LAKESHORE TECHNICAL COLLEGE

MECHANICAL DESIGN AND ENGINEERING TECHNOLOGY

Program Number 10-606-1
Associate Degree in Applied Science • Four Terms

ABOUT THE PROGRAM

Mechanical design and engineering technicians help develop and test products, calculate strength and cost of materials, make drawings to scale, and work on prototypes and product improvement. Students work on acquiring high-level drafting skills and utilize a variety of Computer-Aided Drafting (CAD) software. They learn to construct and revise engineering working drawings and tooling drawings; research and apply information for parts and materials; and specify appropriate tolerances, materials, and other engineering data. Mechanical designers work on teams that focus on continuous improvement, Six Sigma initiatives, and lean manufacturing efforts.

PROGRAM OUTCOMES

- Prepare detail and assembly drawings for documentation of mechanical components and products.
- Create CAD geometry, parts and assemblies.
- Design mechanical components and products.
- Analyze mechanical engineering problems.
- Select purchased parts.

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.

SPECIAL NOTE

This program can also be completed by attending evenings.

CONTACT

LTC Admissions Advisor
920.693.1162 • Admissions@gotoltc.edu

Catalog No.	Class Title	Credit(s)
	Term 1	
10606100	Mechanical Drafting Standards/Procedures	1
10606101	AutoCAD-2D Computer Aided Design	2
10606108	SolidWorks 1-Parametric Modeling	2
10606102	Product Design & Rapid Prototyping	1
10606104	Manufacturing Processes and Materials	2
10420107	Machining Applications	1
10103121	Excel - Level 1	1
10804113	College Technical Math 1A OR 10804198 Calculus 1* (4 cr)	3
10801196	Oral/Interpersonal Communication	3
		16
	Term 2	
10606106	Tolerancing and GD&T	3
10606134	Statics	4
10606109	SolidWorks 2-Modeling/Details for Designers	2
10606110	SolidWorks 3-Working Drawings for Designers	2
10606111	SolidWorks-Advanced Modeling	2
10806154	General Physics 1	4
		17
	Term 3	
10606117	Design of Machine Elements	3
10606118	Kinematics	3
10606119	Strength of Materials	3
10606120	Reverse Engineering	2
10620130	Mechanical Drive Systems	3
10620169	Robotic Mechanical Maintenance	1
10444104	HSM for SolidWorks	1
		16
	Term 4	
10606197	Portfolio-Mechanical Design/Engineering	1
10606190	Design for Manufacture and Assembly (DFMA)	2
10606189	Quality Systems	2
10606198	Engineering Technology Applications	4
10801195	Written Communication	3
10809196	Introduction to Sociology OR 10809195 Economics	3
10809198	Introduction to Psychology	3
		18
		TOTAL 67

*Students who plan to also achieve a Bachelor's degree are encouraged to take this transferable course.

Curriculum and program acceptance requirements are subject to change. Program start dates vary; check with your program counselor for details. The tuition and fees are approximate based on 2023-2024 rates and are subject to change prior to the start of the academic year.

AUTOCAD-2D COMPUTER AIDED DESIGN…provides the learner with the skills to utilize AutoCAD's drawing editor, viewing commands; apply coordinate entry methods, AutoCAD file commands; utilize draw commands, modify commands; create and edit text, prints & plots; apply geometric construction to solve a drawing problem; utilize selection sets, duplicating modify commands, layers & objects properties, blocks; apply principles of orthographic and multi view projection.

