Mechanical Engineering Technology Diploma-to-Degree Pathway Agreement

(Contract #2017-27)

Final Report

May 2, 2018

Prepared by Quality Learning, Teaching & Innovation
Canadore College

This submission was prepared by:

Mélanie Dupuis, Project Leader
Quality Learning, Teaching and Innovation
Canadore College of Applied Arts and Technology
100 College Drive
North Bay, ON P1B 8K9
Telephone: (705) 474-7600, ext. 5820
Fax: (705) 474-2384
Email: melanie.dupuis@canadorecollege.ca

List of Participants and Partner Institutions

Canadore College

Deidre Bannerman, Academic Director, Quality Learning, Teaching and Innovation
Mark Lamontagne, Dean of Trades, Technology, Justice Programs and Part Time Studies
Mélanie Dupuis, Project Leader, Quality Learning, Teaching and Innovation
Stephen Parrick, Professor/Co-ordinator

Confederation College

Rick Clace, Dean, School of Aviation, Technology and Trades
John Kantola, Chair of Trades and Apprenticeship
Richard Kukkee, Program Coordinator
Joe Viera, Acting Dean, School of Aviation, Technology and Trades

Lakehead University

Dr. David Barnett, Acting Provost & Vice-President (Academic)
Dr. Basel I. Ismail, Chair, Mechanical Engineering
Dr. Antony Gillies, Acting Dean

NCCP

Dr. Marguerite Donohue, NCCP Project Administrator

Northern College

Aaron Klooster, Associate Dean, Trades and Technology
Shane Storing, Professor

Sault College

Corey Meunier, Chair, Technology and Skills Trades
Howard Gray, Professor/Program Coordinator

Table of Contents

Executive Summary

Project Description

Canadore College partnered with Lakehead University to formalize an ongoing academic relationship for the purpose of facilitating student movement and regularly examining programmatic collaborative opportunities. The partners were to develop a clear pathway agreement for the Mechanical Engineering Technology, Ontario College Advanced Diploma, to the Post-Diploma Bachelor of Engineering (Mechanical) degree, which would increase diploma-to-degree student movement and help meet employment demand. This project would also engage all Northern Colleges Collaborative Programming (NCCP) colleges offering Mechanical Engineering Technology advanced diploma programs.

Project Goals

The facilitation of learner mobility and laddering of credentials, while balancing community-based learning opportunities to get students on a path to a career, is a growing need in rural and remote areas. These challenges are common and are of paramount importance to address for students in Northern Ontario.

Simply stated, the goals of this project are to:

1) Align the northern colleges' (Cambrian (in development), Canadore, Confederation, Northern, and Sault) Mechanical Engineering Technology programs to ensure a clear <u>path</u> to Lakehead University's Bachelor of Engineering (Mechanical) degree program.
    a. The participating institutions feel the need to emphasize the focus of the goal is the <u>path</u> to the degree is being aligned (which may require some reach-back into years 1 and 2 of the colleges' curriculum). Emphasis on this is important, as it is recognized that the mandate of the NCCP project is to align college programming, outside that scope is to build the <u>*path for the colleges to the university*</u>, which is the focus of this goal.
2) Reduce student course overload by aligning the Mechanical Engineering Technology curriculum to eliminate the 3 to 5 courses that students are required to pick up as "missing requirements".
3) Lessen the burden on students by aligning curriculum to potentially reduce the number of bridging (ideally, from 4 to 2 for summer transition) math courses graduates of Mechanical Engineering Technology programs have to take.
4) Begin discussions for other potential engineering pathways to Lakehead University.

The main goal of the project is to develop a pathway between the Mechanical Engineering Technology, Ontario College Advanced Diploma and Lakehead's Post-Diploma Bachelor of Engineering (Mechanical) degree and provide the learner with laddering and mobility options to further their career both locally and within the province of Ontario (as captured in items 1 to 3 above).

The intention of this diploma-to-degree pathway partnership is to develop a seamless pathway that will provide Mechanical Engineering Technology students in the North, the opportunity to acquire their degree while minimizing their costs and minimizing the time before commencing their professional career. The primary focus of the project is to provide Northern Ontario colleges' Mechanical Engineering Advanced Technology Diploma graduates access to the Lakehead University Post-Diploma Bachelor of Engineering (Mechanical) degree program, with maximum transferability and the opportunity to complete some components, without leaving the North. In place of occasional, ad hoc, individual transfer agreements, a formalized academic partnership structure will be established. Emphasis will be to facilitate student movement through various methods within the parameters of government or programmatic regulations as suited to this particular discipline. Furthermore, Canadore's engagement with the NCCP

project will open opportunities for colleges in the North who deliver Mechanical Engineering Technology diploma programs to participate in the pathway partnership.

Final Results

The NCCP-Lakehead committee along with Faculty/Program Coordinators collaboratively created a clear pathway for students.

The partners aligned the northern college's (Cambrian (in development), Canadore, Confederation, Northern and Sault) Mechanical Engineering Technology (third year curriculum) program to ensure a clear path to Lakehead University's Bachelor of Engineering (Mechanical) degree program.

Qualified graduates of the Mechanical Engineering Technology, Ontario College Advanced Diploma from Canadore College, Northern College, Confederation College and Sault College are eligible to apply for admission to the Post-Diploma Bachelor of Engineering (Mechanical) degree program at Lakehead University. Students are admitted into the Post-Diploma Program which includes the summer transition courses (currently, ENGI3021, ENGI3022, ENGI3014, and ENGI3017) and specific "make-up courses". Advancement is not dependent on passing all four transition courses. Students from the participating Northern Colleges admitted into the Post-Diploma Bachelor of Engineering (Mechanical) degree program at Lakehead University are required to successfully complete the following two additional (make-up) courses in addition to the program requirements towards completion of the degree program:

- COMP-1411 - Computer Programming I
- EMEC-1533 – Mechanics of Materials II

It should be noted that these required make-up courses were determined using the gap-analysis (Appendix 2) based on the academic curricula for the four NCCP participating colleges (Appendix 3) and the NCCP Mechanical Engineering Technology common third year curriculum (Table 2):

The minimum grade average requirements for admission to the Post-Diploma Bachelor of Engineering (Mechanical) program at Lakehead University is available on the official website of Lakehead University:

https://www.lakeheadu.ca/academics/faculties/engineering/college-transfer-program/admissions

Future Participation of Cambrian College

Although Cambrian College does not currently offer the Mechanical Engineering Technician program, they have collaborated and participated throughout this entire project. If they do decide to offer the program in the future, they will use the same Mechanical Engineering Technology (3rd year curriculum) as Canadore College, Confederation College, Northern College and Sault College. They may also choose to contact Lakehead University directly to initiate the development of a pathway agreement for the Mechanical Engineering Technology to the Post-Diploma Bachelor of Engineering (Mechanical) degree and have indicated that they plan to do so.

