

IMTL - INTEGRATED METALS

IMTL110 Machine Shop I Theory

Credits 3
Registration Requirement: RD090, WR090, or IECC201R and IECC201W, and MTH020 with a "C" or better, or placement into higher course levels; and acceptance into the Integrated Metals program. Concurrent Requisite: IMTL111. This is a lecture course with instruction in the fundamentals of industrial processes and machines that are required of the machinist. This course provides the student with an introduction to layout procedures as well as machining metal materials by drilling, sawing, turning, milling and grinding. Included is an introduction to and use of the "Machinery's Handbook." The use and maintenance of machinist hand tools are also presented.
Additional Course Fee: \$5.00

IMTL111 Machine Shop I Lab

Credits 3
Registration Requirement: Concurrent enrollment in IMTL110 or instructor consent is required. This class provides instruction in the fundamentals of industrial processes and machines that are required of the machinist. The student will perform layout and machining metal by drilling, sawing, turning, milling and grinding. The application of the "Machinery's Handbook" is stressed and use and maintenance of machinist hand tools are demonstrated in the completion of assigned exercises.
Additional Course Fee: \$80.00

IMTL114 Blueprint Reading for the Metals Industry

Credits 3
Registration Requirement: Acceptance into an Integrated Metals program or instructor consent. This course provides students with the principles and skills of reading and interpreting blueprints as related to the metals industry. It also covers basic dimensioning practices, notes and symbols. Emphasis is placed on interpreting detail drawings and communication skills required in metals manufacturing. Students are also introduced to basic geometric dimensioning and tolerancing (GD&T) concepts.
Additional Course Fee: \$5.00

IMTL116 Introduction to Precision Measuring

Credits 3
Registration Requirement: Acceptance into the Integrated Metals program. This theory and lab course is designed to introduce inch and metric measurement systems. It provides hands-on training with semi-precision and precision measuring tools including rulers, combination squares, outside micrometers, calipers, height gages, depth micrometers, inside micrometers, telescoping gages, small-hole gages, surface gages and dial indicators. Instruction is also given in the application of squares, surface plates and related tools.
Additional Course Fee: \$25.00

IMTL118 Machine Shop Math Applications

Credits 2
Registration Requirement: Acceptance into an Integrated Metals program. This course covers instruction and practice working with decimals, fractions, formulas, inch and metric systems as they relate to the machine trade. Students are introduced to how to apply the use of the inch/metric systems, as they pertain to thread calculations and speed and feed calculations. Also introduced are the rules, methods and procedures for using trigonometry formulas that deal with both the sides and the angles of the right triangle and oblique triangle to solve for the unknown parts within the machine trade (CNC, manual, quality control, etc.)
Additional Course Fee: \$5.00

IMTL120 SMAW (Shielded Metal Arc Welding/Stick) Theory

Credits 2
Registration Requirement: Concurrent enrollment in IMTL121 is required. This course is an introduction to shielded metal arc welding (SMAW) processes and procedures and is designed to provide fundamental knowledge of the techniques and manipulative skills in the safe use of SMAW and related equipment.
Additional Course Fee: \$15.00

IMTL121 SMAW (Shielded Metal Arc Welding/Stick) Lab

Credits 3
Registration Requirement: Concurrent enrollment in IMTL120 is required. Instruction is given in Shielded Metal Arc Welding (SMAW) and related processes with various electrodes and power sources. The course is designed to provide fundamental knowledge of the techniques and manipulative skills necessary for application of the SMAW process utilizing live demonstrations in the lab.
Additional Course Fee: \$100.00

IMTL124 Blueprint Reading for Welding Applications

Credits 3
 Every commercially fabricated weldment traditionally begins with a blueprint outlining the specifications and requirements for the item. As students work through this course they will gain the skills necessary for blueprint reading and interpretation as applied to the welding and fabrication industries. Also covered are basic sketching techniques, dimensioning practices, notes and welding symbols, orthographic projection and auxiliary views in common use today. Emphasis is placed on interpreting detail drawings and development of appropriate communication skills required in metals manufacturing.
Additional Course Fee: \$35.00

IMTL128 GTAW (Gas Tungsten Arc Welding/ TIG) Theory

Credits 2
Registration Requirement: Concurrent enrollment in IMTL129 is required. This course is an introduction to GTAW processes and procedures and is designed to provide fundamental knowledge of the techniques and manipulative skills utilized in the safe use of GTAW and related equipment. An introduction to plasma arc cutting is included.
Additional Course Fee: \$15.00

IMTL129 GTAW (Gas Tungsten Arc Welding/ TIG) Lab

Credits 3

Registration Requirement: Concurrent enrollment in IMTL128 is required.

