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**Electro-Mechanical Technology Program**

**Course Curriculum**

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| **Semester 01**   (Tuition: $2,780  Books: $450-$740) |
| **Course #** | **Course Title** | **Credits** |
| 10-620-101 | DC and AC Fundamentals | 5 |
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| Credits: 5 Lecture Hours: 54 Lab Hours: 72Students will explore and apply the principles of DC and AC electricity and components. Major topics of study include: electrical safety, direct current (DC) and its characteristics, resistors and resistance, electrical units of volts, ohms, amps, and watts and their relationships in series, parallel, and series-parallel circuits, test and measurement tools and techniques, circuit analysis using common electrical laws and theorems, alternating current (AC) and its characteristics, capacitors and inductors and the effects of inductance and capacitance in AC circuits. In addition, basic soldering/desoldering, breadboarding, and troubleshooting skills will be practiced. |
| 10-620-121 | Mechanics and Materials | 4 |
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| Credits: 4 Lecture Hours: 36 Lab Hours: 72Learners explore the basic concepts of simple mechanical drives and drive components. Major topics include: V-belt drives, chain drives, and gear drives. Learners install and align mechanical drive system components to specified tolerances using a variety of common and specialized hand tools and measuring instruments including dial calipers, micrometers, levels, and rules. |
| 10-620-123 | Construction Electrical Wiring I | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 18Maintaining compliance with the Wisconsin and National Electrical Codes for adhering to OSHA Sub Part S, the student installs, troubleshoots, and maintains electrical equipment for the following: Connection to electrical utility, distribution throughout facility, and control of electrical power. Co-requisite: DC/AC Fundamentals (10-620-101) |
| 10-620-124 | Welding for Maintenance | 2 |
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| Credits: 2 Lecture Hours: 9 Lab Hours: 54The student creates weldments in flat, vertical, horizontal, and overhead positions; these weldments will utilize SMAW, MIG, TIG, brazing and oxyfuel. All operations will adhere to AWS Code. |
| 10-620-138 | Construction Electrical Wiring II | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 18Maintaining compliance with the Wisconsin and National Electrical Codes for adhering to OSHA Sub Part S, the student installs, troubleshoots, and maintains electrical equipment for the following: Connection to electrical utility, distribution throughout facility, and control of electrical power. Co-requisite: Construction Electrical Wiring I (10-620-123) |
| 10-620-160 | Industrial Safety Practices & Career Development | 1 |
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| Credits: 1 Lecture Hours: 18Students will gain an understanding of the OSHA regulations governing safety in the workplace. They will earn an OSHA 10-hour certification card upon successful completion of this course. Students will also be introduced to the ASME safe rigging practices to be applied to rigging applications in the field. Students discover employment strategies designed to assist in securing employment. The course will help develop an awareness of personal and academic skills as they relate to the job seeking process. |
| 10-804-113 | College Technical Math 1A | 3 |
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| Credits: 3 Lecture Hours: 54Topics include: solving linear equations; graphing; percent; proportions; measurement systems; computational geometry; and right triangle trigonometry. Emphasis will be on the application of skills to technical problems. Successful completion of College Technical Mathematics 1A and College Technical Mathematics 1B is the equivalent of College Technical Mathematics 1. |
|  |  | **17** |
| **Semester 02**   (Tuition: $2,750  Books: $430-$590) |
| **Course #** | **Course Title** | **Credits** |
| 10-620-107 | Hydraulics and Pneumatics | 3 |
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| Credits: 3 Lecture Hours: 27 Lab Hours: 54Students examine the principles of fluidic and pneumatic power. Students investigate the operation and applications of devices used in these systems along with the symbolic representation of these devices. Utilizing this information the student will build, analyze, and troubleshoot hydraulic and pneumatic circuits in a laboratory setting. Prerequisites: College Technical Math 1A (10-804-113) or College Technical Math 1 (10-804-115) |
| 10-620-130 | Machine Shop for Maintenance | 2 |
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| Credits: 2 Lecture Hours: 9 Lab Hours: 54The student sets up and operates engine lathes, cutoff saws, milling machines, and drill presses to fabricate projects according to blueprints provided and within tolerances specified. |
| 10-620-146 | Advanced Mechanical Drives | 3 |
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| Credits: 3 Lecture Hours: 27 Lab Hours: 54This course examines both preventive and predictive maintenance concepts as they apply to mechanical drive systems on industrial machines. Students will develop skills related to assessing machine conditions and equipment breakdowns using correct troubleshooting procedures. Students will also explore the electrical safety practices necessary to safely troubleshoot and perform preventative maintenance practices with a thermal image camera. Prerequisite: Mechanics and Materials (10-620-121) |
| 10-620-148 | Intro to Motor Controls | 2 |