Collaboration Model

All partners involved with this project agree that this collaborative model should be used for other potential programs. Conversations regarding future engineering pathways to Lakehead University similar to this one have already taken place.

Project Purpose and Goals

Description

Canadore College proposes to partner with Lakehead University to formalize an ongoing academic relationship for the purpose of facilitating student movement and regularly examining program collaborative opportunities. The partners will develop a clear pathway agreement for the Mechanical Engineering Technology, Ontario College Advanced Diploma, to the Post-Diploma Bachelor of Engineering (Mechanical) degree, which will increase diploma-to-degree student movement and help meet employment demand. This project will also engage all Northern Collaborative College Project (NCCP) colleges offering Mechanical Engineering Technology diploma programs.

Project Goals

The facilitation of learner mobility and laddering of credentials, while balancing community-based learning opportunities to get students on a path to a career, is a growing need in rural and remote areas. These challenges are common and are of paramount importance to address for students in Northern Ontario. Simply stated, the goals of this project are to:

1. Align the northern colleges' (Cambrian (in development), Canadore, Confederation, Northern, and Sault) Mechanical Engineering Technology programs to ensure a clear path to Lakehead University's Bachelor of Engineering (Mechanical) degree program.
    a. The participating institutions feel the need to emphasize the focus of the goal is the path to the degree is being aligned (which may require some reach-back into years 1 and 2 of the colleges' curriculum). Emphasis on this is important, as it is recognized that the mandate of the NCCP project is to align college programming, outside that scope is to build the *path for the colleges to the university*, which is the focus of this goal.
2. Reduce student course overload by aligning the Mechanical Engineering Technology curriculum to eliminate the 3 to 5 courses that students are required to pick up as "missing requirements".
3. Lessen the burden on students by aligning curriculum to potentially reduce the number of bridging (ideally, from 4 to 2 for summer transition) math courses graduates of Mechanical Engineering Technology programs have to take.
4. Begin discussions for other potential engineering pathways to Lakehead University.

Background and Motivating Factors

Early evidence of well-developed pathways into Baccalaureate degrees offered at the colleges show their increasing appeal to college diploma graduates. Increased access to degree opportunities also requires attention given the geographic challenges. Evidence shows that college graduates are more likely to transfer to a local university (see http://www.heqco.ca/SiteCollectionDocuments/TransferExperienceofOntarioCollegeGraduates.pdf); providing transfer opportunities for students to remain at home is critical.

The evidence suggests, therefore, that increased transfer success is supported by three conditions:

- Programs of high affinity (and thereby increased transfer credit);
- Geographic proximity; and
- Learning options.

The intent of an NCCP-Lakehead academic partnership model would be to actively address these areas

including the Mechanical Engineering Technology pathway as well as explore new degree pathways for other programs. To facilitate diploma-to-degree movement, the partnership would engage in an exhaustive curriculum content evaluation of existing offerings.

Pathway Development

Methodology

Throughout the entire project, faculty, staff and all stakeholders were engaged throughout the pathway development process to ensure the utmost quality and integrity of the Mechanial Engineering degree pathway.

The NCCP-Lakehead academic partnership model established a permanent Steering Committee comprised of the senior level academics from each of the institutions to oversee and guide the development of collaborative academic programming and delivery. The established Steering Committee was responsible for:

- Identifying new areas for compatible diploma and degree development to increase transfer opportunities;
- Initiating specific curriculum committees to ensure high affinity;
- Initiating investigation of new and innovative academic delivery structure;
    - Development of new online courses
    - Investment in and experimentation with synchronous learning classrooms
    - Delivery of courses of one college taught by faculty of the other
- Identify infrastructure areas for development and assign respective committees for review and recommendations;
- Ensure appropriate communication mechanisms are fully utilized;
    - Timely posting of evaluations and transfer agreements on ONTransfer
    - Posting to the Canadore, Confederation, Northern, Sault and Lakehead websites
    - Degree and Credit Transfer Office staff providing guidance to Canadore, Confederation, Northern and Sault transfer students utilizing communication technology
- Regularly review progress and establish yearly objectives;

Program Comparison and Analysis

To facilitate diploma-to-degree movement, the partnership engaged in an exhaustive curriculum evaluation of existing offerings. In the initial phase of the evaluation process, Lakehead University individually reviewed the Mechanical Engineering – Technician program curricula for each of the NCCP participating colleges (Canadore, Northern, Confederation and Sault). The main objective was to identify courses deficiencies and hence provide insights into the development and design of the NCCP Mechanical Engineering Technology common third year program curriculum (i.e. a curiculum that would be common to all four participating colleges). This included rigorous course by course outline analysis for each existing Mechanical Engineering Technician program's curriculum (2017-2018) of the NCCP participating college and mapping out the contents of the courses with the year one and year two level courses in the Bachelor of Mechanical Engineering's program curriculum at Lakehead University. The results of this courses difficiency (gap) analysis showed that (see Appendix 1), Candore College's curriculum is deficient by 9 courses, Northern by 8 courses, Confederation and Sault each by 10 courses. The results and insights were then communicated and discussed with the representatives of the NCCP four participating colleges. Based

on this, they then provided a draft of the NCCP Mechanical Engineering Technology common third year program curriculum. This included NCCP third year model courses titles, description of contents, and credit hours. The draft was then reviewed by Lakehead University for feedback in order to optimize the NCCP third year curriculum by minimizing the number of additional (make-up) courses that graduates from the NCCP participating colleges, if enrolled, would have to take at year 3 of the Post-Diploma Bachelor of Mechanical Engineering program at Lakehead University. Modifications to some model courses, in terms of titles and contents, were suggested by Lakehead University and most of the suggested revision were incorprated into the Mechanial Engineering advanced diploma year three curriculum. i. The finalized NCCP Mechanical Engineering Technology common third year program curriculum is shown in Table 2 of this report.