Instruction is given in the welding of ferrous and non-ferrous metals using the gas tungsten arc welding (GTAW) process. Instruction in plasma arc cutting is included. The course is designed to provide fundamental knowledge of the techniques and manipulative skills utilizing live demonstrations in the lab.

Additional	Course	Fee:	\$100.00
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IMTL130 Machine Shop II Theory

Credits 3

Registration Requirement: IMTL110 and IMTL111, each with a grade of "C" or better. Concurrent registration in IMTL131 or instructor consent is required.

This course provides instruction in basic machine tool operation and maintenance. Included are topics addressing engine lathes, milling machines, carbide cutting tools, inserts and geometry of tools for lathe applications. This course continues developing the use and application of the "Machinery's Handbook."

Additional	Course	Fee:	\$5.00
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IMTL131 Machine Shop II Lab

Credits 3

Registration Requirement: IMTL110 and IMTL111, each with a grade of "C" or better. Concurrent registration in IMTL130 or instructor consent is required.

This lab course provides instruction in basic machine tool operation. Students continue skill development by setting up and operating engine lathes, milling machines and radial drill and post drill presses. Operations practiced include threading, turning, face milling and end milling as well as other basic operations performed by a machinist. Instruction continues to include use of the "Machinery's Handbook" as applied to machining projects.

Additional	Course	Fee:	\$80.00
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IMTL134 Metallurgy Theory

Credits 3

Registration Requirement: Concurrent enrollment in IMTL135 is required.

This course provides fundamental knowledge of physical and chemical concepts of metallurgy. This includes discussion of ferrous and non-ferrous metallurgy and metals processing, analysis of destructive and non-destructive testing methods and an introduction to plastics. The focus is on metallurgical issues faced by the practitioner in metals manufacturing.

Additional	Course	Fee:	\$5.00
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IMTL135 Metallurgy Lab

Credit 1

Registration Requirement: Concurrent enrollment in IMTL134 is required.

This course provides fundamental knowledge of the manufacturing processes of the metals industry, ferrous metallurgy, foundry process and non-destructive and destructive test methods. Lab work includes metallurgical processes involving microscopic and macroscopic examination of heat-treated specimens, hardness and tensile testing and non-ferrous casting processes.

Additional	Course	Fee:	\$15.00
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IMTL136 Introduction to CNC (Computer Numerical Control) Machining

Credits 3

Registration Requirement: IMTL110 and IMTL111, each with a grade of "C" or better; or machine shop experience; or instructor consent.

This course introduces the student to CNC machine tools. The student will set up and operate CNC machine tools for milling and turning applications. This includes a basic introduction to CNC coordinate systems for milling and turning and learning how to read and interpret CNC code. Students are introduced to the application of cutting tools and tooling systems for CNC operations.

Additional	Course	Fee:	\$15.00
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IMTL140 GMAW/FCAW (Gas Metal and Flux Cored Arc Welding/Wire Feed) Theory

Credits 2

Registration Requirement: Co-requisite: IMTL141 and IMTL172; or full-time instructor's approval is required.

This course is an introduction to GMAW/FCAW processes and procedures and is designed to provide fundamental knowledge of the techniques and manipulative skills utilized in the safe use of GMAW/FCAW and related equipment.

Additional	Course	Fee:	\$15.00
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IMTL141 GMAW/FCAW (Gas Metal and Flux Cored Arc Welding/Wire Feed) Lab

Credits 3

Registration Requirement: Concurrent enrollment in IMTL140 is required.

Instruction is given in gas metal arc welding (GMAW) and flux cored arc welding (FCAW) with various filler materials, power sources and wire feeders. Training includes machine setup and minor repair. New students are placed at their skill level.

Additional	Course	Fee:	\$100.00
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IMTL143 CNC Cutting

Credits 4

Registration Requirement: Computer proficiency with basic Windows knowledge is recommended.

This course examines the automated methods used in processing material for metal fabrication. Special emphasis is given to computer-controlled burning and CNC programming for automated shape cutting.

Additional	Course	Fee:	\$40.00
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IMTL150 Machine Shop III Theory

Credits 3

Registration Requirement: IMTL130 and IMTL131, each with a grade of "C" or better. Concurrent enrollment in IMTL151 or instructor consent is required.

