

Mechanical Engineering Technology

Section B.101

9/22/2020

Ontario College Advanced Diploma (3 Years - 6 Semesters) (4043)

705.759.6700 : 1.800.461.2260 : www.saultcollege.ca : Sault Ste. Marie, ON, Canada



PROGRAM OVERVIEW

The three-year Mechanical Engineering Technology program prepares you for a career in engineering to assist engineers in design analysis and supervisory functions in the production of components in a mechanical engineering environment, as well as carry out manufacturing and quality control procedures. You will be able to apply communication, documentation, computer applications, information technology, and teamwork skills to support the engineering activities of an organization.

Direct entry to this program requires completion of a 2-Year Mechanical Technician Program and successful completion of MTH551 (Calculus) course and MCH125 (Mechanics of Fluids) course.

Thru-way programs offer diplomas at the completion of Year 2. The third year of this program is offered through Northern Colleges Collaboration Program (NCCP) through web-conferencing software using computers, laptops or mobile device with a headset or earbuds with a microphone and some labs may be delivered on campus. Classes are delivered in synchronous format and students will have access to all college services at the college where they register for the program.

Click here to learn more about [Northern Colleges Collaboration Program \(NCCP\)](#).

PROGRAM OUTCOMES

MTCU Code: 61007

ADMISSIONS

MINIMUM ACADEMIC REQUIREMENTS

Completion of a 2-Year Mechanical Technician Program and successful completion of MTH551 (Calculus) course and MCH125 (Mechanics of Fluids) course are required for direct entry to the third year of this program.

CAREER PATHS

Graduates of the Mechanical Engineering Technology Program work in a broad range of employment settings in a variety of sectors in the mechanical engineering industry in both large and small organizations which are present in Sault Ste. Marie. Their activities could range from computer-aided design and manufacturing, to industry sales, or to junior management in the mechanical field.

OTHER INFORMATION

For more information contact Donovan Kennedy at 705.759.2554 ext 2581 or email Donovan.Kennedy@saultcollege.ca.

PROGRAM OF STUDY

SEMESTER 1

CMM115-3 Communications I
DRF105-3 Drafting and Blueprint Reading
ENV102-3 Industrial Health and Safety
MCH121-3 Machine Shop Theory and Measurement
MCH134-2 Materials and Fasteners
MCH144-4 Machine Shop Practical I
MTH142-5 Mathematics
WLD121-2 Welding

SEMESTER 2

ELR111-1 Electric and Electronic Controls
MCH141-3 Power Transmission Systems
MCH142-3 Pumps, Valves, Piping and Compressors
MCH145-4 Machine Shop Practical II
MCH244-4 Manufacturing Process
MCH253-2 Bearings, Seals and Lubrication
MET207-3 Metallurgy
RIG101-2 Rigging and Hoisting
GEN100-3 Global Citizenship

SEMESTER 3

CAD225-3 AutoCAD/Drawing and Schematics
ELR213-1 Electrical/Electronic Controls II
MCH110-4 Applied Mechanics
MCH258-4 Pneumatics and Hydraulics
MCH259-3 Machine Shop Practical III
MTH143-5 Mathematics
TNY130-3 Technology in Society

SEMESTER 4

CAD401-2 Advanced Computer Aided Design
MCH103-3 Strength of Materials
MCH125-3 Mechanics of Fluids
MCH254-2 Preventive/Predictive Maintenance
MCH256-3 Introductory Thermodynamics
MCH257-3 Machine Technology
MTH551-4 Calculus I for Technology

Select one of the following:

GEN110: Student Selected General Education

SEMESTER 5

MCH501-4 Engineering Operations Management
MCH502-3 Advanced Dynamics
MCH503-2 Mechanical Lab I
MCH504-3 Research Project I
MCH506-3 Advanced Fluid Mechanics
MTH577-4 Calculus II for Technology

SEMESTER 6

MCH601-3 Advanced Dynamics of Machines

MCH603-4 Research Project II
MCH605-3 Mechanical Lab II
MCH607-3 Metrology and Quality Control
MCH608-3 Advanced Strength of Materials
MCH609-3 Machine Design
MCH610-2 Applied Thermodynamics and Heat Transfer

Course Descriptions

Semester 1

Communications I (CMM115) (3 credits)

This course is designed to help students develop the skills necessary to communicate effectively in their programs and at the college level. Students will think critically to capture the meaning messages and respond appropriately; produce coherent, clear paragraphs; and purposively research and responsibly integrate credible sources into their own writing. Emphasis is placed on the writing process, from planning to revising, while providing opportunities to explore various modes of communication.

