Area of Interest: Engineering and Architecture

**Manufacturing Engineering Technician**

Ontario College Diploma

2 Years

Ottawa Campus

**Academic Year:** 2019/2020

**Program Code:** 1518X01FWO

**Our Program**

Prepare for a variety of dynamic technical positions within the manufacturing industry.

The two-year Manufacturing Engineering Technician Ontario College Diploma program prepares you for technical positions in the manufacturing industry. Gain a broad overview of mechanical engineering principles, with a focus on product manufacturing, and learn from professors who are industry professionals.

As a student in this program, you experience a combination of classroom and lab-based environments and cultivate ideas from conception to production within various streams. These include:

- solid modelling
- computer numerical control programming
- process engineering

**Employment**

Graduates may find employment in positions such as CNC operators and CNC programmers, production schedulers, machinists, quality control inspectors, CAD drafters and designers and process engineers, ranging from small manufacturing firms to large multi-national manufacturing corporations.

**Learning Outcomes**

The graduate has reliably demonstrated the ability to:

- Analyze and solve routine technical problems related to manufacturing environments through the application of engineering principles.
- Conduct routine analysis of components, processes, and systems through the application of engineering principles and practices.
- Interpret and prepare graphics and other technical documents to appropriate engineering standards.
- Use computer hardware and software to support the engineering environment.
- Apply knowledge of manufacturing materials, operations, and processes to support the production of components.
- Apply knowledge of machinery, tools and other equipment to manufacture and assemble components.
- Conduct quality control and quality assurance procedures as required.
- Recognize the environmental, economic, legal, safety, and ethical implications of manufacturing projects.
- Use and maintain documentation, inventory, and records systems.
• Contribute to the implementation of a manufacturing project.
• Develop strategies and plans to improve job performance and work relationships.
• Identify and apply discipline-specific practices that contribute to the local and global community through social responsibility, economic commitment and environmental stewardship.

Program of Study

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<tr>
<th>Level: 01</th>
<th>Courses</th>
<th>Hours</th>
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<tbody>
<tr>
<td></td>
<td>CAD8300  Computer Aided Design/Drafting (CAD/D)</td>
<td>56.0</td>
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<td>ELN9104  DC and AC Electronics</td>
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<td></td>
<td>ENL1813T Communications I</td>
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<td>MAT8050  Geometry and Trigonometry</td>
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<td></td>
<td>MFG8518   Manufacturing and Metrology</td>
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<td>ROBB220  Industrial Pneumatics</td>
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<tr>
<td></td>
<td>DRA8253  Understanding Engineering Drawings</td>
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<td></td>
<td>DSN8500  Additive Manufacture and 3D Printing</td>
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<td>ENG8319  Quality Control/Quality Assurance</td>
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<td>GEN2003M  Healthy Lifestyle</td>
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<td>MAT8051  Algebra</td>
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<td>MFG8512   Manufacturing Application I</td>
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<td></td>
<td>WEL9107  Introduction to Fuel Gas and Electrical Welding</td>
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Choose one from equivalencies:

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<tr>
<th>Courses</th>
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<td>GED1518 General Education Elective</td>
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<tr>
<td></td>
<td>CAM8505  CNC Machining 1</td>
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<td>CAM8515  Computer Aided Manufacturing I</td>
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<td>DSN8300  Tool Design</td>
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<td></td>
<td>ELN8613  Basic Electronic Assembly</td>
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<td>GED0019  Becoming an Entrepreneur: Is It for Me?</td>
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<td>MFG8513  Manufacturing Theory II</td>
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<td>MFG8514  Manufacturing Application II</td>
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<td>ROBB306  Electomechanical Project Planning</td>
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<tr>
<td></td>
<td>CAM8507  Computer Aided Manufacturing 2</td>
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<td>ELN9206  Mechanisms</td>
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<td>ENG8306  Materials Science</td>
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<td>ENL8720  Technical Communication for Technicians</td>
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<td>MGT8215  Final Project</td>
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Fees for the 2019/2020 Academic Year

Tuition and related ancillary fees for this program can be viewed by using the Tuition and Fees Estimator tool at [https://www.algonquincollege.com/fee-estimator](https://www.algonquincollege.com/fee-estimator). Further information on fees can be found by visiting the Registrar’s Office site at
Additional program related expenses include:

Books and supplies cost approximately $950 and can be purchased at the campus store. Selected books are available for a reduced price through ebook initiatives at http://www.coursesmart.com/. (All students are responsible to supply their own CSA-approved safety eye wear and leather steel toe work boots. Any other types of footwear are not acceptable).