This is a theory course that provides basic instruction in machine tools and operations that are used by machinists in industrial settings. The focus is on cutting fluids, abrasives, surface grinding, cylindrical grinding and ceramic, diamond and carbide tooling for manual and CNC milling and turning applications. Additional operations using the engine lathe and the milling machines are introduced. Applications of the "Machinery's Handbook" are continued.

Additional	Course	Fee:	\$5.00
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IMTL151 Machine Shop III Lab

Credits 3

Registration Requirement: IMTL130 and IMTL131, each with a grade of "C" or better. Concurrent enrollment in IMTL150 or instructor consent is required. This is a lab course with instruction in basic operations of machine tools expected by the machinist working in industry. Topics addressed are the operation of the surface grinder, cylindrical grinder and heat treating processes with additional skill building instruction in the operation of the engine lathe and milling machines. Carbide tooling standards and applications are integrated into lab exercises. There is additional application of the "Machinery's Handbook" in the process.

Additional Course Fee: \$80.00

IMTL152 Welding Processes and Procedures

Credits 2

Registration Requirement: Successful completion of fall and/or winter terms of the IMTL Welding curriculum with a grade of "C" or better; or instructor consent. The emphasis of this course is on various welding applications, procedures and interpretation of American Welding Society D1.1 Structural Steel Welding Code. Instruction is designed to prepare students for welder certification in accord with AWS Code specifications. Students formulate and write a unique welding procedure specification based on data collected from interviews with local welding and fabrication industry employers.

Additional Course Fee: \$15.00

IMTL153 CNC (Computer Numerical Control) Machining

Credits 4

Registration Requirement: IMTL136 with a grade of "C" or better or instructor consent. This is a continuation course with focus on teaching the student to set up and operate CNC machine tools for milling and turning applications. The student will set up and operate all CNC machines in the shop. This includes the reading and interpreting of CNC code; editing programs; and program prove out procedures.

Additional Course Fee: \$65.00

IMTL155 Industrial Safety

Credits 3

Registration Requirement: Acceptance into an Integrated Metals program. This course is a comprehensive study of safety issues in the modern metals manufacturing environment. Topics include hazardous materials/waste, fire safety, crane and forklift safety, biohazards and blood-borne pathogens, materials safety, MSDS forms, personal protective equipment (PPE), personal safety in lifting and work environment, machine safety and general shop safety.

IMTL157 Introduction to Computer-Aided Design for Machinists

Credits 2

Registration Requirement: Acceptance into the Integrated Metals program. This course teaches the basics of computer aided design (CAD) using CAD software. Students create drawings and drawing exchange files using CAD commands. Emphasis is placed on developing accuracy and correct drawing procedures. This course relates the design of parts to part manufacturing.

Additional Course Fee: \$20.00

IMTL160 Fabrication Practices Theory

Credits 2

Registration Requirement: IMTL120 and IMTL121, each with a grade of "C" or better; or IMTL140 and IMTL141, each with a grade of "C" or better; or instructor consent. Concurrent enrollment in IMTL161 is required. This class will present techniques of fabrication practices and processes. Students will receive instruction in the use of hand and power tools, assembly and use of jigs, fixtures and templates. Procedures for equipment maintenance will be presented. The student will be instructed in the use of blueprints, layout of material, measurement, fitting of metal parts, joint design, weld construction and shop safety. Key elements of working metals at elevated temperatures will be presented.

Additional Course Fee: \$15.00

IMTL161 Fabrication Practices Lab

Credits 3

Registration Requirement: IMTL120 and IMTL121, each with a grade of "C" or better; or IMTL140 and IMTL141, each with a grade of "C" or better; or instructor consent. Concurrent enrollment in IMTL160 is required. The student will put to practical use tools, layout principles and blueprints related to fabrication of metal parts.

Additional Course Fee: \$100.00

IMTL163 Welding Certification Preparation Lab

Credits 3

Registration Requirement: IMTL120 and IMTL121, each with a grade of "C" or better; or IMTL140 and IMTL141, each with a grade of "C" or better; or instructor consent. This course includes welding of various metals using several welding processes. Emphasis is on lab practice sufficient to obtain Welder Certification(s) using one or more welding processes in one or more welding positions according to American Welding Society (AWS) code standards. Students must pass at least one guided bend test as required for Welder certification.

