS 110</a>	Analytical Measurement	
<a href="#">SEM 101</a>	Technology Seminars	<a href="#">Arts &amp; Sciences</a>
<a href="#">SRVY 107</a>	Surveying 1	
<a href="#">TCOM 102</a>	Workplace Communication	
<a href="#">TERR 101</a>	Engineering Geology	
<a href="#">TERR 102</a>	Engineering Geology Laboratory	
<b>Semester 2</b>		
<a href="#">CADD 125</a>	Civil Design	
<a href="#">CLTR 200</a>	Culture and Diversity	<a href="#">Arts and Sciences</a>
<a href="#">MAT 111</a>	Calculus for Engineering Technology	<a href="#">Arts and Sciences</a>

<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>Delivered by another department/program</b>
<a href="#">PHYS 104</a>	Physics for Engineering Technologies	
<a href="#">SOIL 120</a>	Soil Analysis	
<a href="#">SRVY 108</a>	Surveying 2	
<a href="#">SRVY 109</a>	Survey Camp	
<a href="#">TCOM 103</a>	Technical Communication	<a href="#">Arts and Sciences</a>
<a href="#">COOP 101</a>	Co-operative Work Term	
<a href="#">COOP 201</a>	Co-operative Work Term	
<b>Civil Construction Specialty Semester 3</b>		
<a href="#">CONC 220</a>	Concrete Technology 2	
<a href="#">HYDR 220</a>	Hydraulics 1	
<a href="#">PAVE 220</a>	Asphalt Construction	
<a href="#">SOIL 220</a>	Soils	
<a href="#">STAT 201</a>	Statistics for Construction	<a href="#">Arts &amp; Sciences</a>
<a href="#">STRU 235</a>	Applied Mechanics	
<a href="#">STRU 236</a>	Mechanics of Materials	
<a href="#">STRU 237</a>	Structures	
<b>Semester 4</b>		
<a href="#">HYDR 221</a>	Hydraulics 2	
<a href="#">MGMT 103</a>	Construction Contracts	
<a href="#">PAVE 223</a>	Highway Materials	
<a href="#">STRU 225</a>	Structural Steel Design	
<a href="#">STRU 231</a>	Mechanics of Materials	
<a href="#">TRAN 222</a>	Transportation Engineering	
<a href="#">WTER 233</a>	Water and Wastewater	

<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>Delivered by another department/program</b>
<b>Semester 5</b>		
<a href="#">MGMT 226</a>	Project Management	
<a href="#">MUNI 220</a>	Municipal Infrastructure	
<a href="#">PAVE 222</a>	Pavement Structures	
<a href="#">PROJ 206</a>	Capstone Project	
<a href="#">SOIL 222</a>	Geotechnical Design	
<a href="#">STRU 241</a>	Wood & Concrete Design	
<a href="#">TCOM 104</a>	Applied Research in Technology	<a href="#">Arts and Sciences</a>
<a href="#">TRAN 223</a>	Transportation Engineering	
<b>Water Resources Specialty - Semester 3</b>		
<a href="#">CHEM 200</a>	Engineering Chemistry	
<a href="#">HYDO 225</a>	Groundwater Technology	
<a href="#">HYDR 220</a>	Hydraulics 1	
<a href="#">INST 227</a>	Instrumentation & Measurement 1	
<a href="#">LABS 220</a>	Water and Wastewater Laboratory Analysis	
<a href="#">STAT 201</a>	Statistics for Engineering Technology	<a href="#">Arts &amp; Sciences</a>
<a href="#">WTER 232</a>	Water & wastewater	
<b>Semester 4</b>		
<a href="#">CAMP 226</a>	Field Camp	
<a href="#">HYDO 228</a>	Hydrology 1	
<a href="#">HYDR 221</a>	Hydraulics 2	
<a href="#">INST 231</a>	Instrumentation & measurement 2	
<a href="#">MGMT 103</a>	Construction Contracts	
<a href="#">WTER 226</a>	Organic Chemistry	

<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>Delivered by another department/program</b>
<a href="#">WTER 231</a>	Watershed Management	
<b>Semester 5</b>		
<a href="#">ENVR 232</a>	Environmental Engineering	
<a href="#">HYDO 229</a>	Hydrology 2	
<a href="#">MGMT 226</a>	Project Management	
<a href="#">MUNI 220</a>	Municipal Infrastructure	
<a href="#">PROJ 206</a>	Capstone Project	
<a href="#">RVRS 220</a>	River & Reservoir Engineering	
<a href="#">TCOM 104</a>	Applied Research in Technology	<a href="#">Arts and Sciences</a>

## CADD 120 – Computer Aided Drafting 1

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

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** none  
**Equivalent course(s):** DRFT 105

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Demonstrate the Computer Aided Drafting (CAD) software and drawing environment.			
2. Demonstrate the use of foundational commands of CAD software.			
3. Construct basic geometric objects and annotations.			
4. Apply file management techniques and drawing templates.			
5. Perform editing techniques.			
6. Prepare and produce drawings for output.			
7. Construct basic blocks.			
8. Employ hatching.			
9. Manage raster images.			

## CONC 120 – Concrete Technology 1

You will be introduced to the practical and theoretical aspects of concrete technology. You will perform current Canadian Standards Association (CSA) test procedures on plastic and hardened concrete, and fine and coarse aggregates.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** none  
**Equivalent course(s):** CONC 102

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b> I can apply this outcome without direction or supervision.  <b>Learning:</b> I am still learning skills and knowledge to apply this outcome.  <b>None:</b> I have no knowledge or experience related to this outcome.</p>	<b>Competent</b>	<b>Learning</b>	<b>None</b>
1. Practice safety standards in a concrete laboratory.			
1. Define the fundamentals of concrete ingredients.			
2. Describe the fundamentals of concreting operations.			
3. Perform aggregate tests using Canadian Standards Association (CSA) standards.			
4. Perform quality control concrete tests using CSA standards.			



## MEAS 110 – Analytical Measurements

You will demonstrate safety in a laboratory and field setting following Canadian industry standards. You will apply statistical analysis to collected data and measured numbers. You will demonstrate fundamental use of Microsoft Excel. You will practice industry standard documenting practices and procedures in support of Quality Assurance/Quality Control (QA/QC) and due diligence.