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| Credits: 2 Lecture Hours: 18 Lab Hours: 36Students operate, install, and troubleshoot relay and variable frequency drive control of A/C electric motors found in industrial and commercial applications. Students will learn to develop and read schematics, including ladder logic, wire typical relay applications, test and monitor A/C electrical equipment and troubleshoot equipment as necessary. Prerequisite: DC and AC Fundamentals (10-620-101) |
| 10-620-149 | Intro to Programmable Controls | 2 |
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| Credits: 2 Lecture Hours: 18 Lab Hours: 36Students design, program, operate, and troubleshoot discrete input/ output PLC functions utilizing Allen Bradley Control Logix programming software. Students will develop ladder logic programs on a PC, transfer them to and from a PLC, and monitor PLC operations. Co-requisites: Machine Control I-A (10-620-127)or Intro to Motor Controls (10-620-148) |
| 10-804-114 | College Technical Math 1B | 2 |
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| Credits: 2 Lecture Hours: 36This course is a continuation of College Technical Mathematics 1A. Topics include: performing operations on polynomials; solving quadratic and rational equations; formula rearrangement; solving systems of equations; and oblique triangle trigonometry. Emphasis will be on the application of skills to technical problems. Successful completion of College Technical Mathematics 1A and College Technical Mathematics 1B is the equivalent of College Technical Mathematics 1. |
| 10-809-199 | Psychology of Human Relations | 3 |
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| Credits: 3 Lecture Hours: 54Students explore the relationship between the general principles of psychology and our everyday lives. Students are given the opportunity to achieve a deepened sense of awareness of themselves and others. This understanding enables students to improve their relationship with others at work, in the family, and in society. |
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| **Semester 03**   (Tuition: $2,730  Books: $350-$630) |
| **Course #** | **Course Title** | **Credits** |
| 10-620-126 | Industrial Electrical Wiring | 2 |
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| Credits: 2 Lecture Hours: 18 Lab Hours: 36The students design, install, and troubleshoot electrical systems for power distribution and motor control within Industrial environments. All functions adhere to NFPA 79 and the National Electrical Code. Prerequisite: Construction Electrical Wiring II(10-620-138) |
| 10-620-143 | Advanced Welding for Maintenance *\* OR \** |  |
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| Credits: 2 Lecture Hours: 9 Lab Hours: 54The students will create advanced weldments in flat, vertical, horizontal, and overhead positions. These weldments will utilize SMAW, MIG, TIG, brazing, and oxyfuel operations. All operations will adhere to AWS Code. |
| 10-150-129 | Introduction to Networks | 2 |
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| Credits: 2 Lecture Hours: 18 Lab Hours: 36In this course learners will install, operate, configure, secure and troubleshoot networks. This is an entry-level networking course that learners will explore the fundamentals of LAN and WAN technologies including routing, switching and wireless. Learners will work directly with Cisco routers and switches configuring IPv4 and IPv6 by implementing switched networks using VLANs, Access Control Lists (ACLs) and routing technologies. |
| 10-620-151 | Process Control Systems | 5 |
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| Credits: 5 Lecture Hours: 54 Lab Hours: 72Students will explore and apply the fundamental concepts, components, and techniques of industrial process control. Major topics of study include: on-off, proportional, and PID control of level, flow, and temperature processes. Prerequisite: DC & AC Fundamentals (10-620-101) |
| 10-620-156 | Fiber Optic Cabling Technician | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 18This course will introduce the learner to the essential knowledge, skills, and abilities required to install and configure fiber optic networking infrastructure in an industrial plant setting. Major topics of study include: using light to transmit information, fiber types, fiber preparation, fiber termination, fiber splicing, fiber inspection and testing, and safety issues and procedures unique to the fiber optic industry. Learners will practice the skills necessary to select, install, terminate, splice, inspect, and test fiber optical cables to EIA/TIA standards using industry standard tools and procedures. This course is a recommended preparation activity for those interested in pursuing the Fiber Optics Association (FOA) Certified Fiber Optic Technician (CFOT) written and hands-on certification exam. |
| 10-620-157 | Fundamentals of Embedded Systems | 1 |
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| Credits: 1 Lecture Hours: 9 Lab Hours: 18Automobiles, smartphones, E-textiles, and the “Internet of Things”. Embedded systems are at the heart of many of the products that surround us in modern life. In this introductory course the learner will explore the role of the invisible, but key component of embedded systems; the microcontroller. Learners will study the architecture, operation, and programming of a small microcontroller as found in many common consumer and industrial products. Major topics of study include: number systems and codes, digital basics, microcontrollers vs. PCs, and basic microcontroller programming. Learners will practice classroom theory by developing a variety of microcontroller based solutions to solve simulated industrial tasks. Note: Learners enrolled in this course are strongly encouraged to bring a laptop with one available USB port and a minimum of Windows XP to this course. Prerequisite: DC & AC Fundamentals (10-620-101) |