Admission Requirements for the 2020/2021 Academic Year

College Eligibility

• Ontario Secondary School Diploma (OSSD) or equivalent. Applicants with an OSSD showing senior English and/or Mathematics courses at the Basic Level, or with Workplace or Open courses, will be tested to determine their eligibility for admission; OR

• Academic and Career Entrance (ACE) certificate; OR

• General Educational Development (GED) certificate; OR

• Mature Student status (19 years of age or older and without a high school diploma at the start of the program). Eligibility may be determined by academic achievement testing for which a fee of $50 (subject to change) will be charged.

Program Eligibility

• English, Grade 12 (ENG4C or equivalent).

• Mathematics, Grade 12 (MAP4C with a grade of 60% or higher) or Grade 11 (MCF3M with a grade of 50% or higher) or equivalent.

• At least two science courses from Grade 11 and/or Grade 12.

• International applicants must provide proof of the subject specific requirements noted above along with proof of either: (IELTS / TOEFL) IELTS-International English Language Testing Service (Academic) Overall band of 6.0 with a minimum of 5.5 in each band; OR TOEFL-Internet-based (iBT) Overall 80, with a minimum of 20 in each component: Reading 20; Listening 20; Speaking 20; Writing 20.

• Applicants with international transcripts must provide proof of the subject specific requirements noted above and may be required to provide proof of language proficiency.

• Proficiency in Internet browsing and searching, and proficiency with an office software suite (word processing, spreadsheets, etc.) prior to the start of the program.

Should the number of qualified applicants exceed the number of available spaces, applicants will be selected on the basis of their proficiency in English and mathematics.

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• Ontario Secondary School Diploma (OSSD) or equivalent. Applicants with an OSSD showing senior English and/or Mathematics courses at the Basic Level, or with Workplace or Open courses, will be tested to determine their eligibility for admission; OR

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Application Information

MANUFACTURING ENGINEERING TECHNICIAN
Program Code 1518X01FWO

Applications to full-time day programs must be submitted with official transcripts showing completion of the academic admission requirements through:

ontariocolleges.ca
60 Corporate Court
Guelph, Ontario N1G 5J3
1-888-892-2228

Students currently enrolled in an Ontario secondary school should notify their Guidance Office prior to their online application at http://www.ontariocolleges.ca/.

Applications for Fall Term and Winter Term admission received by February 1 will be given equal consideration. Applications received after February 1 will be processed on a first-come, first-served basis as long as places are available.

International applicants please visit this link for application process information: https://algonquincollege.force.com/myACint/.

For further information on the admissions process, contact:

Registrar’s Office
Algonquin College
1385 Woodroffe Ave
Ottawa, ON K2G 1V8
Telephone: 613-727-0002
Toll-free: 1-800-565-4723
TTY: 613-727-7766
Fax: 613-727-7632
Email: mailto:AskUs@algonquincollege.com

Additional Information

Programs at Algonquin College are Bring Your Own Device (BYOD). To see the BYOD requirements for your program, please visit: https://www7.algonquincollege.com/byod/.

The first level of this program is common with two other programs, Mechanical Engineering Technology and Electro-Mechanical Engineering Technician - Robotics. This provides students with the option of transitioning to either of these programs prior to the start of the second level.
Students wishing to transfer to Electro-Mechanical Engineering Technician - Robotics may do so with permission from the program coordinator prior to the start of their second level. Students wishing to transition to Mechanical Engineering Technology need to maintain a good academic standing during the first semester and obtain a grade of at least C in the following courses: CHE8087 (Models and Matter) and MAT8050 (Geometry and Trigonometry). Students also need to speak to the coordinator of Mechanical Engineering Technology about an additional math course.

Note: Proficiency in Internet browsing and searching, and proficiency with an office software suite (word processing, spreadsheets, etc.) prior to the start of the program is recommended. The Mobile Learning Center Coach (C102) offers training in these skills if needed. While programming experience is not a requirement to enter the program, aptitude for programming is necessary and includes strong language, problem solving and logic skills.

This program has an annual intake in the Fall. For more information, please contact Hooman Abdi, Program Coordinator at 613-727-4723 ext 3473 by email at mailto:hoomana@algonquincollege.com.