**Credit unit(s):** 2.0

**Pre and Co Requisites:** none

**Equivalent course(s):** MEAS 106

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Demonstrate safe practices while working in laboratory and field settings.			
2. Collect and test field samples for analysis and produce basic tables, functions and graphs in Excel.			
3. Demonstrate proper use of different lab equipment types.			
4. Calculate uncertainty in measured numbers and precision of instruments.			
5. Describe the components of a Quality Assurance/Quality Control program.			
6. Practice documenting procedures and activities.			

## 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

**Pre and Co Requisites:** none

**Equivalent course(s):** ENGM 108, ETHC 183, ORTN 120, SEM 104

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

## SRVY 107 – Surveying 1

You will discuss the basics of surveying. You will perform horizontal measurements, levelling, angle and direction measurement, computations and traverses. You will apply industry standard surveying techniques when taking measurements and notes.

**Credit unit(s):** 4.0  
**Pre and Co Requisites:** none  
**Equivalent course(s):** SRVY 102 SRVY 120

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b> I can apply this outcome without direction or supervision.  <b>Learning:</b> I am still learning skills and knowledge to apply this outcome.  <b>None:</b> I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss survey fundamentals.			
2. Discuss various methods of measuring distances.			
3. Assess the errors associated with distance measurements.			
4. Measure the various ground distances.			
5. Practice various techniques of differential leveling in vertical control surveys.			
6. Create closed and open level loops with appropriate correction method.			
7. Discuss various types of traverse surveys.			
8. Calculate directions utilizing azimuths and bearings.			
9. Measure internal angles and horizontal distances in a closed traverse.			
10. Revise field/observed measurements of traverse.			
11. Determine the land location, and size, of a legal land description under the Dominion Land Survey (DLS) system and various coordinate systems.			
12. Apply the ‘standard practice of surveying’ in recording field notes with relevant sketches.			

## TCOM 102 – Workplace Communication

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

**Credit unit(s):** 3.0

**Pre and Co Requisites:** none

**Equivalent course(s):** COM 160, COMM 191, JOBS 190, JOBS 288, JOBS 290, TCOM 102CE, TCOM 120, TCOM 140, TMGT 180

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

**TERR 101 – Engineering Geology**

You will study physical geology including the origin, composition and characteristics of the major minerals and rock classifications. You will study geologic processes, landforms and geologic structures created by these processes referencing Saskatchewan’s glaciated terrain.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** TERR 102  
**Equivalent course(s):** TERR 121

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Describe the origin and physical characteristics of various rock and soil types.			
2. Describe the effects of mass wasting and running water on the landscape.			
3. Describe the origin of groundwater and the characteristics of wells.			
4. Identify various glacial landforms and how they are significant in terms of type of soil materials and origin.			
5. Describe the origin of deserts and how the landscape evolves.			
6. Describe the process of plate tectonics and the geological features associated with it.			
7. Describe crust deformation and mountain building processes.			

## TERR 102 – Engineering Geology Laboratory

This course will introduce fundamental mapping concepts and map reference systems. You will be introduced to how to read and extract information from topographic maps. You will study aerial photo interpretation as a tool to help identify natural surface features. You will study the characteristics of features formed by the advance and retreat of massive ice sheets during the last glacial period.

**Credit unit(s):** 2.0  
**Pre and Co Requisites:** TERR 101  
**Equivalent course(s):** TERR 121

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Describe the coordinate reference systems used in mapping.			
2. Describe the Western Canada Dominion Land Survey system.			
3. Describe the National Topographic System (NTS).			
4. Demonstrate proficiency reading a topographic map sheet.			
5. Compare the evolution of administrative boundaries within Canada with the pre-contact extent of First Nations' territories.			
6. Describe the characteristics of glaciated features observed on aerial photos.			

## CADD 125 – Civil Design

You will use standard drafting practices to produce typical civil engineering drawings using Computer Aided Drafting (CAD) software. You will use the basic concepts of civil design software to import surveying data and produce civil engineering drawing software.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** CADD 120, SRVY 108

**Equivalent course(s):** COAP 108

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Apply drawing management techniques.			
2. Construct a title block with automated attributes.			
3. Create hardcopy output.			
4. Create Civil Engineering Drawings using current CAD software.			
5. Create a civil set using current civil design software.			
6. Perform a field book data transfer.			
7. Create a topographic map using current civil design software.			

## PHYS 104 – Physics for Engineering Technologies

You will apply vectors and Newton’s laws of motion to force systems. You will study work, power and the conservation of mechanical energy. You will study momentum and collisions. You will study the properties of static and dynamic fluids, thermal energy, and heat. This course is also intended to build critical thinking and problem-solving skills.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** none  
**Equivalent course(s):** PHYS 102

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Apply methods of vector addition to concurrent and non-concurrent force systems.			
2. Apply Newton’s laws to dynamic and static force systems.			
3. Analyze work, power and the conservation of mechanical energy.			
4. Examine the conservation of momentum in collisions.			
5. Solve problems involving static and dynamic fluids.			
6. Solve problems involving temperature, thermal energy and heat.			



## SOIL 120 – Soil Analysis

You will study data collection, analysis and reports for the identification, classification and determination of properties of earth materials. You will perform industry-standard test procedures on soil and aggregate. You will evaluate the methods and determine the results.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** none  
**Equivalent course(s):** SOIL 100

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b> I can apply this outcome without direction or supervision.  <b>Learning:</b> I am still learning skills and knowledge to apply this outcome.  <b>None:</b> I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Practice weight and volume determinations using various methods.			
2. Demonstrate course-grained and fine-grained water content analysis by various drying methods.			
3. Demonstrate a wash sieve analysis.			
4. Demonstrate standard test methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.			
5. Distinguish soils by application of two classification systems.			
6. Demonstrate a hydrometer analysis.			
7. Demonstrate a moisture density analysis of fine-grained soils.			
8. Discuss the safe operation of a nuclear densometer.			
9. Discuss nuclear, sand cone and balloon methods of compaction control.			

## SRVY 108 - Surveying 2

You will conduct topographic surveys using Global Navigation Satellite System receivers and Total Stations with data collection. You will be introduced to survey control using local grids, Universal Transverse Mercator, and the Dominion Land Survey System. You will assess survey drawings and maps, contours, profiles, and cross sections. You will calculate construction volumes, as well as compound and vertical curves.