Drafting and Blueprint Reading (DRF105) (3 credits)

In a hands-on environment students will learn blueprint reading, geometric dimensioning and tolerancing (G.D. & T.) and be introduced to AutoCAD. The course will commence with skill development in blueprint reading. These skills shall be applied to the machinist's trade and related areas. New information has been added to explain computer-aided design, new dimensioning practices, and assembly drawing interpretation. Using common shop terminology, industrial prints will be interpreted. G.D. & T. includes reading dimensional drawings in fractions, decimals and in metric units. AutoCAD is taught so that upon completion students can create computerized, mechanical drawings.

Industrial Health and Safety (ENV102) (3 credits)

This is an introductory course for all those interested in industrial practices from the standpoint of industrial hygiene and industrial health and safety. Students will become familiar with pertinent legislation, industry and workers rights and responsibilities, recognition, evaluation and control methods and safe working practices.

Machine Shop Theory and Measurement (MCH121) (3 credits)

This course is designed to give the students an understanding of the theoretical aspects of machining and manufacturing including feeds, speeds, threading and gear cutting formulas. This course is also designed to strengthen the student's ability to measure and inspect to precise tolerances. Tools using micrometer and vernier scales for linear and angular measurement will be used. There will be a basic introduction to Statistical Process Control (SPC), including interpretation and recording of data.

Materials and Fasteners (MCH134) (2 credits)

To provide students with a working knowledge of the theory behind the procedures that are used in the heat treating and machining of carbon steels, aluminum and its alloys. Practical lab/shop activities will be used to enhance and/or demonstrate theoretical concepts where possible.

Machine Shop Practical I (MCH144) (4 credits)

A study of shop machines, safety, and tool care, measurements and layout, bench work and hand tools, material identification, heat treatment and testing, basic lathe, saws, drill presses, shapers, grinder, and milling machine, theory and practices, speeds, feeds, tapers, threads.

Mathematics (MTH142) (5 credits)

This first level mathematics course for engineering technology programs begins with a review of fundamental concepts, arithmetic operations, and units of measurement. This is followed by an in-depth

study of basic algebra, trigonometric and other functions, and quadratic equations.

Welding (WLD121) (2 credits)

A trades curriculum that has been designed to provide students with a combination of theoretical knowledge and hands-on skill in relation to the safe use and operation of both OFG/SMA welding, cutting and heating equipment.

Semester 2

Electric and Electronic Controls (ELR111) (1 credits)

This course will provide students with the basic knowledge of electric and electronic theory. Students will learn about the purpose, scope of electrical codes, purpose and function of electrical components, selection and safe use of electrical instruments and electric and electron principles. They will also understand and be able to apply OHM's law including units and relationships.

Power Transmission Systems (MCH141) (3 credits)

A trades course designed to provide students with knowledge of power transmission systems such as belt drives, chains, gears, shafts and couplings.

Pumps, Valves, Piping and Compressors (MCH142) (3 credits)

In this course, the student will learn about the different applications, installation, maintenance and types of pumps, valves, piping, compressors and ancillary equipment.

Machine Shop Practical II (MCH145) (4 credits)

This course will continue to build on the study of shop machines, safety, and tool care, measurements and layout, bench work and hand tools, material identification, heat treatment and testing, basic lathe, saws, drill presses, grinder, and milling machine, theory and practices, speeds, feeds, tapers, and threads.

