MANUFACTURING ENGINEERING TECHNOLOGY

Program Number 10-623-3
Associate Degree in Applied Science • Four Terms

ABOUT THE PROGRAM
Manufacturing Engineering Technology program prepares students to work in the manufacturing sector assisting engineering and management in the design and development of new products and in the improvement of production processes.

PROGRAM OUTCOMES
• Characterize how lean culture and tools can help an organization achieve operational excellence.
• Apply proper engineering principles in design.
• Utilize computer - aided applications in design and manufacture of products and processes.
• Demonstrate the principles of material selection and application.
• Apply automation principles for design and control of manufacturing processes.

CAREER AND EDUCATION ADVANCEMENT OPPORTUNITIES
LTC credits transfer to over 30 universities. For more information visit gotoltc.edu/future-students/transfer.

ADMISSIONS AND FIRST SEMESTER ENROLLMENT STEPS
 - Submit online application.
 - Complete the online Student Success Questionnaire.
 - Schedule your 1st Time Program Counseling/Registration Session with your assigned program counselor to plan your first semester schedule, review your entire plan of study and discuss the results of the Student Success Questionnaire.
Submit transcripts and test scores (optional, highly recommended): College transcripts, along with high school transcripts and test scores from within the last five years, used for course registration. Official transcripts needed for transferring college credit(s) and for financial aid purposes.

FUTURE SEMESTER ENROLLMENT STEPS
- Complete online Student Success Tutorial prior to registering for second semester.

APPROXIMATE COSTS
• $146.20 per credit tuition (WI resident) plus $8.77 per credit student activity fee. Material fee varies depending on course. Other fees vary by program. Visit gotoltc.edu/financial-aid/tuition-and-fees for details.

FINANCIAL AID
This program is eligible for financial aid. Visit gotoltc.edu/Financial-Aid or talk with your Admissions Advisor about how to apply for aid.

CONTACT
LTC Admissions Advisor
920.693.1162 • Admissions@gotoltc.edu

Catalog No.	Class Title	Credit(s)
Term 1		
10664110	Introduction to Mechatronics	2
10804113	College Technical Math 1A OR 10804198 Calculus 1* (4 cr)	3
10620105	DC Fundamentals	2
10196189	Team Building and Problem Solving	3
10620168	Robotics Introduction	2
10606108	SolidWorks 1-Parametric Modeling	2
10620124	Microcontroller Programming	1
		15
Term 2		
10664100	Introduction to Industrial Control Systems	2
10664120	Industrial Internet of Things	2
10620110	AC Fundamentals	2
10620155	Hydraulics and Pneumatics	3
10620138	Programmable Controllers - Allen Bradley	3
10801195	Written Communications	3
		15
Term 3		
10623118	Lean Manufacturing Overview	3
10196188	Project Management	3
10620140	Programmable Controllers - Allen Bradley Advanced	2
10623101	Quality Concepts	3
10801196	Oral/Interpersonal Communication	3
10606104	Manufacturing Processes and Materials	2
10420107	Machining Applications	1
		17
Term 4		
10623110	Lean Six Sigma - Measure and Analyze	4
10462111	Maintenance Print Reading OR 10623123 Blueprint Reading and Metrology (3 cr) OR 10606106 Tolerancing and GD&T (3 cr)	2
10623170	Manufacturing Cost Analysis	3
10620171	Robotics Advanced	2
10809195	Economics OR 10809196 Introduction to Sociology (3 cr)	3
10809198	Introduction to Psychology	3
		17
		TOTAL 64

*Calculus 1 is designed for students planning to transition to a 4-year college following LTC program completion.

REAL EXPERIENCE FOR THE REAL WORLD

2023-24

AC FUNDAMENTALS...prepares student to analyze electrical circuits using AC math, analyze AC waveforms, measure and analyze AC power, analyze capacitors and inductors in DC and AC circuits, analyze AC circuits containing reactance and calculate resonance, apply the elements and properties of basic measuring circuits, and describe transformer characteristics. PREREQ: 10620105 DC Funds or 10660105 DC Funds

COLLEGE TECHNICAL MATHEMATICS 1A...prepares the student to solve linear, quadratic, and relational equations; graph; formula rearrangement; solve systems of equations; percent; proportions; and operations on polynomials. Emphasis will be on the application of skills to technical problems. PRERREQUISITES: 10834109 Pre-Algebra or 10804107 College Mathematics or 31457318 Ind Mtnc Trades Math or 31420320 Machine Tool Math or Math placement assessment equivalent.