Table 1: Deliverables

Id.	Title	Tasks	Planned completion date	Mid-project planned completion date	Actual completion date
1	Project Committee Selection	Canadore College and Lakehead University will create a project committee and enlist the required contacts at both institutions. The committee will work collaboratively to define project tasks and assign these accordingly. The institutions will also engage the NCCP colleges.	April 30, 2017	April 30, 2017	April 15, 2017
2	Scheduled Meeting Plan	The project committee will determine a scheduled timeline of meetings in order to complete the project tasks. The committee will discuss the number of meetings that need to take place and the types of meetings (i.e. teleconference, in-person, etc.).	May, 31, 2017	May 31, 2017	April 21, 2017
3	Mechanical Engineering Pathway Development	Consultation with Subject Matter Experts and pathway development partners. Analysis of program learning outcomes and curriculum review and alignment if and where applicable.	October 31, 2017	December 5, 2017	February 5, 2018
4	Face-to-face Meeting	NCCP group to meet at Canadore College for a project overview/current status, ONCAT goals review, budget, Mechanical Engineering Technician Program gap analysis and the plan moving forward.	November 17, 2017	November 17, 2017	November 17, 2017
5	Proposed Pathway	Proposed changes will be submitted to the institutions' various program quality and evaluation departments.	November 31, 2017	December 23, 2017	February 23, 2018
6	Pathway Validation	A mid-project progress report will be submitted.	December 31, 2017	January 20, 2018	March 20, 2018
7	Pathway Adoption and Posting	Draft pathways will be reviewed and changes implemented. Agreement will be signed by both institutions.	February 28, 2018	February 28, 2018	April 30, 2018
8	New Pathway Opportunities	New pathway opportunities identified and delegation of tasks, to explore the new pathways, are established.	March 10, 2018	March 10, 2018	April 20, 2018

Table 2: NCCP Mechanical Engineering Technology Common Year 3 Curriculum
Starting Fall 2018

SEMESTER 5 - FALL 2018 (15 wks)			
COURSE TITLE	**HRS**	**TOTAL SEM HRS**	**COURSE DESCRIPTION**
Engineering Operations and Management (MEC901)	4	60	In this course, students learn concepts required to design competitive manufacturing systems. Topics include continuous improvement, cellular layouts, line balancing, equipment pay-back, cycle times, multi-product production and cost estimation. In this course students learn concepts required to design and operate competitive manufacturing/industrial systems. Topics include product-production design interaction, facilities location and layout, material handling, work measurement, financial compensation, human factors, operations planning and control, quality control, linear programming, inventory control, and project management.
Dynamics (MEC902)	3	45	In this course, students learn about kinematics of particles: rectilinear motion, planar curvilinear motion using various coordinate frames (such as rectangular, normal-tangential and radial-transverse), and analysis using Newton's Second Law. Students also study the kinematics of rigid bodies: translation, rotation, general planar motion, forces and accelerations, mass moment of inertia, and static forces in machines.
Advanced Calculus (MEC903)	4	60	In this advanced course in calculus, students learn several methods of integration, Maclaurin, Taylor and Fourier series, various types of first and second order differential equations, an introduction to Laplace transforms, and applications to the mechanical, electrical/electronic technologies.
Advanced Fluid Mechanics (MEC904)	3	45	In this course, students learn about fundamentals and advanced topics of fluid mechanics. Topics include the nature of fluids and the study of fluid mechanics, viscosity of fluids, pressure measurement, forces due to static fluids, buoyancy, flow of fluids, general energy equation, Reynolds number and energy losses due to friction, minor losses, series pipeline systems, pump selection and application, flow measurement, forces due to fluids in motion, and drag and lift.
Mechanical Lab I (MEC905)	2	30	The Mechanical Lab 1 course supplements and supports the Advanced Fluid Mechanics and Dynamics courses with practical learning. Lab topics in Advanced Fluid Mechanics include application of the Energy Principle, experimental determination of minor losses and losses in series/parallel pipeline systems, and pump selection through given parameters. Lab topics in Dynamics include rigid links, cams, and gears.
Research Project I (MEC906)	3	45	In the two Research Project courses, students complete an independent technical project. These courses mirror working conditions that are frequently encountered in industry; that is, they are a self-directed, comprehensive study of a specific topic in the student's field, one not covered in other courses. In Research Project I, students prepare a detailed project schedule, meet weekly with faculty and industry advisors, prepare weekly progress reports, and deliver a formal technical project proposal. In the selected research project, students incorporate the following technology design aspects of a selected product: incorporate design synthesis process, apply some design methods, use some tools for designing the selected product, apply some graphical communication, related prototyping and proof of concept, introduce some related economic analysis and costing, ensure team organization, management and professionalism and ethics in the design process. Students begin work on the project in this course in preparation for project completion in Research Project II.
Totals	**19**	**285**	

SEMESTER 6 - WINTER 2019 (15 wks)			
Metrology and Quality Control (MEC907)	3	45	This course is dedicated to quality systems and learning the theory behind basic metrology. Students gain a theoretical understanding of calibration techniques and learn calibration standards, statistical process control, and methods of measurement using different measuring devices.
Advanced Strength of Materials (MEC908)	3	45	This course builds on concepts students have learned in earlier courses. In this course, beams will be analyzed using first principles in terms of shear, bending and deflection with applications to statically determinant and indeterminate problems. Columns will also be analyzed for crushing (short columns) buckling (long slender columns). Euler's equation will be used to analyze columns with various end conditions.
Advanced Dynamics of Machines (MEC909)	3	45	In this course, students build upon knowledge and concepts from the previous dynamics course. The relationships between work and force, work and energy, energy and power will be learned. Conservation of forces, conservation of energy (potential, kinetic, electrical), and efficiency will be discussed. Linear and angular momentum and impulse principles will be analyzed with respect to systems of particles and impact examples. Conservation of momentum and conservation of energy will be used to analyze problems. Three-dimensional kinematics of rigid bodies will be analyzed with respect to velocities and accelerations. Students will also create mechanism displacement diagrams (for straight and curved links) of machine members using the relative velocity method, instantaneous centers, velocity polygon, relative acceleration polygon, Coriolis acceleration, machine dynamics which includes inertia force method and analysis of translation, rotation, and plane motion, balancing rotating and reciprocating masses, and whirling of shafts.
Machine Design (MEC910)	3	45	In this course, students learn how to design, select and integrate common machine elements found in mechanical devices and systems including shafts, bearings, springs, gears, cams, belts, and chains. Students will also analyze the performance of fasteners and welded joints in various loading conditions and be introduced to failure mechanisms.
Applied Thermodynamics and Heat Transfer (MEC911)	2	30	In this course, students build upon fundamentals from previous study in the application of thermodynamics and heat transfer. Concepts will include: phase-change processes, property diagrams (p-T, p-v and T-v diagrams), thermodynamic tables, work, heat and energy transfer, heat transfer mechanisms (conduction, convection, radiation), thermal resistance analogy, application of the 1st-Law of thermodynamics to (a) a process, (b) a cycle of a closed system, energy analysis of closed systems, applications of the 1st-law for steady-state-steady-flow processes and devices, and heat exchangers.
Mechanical Lab II (MEC912)	3	45	The Mechanical Lab II course supplements and supports the Advanced Strength of Materials, Advanced Dynamics, Machine Design, and Applied Thermodynamics and Heat Transfer courses with practical learning. Lab topics in Advanced Strength of Materials include stresses in beams, deflection in beams, and columns. Lab topics in the Advanced Dynamics include forces in machines and balancing rotating/reciprocating masses. Lab topics in Machine Design include connections, material strength, and power transmission. Lab topics in Applied Thermodynamics and Heat Transfer include heat transfer and psychrometry.
Research Project II (MEC913)	4	60	In the two Research Project courses, students complete an independent technical project. These courses mirror working conditions that are frequently encountered in industry; that is, they are a self-directed, comprehensive study of a specific topic in the student's field, one not covered in other courses. Research Project II is a continuation of Research Project I, where students continue to work on their project, meet with faculty and industry advisors, and prepare written progress reports. Students also learn the theory necessary for the preparation, writing, and oral defense of a formal technical report. Students do a presentation of the formal technical report on their completed project.
Totals	**21**	**315**	
TOTAL HOURS/CREDITS	**40**	**600**	

Implementation Process and Timelines

A copy of the signed Pathway Agreement will be provided to each of the participating college's Pathway Officer by May 15, 2018. The Pathway Officer will ensure that the Pathway Agreement is posted on their college's website.