**Credit unit(s):** 4.0  
**Pre and Co Requisites:** none  
**Equivalent course(s):** SRVY 222

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Compute compound curves.			
2. Compute vertical curves.			
3. Compare various topographic surveying and mapping techniques.			
4. Assess various techniques for municipal constructions surveys.			
5. Determine the land location and legal land description under the Dominion Land Survey System.			
6. Apply various coordinate systems.			
7. Collect electronic survey measurement with Total Stations.			
8. Collect electronic survey measurements with Global Navigation Satellite System receivers.			

## SRVY 109 – Survey Camp

You will perform surveying activities to complete projects in the field. You will collect survey data in the field to produce a topographic map of the area using industry standard software. You will design a section of road with a horizontal and vertical component. You will layout a roadway in the field. You will gather elevation data using levels from the field for use in calculations of fill. You will create field notes meeting industry standard.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** none

**Equivalent course(s):** CAMP 225, CADD 125, SRVY 108

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Review use of total station.			
2. Collect topographic survey data.			
3. Perform checks and calculations to ensure data accuracy and integrity.			
4. Prepare field sketches and notes.			
5. Create a topographic plan using industry standard software.			
6. Review use of Global Navigation Satellite System (GNSS) receivers.			
7. Design a section of road based on given parameters.			
8. Layout a section of road in the field.			
9. Utilize safe practices while performing field work.			

## COOP 101 – Co-operative Work Term

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

**Credit unit(s):** 0.0

**Pre and Co Requisites:** none

**Equivalent course(s):** none

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

## COOP 201 – Co-Operative Work Term

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

**Credit unit(s):** 0.0  
**Pre and Co Requisites:** none  
**Equivalent course(s):** none

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

## CONC 220 – Concrete Technology 2

You will analyze concrete aggregates, cement, supplemental cementing materials and admixtures. You will design various concrete mixtures. You will perform the batching and mixing of concrete mixtures. You will test plastic and hardened concrete samples. You will evaluate the test results collected and apply those findings to the given design criteria. You will discuss the different types of concrete and their uses in industry.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** CONC 120  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b> I can apply this outcome without direction or supervision.  <b>Learning:</b> I am still learning skills and knowledge to apply this outcome.  <b>None:</b> I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze the properties of aggregates, admixtures, and various supplemental cementing materials.			
2. Design and proportion concrete mixtures.			
3. Perform concrete mixes in the laboratory to design specifications.			
4. Perform quality control tests on aggregates and plastic and hardened concrete.			
5. Evaluate concrete mixtures.			
6. Discuss the various methods of concrete inspection.			
7. Discuss rigid pavement uses and design.			
8. Discuss high performance concrete mixtures.			
9. Discuss precast and pre-stressed concrete.			

## HYDR 220 – Hydraulics 1

You will study fluid mechanics principles including pressure measurement, forces on submerged planes, buoyancy and stability, general energy equation and viscosity. You will apply the fundamentals of hydrodynamics including hydraulics of flow in pipes, flow measurement devices and pumping system design.

**Credit unit(s):** 4.0  
**Pre and Co Requisites:** MAT 111, PHYS 104  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Define fluid and fluid properties.			
2. Discuss the Bernoulli General Energy Equation.			
3. Describe the fundamental laws of hydrodynamics.			
4. Apply Pascal’s Law.			
5. Apply velocity profiles in commercial pipes.			
6. Solve hydrostatic force problems for submerged flat plane.			
7. Solve buoyancy and stability problems for floating and submerged objects.			
8. Calculate friction and minor head losses in pipes.			
9. Measure fluid pressure.			

**PAVE 220 – Asphalt Construction**

You will study how to inspect, manage and evaluate the manufacture and placement of aggregate and bituminous mix for parking lots, streets and highways.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** SOIL 120 SOIL 220  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Interpret Total Quality Management (TQM) methods in the manufacture and placement of Hot Mix Asphalt (HMA) concrete.			
2. Evaluate asphalt cements, liquid asphalts and emulsions for the manufacture and placement of HMA concrete.			
3. Evaluate aggregates for asphalt road surfaces.			
4. Evaluate asphalt and aggregate mixtures by the Marshall mix method.			
5. Evaluate hot mix asphalt batch and continuous plant operations.			
6. Evaluate the placement, compaction, and acceptance operations of hot mix asphalt concrete pavement.			
7. Evaluate causes of segregation of asphalt mixtures.			
8. Evaluate causes of hot mix asphalt concrete failures.			
9. Determine hot mix asphalt concrete pavement maintenance procedures.			



## SOIL 220 - SOILS

You will evaluate the physical properties and engineering applications of soils. You will study concepts for the design, construction and inspection of earth works.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** SOIL 120  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze the geological processes that formed soils in Saskatchewan.			
2. Analyze basic mass weight and volume relationships of soil composition.			
3. Estimate the performance of coarse-grained and fine-grained soils on the basis of soil particle size, shape and their reaction to water.			
4. Evaluate properties to classify soils.			
5. Evaluate site soils.			
6. Evaluate water movement through soil.			
7. Evaluate compaction procedures for various soil types.			
8. Evaluate practical groundwater effects.			
9. Evaluate the shear strength of coarse and fine grained soils.			

## STAT 201 – Statistics for Construction

You will gain knowledge of statistical concepts and techniques applicable to engineering technology. You will study descriptive statistics, probability distributions, the Central Limit Theorem, inferential statistics, and linear regression. This course is intended to build problem solving and critical thinking skills, and to demonstrate the importance of statistics in professional practices.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** none

**Equivalent course(s):** MAT 233, STAT 120, STAT 120CE, STAT 220

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

**STRU 235 – Applied Mechanics**

You will study the effects of forces and moments applied to various objects in static equilibrium stationary objects. You will use the engineering problem solving approach.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** MAT 111  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Solve force vector problems.			
2. Solve statics problems involving forces and moments.			
3. Calculate the resultant of a system of forces.			
4. Analyze force systems using free body diagrams and the equations of static equilibrium.			
5. Analyze the forces acting on frames and machines.			
6. Calculate the centre of gravity and centroid.			
7. Calculate the moment of inertia for various cross-sectional areas.			