Additional Course Fee: \$100.00

IMTL171 Welding Certificate Program Lab I

Credit 1

Registration Requirement: Concurrent enrollment in IMTL121 is required. This course is intended to increase a student's skill level and improve technique in the application of SMAW (stick), GMAW (MIG), FCAW (flux cored) and GTAW (TIG) welding processes.

Additional Course Fee: \$35.00

IMTL172 Welding Certificate Program Lab II

Credit 1

Registration Requirement: Concurrent enrollment in IMTL141 is required. This course is intended to increase a student's skill level and improve technique in the application of SMAW (stick), GMAW (MIG), FCAW, GTAW (TIG) welding processes and Certification Preparation Lab.

Additional Course Fee: \$35.00

IMTL173 Welding Certificate Program Lab III

Credit 1

Registration Requirement: Concurrent enrollment in IMTL163 is recommended. This course is intended to increase a student's skill level and improve technique in the application of SMAW (stick), GMAW (MIG), FCAW (flux cored) and GTAW (TIG) welding processes.

Additional Course Fee: \$35.00

IMTL208 Pre-Pipe Welding

Credits 2

Registration Requirement: IMTL120 or IMTL140 or IMTL128. Co-requisite: IMTL209.

This course is an introduction to welding open root of plate in preparation for welding pipe with the shielded metal arc welding (SMAW) processes and procedures. It is designed to provide fundamental knowledge, techniques, and safe setup of operation of welding equipment. Students will be instructed on setting up and welding of open groove plates in all positions using E6010 and E7018 electrodes. Standards and specifications will be covered.

Additional Course Fee: \$15.00**IMTL209 Pre-Pipe Welding Lab**

Credits 3

Registration Requirement: IMTL121 or IMTL141 or IMTL129. Co-requisite: IMTL208.

This lab course is an introduction to the welding of open groove plate in preparation for welding pipe with the shielded metal arc welding (SMAW) processes and procedures. Instruction provides fundamental knowledge and skills needed for welding and other related equipment. Students will acquire skills needed to perform open groove welds using E6010 and E7018 electrodes.

Additional Course Fee: \$100.00**IMTL210 Pipe Welding**

Credits 2

Registration Requirement: IMTL208 and IMTL120; or IMTL140; or IMTL128. Co-requisite: IMTL211.

This course is an introduction to welding pipe with a shielded metal arc welding (SMAW) process and procedures. It is designed to provide fundamental knowledge, techniques, safe setup of welding and operation of related equipment. Students will be instructed on setting up and welding pipe in all positions of pipe using E6010 for the root weld and E7018 for fill and cap. Standards and specifications will be covered.

Additional Course Fee: \$15.00**IMTL211 Pipe Welding Lab**

Credits 3

Registration Requirement: IMTL209 and IMTL121; or IMTL141; or IMTL129. Co-requisite: IMTL210.

This lab course is an introduction to welding pipe with the shielded metal arc welding (SMAW) processes and procedures. Instruction provides fundamental knowledge and skills needed for the safe setup of welding and other related equipment. Students will acquire skills needed to weld pipe with E6010 and E7018 electrodes.

Additional Course Fee: \$100.00**IMTL215 Inspection and Measurement**

Credit 1

Registration Requirement: IMTL116 or IMTL116B, and second-year student in Integrated Metals or Machine Tool Technology program; industrial experience in a machine shop; or instructor consent. This course provides instruction in precision measurement methods, gauge use and capability, as well as data collection. Included are methods used in quality assurance systems in the modern manufacturing facility or machine shop. Hands-on applications of principles are presented in this course. Also addressed in this course are introductory topics relevant to ISO-9000 certification.

Additional Course Fee: \$25.00**IMTL220 SMAW (Shielded Metal Arc Welding/Stick)**

Credits 2

Registration Requirement: IMTL120.

This course gives students advanced knowledge of Shielded Metal Arc Welding (SMAW) processes and procedures as well as fundamental knowledge and techniques of other electrodes.

IMTL221 SMAW (Shielded Metal Arc Welding/Stick) Lab II

Credits 2

Registration Requirement: IMTL121. Co-requisite: IMTL220.

This course offers advanced instruction on Shielded Metal Arc Welding (SMAW) processes and procedures using other electrodes and gives students the skills needed to perform quality fillet and groove welds in all positions. Students will continue building skills with the oxy-fuel cutting and carbon arc cutting processes.