As for the ONtransfer website, since the receiving institution is Lakehead University, they will be responsible to provide the Pathway MOU to ONCAT by May 31st, 2018.

Summary of Pathway Created

Although Cambrian College does not currently offer the Mechanical Engineering Technician program, they have collaborated and participated throughout this entire project. If they do decide to offer the program in the future, they will use the same Mechanical Engineering Technology (3rd year curriculum) as Canadore College, Confederation College, Northern College and Sault College. They may also choose to contact Lakehead University directly to initiate the development of a pathway agreement for the Mechanical Engineering Technology to the Post-Diploma Bachelor of Mechanical Engineering degree and have indicated they plan to do so.

Qualified graduates of the Mechanical Engineering Technology, Ontario College Advanced Diploma from Canadore College, Northern College, Confederation College and Sault College are eligible to apply for admission to the Post-Diploma Bachelor of Mechanical Engineering degree program at Lakehead University. Students are admitted into the Post-Diploma Program which includes the summer transition courses (currently, ENGI3021, ENGI3022, ENGI3014, and ENGI3017) and possible make-up courses. Advancement is not dependent on passing all four transition courses. Advancement is not dependent on passing all four transition courses. In addition to meeting the program requirements, Mechanical Engineering Technology graduates from the participating Northern Colleges admitted into the Post-Diploma Bachelor of Mechanical Engineering degree program at Lakehead University are required to successfully complete the following make-up courses in addition to the program requirements towards completion of the degree program:

- EMEC-1533 – Mechanics of Materials II
- COMP-1411 - Computer Programming I

It should be noted that these required make-up courses were determined using the gap-analysis based on the academic curricula for the NCCP four participating colleges and the NCCP common third year curriculum as listed in the Appendix 1 and Appendix 2.

For more detailed information, please refer to the Pathway Template submitted in a separate document.

Promising Practices and Lessons Learned

Great effort was made to eliminate some of the summer transition courses. However, it was decided by the NCCP Deans that it is better to have the students who are pursuing the degree take the four summer transition courses rather than designing the common Mechanical Engineering Technology program in a way that is too demanding for those students not pursuing the degree pathway. The college partners found it challenging to balance between aligning courses to the Bachelor of Mechanical Engineering Degree program to minimize the number of additional make-up courses, while ensuring that the Mechanical Engineering Technology PVLOs were met. Much of the learning in the transition courses if beyond the PVLOs.

Aligning the third year curriculum amongst the NCCP colleges made the gap analysis more efficient and simplistic since Lakehead University only had to analyze one Mechanical Engineering Technology curriculum instead of four different curricula. Having the NCCP-Lakehead academic partnership enabled us to collaborate and reduce the additional number of make-up courses from 6-8 to only 2.

A challenge encountered during this project was the 5-week provincial college faculty labour disruption that resulted in a delay in meeting our milestones. As a result, the NCCP colleges' Deans of Trades and Technology met, discussed timelines, determined a revised plan, and requested an extension of approximately two months in order to meet the milestones.

Despite the challenges that came as a result of the college faculty strike, the engagement and cooperation from the Coordinators for this project was exemplary. Without their dedication to this project, deadlines would not have been met. Also, ongoing communication with all partners and ONCAT was key to successfully completing all milestones on time.

Appendices

Appendix 1 - Mechanical Engineering Technician - College Program Analysis

Canadore College

Mechanical Engineering Technician program - Canadore College	
(Ref: https://www.canadorecollege.ca/programs/mechanical-engineering-technician)	
Mech Tech Courses-Canadrore College (2017-2018)	
2 years, 4 semesters	
Courses Defficiency for Canadore	
Gap-Analysis Results:	CMM140 (Technical Writing I)
	CMM300 (Researching and Reporting II)
COMP-1411	
EMEC 2336	MET210 (Manufacturing Process)
EMEC 1112	ECM100 (Estimating/Project Mangement)
EMEC 2111	CAD100 (Computer Aided Design I)
EMEC 1533	CAD150 (Computer Aided Design II)
EMEC 2333	CAD210 (Advanced Cad - 3D Design)
Techology Project/HVAC	
ENGI 2939	
EMEC 2518	MCH120 (Applied Statics), PHY160 (Introduction to Statics) (used to beFundamental Physics for Engineering)
EMEC 2434	MET240 (Mechanics & Dynamics of Machines) used to be MET110 (Mechanics & Dynamics)-phased out, April 25,2018
	MET215 (Applied Strength of Materials)
	ECM260 (Fluid Mechnaics)
	MET250 (Electrical and Electronic Fundamentals)
Gap/Difficiency Cousrse = 9	

Northern College

Mechanical Engineering Technician - Northern College	
(Ref: http://www.northernc.on.ca/mechanical-engineering-technician/)	
2 years, 4 semesters	Mech Tech Courses-Northern College (2017-2018)
Courses Defficiency for Northern	Existing Courses at Northern Mechanical Technician program
College (compared to LU-Mech)	CM1903 (Communications I),
	CM2903 (Communications II)
Computer Programming I	IN3263(Embeded Programming and Netwroks)
COMP-1411	AR2014 (Statics)
EMEC 2111	ME3253 (Dynamics)
EMEC 2336	GN1033 (Health and Safety)
EMEC 1112	ME3044(Manufacturing Processes I)
EMEC 1533	MM1002 (Millwright Machining I)
EMEC 2333	MM3003(Industrial Indoctrination)
EMEC 2518	IN1224(CAD I),
EMEC 2434	ME2014 (Mechanical Design/CAD II),
	ME4044 (Mechanical Design/CAD III)
Gap/Difficiency Cousrse = 8	WE3044 (Strength of Materials I) was WE3034 (Strength of Materials)
	ME3013 (Fluid Mechanics)
	ME4013 (HVAC)
	ME3003 (Electrical/Electronic Fundamentals)