## STRU 236 – Mechanics of Materials

You will study stress and strain relationships in this introductory mechanics of materials course. You will review centroids and moments of inertia. You will study structural shapes and calculate shear and bending moment in beams allowing you to draw shear force. You will study bending moment diagrams and calculate shear stress, flexural stress, and deflection at any point on a loaded beam.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** STRU 235

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Define the general principals of strength of materials.			
2. Illustrate the relationship between stress and strain and their application to various engineering materials.			
3. Solve problems involving stress and strain.			
4. Solve problems involving first and second moments of area.			
5. Illustrate the concept of shear and bending moment in a beam.			
6. Draw shear force and bending moment diagrams for members subjected to various loadings.			
7. Illustrate the concepts of internal flexural stress and internal shear stress within a beam.			
8. Solve problems involving internal flexural and shear stresses within beams.			
9. Discuss the deflection of beams under various loading criteria.			
10. Solve problems involving the deflection of beams under various loading.			

## STRU 237 - Structures

You will study the various types of structures. You will learn how to read structural drawings and interpret specifications. You will learn how to determine design loads using the Limit States Design Method in accordance with the National Building Code of Canada. You will use the design loads to calculate the loads on the various structural components.

**Credit unit(s):** 2.0  
**Pre and Co Requisites:** STRU 235  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss the various types of structures and structural members.			
2. Interpret structural specifications and drawings.			
3. Interpret Part 4 of the National Building Code of Canada (NBCC).			
4. Calculate the design loads for various structural members.			
5. Calculate the specified and factored loads on the individual members of a structure.			

## HYDR 221 – Hydraulics

You will use industry standard software to design flow in pipe networks. You will examine open channel flow, pump selection and flow measurement techniques. You will use industry standard software to design pipe networks.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** HDYR 220  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Identify specific advanced applications of hydraulics.			
2. Design series problems.			
3. Develop culvert systems.			
4. Design parallel pipeline systems.			
5. Discuss the effects of turbomachinery to systems.			
6. Calculate power and efficiencies of turbomachinery.			
7. Solve open channel flow systems.			
8. Solve gradually varied flow systems.			

## MGMT 103 – Construction Contracts

You will examine construction contracts as developed by the Canadian Construction Documents Committee (CCDC). You will discuss the laws and guidelines surrounding construction contracts. You will examine construction project organization and contracting methods. You will examine how a typical construction project is organized, bid, awarded, and completed. You will discuss the roles and responsibilities of all parties involved. You will use industry standard drawings and specifications.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** none

**Equivalent course(s):** MGMT 225

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Describe how a construction project is organized.			
2. Describe the roles of the inspector, consultant, contractor and owner in the successful completion of a construction project.			
3. Recognize how the principles of Canadian law affect a business relationship, professional ethics contracts and professional liability.			
4. Describe the components of a typical construction contract.			
5. Apply the Canadian Construction Documents Committee (CCDC) standards in the preparation of a construction contract.			
6. Discuss the bidding process and the law of competitive bidding.			
7. Discuss the use of bonds and legislative requirements.			
8. Examine how progress claims, extra work and change orders are initiated and approved for a construction project.			
9. Use drawings and specifications conforming to the Canadian Master Specification format to find information regarding a project.			

## PAVE 223 – Highway Materials

You will investigate, design and evaluate soil, aggregate and related materials for use in streets, highways and other earth structures.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** SOIL 220 PAVE 220

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Conduct American Society for Testing Materials (ASTM) and Canadian Standards Association (CSA) standard procedures to sample, locate, mark, ship and store aggregate and soil specimens.			
2. Conduct a site characterization following ASTM procedures with a dry auger drill rig.			
3. Appraise a site based on site characterization information.			
4. Conduct ASTM, CSA, and other methods to test various properties of aggregates and asphaltic binders.			
5. Estimate an aggregate blend based on test properties and design criteria.			
6. Conduct ASTM and Asphalt Institute procedures to collect experimental data on an aggregate and asphalt mix.			
7. Appraise the design properties for the aggregate and asphalt mixture.			
8. Conduct ASTM procedures to test the load bearing properties of pavement structure materials.			
9. Appraise load bearing test procedure and properties of pavement structure materials.			



**STRU 225 – Structural Steel Design**

You will design and analyze basic structural steel members using the Limit States Design Method in accordance with the National Building Code of Canada and the Canadian Standards Association.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** STRU 236, STRU 237  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	<p><b>Competent</b></p>	<p><b>Learning</b></p>	<p><b>None</b></p>
1. Discuss the basic properties of structural steel.			
2. Design a tension member.			
3. Design a bending member.			
4. Design a compression member.			
5. Design a bolted connection.			
6. Design a welded connection.			

**STRU 231 – Mechanics of Materials**

You will study the buckling potential of structural columns in this advanced mechanics of materials course. You will use Mohr’s circle to evaluate stresses in beams and evaluate combined loading. You will calculate statically indeterminate beams.

**Credit unit(s):** 2.0  
**Pre and Co Requisites:** STRU 236  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze the buckling of columns using Euler analysis.			
2. Appraise the buckling potential of various column types under different end restraint conditions.			
3. Evaluate the stresses acting on an inclined plane of a beam using Mohr’s circle analysis.			
4. Evaluate the effects of flexural and axial loads applied in combinations.			
5. Calculate problems involving statically indeterminate systems.			

## TRAN 222 – Transportation Engineering

You will design a section of highway using Computer Aided Drafting (CAD) to produce a drawing showing a centerline plan and profile, and a mass haul diagram. You will study drainage control, spiral curves and superelevation, cost considerations and the interpretation and proper presentation of highway drawings. You will compare and contrast various Global Navigation Satellite Systems.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** SRVY 109  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Apply the principles of geometric design to a highway design.			
2. Calculate spiral transition curve parameters.			
3. Compare various satellite positioning systems.			
4. Design a basic section of highway using industry standard Computer Aided Drafting (CAD) software.			
5. Produce drawings of a highway design using industry standard Computer Aided Drafting (CAD) software.			
6. Evaluate profiles and mass haul diagrams for highway designs.			