Manufacturing Process (MCH244) (4 credits)

A job planning course to cover shop organization costing, routing and scheduling, various processes as to viability and methods including foundry processes, hard mould casting, die casting, plastics and rubbers, primary metal working, welding, forging and comparisons as to quality, economics and feasibility.

Bearings, Seals and Lubrication (MCH253) (2 credits)

Students will learn about selecting, installing and maintaining friction/plain and rolling element bearings and static and dynamic seals. They will learn to interpret ISO charts and bearing catalogues. Students will also learn about bearing lubricants and their proper application.

Metallurgy (MET207) (3 credits)

A combination of lab and theory designed to provide Mechanical Drafting Technicians with the basics of metallurgy. More specifically, it deals with the production of iron and steel; heat treating methods and surface treatments; the shaping and forming of metal; as well as the properties of metals.

Rigging and Hoisting (RIG101) (2 credits)

This course is designed to provide the student with the knowledge and understanding of correct lifting and hoisting procedures and the safe use of all equipment.

Global Citizenship (GEN100) (3 credits)

The world we are living in is one in which local, national and international issues are interwoven, and the need for us to understand the impact these issues can have on our lives has never been greater! Using a socio-cultural, political and environmental lens, students will view how the world is changing and how to become active agents of change from the local to international level. Important issues such as social injustice, poverty, environmental protection, resource scarcity, sustainability, and health will be addressed. Global citizenship is an opportunity to `Be the Change`. This course meets the Civic Life and Social and Cultural Understanding General Education themes.

Semester 3

AutoCAD/Drawing and Schematics (CAD225) (3 credits)

Students will learn to effectively use manufacturers manuals, sketch and draw machine component parts, including sectional views. This course will introduce the student to the fundamentals of computer assisted drafting using AutoCAD.

Electrical/Electronic Controls II (ELR213) (1 credits)

Students will learn the basic knowledge of electric and electronic controls. Students will learn about safely removing and resetting electrical and electronic devices such as fuses, circuit breakers and about lockouts and shut off procedures. The student will also learn about diagnostic testing and application of electronic devices used in control systems.

Applied Mechanics (MCH110) (4 credits)

This course entails a thorough study of statics, providing fundamental skill for further development in mechanical studies. Topics include: force vectors, components, resultants, moments, couples, equilibrium in force systems, trusses and frames, centroids, friction laws, impending motion.

Pneumatics and Hydraulics (MCH258) (4 credits)

Students will learn to identify and explain pneumatic and hydraulic system components, and understand the basic principles of operation. Circuit diagrams will be used as an aid for assembling and troubleshooting hydraulic systems.

Machine Shop Practical III (MCH259) (3 credits)

This course will continue to build on the study of shop machines, with emphasis on the use of milling machines.

Mathematics (MTH143) (5 credits)

This course is a continuation of MTH142 (from Semester I) for engineering technology students. Topics of study include exponents and radicals, plane analytic geometry, solid mensuration, and functions including trigonometric, exponential and logarithmic functions. This course concludes with an introduction to statistics.

Technology in Society (TNY130) (3 credits)

This course will introduce students to the impact that technological change has on society. Illustrations and examples will be drawn from the students discipline. Potential topics include the social and economic impact of new technology, responsibilities and ethics, privacy, liability and technology-based crime, and emerging trends.

It is designed to provide students from varied programs and backgrounds with a particularly relevant and timely appreciation of the impact technology and technological advances have made on every aspect of society. Technology and its implementation in society have strengths, weaknesses, opportunities and threats. This course investigates the social, legal, and ethical issues the use of technology raises.

Semester 4

Advanced Computer Aided Design (CAD401) (2 credits)

The students will learn modern computer aided design using some of the various programs available that are used in industry today. This course will build on the students knowledge and enable them to produce workable CAD drawings ready for industry.

Strength of Materials (MCH103) (3 credits)

Basic concepts, stress and strain, Hooke's law, Young's modulus, temperature stresses, thin walled cylinders, factor of safety, structural shapes, riveted and bolted connections, first and second moment of areas, and shear and bending diagrams are studied.