Course Descriptions

**CAD8300 Computer Aided Design/Drafting (CAD/D)**

Students are introduced to (CAD/D) Computer-Aided Design/Drafting. Students use a commercial 3D CAD/D system (SolidWorks) to parametrically model mechanical parts and assemblies. Area and mass property information is determined and verified by students. Motion inter-dependencies and physical dynamics within the model are established to create realistic virtual models. Commercial-off-the-shelf third party components are sourced, imported and utilized as required. Students create drawing layouts which typically include the orthographic, section, auxiliary and detailed views necessary to thoroughly describe a part/assembly. Students learn how to annotate their drawings in strict accordance with the ANSI/ASME Y14.5 drafting standard.

Prerequisite(s): none  
Corerequisite(s): none

**CAM8505 CNC Machining 1**

Through instruction and assistance, students operate computer numerical control machines, load and edit part programs, follow instruction sheets, set up the tooling and fixtures required to manufacture component parts and practise CNC related mathematics.

Prerequisite(s): none  
Corerequisite(s): CAM8501

**CAM8506 CNC Machining 2**

The manufacturing industry relies heavily on computer-aided technologies. Students develop a technical understanding required for their program, practise advanced operation techniques of computer numerical machining centres, and setup of tooling and fixtures. Students design part drawings and generated toolpaths on CAD/CAM systems, simulate CNC files using the software and also practise CNC related mathematics.

Prerequisite(s): CAM8501 and CAM8505  
Corerequisite(s): CAM8507

**CAM8507 Computer Aided Manufacturing 2**

Students develop the technical understanding required for building competence in Computer Aided Manufacturing. Through instruction and assistance, students write and refine part programs using advanced programming techniques, such as computer-aided design and computer-aided manufacturing systems (CAD/CAM).

Prerequisite(s): CAM8501 and CAM8505  
Corerequisite(s): none

**CAM8515 Computer Aided Manufacturing I**
The use of Computer Numerical Control (CNC) machinery has become a standard in the manufacturing industry. Through instruction and discussion of concept, applications and coding systems of CNC machines, students examine CNC manufacturing methods and develop the technical understanding required to operate such machinery. Students also write and edit part programs and operate IBM compatible computers using editing, printing and back-plotting software.

Prerequisite(s): CAD8300 and MFG8518
Corequisite(s): none

**DRA8253 Understanding Engineering Drawings**

Students gain an understanding of reading engineering prints, an introduction to Canadian and international drawing standards, how to produce detailed sketches to scale and interpret and sketch sectional views, as well as explore the symbology used in the engineering/manufacturing field. Students also examine machining symbols and surface finish requirements, interpret and apply dimensioning and numeric tolerancing on engineering drawings, as well as explore welding symbology, basic sheet metal development, Geometric Dimensioning and Tolerancing (GD&T).

Prerequisite(s): CAD8300
Corequisite(s): none

**DSN8300 Tool Design**

Students are exposed to a significant amount of drafting. Topics include design of cutting tools, gauges and gauge design, principles of locating and clamping, work-holder standards and special purpose, design analysis procedures, manufacturing process as related to tool design, tooling materials and their applications, design of sheet metal, shearing, bending and forming and drawing dies.

Prerequisite(s): CAD8305 and MAC8519 and MFG8518 or DRA8253 or MFG8512
Corequisite(s): none

**DSN8500 Additive Manufacture and 3D Printing**

Additive Manufacturing (AM) is the newest emerging technology within manufacturing. AM is the creation of an object by adding layer-upon-layer of material to build the desired component. While many technologies exist to produce these components they all revolve around the designing within solid modeling by 3D CAD. Students build upon the skills already gained in CAD modeling and manufacturing techniques to learn how to design for this exciting method of manufacture.

Prerequisite(s): CAD8300 and DRA8253 and MFG8512
Corequisite(s): none

**ELN8613 Basic Electronic Assembly**

Students are exposed to soldering techniques. Brief lecture sessions provide the theoretical background followed by practical skills demonstration. Students perform labs to develop various skills, such as Printed Circuit Board component soldering (and de-soldering) for both traditional Through-Hole and Surface Mount Technology. They build their own set of meter leads and a functional project, (such as a Logic Probe) for use in other electronic courses.

Prerequisite(s): none
Corequisite(s): none

**ELN9104 DC and AC Electronics**

An understanding of entry-level electronics is essential to all engineering fields. Students explore basic electrical components and how they are used in electrical circuits. Discovering and using resistors, capacitors and inductors to build circuits from schematic diagrams, students perform tests and measurements to promote their understanding of fundamental electronics. Through following the flow of energy in complete circuits, students apply troubleshooting strategies to identify, localize and correct malfunctions. Students use digital multimeters, oscilloscopes and
Manufacturing Engineering Technician

Manufacturing Engineering Technician

Signal generators to create and measure circuit characteristics. Students evaluate circuits using Ohm’s Law, Kirchoff’s laws, superposition and other theorems. RL, RC and RLC circuits are examined. Good lab safety practices are stressed. Students provide written reports on their findings.