**WTER 233 – Water Wastewater**

You will study common and advanced unit processes utilized in water and wastewater treatment. You will analyze physical, chemical and biological treatments utilizing information and skills in water chemistry and water and wastewater treatment. You will study regulatory guidelines and industry standards.

**Credit unit(s):** 2.0  
**Pre and Co Requisites:** none  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss the goals of environmental engineering.			
2. Discuss the needs for treatment and the factors that affect water and wastewater treatment.			
3. Discuss fundamentals of process kinetics and the concept of microbiology related to treatment.			
4. Discuss advanced water and wastewater treatment systems.			
5. Analyze private and small-scale water and wastewater treatment plants.			
6. Analyze individual components of medium and large-scale water and wastewater treatment plants.			

## MGMT 226 – Project Management

You will analyze the project management process. You will use industry standard construction documents to manage risk on a project. You will discuss jobsite safety procedures and documentation. You will practice scheduling, resource allocation and estimating. You will estimate cost for a small project. You will prepare a bid package for a small project.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** none

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Describe industry standard common practices with regards to construction project management.			
2. Discuss stakeholder relations, negotiations, and dispute resolution.			
3. Discuss jobsite safety documentation and procedures.			
4. Create a project schedule using the Critical Path Method (CPM).			
5. Apply industry standard project quality management techniques.			
6. Analyze construction changes using industry standard management procedures and process claims.			
7. Formulate payments and cash flow projections.			
8. Examine the project closeout procedures and documentation.			
9. Assemble a bid package for a construction project.			

## MUNI 220 – Municipal Infrastructure

You will plan and design municipal infrastructures. You will review existing design compliance with current development bylaws. You will design a storm and sanitary sewer for the given network.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** HYDR 221, CADD 125

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss the zoning bylaws governing land for municipal development.			
2. Create an urban roadway.			
3. Employ methods for forecasting future utility use.			
4. Determine design flows for storm sewers.			
5. Design a storm sewer.			
6. Design a storm water management facility for a new subdivision.			
7. Determine flow and volume requirements for a water distribution system.			
8. Determine sanitary system flow characteristics.			
9. Design a sanitary collection system.			
10. Prepare a comprehensive set of drawings.			

## PAVE 222 – Pavement Structures

You will study designing, constructing, evaluating and managing asphalt and Portland cement pavement structures.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** PAVE 223

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Perform slope movement measurements and pore water measurements for road slope stability.			
2. Assess performance of road structures from strength and settlement analysis.			
3. Prepare a pavement condition index for a road.			
4. Evaluate materials and methods to stabilize soils for road construction.			
5. Estimate traffic volume and loading.			
6. Estimate flexible pavement structure thickness.			
7. Estimate material quantities for pavement structure construction.			
8. Evaluate processes to maintain and rehabilitate roads.			
9. Interpret the Superpave specifications.			

## PROJ 206 – Capstone Project

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

**Credit unit(s):** 2.0

**Pre and Co Requisites:** none

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Propose a project and research the technical and design aspects required to complete the project.			
2. Manage scheduling to ensure timely completion of the project.			
3. Collect data required per the project proposal.			
4. Analyze the project and provide solutions to project design.			
5. Prepare a final report.			
6. Defend project conclusions in a technical presentation.			



## SOIL 222 – Geotechnical Design

You will calculate subsurface soil stresses and deformation associated with imposed construction loads. You will design foundations and gravity walls. You will assess temporary cut slopes of excavations. You will evaluate the stability of soil slopes. You will discuss soil slope stabilization techniques.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** SOIL 220

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze subsurface soil stresses.			
2. Calculate immediate, primary and secondary consolidation settlements.			
3. Evaluate the shear strength of soils for different drainage and loading conditions.			
4. Evaluate the shear strength of soils for different drainage and loading conditions.			
5. Design shallow foundations.			
6. Design deep foundations.			
7. Design gravity walls.			
8. Calculate horizontal stresses in shoring systems.			
9. Assess temporary cut slopes of excavations.			
10. Evaluate the stability of slopes on soils.			
11. Discuss the most common techniques for the stabilization of slopes.			

## STRU 241 – Wood & Concrete Design

You will study the design and analysis of timber components and structural reinforced concrete components using the Limit States Design Method in accordance with the National Building Code of Canada. You will become familiar with standard industry practices. You will be introduced to computer applications where appropriate.

**Credit unit(s):** 4.0  
**Pre and Co Requisites:** STRU 237  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Describe the wood products commonly used in construction.			
2. Design a wood member subjected to bending.			
3. Design a wood member subjected to tensile or compressive loads.			
4. Design a wood member to support combined axial and bending loads.			
5. Design connections for wood members to support a given load.			
6. Describe lateral load resistance systems for wood structures.			
7. Design a reinforced concrete beam to support a given flexural load.			
8. Check the reinforcing details of a beam for compliance with Canadian Standards Association (CSA).			
9. Design a reinforced concrete beam to support a given shear load.			
10. Design a reinforced concrete footing.			
11. Apply the industry standard practices of reinforcing steel.			
12. Prepare the bar list and placing drawing for a small concrete foundation.			

**TCOM 104 – Applied Research in Technology**

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

**Credit unit(s):** 2.0

**Pre and Co Requisites:** TCOM 103, ENG 101

**Equivalent course(s):** COMM 115, COMM 182, COMM 290, TCOM 239

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

**TRAN 223 – Transportation Engineering**

You will study the highway design standards including curve lengths and stopping sight distances. You will evaluate traffic volume counts, highway capacity analysis and intersection capacity and control.

**Credit unit(s):** 4.0  
**Pre and Co Requisites:** TRAN 222  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Interpret road classification systems.			
2. Discuss the effects of the basic characteristics of drivers, vehicles and roads to highway design.			
3. Evaluate data collected for spot speed.			
4. Evaluate data collected for traffic volume and travel time studies.			
5. Discuss highway safety and design solutions for roadways.			
6. Calculate the capacity and level of service of a highway.			
7. Calculate components of intersection design and control.			
8. Calculate the capacity and level of service of a signalized intersection.			
9. Evaluate traffic volume count forecasting on individual routes.			