COLLEGE TECHNICAL MATHEMATICS 1A...prepares student to solve linear, quadratic, and relational equations; graph; formula rearrangement; solve systems of equations; percent; proportions; and operations on polynomials. Emphasis on the application of skills to technical problems. COREQUISITE: Math placement assessment or equivalent

DESIGN FOR MANUFACTURE AND ASSEMBLY (DFMA)…introduces learners to and will apply the concept of Design for Manufacturing and Assembly (DFMA) to an industrial assembly. DFMA is an engineering methodology that focuses on reducing time-to-market and the total production cost by prioritizing both the ease of manufacture for the product's parts and the simplified assembly of those parts into the final product. PREREQUISITES: 10606160 Mfg Processes & Applctns or 10606104 Mfg Processes & Materials and 10420103 Machining Applctns and 10606102 Product Design & Rapid Prototyping and 10606111 SolidWorks 3-Working Drawings for Designers and 10606106 Tolerancing and GD&T

DESIGN OF MACHINE ELEMENTS...introduces student to the various components found on machinery, including shafts, bearings, power transmissions, gears, and selection of standard machine elements from manufacturers' catalogs, and use of spreadsheet solutions. PREREQ: 10606130 Strength of Materials or COREQ: 10606119 Strength of Materials

ENGINEERING TECHNOLOGY APPLICATIONS...applies the knowledge and skills gained throughout the Mechanical Design and Engineering Technology program. This is a capstone course in which the learner will create a project portfolio that will showcase a full set of working drawings to produce an industrial assembly and all the design calculations to ensure function and lifecycle requirements. The learner will create a physical, working prototype in the MDET Fab Lab as part of this capstone project. PREREQUISITES: 10606117 Design of Machine Elements, 10606118 Kinematics, 1006110 SolidWorks 3-Working Drawings for Designers, 10606106 Tolerancing and GD&T

EXCEL - LEVEL 1…introduces the student to spreadsheet features such as creating, saving, editing, navigating, formatting worksheets; entering formulas and functions; working with charts; and developing multiple-sheet workbooks.

GENERAL PHYSICS 1...presents the applications and theory of basic physics principles. This course emphasizes problem-solving, laboratory investigation, and applications. Topics include unit conversions and analysis, vectors, translational and rotational kinematics, translational and rotational dynamics, heat and temperature, and harmonic motion and waves. PREREQUISITE: 10804113 College Tech Math 1A or Math placement assessment or equivalent

HSM FOR SOLIDWORKS…CAD software that is often used for mechanical design. HSM for SolidWorks is an add-on to SolidWorks for CAM processes, creating G&M code programs from the solid model. You will explore the SolidWorks interface and create face milling, end milling, and hole-producing tool paths for CNC machining centers. You will also be creating turning, boring, threading, and hole-producing tool paths for CNC turning centers.

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

INTRODUCTION TO SOCIOLOGY...introduces students to basic concepts of sociology: culture, socialization, social stratification, multi-culturalism, and the five institutions, including family, government, economics, religion, and education. Other topics include demography, deviance, technology, environment, social issues, social change, social organization, and workplace issues. COREQUISITE: Reading placement assessment or equivalent

KINEMATICS...provides the student with the skills necessary to determine the motions required to accomplish the objective of a machine, calculate velocities and design gears. PREREQUISITE: 10804115 College Technical Math 1 or 10804113 College Technical Math 1A or 10804198 Calculus 1 or 10804118 Interm Algebra with Apps

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

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.

MECHANICAL DRAFTING STANDARDS & PROCEDURES…develops skills in creating engineering sketches through application of drafting standards and procedures. Principles covered include view selection, orthographic projection, section and auxiliary views, and their utilization in working drawings. Need for engineering sketching is reinforced through a hands-on project requiring measurement, inspection and sketching of orthographic views.

MECHANICAL DRIVE SYSTEMS...prepares the learner to use tools and fasteners safely; identify belt and chain drive components; install and adjust belt and chain drives; apply bearing and lubrication information; perform coupling alignment using straight edge, feeler gauge, and dial indicator and laser methods; identify various gear drives; calculate gear ratios; and analyze first-, second-, and third-class levers.

