Southwest Wisconsin TECHNICAL COLLEGE

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Electro-Mechanical Technology Program

Course Curriculum

Semester 01 (Tuition: $3,060)

Course #	Course Title	Credits
10-620-101	DC and AC Fundamentals	5

Credits: 5 Lecture Hours: 54 Lab Hours: 72
Students 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

Credits: 4 Lecture Hours: 36 Lab Hours: 72
Learners 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

Credits: 1 Lecture Hours: 9 Lab Hours: 18
Maintaining 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. Corequisites: DC and AC Fundamentals (10-620-101)

10-620-124	Welding for Maintenance	2

Credits: 2 Lecture Hours: 9 Lab Hours: 54
The 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

Credits: 1 Lecture Hours: 9 Lab Hours: 18
Maintaining 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. Corequisites: Construction Electrical Wiring I (10-620-123)

10-620-163	Intro to Mechatronics	1

Credits: 1 Lecture Hours: 9 Lab Hours: 18
Students will learn foundational information and develop hands-on skill in the areas of Mechanical, Electrical, and Control Technology. Topics covered include the areas of pneumatics, electricity, sensors, actuators, and controls.

10-804-113 College Technical Math 1A 3

Credits: 3 Lecture Hours: 54
Topics 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. Note: Successful completion of College Technical Mathematics 1A and College Technical Mathematics 1B is the equivalent of College Technical Mathematics 1.

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Semester 02 (Tuition: $3,020)

Course #	Course Title	Credits
10-449-160	Industrial Safety Practices & Career Development	1

Credits: 1 Lecture Hours: 18
Students 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.

10-620-107 Hydraulics and Pneumatics 3

Credits: 3 Lecture Hours: 27 Lab Hours: 54
Students 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)

10-620-148 Intro to Motor Controls 2

Credits: 2 Lecture Hours: 18 Lab Hours: 36
Students 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. Prerequisites: DC and AC Fundamentals (10-620-101)

10-620-149 Intro to Programmable Controls 2

Credits: 2 Lecture Hours: 18 Lab Hours: 36
Students 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. Prerequisites: Intro to Motor Controls (10-620-148)

10-620-162 Manual Machine Shop Fundamentals 3

Credits: 3 Lecture Hours: 18 Lab Hours: 72
This course teaches students to set up and operate engine lathes, band saws, milling machines, and hydraulic surface grinders to fabricate within tolerances specified in projects according to prints provided. Students will use and identify machine shop tooling and measurement equipment.

10-620-164 Intro to Preventative Maintenance 1

Credits: 1 Lecture Hours: 9 Lab Hours: 18
Students will be familiar with industry trends and predictive maintenance techniques, such as, IR thermography, vibration analysis, oil analysis, and ultrasonic.

10-804-114 College Technical Math 1B 2

Credits: 2 Lecture Hours: 36
This 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. Note: Successful completion of College Technical Mathematics 1A and College Technical Mathematics 1B is the equivalent of College Technical Mathematics 1. Prerequisites: College Technical Math 1A (10-804-113)

10-809-199 Psychology of Human Relations 3

Credits: 3 Lecture Hours: 54
Students 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: $3,030)

Course #	Course Title	Credits
10-150-129	Introduction to Networks	2

Credits: 2 Lecture Hours: 18 Lab Hours: 36
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.

10-620-126 Industrial Electrical Wiring 2

Credits: 2 Lecture Hours: 18 Lab Hours: 36
The 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. Prerequisites: Construction Electrical Wiring II (10-620-138)

10-620-151 Process Control Systems 5

Credits: 5 Lecture Hours: 54 Lab Hours: 72
Students 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. Prerequisites: DC and AC Fundamentals (10-620-101)

10-620-156 Fiber Optic Cabling Technician 1

Credits: 1 Lecture Hours: 9 Lab Hours: 18
This 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

Credits: 1 Lecture Hours: 9 Lab Hours: 18
Automobiles, 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. Prerequisites: DC and AC Fundamentals (10-620-101)

10-801-136 English Composition 1 3

Credits: 3 Lecture Hours: 54
This 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

Credits: 3 Lecture Hours: 54
Students 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: $2,670)

Course #	Course Title	Credits
10-150-126	Premises Cabling Technician	2

Credits: 2 Lecture Hours: 18 Lab Hours: 36
This 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.

10-620-117 Robotics 3

Credits: 3 Lecture Hours: 18 Lab Hours: 72
Students 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. Prerequisites: Fundamentals of Embedded Systems (10-620-157)

10-620-150 Advanced Programmable Controls 2

Credits: 2 Lecture Hours: 18 Lab Hours: 36
This course will provide the learner with advanced PLC programming including analog principles and human machine interfaces in conjunction with other advance programming features. Prerequisites: Intro to Programmable Controls (10-620-149) or Machine Control I-B (10-620-141)

10-620-159 Introduction to Frequency & Servo Drives 2

Credits: 2 Lecture Hours: 18 Lab Hours: 36
Students operate, wire, program, and troubleshoot variable frequency and servo drives found in industrial and commercial applications. Students will learn to develop and read schematics, wire typical drive applications, troubleshoot and monitor the control of A/C electrical motors. Prerequisites: DC and AC Fundamentals (10-620-101), Intro to Motor Controls (10-620-148), Intro to Programmable Controls (10-620-149), and Introduction to Networks (10-150-129)

10-801-197 Technical Reporting 3

Credits: 3 Lecture Hours: 54
Students 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.

10-806-143 College Physics 1 3

Credits: 3 Lecture Hours: 36 Lab Hours: 36
Presents the applications and theory of basic physics principles. This course emphasizes problem solving, laboratory investigation and applications. Topics include laboratory safety, unit conversions and analysis, kinematics, dynamics, work, energy, power, temperature, and heat. Note: The course can also be met with High School Pre-Calculus with a grade of "C" or higher. Prerequisites: College Technical Math 1A (10-804-113) or Trigonometry with Applications (10-804-196) and College Algebra with Applications (10-804-195)

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Total Credits: 66

Estimated Total Tuition*: $11,780

Tools/Equipment: $400

Additional industry credentialing certification fees may apply.