## CHEM 200 – Engineering Chemistry

You will study the general principles of chemistry and chemical calculations. The concepts and application of stoichiometry, concentration determination, equilibrium, acid-base chemistry, pH, volumetric and gravimetric analysis will be used to describe the chemistry of aquatic systems.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** MAT 110

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss the general principles of chemistry and their specific relationship to technology.			
2. Analyze the concepts, principles and generalizations of chemical behaviour.			
3. Interpret the mathematical functions that express chemical relationships.			
4. Differentiate between the Gas Laws and their applications.			
5. Examine the structure of compounds relating bonding and molecular bonding to chemical and physical properties.			
6. Identify the various states of matter and the properties that attribute to these phases.			
7. Examine the factors that alter the equilibrium in a chemical reaction.			
8. Examine the theories of solubility and solution chemistry.			
9. Examine the nature, behaviour, concentration and strength of acids and bases.			
10. Apprise the indicators of chemical change utilizing the Ksp, Kw, and Ka theories.			
11. Apply oxidation numbers to identify redox reactions.			
12. Analyze the nature and behaviour of the atomic nucleus including radioactive isotopes and their practical application.			

## HYDO 225 – Ground Water Technology

You will study the basic principles of applied hydrogeology including the calculation of aquifer parameters, groundwater flow and groundwater recharge. You will examine the installation and maintenance of wells, groundwater quality, and measures to protect groundwater from contamination. You will discuss the groundwater approval process administered by the Water Security Agency.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** MAT 111

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss applied hydrogeology.			
2. Calculate aquifer properties.			
3. Calculate groundwater flow.			
4. Calculate groundwater flow to wells.			
5. Calculate soil moisture and groundwater recharge.			
6. Assess groundwater quality.			
7. Discuss methods for drilling and completing wells.			
8. Discuss design elements of wells.			
9. Explain the importance of protecting wells from contamination.			
10. Prepare a Groundwater Investigation Report.			

## HYDR 220 – Hydraulics 1

You will study fluid mechanics principles including pressure measurement, forces on submerged planes, buoyancy and stability, general energy equation and viscosity. You will apply the fundamentals of hydrodynamics including hydraulics of flow in pipes, flow measurement devices and pumping system design.

**Credit unit(s):** 4.0  
**Pre and Co Requisites:** MAT 111, PHYS 104  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Define fluid and fluid properties.			
2. Discuss the Bernoulli General Energy Equation.			
3. Describe the fundamental laws of hydrodynamics.			
4. Apply Pascal’s Law.			
5. Apply velocity profiles in commercial pipes.			
6. Solve hydrostatic force problems for submerged flat plane.			
7. Solve buoyancy and stability problems for floating and submerged objects.			
8. Calculate friction and minor head losses in pipes.			
9. Measure fluid pressure.			

**INST 227 – Instrumentation & Measurement 1**

You will be introduced to various meteorological instruments in this laboratory-oriented course. You will measure various variables including precipitation, temperature, wind speed and direction, solar radiation, relative humidity, barometric pressure, and evaporation.

**Credit unit(s):** 4.0  
**Pre and Co Requisites:** MAT 110 PHYS 104  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss general considerations in selecting and operating meteorological instruments.			
2. Measure temperature.			
3. Measure relative humidity.			
4. Measure precipitation.			
5. Estimate snow water equivalent.			
6. Measure barometric pressure.			
7. Measure wind speed and direction.			
8. Measure sunshine duration and solar radiation.			
9. Measure evaporation.			
10. Measure soil moisture.			
11. Calibrate meteorological instruments.			
12. Analyze data collected by an automatic weather station.			



## LABS 220 – Water and Wastewater Laboratory Analysis

You will focus on the lab skills required to obtain water and wastewater quality measurements. You will be able to perform the tasks involved in obtaining analytical results from those samples and applying those results to the regulations and what those results are telling you about the water quality.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** MAT 110

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss safety requirements in the water and wastewater analysis laboratory.			
2. Discuss laboratory equipment, measurement techniques, federal, provincial standards, and regulations.			
3. Assess quality control for water and wastewater analysis results.			
4. Execute a standard method titration.			
5. Execute a total, calcium, and magnesium hardness analysis on a water sample.			
6. Perform an alkalinity, total and phenolphthalein, chloride, and sulphate analysis on a water sample.			
7. Perform a total and free residual chlorine and iron content analysis on a water sample.			
8. Analyze the significance of dissolved oxygen content of a water supply and/or receiving water.			
9. Analyze colour, true and apparent, and turbidity of a water/wastewater sample.			
10. Analyze a water/wastewater sample for the solids.			
11. Create a chlorine demand curve for an unknown wastewater sample.			

## STAT 201 – Statistics for Engineering Technology

You will gain knowledge of statistical concepts and techniques applicable to engineering technology. You will study descriptive statistics, probability distributions, the Central Limit Theorem, inferential statistics, and linear regression. This course is intended to build problem solving and critical thinking skills, and to demonstrate the importance of statistics in professional practices.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** none

**Equivalent course(s):** MAT 233, STAT 120, STAT 120CE, STAT 220

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
9. Define statistical terminology and procedures.			
10. Apply measures of central tendency to technical problems.			
11. Apply measures of dispersion and the Central Limit Theorem to descriptive statistics.			
12. Examine basic probability.			
13. Examine probability distributions of random variables.			
14. Apply the Normal Probability Distribution and the Central Limit Theorem to inferential statistics.			
15. Apply confidence intervals and tests of hypothesis to technical problems.			
16. Analyze paired statistical data using simple linear regression.			

**WTER 232 – Water & Wastewater**

You will study common and advanced unit processes utilized in water and wastewater treatment. You will examine detailed physical, chemical, and biological treatments utilizing information and skills in water chemistry and water and wastewater treatment. You will design components in a water/wastewater treatment plant. You will incorporate regulatory guidelines and industry standards into the design portion of the project.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** CHEM 200  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss the goals of environmental engineering.			
2. Discuss needs for water and wastewater treatments.			
3. Discuss private wastewater/water systems and small scale water/wastewater treatment plants.			
4. Discuss advanced wastewater/water treatment systems.			
5. Discuss sludge treatment options.			
6. Analyze fundamentals of process kinetics and the concept of microbiology.			
7. Analyze the factors affecting the water and wastewater treatment.			
8. Design a lagoon system and a standalone septic system.			
9. Design individual components of medium and/or large scale water and/or wastewater treatment plants.			