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

PORTFOLIO-MECHANICAL DESIGN/ENGINEERING…acquaints students with the process and the development of a plan for securing employment in the mechanical design and engineering field. Includes letters of introduction, resume design, personal data sheets, portfolio design and job interview techniques. Students will create profiles on the college job search site and LinkedIn. PREREQUISITE: 10606110 SolidWorks 3-Working Drawings for Designers and 1606117 Design of Machine Elements

PRODUCT DESIGN AND RAPID PROTOTYPING…introduces students to rapid prototyping methods and the operation of various types of rapid prototyping equipment available in the Mechanical Design & Engineering Technology program's Fab Lab. Research and use 3D printers including FDM and related material usage, will be explored through hands-on lab activities to develop a working prototype. COREQ: 10606108 SolidWorks 1-Param Mod

QUALITY SYSTEMS...introduces the learner to the theories and concepts of Statistical Process Control, Six Sigma and Lean Manufacturing. PREREQUISITES: 10804115 College Tech Math 1 or 10804113 College Tech Math 1A

REVERSE ENGINEERING…prepares students to take an existing assembly, take it apart, measure it using micrometers, calipers and coordinate measuring machines. Using the measurements, students will then create a full set of working drawings including appropriate tolerances. Students will also be introduced to a reverse engineering scanner system and software, used for reverse engineering applications in the SolidWorks 3D modeling environment. PREREQUISITES: 10606111 SolidWorks-Advanced Modeling and 10606104 Manufacturing Processes and Materials

ROBOTIC MECHANICAL MAINTENANCE...introduces the students to the robot teach pendant and robot jogging. Students will be taught to replace servo motors, recalibrate the robot and back up robot software and programs.

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.

SOLIDWORKS 2-MODELING/DETAILS FOR DESIGNERS…is the second course in the study of parametric solid modeling using SolidWorks as it applies to the mechanical design field. Students extract 2D documentation from the 3D models and add details to the drawings. Advanced software applications are explored including assembly modeling techniques, configurations, detail drawing generation, surfaces, multibody parts, additional work with sweeps and lofts, and preparation for the CSWA (Certified SolidWorks Associate) exam. PREREQUISITES: 10606100 Mechanical Drafting Standards/Procedures and 10606108 SolidWorks 1 - Parametric Modeling

SOLIDWORKS 3-WORKING DRAWINGS FOR DESIGNERS…focuses on the creation of complete sets of engineering detail and assembly drawings including the accompanying engineering documentation, bill of materials and the application of geometric dimensioning and tolerancing standards. Emphasis is placed on product design analysis, tolerance stack ups and the application of GD&T. COREQUISITE: 10606109 SolidWorks 2-Modeling/Details for Designers

SOLIDWORKS-ADVANCED MODELING…introduces students to advanced modeling and design techniques for part design in sheet metal, weldments, castings and mold design. COREQUISITES: 10606110 SolidWorks 3-Working Drawings for Designers and 10606106 Tolerancing and GD&T

STATICS...covers the study of forces on and in structures that are at rest. Forces, vectors, resultants, moments, couples, equilibrium, free-body diagrams, friction, centroids, and centers of gravity, and moments of inertia are covered. COREQUISITE: 10804115 College Technical Math 1 or 10804113 College Technical Math 1A or10804198 Calculus 1 or 10804118 Interm Algebra with Apps

STRENGTH OF MATERIALS...provides the learner with the skills to identify and calculate centers of gravity, moments of inertia, and stresses induced in force-bearing elements for the purpose of sizing the material in that element, specifically studying shear, axial, bending, torsional, and combined stresses. PREREQUISITE: 10606134 Statics

TOLERENCING AND GD&T…provides the learner with the skills to apply and interpret tolerancing standards for both rectangular and geometric tolerancing (ASME 14.5M-2018) on part drawings, including form, profile, orientation, runout, and positional tolerances. Additionally the learning will design mating parts and tolerance stack ups with and without GD&T.

WRITTEN COMMUNICATION...teaches writing process, which includes prewriting, drafting, revising, and editing. Through a variety of writing assignments, student will analyze audience and purpose, research and organize ideas, and format and design documents based on subject matter and content. Keyboarding skills required for this course. 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