Confederation College

Mechanical Engineering Technician - Confederation College			
(Ref: http://www.confederationcollege.ca/program/mechanical-engineering-technician/courses)			
2 years, 4 semesters	MechTech Courses-Confederation College (2017-2018)		
Courses Defficiency for Confederation			
College (compared to LU-Mech)	CS007 (Pursuasive Writing)		
	CS219 (Communications for Technology)		
EMEC 2336			
COMP-1411	MX301 (Statics), MX475 (Advanced Structural Design)		
EMEC 1533	MX460 (Introduction to Electricity)		
EMEC 1112	MX121 (Mechanical Practices)		
EMEC1111	MX131 (Metrology/Machine Shop I)		
EMEC 2111	MX141 (Welding Practices I)		
EMEC 2333	MX231 (Machine Shop II)		
EMEC 2518	MX241 (Welding Practices II)		
EMEC 2434	MX455 (Materilas and Processes)- phased out in 2017-2018		
Techology Project/HVAC	MX431 (Intro to CNC)		
ENGI 2939	MX341 (Strength of Materials), MX475 (Advanced Structural Design)		
	MX491 (Operation Management) - phased out, April 25-2018		
	MX111 (Engineering Graphics)		
Gap/Difficiency Cousrse =10	MX271 (Industrial Design I)		
	MX371 (Industrial Design II)		
	MX261 (Power Transmission)		
	MX495 (Mechanical Project Management)? Removed from the updated program		
	MX361 Power Transmission II (used to be Mechanical Design before April 2018)		
	MX381 (Fluid Power), MX481 (Fluid Mechanics), MX471 (Power Transmission III)		
	MX410 (Intro to Thermodynamics)		

Sault College

Mechanical Engineering Technician - Manufacturing - Sault College		
https://www.saultcollege.ca/Programs/Programs.asp?progcode=4039&cat=overview&groupcode=ENG		
2 years, 4 semesters	Mech Tech Courses-Sault College (2017-2018)	
Courses Defficiency for Sault		
College (compared to LU-Mech)	Existing Courses at Candaroe Mechanical Technician program	
EMEC 1112	CMM115	Communication I
EMEC 2336	MCH121	Machine Shop Theory and Measurement
EMEC 2518	MCH134	Materials and Fasteners
COMP-1411	MCH144	Machine Shop Practical I
EMEC 1111	MCH145	Machine Shop Practical II
EMEC 2111	MET207	Metallurgy
EMEC 1533	WLD121	Welding I
EMEC 2333	MCH244	Manufacturing Processes
EMEC 2434	MCH110	Applied Mechanics
Techology Project/HVAC	ENV102	Industrial and Health Safety
ENGI 2939	MCH253	Bearing & Seals
	MCH254	Prenvetive Predective Maintenance
Gap/Difficiency Cousrse =10	MCH257	Machine Technology
	DRF105	Drafting and Bluprint Reading
	CAD225	Autocad Drawings and Schematics
	CAD401	Advanced CAD
	MCH103	Strength of Materials
	MCH125	Fluid Mechanics I
	MCH256	Introduction to Thermodynamics
	ELR111	Electrical and Electronic Controls
	ELR213	Electrical and Electronic Controls II

Appendix 2 - NCCP - Mechanical Engineering Technology (common year 3) - College Program Draft - Analysis

COURSE TITLE	HRS	TOTAL SEM HRS	COURSE DESCRIPTION (NCCP Revisions)	Modified course title (proposed)	Modified COURSE DESCRIPTION (NCCP Revisions)	Equivalent Course at Lakehead U.	Lab Required	Exempted College
Engineering Operations Management	4	60	In this course students learn concepts required to design competitive manufacturing systems. Topics include continuous improvement, cellular layouts, line balancing, equipment pay-back, cycle times, multi-product production and cost estimation.	Engineering Operations & and Management **Agreed**	In this course students learn concepts required to design and operate competitive manufacturing/industrial systems. Topics include product-production design interaction, facilities location and layout, material handling, work measurement, financial compensation, human factors, operations planning and control, quality control, linear programming, inventory control, and project management. **Agreed**	ENGI 2336: Industrial Engineering	No	None
Mechanics of Machines	3	45	In this course students study mechanism displacement diagrams of machine members by relative velocity method, instantaneous centers, velocity polygon, relative acceleration polygon, coriolis acceleration, and straight and curved links. **Revised NCCP Description:** In this course students learn about kinematics of particles: rectilinear motion, planar curvilinear motion using various coordinate frames (such as rectangular, normal-tangential and radial-transverse), and analysis using Newton's Second Law. Students also study the kinematics of rigid bodies: translation, rotation, general planar motion, forces and accelerations, mass moment of inertia, and static forces in machines.	Dynamics **Agreed**	In this course students learn about kinematics of particles, rectilinear motion analysis~~using differentiation and integration~~, planar curvilinear motion analysis using coordinate frames such as rectangular, normal-tangential and radial-transverse, kinetics of particles, Newton's Second Law, rectilinear motion using Newton's Second Law of Motion, planar curvilinear motion using Newton's Second Law of Motion, kinematics of rigid bodies, translation, rotation, general planar motion, kinetics of rigid bodies – forces and accelerations, mass moment of inertia, translation, fixed-axis rotation, general planar motion, static forces in machines. **See revision in cell I8.**	ENGI 1111 & partly ENGI 3451	No	Canadore & Northern Colleges
Advanced Calculus	4	60	In this advanced course in calculus students learn several methods of integration, Maclaurin, Taylor and Fourier series, various types of first and second order differential equations, an introduction to Laplace transforms, and applications to the mechanical, electrical/electronics technologies.					None
Advanced Fluid Mechanics	3	45	In this course students learn about energy as it relates to fluid, dimensional analysis, the use of boundary layers, flow in conduits including turbulent and laminar flow, and pressure/velocity and flow measurements. Students also learn about system design based on pump selection, pump curves and pump installation.		In this course students learn about fundamentals and advanced topics of fluid mechanics. Topics include the nature of fluids and the study of fluid mechanics, viscosity of fluids, pressure measurement, forces due to static fluids, buoyancy, flow of fluids, general energy equation, Reynolds number and energy losses due to friction, minor losses, series pipeline systems, pump selection and application, flow measurement, forces due to fluids in motion, and drag and lift. **Agreed**	ENGI 1635: Fluid Mechanics	Yes (MEC905: Mechanical Lab I, already in the NCCP model)	All 4 colleges (Canadore, Northern, Sault, Confederation)
Mechanical Lab I	2	30	The Mechanical Lab 1 course supplements and supports the Advanced Fluid Mechanics and Mechanics of Machines courses with practical learning. Lab topics in Advanced Fluid Mechanics include application of the Energy Principle, experimental determination of minor losses and losses in series/parallel pipeline systems, and pump selection through given paramenters. Lab topics in Mechanics of Machines include rigid links, cams, and gears.					None
Research Project I	3	45	In the two Research Project courses, students complete an independent technical project. These courses mirror working conditions that are frequently encountered in industry; that is, they are a self-directed, comprehensive study of a specific topic in the student's field, one not covered in other courses. In Research Project I, students prepare a detailed project schedule, meet weekly with faculty and industry advisors, prepare weekly progress reports, and deliver a formal project proposal. Students begin work on the project in this course in preparation for project completion in Research Project II.	Research Project I (No change): check to see if title was changed. Not changed.	**Revised NCCP Description:** In the two Research Project courses, students complete an independent technical project. These courses mirror working conditions that are frequently encountered in industry; that is, they are a self-directed, comprehensive study of a specific topic in the student's field, one not covered in other courses. In Research Project I, students prepare a detailed project schedule, meet weekly with faculty and industry advisors, prepare weekly progress reports, and deliver a formal technical project proposal. Students begin work on the project in this course in preparation for project completion in Research Project II. ~~In research project I, students learn how to write an academic/technical report using English language proficiency.~~	ENGI 2939	No	None
Totals	**19**	**285**						