DC FUNDAMENTALS...prepares the student to convert values to scientific and engineering notations; calculate math quantities; describe basic atomic theory; identify basic electrical terms; use established symbols standards; describe DC voltage characteristics and current sources and electrical resistance; measure and analyze electrical quantities in series and parallel circuits; and desolder/solder single lead components. COREQUISITE: 10804113 College Tech Math 1A or 10804115 College Tech Math 1 or 10804198 Calculus 1 or 10804118 Interm Algebra with Apps

ECONOMICS...provides the participant with an overview of how a market-oriented economic system operates, and it surveys the factors which influence national economic policy. Basic concepts and analyses are illustrated by reference to a variety of contemporary problems and public policy issues. Concepts include scarcity, resources, alternative economic systems, growth, supply and demand, monetary and fiscal policy, inflation, unemployment and global economic issues. COREQUISITE: Reading placement assessment or equivalent

HYDRAULICS AND PNEUMATICS...prepares learner to identify hydraulic and pneumatic component symbols and terms, adjust a pressure relief valve, analyze the operation of a pilot operated relief valve; analyze Pascal's law; evaluate flow, velocity, work and power in industrial hydraulic and pneumatic circuits,; analyze meter-in, meter-out, and bypass flow control circuits; identify basic hydraulic and pneumatic control valves; and assemble hydraulic circuits. COREQUISITES: 10804113 College Tech Math 1A

INDUSTRIAL INTERNET OF THINGS...introduces learners to theoretical and practical topics of the Industrial Internet of Things (IIoT). The learner investigates the range of sensor and actuator devices available, ways in which they communicate and compute, methods for getting information to and from IIoT-enabled devices, and ways of visualizing and processing data acquired from the IIoT. Upon completion, learners will utilize hardware and software to construct a sensor network within an existing system and utilize industry standard tools to visual the data captured.

INTRODUCTION TO INDUSTRIAL CONTROL SYSTEMS...introduces learners to basic concepts of industrial computer-controlled systems. The learner explores various types of programming using robots and PLCs and participates in lab experiments designed to introduce programming principles, electronic inputs and outputs (analog and digital), communication between system components including Ethernet protocols. Upon completion of the course, learners will be able to explain how the control processes are utilized to automate manufacturing facilities.

INTRODUCTION TO MECHATRONICS...introduces learners to microprocessor controlled electromechanical systems. The learner examines how individual components work, and how they are integrated into simple systems. Upon completion of the course, learners will understand what technicians do in the workplace and how industry utilizes Mechatronics in advanced manufacturing.

INTRODUCTION TO PSYCHOLOGY...introduces students to a survey of the multiple aspects of human behavior. It involves a survey of the theoretical foundations of human functioning in such areas as learning, motivation, emotions, personality, deviance and pathology, physiological factors, and social influences. It directs the student to an insightful understanding of the complexities of human relationships in personal, social, and vocational settings. COREQUISITE: Reading placement assessment or equivalent

LEAN MANUFACTURING OVERVIEW...expands learner's ability to develop skills to prioritize and sequence work, execute work plans, implement controls, and create and analyze performance evaluations. Allows student to explore the execution of quality initiatives and continuous improvement plans in addition to the control and handling of inventories.

LEAN SIX SIGMA - MEASURE AND ANALYZE...provides the student with skills and tools to collect and analyze data to solve problems and improve processes within an organization. Various techniques for process mapping are explored including SIPOC, FMEA, VSM, standard work sheets, and spaghetti diagrams. Statistical tools are explored including probability, confidence intervals, measurement systems analysis, hypothesis testing, and TAKT time analysis to create and implement a data collection plan.

MACHINING APPLICATIONS...takes a hands-on approach to the subject of machining processes including milling, turning and drilling. Students will use the machines common to a machine shop to build a functional gearbox during their time in this course. The use of calipers, micrometers and coordinate measuring machines will also be used to verify the work. COREQUISITE: 10606104 Manufacturing Processes and Materials

MAINTENANCE PRINT READING...prepares the learner to read prints; make isometric sketches; interpret orthographic projection drawings, to include sections, surface finishes, and tolerancing. The course when delivered in the evening is self-paced, open-entry/exit, and designed for individualized student needs.