## CAMP 226 – Field Camp

You will participate in a number of field activities at the Hannin Creek Education and Applied Research Centre (HCEARC). You will perform a hydrographic survey of a river, perform an aquifer test to determine aquifer parameters and test the quality of a drinking water supply.

**Credit unit(s):** 4.0  
**Pre and Co Requisites:** SRVY 109  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b> I can apply this outcome without direction or supervision.  <b>Learning:</b> I am still learning skills and knowledge to apply this outcome.  <b>None:</b> I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Prepare a topographic map of the Hannin Creek Education and Applied Research Centre (HCEARC).			
2. Prepare a water table map of the HCEARC.			
3. Prepare a hydrographic survey of a river.			
4. Collect discharge and sediment data at a gauging station.			
5. Perform an aquifer test to determine aquifer properties.			
6. Analyze meteorological and hydrometric data sets.			
7. Assess the quality of a potable water supply.			
8. Evaluate the overall health of an aquatic ecosystem through the collection and assessment of abiotic and biotic indicators.			
9. Appraise the riparian health of a stream.			
10. Discuss the importance of aquatic and terrestrial ecosystems to the traditions and the sustenance of Indigenous communities.			

## HYDO 228 – Hydrology 1

You will study the basic concepts associated with the hydrologic cycle. You will acquire various meteorological and hydrometric data sets to perform a range of hydrologic analyzes. You will focus on the collection and utilization of data sets critical to the planning, design and operation of engineering projects related to the management of water resources.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** STAT 201  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b> I can apply this outcome without direction or supervision.  <b>Learning:</b> I am still learning skills and knowledge to apply this outcome.  <b>None:</b> I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss the application of meteorology and hydrology to solve engineering problems.			
2. Discuss the composition and structure of the Earth’s atmosphere.			
3. Explain how water changes states and circulates in the atmosphere.			
4. Explain the occurrence of severe weather events and weather forecasting techniques.			
5. Discuss how the physical characteristics of catchments influences hydrologic response.			
6. Analyze precipitation data.			
7. Calculate evapotranspiration.			
8. Calculate infiltration.			
9. Apply the water balance equation to a catchment.			

## HYDR 221 – Hydraulics

You will use industry standard software to design flow in pipe networks. You will examine open channel flow, pump selection and flow measurement techniques. You will use industry standard software to design pipe networks.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** HDYR 220  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Identify specific advanced applications of hydraulics.			
2. Design series problems.			
3. Develop culvert systems.			
4. Design parallel pipeline systems.			
5. Discuss the effects of turbomachinery to systems.			
6. Calculate power and efficiencies of turbomachinery.			
7. Solve open channel flow systems.			
8. Solve gradually varied flow systems.			

## INST 231 – Instrumentation & Measurement 2

You will study various instruments and techniques that are used to measure and estimate stage, stream discharge, groundwater levels, and sediment loads. You will operate various instruments and spend time in the field taking hydrometric measurements.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** INST 227 SRVY 108

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss the importance of hydrometric measurements for solving engineering problems.			
2. Demonstrate process control technologies.			
3. Demonstrate hydrometric telemetry systems.			
4. Measure the stage in a river.			
5. Estimate the discharge in a river.			
6. Measure stream sediment loads.			
7. Determine groundwater direction and aquifer parameters.			

## MGMT 103 – Construction Contracts

You will examine construction contracts as developed by the Canadian Construction Documents Committee (CCDC). You will discuss the laws and guidelines surrounding construction contracts. You will examine construction project organization and contracting methods. You will examine how a typical construction project is organized, bid, awarded, and completed. You will discuss the roles and responsibilities of all parties involved. You will use industry standard drawings and specifications.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** none

**Equivalent course(s):** MGMT 225

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Describe how a construction project is organized.			
2. Describe the roles of the inspector, consultant, contractor and owner in the successful completion of a construction project.			
3. Recognize how the principles of Canadian law affect a business relationship, professional ethics contracts and professional liability.			
4. Describe the components of a typical construction contract.			
5. Apply the Canadian Construction Documents Committee (CCDC) standards in the preparation of a construction contract.			
6. Discuss the bidding process and the law of competitive bidding.			
7. Discuss the use of bonds and legislative requirements.			
8. Examine how progress claims, extra work and change orders are initiated and approved for a construction project.			
9. Use drawings and specifications conforming to the Canadian Master Specification format to find information regarding a project.			



## WTER 226 – Organic Chemistry

You will study the general principles of organic chemistry and the importance of microbiology as they apply to water quality, environmental monitoring, control, and analysis. You will apply these theories to proper sampling protocol and laboratory analysis, with an emphasis on interpreting the laboratory results.

**Credit unit(s):** 3.0

**Pre and Co Requisites:** LABS 220 LABS 202

**Equivalent course(s):** none

<b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b>  <b>Competent:</b> I can apply this outcome without direction or supervision. <b>Learning:</b> I am still learning skills and knowledge to apply this outcome. <b>None:</b> I have no knowledge or experience related to this outcome.	<b>Competent</b>	<b>Learning</b>	<b>None</b>
1. Discuss safety requirements in a laboratory and in field study environments.			
2. Discuss the importance of organic chemistry in water quality.			
3. Differentiate between saturated and unsaturated hydrocarbons.			
4. Categorize the derivatives of hydrocarbons.			
5. Discuss biochemistry and the molecules of biological polymers.			
6. Analyze the concepts of microbiology.			
7. Conduct a Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD) analysis.			
8. Conduct instrumental analysis utilizing field equipment.			
9. Conduct microbiological analysis.			
10. Execute a water quality field analysis on a water body for use as a potable water supply.			

## WTER 231 – Watershed Management

You will study how water is managed at federal, provincial, and municipal levels. You will focus on how water is valued, and how decisions are made to protect consumptive and non-consumptive uses and how watershed planning is used to protect the quality of water.

