

# Mechanical Design Technology

Program Number: 10-606-1

## Associate in Applied Science Degree

Applied Engineering Technologies Program Cluster

Center for Agriscience and Technologies

Program offered at Madison and Watertown Campuses

For information call: (608) 246-6800 or  
(800) 322-6282 Ext. 6800

### About the Program

Mechanical design technicians assist engineers in the design of products and prepare engineering drawings for any manufactured product that you use in everyday life. The parts of a car, the chairs you sit on or the computer keyboard you use, are all examples of mechanical parts that have to be designed and drawn prior to being manufactured.

Mechanical design technicians are challenged through active involvement in the engineering design process creating more dependable, cost effective and unique product designs that will satisfy their customers. To assist in this process, mechanical design technicians use science, mathematics, engineering problem solving, computer-aided design (CAD) technology and parametric solid modeling.

### Unique Requirements for Admission

It is strongly recommend that students take the high school math sequence of Algebra 1 and Algebra 2. A high school physical science course is highly recommended. Student must earn a 2.0 (C) or better in these high school courses.

The Mechanical Design Technology program participates in MAAP (Mandatory Assessment, Advising and Placement). This requires new students to complete the COMPASS test. Advisement and course placement in English and math is done based on test results. Testing will be required prior to admission.

### Program Courses

**10-606-100 Engineering Technology Communications 3 credits**  
Develops skills in creating engineering sketches through the application of drafting standards and procedures. Principles covered include view selection, orthographic projection, section and auxiliary views, and their utilization in working drawings. The need for engineering sketching is reinforced through a hands-on project requiring measurement, inspection and sketching of orthographic views. In addition, materials, fabrication and assembly methods related to the project will also be explored. Corequisites: 10-606-120 and 10-606-130.

**10-606-101 Engineering Technology Fundamentals 2 credits**  
Introduces the student to the knowledge and skills required to function in today's engineering office environment. Engineering office format, procedures, standards, ethics and application level of engineering office related software is introduced. Students explore the engineering design process and participate in various problem solving and conflict resolution techniques. Career paths available to the Mechanical Design graduate will also be explored. Students utilize Net Meeting, video conferencing and Internet shared data.

## Curriculum

The courses listed below outline the requirements for graduation for students entering this program in the 2011-2012 academic year. Requirements for graduation may vary depending on the semester in which a student is admitted to their program. Current/continuing students should consult their degree progress report available through their student center (myMadisonCollege) account for specific graduation requirements. Program requirements are subject to change.

### FIRST YEAR

First Semester		Credits	Hrs/week Lec-Lab
10-606-100	Engineering Technology Communications.....	3	1-4
10-606-101	Engineering Technology Fundamentals.....	2	1-2
10-606-120	2D CAD.....	2	1-2
10-606-130	SolidWorks 1.....	2	1-2
10-606-160	Fundamentals of Mfg/Eng Materials.....	2	1-2
10-801-195	Written Communication.....	3	3-0
10-804-114	College Technical Math 1B.....	2	2-0
<b>Semester Total</b>		<b>16</b>	

### Second Semester

10-606-131	SolidWorks 2.....	2	1-2
10-606-140	Dimensioning/GDT.....	3	2-2
10-606-155	Statics & Mechanics.....	3	2-2
10-606-161	Manufacturing Processes.....	2	1-2
10-606-170	Strength of Materials.....	3	2-2
10-804-116	College Technical Math 2.....	4	2-0
10-809-199	Psychology of Human Relations.....	3	3-0
<b>Semester Total</b>		<b>20</b>	

### SECOND YEAR

#### First Semester

10-606-104	Engineering Technology Practices.....	3	1-4
10-606-116	Machine Design.....	3	2-2
10-606-125	Plastics.....	3	2-2
10-606-163	Manufacturing Analysis.....	2	1-2
10-606-164	Quality Systems.....	2	1-2
10-606-193	Career Development.....	1	1-0
10-809-166	Introduction to Ethics.....	3	3-0
<b>Semester Total</b>		<b>17</b>	

#### Second Semester

10-606-112	Tool Design Technology.....	3	1-4
10-606-150	CAE Applications.....	2	1-2
10-606-152	PLC, Hydraulics, Pneumatics.....	2	1-2
10-606-186	Engineering Technology Applications.....	3	1-4
10-801-197	Technical Reporting.....	3	3-0
10-806-154	General Physics.....	4	3-2
<b>Semester Total</b>		<b>17</b>	

Note: Students are assessed for correct placement in English or mathematics courses based on their scores on the COMPASS test or on completion of the appropriate prerequisite(s). Additionally, there may be courses in other subject areas that may use COMPASS scores as prerequisites when reading, writing, math, or critical thinking competencies are required.



Program Courses (continued)

**10-606-104 Engineering Technology Practices 3 credits**  
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, the engineering change process, product data management and an introduction to stress analysis and rapid prototyping. Other areas of study: threaded fasteners, non-threaded fasteners, springs and gears. Prerequisite: 10-606-140.

**10-606-112 Tool Design Technology 3 credits**  
The fundamentals of tool design are presented to acquaint the student with the language and methods used in designing jigs and fixtures. Through the research and selection of standard tooling components, working tool design drawings are completed. Also explored are common plastic part design and tooling considerations through actual design problems. Prerequisite: 10-606-104.

**10-606-116 Machine Design 3 credits**  
The principles of statics and strength of materials are reviewed and applied to the design of common machine elements. Typical elements studied include: fasteners, shafts, clutches, belts, chains, gears, bearings and springs combined to form machines. Prerequisite: 10-606-170.