Mechanics of Fluids (MCH125) (3 credits)

This course is an introduction to fluids their properties and coherent units of measurement, pressure, vapour pressure, vacuum, Pascal's Law with an emphasis on pressure measuring devices; buoyancy, Bernoulli's equation, flow of fluids, velocity and flow measuring instruments

Preventive/Predictive Maintenance (MCH254) (2 credits)

The student will learn about the procedures, equipment used and the processes associated with a preventive/predictive maintenance program. Topics include the various approaches to maintenance, and vibration monitoring and analysis.

Introductory Thermodynamics (MCH256) (3 credits)

This course covers the basic principles of thermodynamics. Topics include heat transfer, specific heat, thermal expansion and conductive, convective and radiant heat.

Machine Technology (MCH257) (3 credits)

This course will deal with Material Handling Systems, Prime Movers Pollution control and Wind Power Generation. Specific Materials Handling topics covered will include, belt, bucket, screw, pneumatic, roller, chain, apron, slurry, and food handling conveyors. Specific Prime Mover topics will include various combustion engines, gas and steam turbines, with mention to fans, blowers and electric motors. Specific pollution control will include treatment systems for water and air, collectors and precipitators. Specific Wind energy topics include a breakdown of each component required to produce energy using a wind turbine.

Calculus I for Technology (MTH551) (4 credits)

The basic concepts of calculus are introduced through an emphasis on applications and examples. Topics include limits, simple derivatives, derivatives of trigonometric and logarithmic functions, applications of derivatives, curve sketching, integration and applications of integration.

Student Selected General Education (GEN110) (3 credits)

For Transfer Credit Purposes only.

Semester 5

Engineering Operations Management (MCH501) (4 credits)

In this course students will 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.

Advanced Dynamics (MCH502) (3 credits)

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.

Mechanical Lab I (MCH503) (2 credits)

The Mechanical Lab 1 course supplements and supports the Advanced Fluid Mechanics and Advanced 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. Lab topics in Dynamics include plane motion and inertial forces.

Research Project I (MCH504) (3 credits)

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.

Advanced Fluid Mechanics (MCH506) (3 credits)

A study of gas laws-isothermal, adiabatic, polytropic, combustion, properties of steam, manometry, pressure at a depth, centre of pressure, Bernoulli's Theorem, Venturimeter, losses in pipes.

Calculus II for Technology (MTH577) (4 credits)

This course is a continuation of MTH551 and provides the student with a more advanced study of calculus. Topics of study include methods of integration, first and second order differential equations including Laplace transforms, and series expansions.

Semester 6

Advanced Dynamics of Machines (MCH601) (3 credits)

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 kinetic 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.

Research Project II (MCH603) (4 credits)

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 do a presentation of the formal technical report on their completed project.

Mechanical Lab II (MCH605) (3 credits)

The Mechanical Lab II course supplements and supports the Advanced Strength of Materials, Advanced

Dynamics of Machines, Machine Design, and Applied Thermodynamics & 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 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.

Metrology and Quality Control (MCH607) (3 credits)

A lab course taught by theory and experimentation to study sources of error, standards of length, interferometry, angular measurement, the autocollimator, R.M.S. finishes, screw thread and gear elements, metallurgical testing and calibration.

Advanced Strength of Materials (MCH608) (3 credits)

Torsion shafts and couplings, properties of sections, shear force and bending moment diagrams in beams, flexure formula, shearing stresses due to bending, design of beams, materials, testing, columns will all be covered in this course.

Machine Design (MCH609) (3 credits)

This course deals with stress analysis, anti-friction bearings, lubrication and journal bearings, stress concentrations, theories of failure, fatigue and endurance limits, selection of materials and consideration in production methods, graphical analysis, mohrs circle of stress.

Applied Thermodynamics and Heat Transfer (MCH610) (2 credits)

Rankin cycle, mixtures, psychrometry, air conditioning, heat transfer mechanisms and exchangers are discussed in this course.