Prerequisite(s): none
Corerequisite(s): MAT8001M or MAT8100

ELN9206 Mechanisms

Mechanics and mechanical systems are pervasive and can be found in many diverse applications ranging from automotive to aerospace. Students learn about the mechanical and fluid components used to transmit power in mechanical systems. How to select bearings, seals, shafts, couplings, brakes, clutches, and other components to assemble drive systems will be introduced. Students will be exposed to power losses, friction reduction and lubrication in mechanical systems. The use of fluid power and its integration into mechanical systems will be introduced.

Prerequisite(s): none
Corerequisite(s): none

ENG8306 Materials Science

Understanding the properties of materials is an important component in working with such materials. Topics covered include crystal structures, atomic bonding, dislocation theory, equilibrium diagrams, heat treatments, hardening ability, IT diagrams and ferrous alloys.

Prerequisite(s): none
Corerequisite(s): none

ENG8319 Quality Control/Quality Assurance

Organizations require formal control processes and systems to ensure quality of products and services. Through the examination of theory and practice, students gain exposure to control of quality by exploring the numerous quality control strategies, such as Statistical Process Control, Lean Manufacturing, Six Sigma, 5-S Systems and basic ISO standards and practices. Students also experience hands-on use of Quality Control (QC) measuring equipment to complete reports including, First Article Inspection (FAI), inspection of incoming product and batch inspection techniques.

Prerequisite(s): none
Corerequisite(s): none

ENL1813T Communications I

Communication remains an essential skill sought by employers, regardless of discipline or field of study. Using a practical, vocation-oriented approach, students focus on meeting the requirements of effective communication. Through a combination of lectures, exercises, and independent learning, students practice writing, speaking, reading, listening, locating and documenting information and using technology to communicate professionally. Students develop and strengthen communication skills that contribute to success in both educational and workplace environments.

Prerequisite(s): none
Corerequisite(s): none

ENL8720 Technical Communication for Technicians

Clear, concise and detailed communication is essential for technical workplaces. Students plan and execute a variety of formal and informal visual, oral and written communication tasks. Exercises and activities foster confidence and competence in workplace communication.

Prerequisite(s): ENL1813T
Corerequisite(s): none
GED0019 Becoming an Entrepreneur: Is It for Me?

The ever changing global economy presents many challenges for job seekers, but it also provides opportunities for entrepreneurs. The process of turning an idea into an opportunity forms the nucleus of entrepreneurship, with the aim of enhancing the socio-economic experience of the public. Students are exposed to the various aspects of entrepreneurship and the effects they have on themselves and the global community. Through classroom discussions, presentations and online activities, students develop their understanding of the pros and cons of entrepreneurship. Students evaluate their career ambitions through introspective reflection to determine if they have the drive and desire to pursue a career as an entrepreneur.

Prerequisite(s): none
Corerequisite(s): none

GED1518 General Education Elective

Students choose one course, from a group of general education electives, which meets one of the following five theme requirements: Arts in Society, Civic Life, Social and Cultural Understanding, Personal Understanding, and Science and Technology.

Prerequisite(s): none
Corerequisite(s): none

GEN2003M Healthy Lifestyle

Are you eating healthy foods? Do you exercise regularly? Do you know how to prevent injuries and disease? These are some of the skills necessary to live a healthy lifestyle. Through self-evaluation, weekly journals, and hands-on exercises students assess their personal lifestyles and learn how to improve them.

Prerequisite(s): none
Corerequisite(s): none

MAT8050 Geometry and Trigonometry

Students study the manipulation of algebraic expressions as a foundation for advanced mathematical concepts and solve a variety of measurement problems involving U.S. Customary and SI units. Students learn to graph simple polynomials and sinusoidal curves using a table of values or by using shifts, shrinks and stretches. They calculate the perimeter and area of basic geometric figures and calculate the surface area and volume of solid geometric figures. Students manipulate trigonometric functions of acute angles and solve problems involving the trigonometry of right triangles and vectors. Delivered in a modular format, this course is equivalent to the completion of all of the following math modules MAT8100 - a, d, m, n, k, and f.