Metrology and Quality Control	3	45	This course is dedicated to quality systems and learning the theory behind basic metrology. Students gain a theoretical understanding of calibration techniques and learn calibration standards, statistical process control, and methods of measurement.	Metrology~~, Measurements &~~ and Quality Control	**Revised NCCP Description:** This course is dedicated to quality systems and learning the theory behind basic metrology~~and measurements~~. Students gain a theoretical understanding of calibration techniques and learn calibration standards, statistical process control, and methods of measurement using different measuring devices.	Partly ENGI 2434: Engineering Measurements and Instrumentations	Yes (can be covered in MEC905, NCCP course model)	None
Advanced Strength of Materials	3	45	This course builds on concepts students learned in earlier courses. In this course, students learn the concepts of shear force, bending moment and deflection in beams. Buckling and crushing behavior in columns will be studied. Beams and columns will be classified, analyzed and designed. **Revised NCCP Description:** This course builds on concepts students have learned in earlier courses. In this course, beams will be analyzed using first principles in terms of shear, bending and deflection with applications to statically determinant and indeterminate problems. Columns will also be analyzed for crushing (short columns) buckling (long slender columns). Euler's equation will be used to analyze columns with various end conditions.		This course builds on concepts students learned in earlier courses. In this course, students learn the concepts of shear force, bending moment and deflection in beams, ~~Stresses in thin-walled pressure vessels, combined loadings, stress transformation equations for plane-stress, Principal stresses and maximum in-plane shear stress, Mohr's circle for plane-stress, Absolute maximum shear stress, Strain transformation equations for plane-strain, Principal strains and maximum in-plane shear strain, Mohr's circle for plane strain, Absolute maximum shear strain.~~ ~~o Strain rosette analysis. Principal strains associated with plane stress.~~ ~~o Differential equation of the elastic curve. Deflections by integration of the moment equation.~~ o Deflections by superposition. Application to statically determinate and statically indeterminate problems. o Buckling of long slender columns. Euler's equation for pin ended columns and columns with other end conditions. ~~o Eccentrically loaded columns: the secant formula.~~ **See NCCP revision in cell I16.**	ENGI 1233 and ENGI 1533	Yes (can be covered in MEC913 Mechanical Lab II, NCCP course model)	None
Advanced Mechanic	3	45	In this course students learn about static forces in machines. Students also learn about machine dynamics which includes inertia force method and analysis of translation, rotation, and plane motion, balancing rotating and reciprocating masses, and whirling of shafts. **Revised NCCP Description:** In this course students build upon knowledge and concepts from the previous dynamics course. The relationships between work and force, work and energy, energy and power will be learned. Conservation of forces, conservation of energy (potential, kinetic, electrical), and efficiency will be discussed. Linear and angular momentum and impulse principles will be analyzed with respect to systems of particles and impact examples. Conservation of momentum and conservation of energy will be used to analyze problems. Three-dimensional kinematics of rigid bodies will be analyzed with respect to velocities and accelerations. Students will also create mechanism displacement diagrams (for straight and curved links) of machine members using the relative velocity method, instantaneous centers, velocity polygon, relative acceleration polygon, coriolis acceleration, machine dynamics which includes inertia force method and analysis of translation, rotation, and plane motion, balancing rotating and reciprocating masses, and whirling of shafts.	Advanced Dynamics o	In this course students learn Kinetics of particles, work of a force, kinetic energy, principle of work and energy, power and efficiency; potential energy, conservative forces and conservation of energy; principle of impulse and momentum, impulsive motion; impact, System of particles, Effective forces, liner and angular momentum, motion of mass centre, angular momentum about its mass centre, conservation of momentum; work-energy principle and conservation of energy, principle of impulse and momentum; Plane dynamics of rigid bodies, work-energy principle, momentum principles for a system of particles, work and kinetics energy, conservation of energy; principle of impulse and momentum, conservation of angular motion; impulsive motion and eccentric impact; Three-dimensional kinematics of rigid bodies, motion about a fixed point and general motion, velocities and accelerations. Students also learn mechanism displacement diagrams of machine members by relative velocity method, instantaneous centers, velocity polygon, relative acceleration polygon, coriolis acceleration, and straight and curved links; machine dynamics which includes inertia force method and analysis of translation, rotation, and plane motion, balancing rotating and reciprocating masses, and whirling of shafts. **See revision in cell I17.**	ENGI 2111 and partly ENGI 3451	No	None
Machine Design	3	45	In this course students learn how to design, select and integrate common machine elements found in mechanical devices and systems including shafts, bearings, springs, gears, cams, belts, and chains. Students will also analyze the performance of fasteners and welded joints in various loading conditions and be introduced to failure mechanisms.		No modifications (good as is)	ENGI 2333: Machine Design	No	None
Applied Thermodyn	2	30	Students in this course learn how to analyze steam plant and internal combustion engines by applying vapor and gas cycle theory including ideal gas mixtures, psychrometry charts, and steam tables. Students also learn how to apply advanced heat transfer techniques to design parallel and counterflow heat exchangers. **Revised NCCP Description:** In this course students build upon fundamentals from previous study in the application of themodynamics and heat transfer. Concepts will include: phase-change processes, property diagrams (p-T, p-v and T-v diagrams), thermodynamic tables, work, heat and energy transfer, heat transfer mechanisms (conduction, convection, radiation), thermal resistance analogy, application of the 1st-Law of thermodynamics to (a) a process, (b) a cycle of a closed system, energy analysis of closed systems, applications of the 1st-law for steady-state-steady-flow processes and devices, and heat exchangers.	Applied Thermodynamics ~~&~~ and Heat Transfer **Agreed**	Students in this course learn about fundamentals and applications of thermodynamics and heat transfer. Topics include: Definitions; Units and Conversions; Concepts of thermodynamics; Forms of Energy; Examples; Properties of a pure substance; Phase-change processes; Property diagrams (p-T, p-v and T-v diagrams); Thermodynamic tables; Gases; Work and Heat & Energy Transfer; Heat transfer mechanisms (conduction, convection, radiation); 1-D; Thermal resistance analogy; Application of the 1st-Law of thermodynamics to (a) a process, (b) a cycle of a closed system; Energy analysis of closed systems; Applications of the 1st-law for SSSF processes and devices; Heat Exchangers. **See revision in cell I19.**	ENGI 2518	Yes, can be included in MEC913 Mechanical Lab II (NCCP)	None