| 10-801-195 | Written Communication *\* OR \** |  |
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| Credits: 3 Lecture Hours: 54Students develop writing skills through prewriting, drafting, revising, and editing. Students complete writing assignments designed to help the learner analyze audience and purpose, research and organize ideas, and format and design documents based on subject matter and content. Students develop critical reading and thinking skills through the analysis of a variety of written documents. |
| 10-801-136 | English Composition 1 | 3 |
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| Credits: 3 Lecture Hours: 54This course is designed for learners to develop knowledge and skills in all aspects of the writing process. Planning, organizing, writing, editing and revising are applied through a variety of activities. Students will analyze audience and purpose, use elements of research and format documents using standard guidelines. Individuals will develop critical reading skills through analysis of various written documents. |
| 10-809-172 | Introduction to Diversity Studies | 3 |
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| Credits: 3 Lecture Hours: 54Students draw from several disciplines to reaffirm the basic American values of justice and equality by learning a basic vocabulary, a history of immigration and conquest, principles of transcultural communication, legal liability and the value of aesthetic production to increase the probability of respectful encounters among people. In addition to an analysis of majority/minority relations in a multicultural context, the topics of ageism, sexism, gender differences, sexual orientation, the disabled and the American Disability Act (ADA) are explored. Ethnic relations are studied in global and comparative perspectives. |
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| **Semester 04**   (Tuition: $2,570  Books: $280-$390) |
| **Course #** | **Course Title** | **Credits** |
| 10-620-117 | Robotics | 3 |
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| Credits: 3 Lecture Hours: 18 Lab Hours: 72Students will use the RoboWare Millennium Edition software to program the Mitsubishi RV-Mx and RV-Ex series of industrial robots to perform a variety of specific tasks. Major topics of study include: robot overview, robot components, robot applications, and robot programming using Roboware Millennium Edition software. Prerequisite: Fundamentals of Embedded Systems (10-620-157) |
| 10-620-144 | Advanced Machine Shop for Maintenance *\* OR \** |  |
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| Credits: 2 Lecture Hours: 9 Lab Hours: 54Students will perform advanced tasks on various types of manual mills, lathes, and other equipment commonly found in many Maintenance Departments. Students will select different metals based on hardness and application qualities. |
| 10-150-126 | Premises Cabling Technician | 2 |
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| Credits: 2 Lecture Hours: 18 Lab Hours: 36This course will introduce the learner to the knowledge and skills required in the installation of copper, fiber and wireless networks. An exploration of cabling types, termination techniques, design and testing will be conducted. Learners will practice using the tools and the skills required to terminate copper, fiber and wireless. At the completion of this course, the learner will complete the requirements for the CPCT certification with a written and hands-on examination. |
| 10-620-150 | Advanced Programmable Controls | 2 |
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| Credits: 2 Lecture Hours: 18 Lab Hours: 36This course will provide the learner with advanced PLC programming including analog principles and human machine interfaces in conjunction with other advance programming features. Prerequisites: Machine Control I-B (10-620-141) or Intro to Programmable Controls (10-620-149) |
| 10-620-159 | Introduction to Frequency & Servo Drives | 2 |
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| Credits: 2 Lecture Hours: 18 Lab Hours: 36Course introduces concepts, terminology, and safety associated with drives and servos used in industry and manufacturing. Prerequisite: DC & AC Fundamentals (10-620-101) Intro to Motor Controls (10-620-148) Intro to Programmable Controls (10-620-149) Introduction to Networks (10-150-129) |
| 10-801-197 | Technical Reporting | 3 |
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| Credits: 3 Lecture Hours: 54Students prepare and present oral and written technical reports. Students create, but are not limited to the following reports: lab and field reports, proposals, technical letters and memos, technical research reports, case studies, and oral technical presentations. Students enroll in this advanced communication course after having completed at least the prerequisite introductory writing course. Prerequisite: Written Communication (10-801-195) or English Composition (10-801-136) |
| 10-806-154 | General Physics 1 | 4 |
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| Credits: 4 Lecture Hours: 54 Lab Hours: 36Presents the applications and theory of basic physics principles. This course emphasizes problem-solving, laboratory investigation, and applications. Topics include unit conversion and analysis, vectors, translational and rotational kinematics, translational and rotational dynamics, heat and temperature, and harmonic motion and waves. Prerequisite: College Technical Math IA (10-804-113)OR College Algebra with Applications (10-804-195)AND Trigonometry with Apps (10-804-196) OR High School Pre-Calculus with a "C" grade or higher |
|  |  | **16** |
| **Total Credits: 67** |
| **Estimated Total Tuition: $10,830** |
| **Tools/Equipment: $400** |
| *Additional industry credentialing certification fees may apply.* |