**Credit unit(s):** 2.0

**Pre and Co Requisites:** Prerequisites - TERR 101 TERR 102, Corequisites - HYDO 228

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Relate the use of effective watershed monitoring to the application of adaptive resource management.			
2. Examine the watershed planning process with an emphasis on the importance of a stakeholder driven planning process.			
3. Value the ecological role that wetlands play in overall watershed health.			
4. Analyze how riparian health and the management decisions of riparian areas play an important role in overall watershed health.			
5. Identify the challenges facing First Nations communities as it relates to water quality and the implementation of the government’s “Duty to Consult” process.			
6. Investigate the challenges of agricultural drainage and the current government processes related to agricultural drainage.			
7. Apply the use of Geographic Information System (GIS) software to assist with watershed monitoring and planning.			

## ENVR 232 – Environmental Engineering

You will be introduced to Environmental Site Assessments (ESA) and Environmental Impact Assessments (EIA) including their components, processes, and applicable regulations. You will study the effects of engineering projects and human activities on the biophysical and human environment. You will illustrate the aims and objectives of an EIA as they pertain to Canada and Saskatchewan. You will implement the stages of an EIA, which includes proposals, screening, scoping through to monitoring and compliance.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** WTER 231

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss the evolution of the Environmental Impact Assessment (EIA) process in Canada and the United States.			
2. Identify the pertinent legislation governing the Canadian EIA process.			
3. Illustrate the objectives of EIA in Saskatchewan.			
4. Differentiate between the first two stages of the environmental impact process.			
5. Develop a project proposal including a stakeholder consultation plan.			
6. Develop an environmental impact statement from a project proposal.			
7. Perform a Phase I Environmental Site Assessment (ESA).			
8. Implement a ground disturbance and site safety plan.			
9. Execute a field sample collection plan.			
10. Assess field data in a Phase II ESA process.			
11. Create an ESA report and present results.			

## HYDO 229 – Hydrology 2

You will study the prediction of flood events. You will estimate peak flows by applying a variety of techniques commonly used in engineering hydrology. You will discuss flood mitigation measures. You will calibrate and validate a hydrologic model that will be used to estimate a design flood.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** HYDR 221 HYDO 228 INST 231

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Analyze streamflow data.			
2. Measure flood potential using drainage basin morphometric parameters.			
3. Calculate the probability of flood events.			
4. Perform a single-station flood frequency analysis.			
5. Calculate peak flow using the Rational Method.			
6. Calculate peak flow using the Soil Conservation Service (SCS) Graphical method.			
7. Calculate peak flow using unit hydrographs.			
8. Analyze the impact of rating curve development on flood estimates.			
9. Calculate snowpack accumulation and snowmelt runoff.			
10. Discuss flood mitigation measures.			
11. Discuss the issues associated with selecting a hydrologic model.			
12. Estimate a design flood using a hydrologic model.			

## MGMT 226 – Project Management

You will analyze the project management process. You will use industry standard construction documents to manage risk on a project. You will discuss jobsite safety procedures and documentation. You will practice scheduling, resource allocation and estimating. You will estimate cost for a small project. You will prepare a bid package for a small project.

**Credit unit(s):** 3.0  
**Pre and Co Requisites:** none  
**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.  <b>Learning:</b>I am still learning skills and knowledge to apply this outcome.  <b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
10. Describe industry standard common practices with regards to construction project management.			
11. Discuss stakeholder relations, negotiations, and dispute resolution.			
12. Discuss jobsite safety documentation and procedures.			
13. Create a project schedule using the Critical Path Method (CPM).			
14. Apply industry standard project quality management techniques.			
15. Analyze construction changes using industry standard management procedures and process claims.			
16. Formulate payments and cash flow projections.			
17. Examine the project closeout procedures and documentation.			
18. Assemble a bid package for a construction project.			

## MUNI 220 – Municipal Infrastructure

You will plan and design municipal infrastructures. You will review existing design compliance with current development bylaws. You will design a storm and sanitary sewer for the given network.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** HYDR 221, CADD 125

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
11. Discuss the zoning bylaws governing land for municipal development.			
12. Create an urban roadway.			
13. Employ methods for forecasting future utility use.			
14. Determine design flows for storm sewers.			
15. Design a storm sewer.			
16. Design a storm water management facility for a new subdivision.			
17. Determine flow and volume requirements for a water distribution system.			
18. Determine sanitary system flow characteristics.			
19. Design a sanitary collection system.			
20. Prepare a comprehensive set of drawings.			

## PROJ 206 – Capstone Project

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

**Credit unit(s):** 2.0

**Pre and Co Requisites:** none

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
7. Propose a project and research the technical and design aspects required to complete the project.			
8. Manage scheduling to ensure timely completion of the project.			
9. Collect data required per the project proposal.			
10. Analyze the project and provide solutions to project design.			
11. Prepare a final report.			
12. Defend project conclusions in a technical presentation.			

## RVRS 220 – River & Reservoir Engineering

You will become familiar with how nature and humans interact with rivers. You will study how river geometry changes in response to changes in flow and sediment transport. You will analyze the impacts of human interaction on river regime. You will apply aspects of reservoir engineering including the morphology, operation and design of reservoirs.

**Credit unit(s):** 4.0

**Pre and Co Requisites:** HYDR 221 INST 231

**Equivalent course(s):** none

<p><b>Use a checkmark (P) to rate yourself as follows for each learning outcome</b></p> <p><b>Competent:</b>I can apply this outcome without direction or supervision.</p> <p><b>Learning:</b>I am still learning skills and knowledge to apply this outcome.</p> <p><b>None:</b>I have no knowledge or experience related to this outcome.</p>	Competent	Learning	None
1. Discuss how hydrology, hydraulics and sediment transport governs river regime.			
2. Prepare river geometry data for flood forecasting.			
3. Perform a regional flood frequency analysis to support river engineering projects.			
4. Assess the impact of sediment transport on river regime.			
5. Analyze the effects of a bridge on river hydraulics.			
6. Design a regime channel.			
7. Apply a channel routing model.			
8. Discuss the main design elements associated with reservoirs.			
9. Determine the morphometric parameters of a reservoir.			
10. Calculate sedimentation in a reservoir.			
11. Analyze reservoir shoreline erosion.			
12. Apply a reservoir routing model.			



## TCOM 104 – Applied Research in Technology

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

**Credit unit(s):** 2.0

**Pre and Co Requisites:** TCOM 103, ENG 101

**Equivalent course(s):** COMM 115, COMM 182, COMM 290, TCOM 239

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