Prerequisite(s): none
Corerequisite(s): none

MAT8051 Algebra

Students review the manipulation of algebraic expressions as a foundation for advanced mathematical concepts. Students solve 2x2 and 3x3 systems of linear equations, and factor algebraic expressions using common factors and techniques for factoring trinomials. They simplify, add, subtract, multiply and divide rational expressions and solve equations involving algebraic fractions. Students also manipulate radicals and algebraic expressions with fractional exponents, and solve exponential and logarithmic equations. Delivered in a modular format, this course is equivalent to the completion of all of the following math modules MAT8100 - b, c, e, g, and h.

Prerequisite(s): none
Corerequisite(s): none

MFG8512 Manufacturing Application I
To effectively function safely in a manufacturing environment, it is necessary to develop the knowledge and skills in maintaining machinery, performing manufacturing and developing components and products. While practising shop safety, students machine basic level projects providing practical experience in a manufacturing environment. Students operate standard machine tools and apply functional application of hands-precision measurement and layout tools.

Prerequisite(s): MFG8518
Corequisite(s): none

**MFG8513 Manufacturing Theory II**

In-depth knowledge of principles and safety relating to manufacturing machines is essential in setup and use of machinery. Students explore strategies and methodologies of component manufacturing including various assembly and secondary processes. In relation to manufacturing of components and products, students examine topics, such as material removal, tooling uses, advanced manufacturing techniques, project planning and layout procedures for application in lab.

Prerequisite(s): MFG8512 and MFG8518
Corequisite(s): MFG8514

**MFG8514 Manufacturing Application II**

Correct inspection and operation of machinery are dependent on strong knowledge of safety, setup, speeds, feeds and form-tools. Students apply assembly practices and procedures to manufacture advanced components on a variety of equipment from a variety of materials. Through application, students use build-to-print principles with engineering drawings for assembly of manufactured components to develop knowledge and skills in the manufacturing field.

Prerequisite(s): MFG8512 and MFG8518
Corequisite(s): MFG8513

**MFG8518 Manufacturing and Metrology**

Manufacturing is complex and dynamic, and professionals must continuously demonstrate skill, adaptability, creativity and collaboration. By examining how components and products are created, students will discover numerous manufacturing processes using many different types of materials. What is also key to manufacturing is the ability to measure those manufactured goods. Through theory and lab exercises the student will learn the importance of quality and accuracy of manufactured components using many different types of measuring equipment. The importance of machine safety and personal safety are a key part in all types of manufacturing; the use of PPE, WHMIS regulations and safe operation of equipment will be emphasized.

Prerequisite(s): none
Corequisite(s): none

**MGT8215 Final Project**

Experience with practical projects provides students with learning opportunities to gain insight and experience, thereby making connections to industry. Students work, in consultation with faculty and closely with external stakeholders, to create deliverables and work towards solutions using project management methodologies. Students undertake projects generated by industry, the department faculty, or the students themselves that solve an industrial manufacturing and automation problem. The finished project must demonstrate a functional, design, manufacturing and electro-mechanical solution. Students in small groups research their project design problem, develop specifications for the design solution and produce a report to document their project work. Students are expected to meet with faculty advisors, document their work, deliver an oral presentation and demonstrate a functional automation project.

Prerequisite(s): ROB8306
Corequisite(s): none

**ROB8220 Industrial Pneumatics**
The current trend towards ever-increasing automation requires a workforce trained in all aspects of automated systems, including pneumatics and electro-pneumatics. Pneumatics is the use of air to do work. Students build pneumatic and electro-pneumatic circuits that mimic real-life industrial situations. Simulation software complements the hands-on lab experience. Pneumatic and electro-pneumatic valves such as timers, directional and flow control valves controlled by solenoids and relays are used extensively throughout the course. Students make use of ladder logic diagrams to develop the logistical requirements of various industrial applications, including meeting safety standards. Students work in teams to apply their skills by designing an industrial application for a culminating project.

Prerequisite(s): none
Corequisite(s): none

**ROB8306 Electomechanical Project Planning**

Students develop basic project management skills, including team management, scheduling, budgeting and the organizational skills required to manage projects. In preparation for ROB9210, students research, review and create possible projects and define project goals. With their team members, students develop a project proposal which they execute in the following semester. Where appropriate, students meet with industrial partners to inform their project proposal.

Prerequisite(s): none
Corequisite(s): none

**WEL9107 Introduction to Fuel Gas and Electrical Welding**

Welding is a skill essential to a variety of professions. Students develop competent welding skills at a basic level using oxyacetylene equipment, Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW) and Gas Tungsten Arc Welding (GTAW). Students are provided with instructions on the safety, proper setup and operation of equipment. Students learn basic principles of flame types and temperatures, metal preparation, gas selection and electrode classification.

Prerequisite(s): none
Corequisite(s): none