MANUFACTURING COST ANALYSIS...covers cost estimating and financial analysis techniques employed in typical manufacturing and processing industries. Topics include product material and labor costing, justification of expenditures and capital equipment, make vs buy analysis, and inventory costs. Also provides an understanding of soft costs, budgeting, and understanding cost behavior.

MANUFACTURING PROCESSES AND MATERIALS...introduces the learner to machining processes including, milling, turning, and drilling. The learner will also learn how to properly use and read dial and digital micrometers; dial, digital and vernier calipers. In addition, the student will also explore metallurgy, computer-age machining and methods in advanced manufacturing technology.

MICROCONTROLLER PROGRAMMING...introduces the student to concepts in basic digital programming, programming logic, electronic components, and Digital and Analog I/O.

ORAL/INTERPERSONAL COMMUNICATION...provides students with the skills to develop speaking, verbal and nonverbal communication, and listening skills through individual speeches, group activities, and other projects. COREQUISITE: Reading placement assessment or equivalent

PROGRAMMABLE CONTROLLERS - ALLEN BRADLEY...prepares the student to understand basic PLC structure and terminology; learn to create and troubleshoot basic PLC programs using the RSLOGIX 500 software and the RSLINX communication software; become familiar with communicating with programming SLC-500 PLCs. This course is highly computer based.

PROGRAMMABLE CONTROLLERS - ALLEN BRADLEY ADVANCED..prepares the student to develop applications utilizing subroutine instructions, analog modules; gain a basic understanding of creating and troubleshooting programs using the ControlLogix, Studio5000 software. This course is highly computer based. PREREQUISITE: 10620138 Prog Cntrls/AB. This class qualifies for 48 hours of Continuing Education Units (CEUs) for Electricians.

PROJECT MANAGEMENT...introduces the learner to explore the relationship of existing and emerging processes and technologies to manufacturing strategy and supply chain-related functions. This course addresses three main topics: aligning resources with the strategic plan, configuring and integrating operating processes to support the strategic plan, and implementing change.

QUALITY CONCEPTS...provides an overview of quality systems, methods and analysis. Basic quality philosophies such as Deming's principles, continuous improvement, quality costs, supplier relations and inspection theory will be presented. The components of a basic quality system compatible with ISO 9000 and Six Sigma will be explored. Techniques such as pareto, trend analysis, histograms, cause and effect diagrams and corrective/preventive action techniques will be applied to the data in order to address problems and improve processes.

ROBOTICS ADVANCED...introduces students to adv robot programming commands to include use of Fanuc IRvision on both Fanuc Robotic arm and Delta Robots. Once a student completes both Robotic Introduction and Robotics Advanced they will be well prepared to take the FanucCertification test by NOCTI. PREREQ: 10620168 Robotics Introduction. This class qualifies for 48 hrs of Continuing Education Units (CEUs) for Electricians.

ROBOTICS INTRODUCTION...introduces the student to robotic axes, movement control, navigating the teach pendant, robotic frames, basic programming commands such as conditional branching, wait and call instructions. This class qualifies for 48 hours of Continuing Education Units (CEUs) for Electricians.

SOLIDWORKS 1-PARAMETRIC MODELING...introduces the students to the concepts and commands of parametric solid modeling. Students create sketches and add relationships to the sketch segments, extrude the sketches to create models, and add features such as fillets, cut extrude, chamfers, holes, draft, shell, lofts and sweeps. Emphasis is placed on the design intent of the parametric solid models.

TEAMBUILDING AND PROBLEM SOLVING...applies the skills and tools necessary to facilitate problem solving in a team environment. Each learner will demonstrate the application of the benefits and challenges of group work, necessary roles in a team, stages of team development, different approaches to problem solving, consensus, a systematic process of problem definition, data acquisition, analysis, developing alternative solutions, solution implementation, and evaluation.

WRITTEN COMMUNICATION...teaches writing process, which includes prewriting, drafting, revising, and editing. Through a variety of writing assignments, the student will analyze audience and purpose, research and organize ideas, and format and design documents based on subject matter and content. Keyboarding skills are required for this course. It also develops critical reading and thinking skills through the analysis of a variety of written documents. COREQUISITE: Writing placement assessment or equivalent AND Reading placement assessment or equivalent