Mechanical Lab II	3	45	The Mechanical Lab II course supplements and supports the Advanced Strength of Materials, Advanced Mechanics of Machines, Machine Design, and Applied Thermodynamics courses with practical learning. Lab topics in Advanced Strength of Materials include stresses in beams, deflection in beams, and columns. Lab topics in the Advanced Mechanics of Machines include forces in machines and balancing rotating/reciprocating masses. Lab topics in Machine Design include connections, material strength, and power transmission. Lab topics in Applied Thermodynamics include heat transfer and psychrometry.					None
Research Project II	4	60	In the two Research Project courses, students complete an independent technical project. These courses mirror working conditions that are frequently encountered in industry; that is, they are a self-directed, comprehensive study of a specific topic in the student's field, one not covered in other courses. Research Project II is a continuation of Research Project I, where students continue to work on their project, meet with faculty and industry advisors, and prepare written progress reports. Students also learn the theory necessary for the preparation, writing, and oral defence of a formal technical report. Students present the formal technical report on their completed project.		**Revised NCCP Description:** In the two Research Project courses, students complete an independent technical project. These courses mirror working conditions that are frequently encountered in industry; that is, they are a self-directed, comprehensive study of a specific topic in the student's field, one not covered in other courses. ~~In Research Project II, students prepare a detailed project schedule, meet weekly with faculty and industry advisors, prepare weekly progress reports, and deliver a formal project proposal. Students begin work on the project in this course in preparation for project completion in Research Project II. In research project I, students learn how to write an academic/technical report using English language proficiency.~~ Research Project II is a continuation of Research Project I, where students continue to work on their project, meet with faculty and industry advisors, and prepare written progress reports. Students also learn the theory necessary for the preparation, writing, and oral defence of a formal technical report. Students do a presentation of the formal technical report on their completed project. *Note: students learn how to write technical reports in other courses in the program.*			None
Totals	**21**	**315**						
TOTAL HOURS/CRED	**40**	**600**						

Finalized Gap-Analysis Results for NCCP - Mechanical Engineering Technology Graduates from all four participating colleges (Canadore, Northern, Confederation, Sault)

Required Makeup courses at Lakehead University (in addition to Summer Transition courses)

ENGI 1411: Computer Programming I
EMEC 1533: Mechanics of Materials II

Appendix 3 - Curricula of Canadore College, Northern College, Confederation College and Sault College Used in the Assessment of Determining the Required Make-up Courses:

Canadore College's Mechanical Engineering Technician Curriculum
2017-2018

SEM 1	FALL 2017 (14 wks)	HRS	SEM HRS
ECM100	Estimating/Project Management	3	42
ECM105	Basic Surveying and Measurement (New)	3	42
CAD100	Computer Aided Design I	3	42
CMM140	Technical Writing I	3	42
MTH160	Technical Math I	3	42
PHY160	Introduction to Statics	4	56
PSY123*	Applied Psychology	3	42
	Totals	**22**	**308**
SEM 2	**WINTER 2018 (14wks)**		
CAD150	Computer Aided Design II	3	42
ECM120	Codes, Standards and Compliance	4	56
ECM115#	Infrastructure Engineering	6	84
MTH161	Technical Math II	3	42
MCH120	Applied Statics	5	70
GenED*	General Education Elective - Online	3	42
	Totals	**24**	**336**
SEM 3	**FALL 2018 (14 wks)**		
CAD210#	Advanced CAD (Mechanical)	4	56
MTH235	Technical Statistics	3	42
MET240	Mechanics and Dynamics of Machines	4	56
MET210	Manufacturing Processes	3	42
MET215	Applied Strength of Materials - Mechanical	4	56
MTH130**	Fundamentals of Calculus	3	42
	(optional for Technicians mandatory for Technologist		
HUM200*	Group Dynamics	3	42
	Totals	**24**	**336**
SEM 4	**WINTER 2019 (14wks)**		
MET220	Energy Systems	6	84
ECM260	Fluid Mechanics	4	56
ECM200	Law/Ethics/Professional Practice	3	42
MET250	Electrical and Electronic Fundamentals	4	56
CMM300	Research and Reporting	3	42
	Totals	**20**	**280**

* GenEds

** optional for Technicians mandatory for Technologist

Experiential Learning

Confederation College's Mechanical Engineering Technician Curriculum
2017-2018

FALL 2017 (15 WKS)			
SEMSTER 1	**DESCRIPTION**	**HOURS/WK**	**TOTAL SEM HOURS**
CS007	Persuasive Writing	3	45
MC165	Microsoft Office	2	30
SC110	Pre-Technology Physics	3	45
MA115	Applied Math for Technology I	4	60
MX111	Engineering Graphics	3	45
MX121	Mechanical Practices	3	45
MX131	Machine Shop I	4	60
MX141	Welding Practices I	4	60
	TOTALS	**26**	**390**
WINTER 2018 (15 WKS)			
SEMSTER 2	**DESCRIPTION**	**HOURS/WK**	**TOTAL SEM HOURS**
SC210	Pre-Technology Science II	3	45
MA215	Applied Math for Technology II	4	60
MX231	Machine shop II	4	60
MX241	Welding Practices II	4	60
MX261	Power Transmission I	3	45
MX271	Industrial Design I	3	45
MX460	Introduction to Electricity	3	45
GE	General Elective	3	45
	TOTALS	**27**	**405**
FALL 2018 (15 WKS)			
SEMSTER 3	**DESCRIPTION**	**HOURS**	**TOTAL SEM HOURS**
MA231	Mathematics II	3	45
MX301	Statics	3	45
MX361	Power Transmission II	3	45
MX371	Industrial Design II	3	45
MX381	Fluid Power	3	45
MX341	Strength of Materials	3	45
GE	General Elective	3	45
CS219	Communication for Technology	3	45
	TOTALS	**24**	**360**
WINTER 2019 (15 WKS)			
SEMSTER 4	**DESCRIPTION**	**HOURS**	**TOTAL SEM HOURS**
MA331	Mathematics III	3	45
MX410	Introduction to Thermodynamics	3	45
MX471	Power Transmission III	3	45
MX475	Advanced Structural Design	3	45
MX481	Fluid Mechanics	3	45
MX431	Introduction to CNC	3	45
GE	General Elective	4	60
	TOTALS	**22**	**330**