IMTL224 Blueprint Reading for Welding Applications II

Credits 3

Registration Requirement: IMTL124.

This course builds on lessons from IMTL124. Students will learn to interpret more complex blueprints and weld symbols, including inspection and pipe welding symbols.

Additional Course Fee: \$35.00**IMTL228 GTAW (Gas Tungsten Arc Welding/ TIG) Theory II**

Credits 2

Registration Requirement: IMTL128. Co-requisite: IMTL229.

This course gives students advanced knowledge of the gas tungsten arc welding (GTAW) processes and procedures as well as fundamental knowledge and techniques of other electrodes.

IMTL229 Advanced GTAW (Gas Tungsten Arc Welding/TIG) Lab

Credits 2

Registration Requirement: Co-requisite: IMTL228.

This lab offers advanced instruction on gas tungsten arc welding (GTAW) processes and procedures using other electrodes and gives students the skills needed to perform quality fillet and groove welds in all positions. Students will continue building skills with the plasma arc cutting process.

IMTL236 Quality Control: Statistical Methods

Credits 3

Registration Requirement: None. Second-year student standing in Integrated Metals or Machine Tool Technology, or industrial experience is recommended.

This course introduces the student to theories in quality control using statistical methods. The main focus is on theory, purpose and application of statistical process control (SPC) and gauge capability studies. Additional instruction in principles of Total Quality Management (TQM) is addressed.

Additional Course Fee: \$5.00**IMTL240 GMAW/FCAW (Gas Metal and Flux Cored Arc Welding/Wire Feed) Theory**

Credits 2

Registration Requirement: IMTL140. Co-requisite: IMTL241.

This course gives students advanced knowledge of gas metal arc welding (GMAW) and flux-core arc welding (FCAW) processes and procedures as well as fundamental knowledge and techniques of other electrodes.

IMTL241 Advanced GMAW/FCAW (Gas Metal and Flux Cored Arc Welding/Wire Feed) Lab

Credits 2

Registration Requirement: IMTL141. **Co-requisite:** IMTL240.

This lab offers advanced instruction on the gas metal arc welding (GMAW) and flux cored arc welding (FCAW) processes and procedures using other electrodes and gives students the skills needed to perform quality fillet and groove welds in all positions. Students will continue building skills in oxy-fuel cutting, carbon arc cutting, and gauging processes.

IMTL257 Geometric Dimensioning and Tolerancing

Credits 3

Registration Requirement: IMTL114 or IMTL114C, and second-year standing in Integrated Metals or Machine Tool Technology program; or instructor consent.

Students study how to read and interpret the quality concepts as applied through the use of geometric dimensioning and tolerancing (GDT) as related to ASME and ISO standards. The emphasis is on applications of GDT for manufacturing processes as well as inspection and measurement techniques. Students will also be prepared to sit for the ASME Geometric Dimensioning and Tolerancing Professional Certification exam at the Technologist level.

Additional Course Fee: \$20.00**IMTL260 Advanced Fabrication Practices Theory**

Credits 2

Registration Requirement: IMTL160. **Co-requisite:** IMTL261.

This class provides instruction on fabrication techniques for intermediate projects. Students will build on skills learned in IMTL160. Students will be instructed on the use of blueprint reading, sketching, layout, measuring, builds of material, job cost calculations, joint designs, fitting, cutting, and welding.

IMTL261 Advanced Fabrication Practices Lab

Credits 2

Registration Requirement: IMTL160 and IMTL161. **Co-requisite:** IMTL260.

This lab offers advanced instruction on fabricating techniques of intermediate projects. Students will build on skills learned from IMTL161. Students will receive instructions and demonstrations on safe use of power tools along with other equipment used in industry.

IMTL262 Fabrication Practices Theory III

Credits 2

Registration Requirement: IMTL160. **Co-requisite:** IMTL263.

This course provides instruction on fabrication techniques for advanced projects. Students will build on skills learned in IMTL260. Students will be instructed on blueprint reading, sketching, layout, measuring, builds of material, job cost calculation, joint design, fitting, cutting, and welding.

IMTL263 Fabrication Practices Lab III

Credits 2

Registration Requirement: IMTL261. **Co-requisite:** IMTL262.

This lab allows students to apply fabrication techniques to advanced projects. Students will build on skills learned from IMTL261. Students will receive instructions and demonstrations on safe use of hand and power tools along with other equipment used in industry.

Course fees are subject to change. Additional section fees (web, hybrid, etc.) may apply.