**10-606-120 2D CAD 2 credits**  
Introduces the basic capabilities of the current version of 2D CAD software as it applies to mechanical design. Emphasis is placed on basic commands and input required for their application in creating two-dimensional mechanical working drawings. Corequisites: 10-606-100 and 10-606-130.

**10-606-125 Plastics 3 credits**  
This course is an introduction to the main plastics processing industries, techniques, and commonly used polymers. Plastic processing principles will be studied and applied through learning activities designed for hands-on classroom manufacturing processing training centers. In addition, students will be provided with relevant information that will enable them to investigate the career possibilities in the plastic industry.

**10-606-130 SolidWorks 1 2 credits**  
Introduces the students to the concepts commands of parametric solid modeling. Students create sketches and add relationships to the sketch segments, extrude the sketches to create models, add features such as fillets, cut extrude, chamfers, holes, draft, shell, lofts and sweeps. Emphasis is placed on the design intent of parametric solid models. In addition, students extract 2D documentation from the 3D models and add details to the drawings. Corequisites: 10-606-100 and 10-606-120.

**10-606-131 SolidWorks 2 2 credits**  
A continuation in the study of parametric design started in 10-606-130, Solid Modeling 1. Topics covered in the course include: assemblies and BOM, the use of equations, part configurations and design tables, derived and molded parts, thin features and sheet metal, and the application of photoworks, edrawings, toolbox and 3D meeting. Prerequisite: 10-606-130.

**10-606-140 Dimensioning/GDT 3 credits**  
Mechanical drafting dimensioning fundamentals are developed including conventional tolerancing and basic hole and shaft tolerancing methods. The course continues with developing the technical knowledge and skills, which are required for meaningful application and interpretation of geometric dimensioning and tolerancing on mechanical drawings in accordance with the current ASME Y14.5M standard. Prerequisites: 10-606-100, 10-606-120 and 10-606-130.

**10-606-150 CAE Applications 2 credits**  
Introduction to how engineering and manufacturing utilize a parametric modeled file. Students will follow parts through the product development cycle utilizing parametric design, computer aided manufacturing, stress analysis, computer simulation and rapid prototyping. Prerequisite/Corequisite: 10-606-186.

**10-606-152 PLC, Hydraulics, Pneumatics 2 credits**  
Overview of the basics of programmable logic controllers, hydraulics, and pneumatics. Basic system components, symbols and schematics are explored. Prerequisite: third or fourth semester standing.

**10-606-155 Statics & Mechanics 3 credits**  
Introduces students to the basic fundamentals of statics. Learners study and analyze forces and loading conditions applied to structures and mechanical devices. Areas of study include resultant and equilibrant of forces, moments, nonconcurrent-coplanar forces (trusses), concurrent-noncoplanar forces and static friction. Prerequisite: 10-804-114. Corequisite: 10-804-116.

**10-606-160 Fundamentals Of Manufacturing/ Engineering Materials 2 credits**  
An introduction to the engineering materials and their properties used in industry. Material testing methods and their relevance to design applications are studied through various lab activities. In addition, this course begins the examination of various contemporary manufacturing processes used in industry today.

**10-606-161 Manufacturing Processes 2 credits**  
Introduces students to computer aided design and manufacturing concepts through an integrated material removal project. Upon completing the project, students will use various measurement and inspection equipment to verify part conformance to engineering specifications. Prerequisites: 10-606-130 and 10-606-160.

**10-606-163 Manufacturing Analysis 2 credits**  
An introduction to manufacturing engineering technology processes, applications, and knowledge, as it relates to the Mechanical Design field. Areas of study include "Manufacturing Topics of Today", "Project Management", and "The Product Development Process" in preparation for the Engineering Technology Applications course. Prerequisite: third semester standing.

**10-606-164 Quality Systems 2 credits**  
This course is an introduction to the foundational building blocks necessary for effective understanding and application of quality principles used today. The fundamentals of quality, measurement for quality, and statistics for quality will be explored as they relate to productivity, specifications, and inspections of processes. In addition, process capability and design of experiments is also explored. Prerequisite: 10-606-140.

**10-606-170 Strength Of Materials 3 credits**  
An analysis of the principles of strength of materials as they apply to various fasteners, welded joints, beams and shafts through practical design and analysis problems. Topics covered include simple stresses, mechanical properties of materials, center of gravity, moment of inertia, shear force and bending diagrams and beam design. Related engineering analysis software is utilized throughout the course. Prerequisite: 10-606-155.

**10-606-186 Engineering Technology Applications 3 credits**  
A comprehensive application of the Mechanical Design Technology program, in which student teams will implement the design project plan previously developed in the Manufacturing Analysis course. Implementation of the design project plan will be carried out through a 3-step concurrent engineering design process: Ideation, Refinement, and Implementation. A final presentation of the design project will be presented in a formal design project notebook, as well as through a formal team design project presentation. Prerequisite: 10-606-163.

**10-606-193 Career Development 1 credit**  
Acquaints students with the process and the development of a plan for securing employment in the mechanical design field. Includes letters of introduction, resume design, personal data sheets, portfolio design and job interview techniques. Presentations by industry professionals in the areas of human resources, management, design and job placement will overview the industry perspective and requirements for employment in the career of mechanical design. Prerequisite: third-semester standing.

Career Potential:

- Detailer
- Mechanical Design Technician
- Mechanical Drafter
- CAD Drafter

With additional education and/or experience, graduates may find employment as:

- Mechanical or Product Designer
- Lead Designer
- Project Engineer
- Technical Sales/Service Representative

*More detailed and updated information on this program may be available at: [madisoncollege.org](http://madisoncollege.org). The college reserves the right to make changes in the regulations and courses announced in this publication without notice.*

*Madison Area Technical College provides equal opportunity in education and employment.*

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