Northern College's Mechanical Engineering Technician Curriculum
2017-2018

Ref: OCI.582 NORTHERN COLLEGE
Date: 6/22/17 PROGRAM SYNOPSIS Page 1

Cmp	Div	Program	AAL	Course	SEC	ALT	Start	Stop	Course Title	M/E	MIN	Credt	SEM Hours	SEM Weeks	TCH Hours	TCH Weeks
PC	TE	W110	2017	1					Mechanical Engineering Technician MECH TEC2YPC Full#/Hrs 7		22.00	Part#/Hrs 5		15.40		
				CM1903	103				Communications I - Model A	M	C	3.0	3.000	15.0	3.000	15.0
				GN1033	101				Health and Safety	M	D	3.0	3.000	15.0	3.000	15.0
				IN1093	101				Computer Applications for Business&Tech.	M	C	3.0	3.000	15.0	3.000	15.0
				IN1224	101				CAD I	M	C	4.0	4.000	15.0	4.000	15.0
				MA1100	102				Mathematics I	M	C	4.0	4.000	15.0	4.000	15.0
				MM1002	101				Millwright Machining I	M	C	2.0	2.000	15.0	2.000	15.0
				MM3003	101				Industrial Indoctrination	M	C	3.0	3.000	15.0	3.000	15.0
													---		---	
													22.000		22.000	
PC	TE	W110	2017	2					Mechanical Engineering Technician MECH TEC2YPC Full#/Hrs 0		.00	Part#/Hrs 0		.00		
				AR2014	201				Statics	M	C	4.0	4.000	15.0	4.000	15.0
				CM2903	203				Communications II - Model A	M	C	3.0	3.000	15.0	3.000	15.0
				EL1003	205				Elective I	E	D		3.000	15.0	3.000	15.0
				MA2104	202				Mathematics II	M	C	4.0	4.000	15.0	4.000	15.0
				ME3003	201				Electrical/Electronics Fundamentals	M	C	3.0	4.000	15.0	4.000	15.0
				ME3253	201				Dynamics	M	C	3.0	3.000	15.0	3.000	15.0
													---		---	
													21.000		21.000	
PC	TE	W110	2016	3					Mechanical Engineering Technician MECH TEC2YPC Full#/Hrs 6		22.33	Part#/Hrs 4		15.63		
				GN2133	101				Law and Ethics	M	D	3.0	3.000	15.0	3.000	15.0
				IN3263	103				Embedded Programming and Networks	M	C	3.0	3.000	15.0	3.000	15.0
				MA3206	101				Mathematics III with Calculus	M	C	6.0	5.000	15.0	5.000	15.0
				ME2014	101				Mechanical Design/CAD II	M	C	4.0	4.000	15.0	4.000	15.0
				ME3013	101				Fluid Mechanics	M	C	3.0	3.000	15.0	3.000	15.0
				WE3044	120		9/06/17	12/01/17	Strength of Materials I	M	C	4.0	4.333	15.0	5.000	13.0
													---		---	
													22.333		23.000	
PC	TE	W110	2016	4					Mechanical Engineering Technician MECH TEC2YPC Full#/Hrs 0		.00	Part#/Hrs 0		.00		
				MA6022	201		1/08/18	4/27/18	Statistics	M	D	2.0	2.000	15.0	2.000	15.0
				ME3004	203				Energy Systems I	M	C	4.0	4.000	15.0	4.000	15.0
				ME3044	201				Manufacturing Processes I	M	C	4.0	4.000	15.0	4.000	15.0
				ME4013	201				HVAC	M	C	3.0	3.000	15.0	3.000	15.0
				ME4044	201				Mechanical Design/CAD III	M	C	3.0	3.000	15.0	3.000	15.0
													---		---	
													16.000		16.000	

Sault College's Mechanical Engineering Technician Curriculum
2017-2018

SAULT COLLEGE MECHANICAL TECHNICIAN PROGRAM COURSES (2017-18)			Contact / week	Contact / semester	Mechanical Technician (4039)
		Course Code			
Semester 1	DRF105	Drafting and Blueprint Reading	2	30	2
	ENV102	Industrial Health & Safety	2	30	2
	MCH121	Machine Shop Theory & Measurement	3	45	3
	MCH144	Machine Shop Practical	4	60	4
	MCH134	Materials and Fasteners	2	30	2
	MTH145	Mathematics(Technicians)	4	60	4
	WLD121	Welding I	2	30	2
	CMM115	Communications	2	30	2
					21
Semester 2					
	MCH145	Machine Shop Practical II	4	60	4
	MCH253	Bearing & Seals	2	30	2
	MCH141	Power Transmissions	3	45	3
	MCH142	Pumps, Valves & Piping	3	45	3
	MET207	Metallurgy	2	30	2
	RIG101	Rigging and Hoisting	2	30	2
	ELR111	Electrical/Electronic Controls	1	15	1
	GEN100	Global Citizenship	2	30	2
	MCH244	Manufacturing Processes	3	45	3
					22
Program Hours Yr. 1				**/wk**	**43**
				/yr	**645**
Semester 3	ELR213	Elect/Electronic Controls II	1	15	1
	MCH259	Machine Shop III	3	45	3
	MTH146	Mathematics(Technicians)	4	60	4
	MCH110	Applied Mechanics	4	60	4
	TNY130	Technology & Society	2	30	2
	MCH258	Pneumatics & Hydraulics	4	60	4
	CAD225	Autocad/Drawings & Schematics	2	30	2
			20	**300**	**20**
Semester 4	CAD401	Advanced CAD	2	30	2
	MCH103	Strength of Materials	3	45	3
	MCH254	Preventative Mtce.	2	30	2
	MCH256	Intro to Thermodynamics	3	45	3
	GEN110	General Education - Elective	2	30	2
	MCH257	Machine Technology	3	45	3
	MCH125*	Mechanics of Fluids (Elective)	4	60	4
	MTH551*	Calculus	4	60	4
			23	**345**	**23**
Program Hours Yr. 2			**43**	**645**	**43**
					688
TOTAL PROGRAM HOURS				**/wk**	**86**
				/pgm	**1333**
*Optional elective included in 2 year program for students wanting to continue to 3rd year					
*Required for students continuing to 3rd year (student must take before entering 3rd year)					