Computer Aided Design and Drafting (CAD)

CAD 1050  Geometric Dimensioning and Tolerancing (GD&T) ................................................. 4 Credit Hours
This course is designed to cover the fundamentals as well as more advanced applications of geometric tolerancing. The student will learn the principles of Geometric Dimensioning and Tolerancing (GD&T) as applied to engineering design, manufacturing and quality control. The course includes geometric concepts and standards used to communicate engineering design intent and to provide a basis for design and productions. The course also includes national and international geometric standards of symbols and terms, datum feature modifiers, types of tolerances, datum reference frames, material boundary modifiers and other related topics. Also included are concepts of basic part print reading as it relates to GD&T. Course/lab fees.

CAD 1101  Introduction to CAD .................................................. 4 Credit Hours
This course is an introduction to computer aided design. Students will apply computer aided design techniques and principles to create drawings related to various architectural, mechanical, interior layout, landscape, and other applications. Students will be exposed to the basic concepts of three-dimensional modeling, design modification, basic computing, and become familiar with the system hardware and software related to CAD and rapid prototyping. In addition to formal classroom lecture and demonstrations, students will utilize CAD equipment in an interactive lecture environment. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 1105  Animation Design ................................................. 3 Credit Hours
Prerequisite: CAD 1101 or consent of instructor.
This course utilizes 3D Studio Max to train students interested in design animation, scene reconstruction, architectural fly-through, machine simulation, and developing animated technical training materials. Students will create rendered models, drawings and presentations that come to life and communicate creative ideas, take industrial models and sell the concept before production, show a virtual model of a building and walk through and around it, and create characters that talk and move. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 1151  CAD Architecture / Civil Engineering ........... 3 Credit Hours
Prerequisite: CAD 1101 or consent of instructor. Pre or Corequisite: Basic Architectural, Interior Design or Civil Engineering Drafting course.
This intermediate course emphasizes the use of CAD systems for architectural / civil engineering / landscape, designs and presentations. Topics include methods of creating site plans, floor plans, elevations, sections, details, dimensioning and related topics utilizing various Autodesk application software packages, including three-dimensional parametric modeling specific to architecture. The concepts of layers, blocks and the library of symbols depicting plumbing, electrical and landscape details are included. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 1160  Revit - Advanced Architectural Applications ......................................................... 4 Credit Hours
Prerequisite: CAD 1151 or consent of instructor.
This course expands on the use of CAD software for the application of building information modeling (BIM) for architecture. Students will learn CAD techniques for advanced wall creation and manipulation, details, wall sections, multiple floor systems and stair development. The course also covers walkthrough techniques and the management of design revisions within CAD database. In addition to classroom lecture and demonstrations, students will utilize CAD equipment in an interactive lecture environment. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 1201  Introduction to Engineering Graphics ........... 4 Credit Hours
Prerequisite: CAD 1101 or consent of instructor. Pre or Corequisite: DDT 1000.
This course presents the techniques and principles for creating orthographic and auxiliary views on a CAD system. Students will create working detail drawings by adding the necessary sections, dimensions, tolerances, notes and specifications to multi-views. Given a work description or isometric view of a simple object, the student will be able to completely describe its shape in orthographic multi-view projection. This course develops skills in the use and selection of standard parts from the CAD database and creation of assembly drawings. Area of study will also include ANSI and ISO standards for dimensioning, geometric tolerance fundamentals, fasteners and symbols. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 1450  Drafting and Design Co-op Internship ........... 3 Credit Hours
Prerequisite: CAD 2102.
This course provides the student with practical training in the field of drafting/design and Computer Aided Engineering (CAE) applications. The student will be employed in a supervised situation under the guidance of a qualified coordinator. During the co-op internship period, the student will identify and describe, through reports, technical problems encountered on the job.

CAD 1500  Special Topics in Computer-Aided Design: Basic Unigraphic Overview, Special Topics in Computer-Aided Design: Technological Sciences ........................................................................ 1.2 Credit Hour
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Basic Unigraphic Overview Course/lab fees., Technological Sciences Course/lab fees.

CAD 1500  Special Topics in Computer-Aided Design: Basic Unigraphic Overview, Special Topics in Computer-Aided Design: Technological Sciences ......................... 1.2 Credit Hour
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Basic Unigraphic Overview Course/lab fees., Technological Sciences Course/lab fees.

CAD 1501  Special Topics in Computer Aided Design .............................................................. 1.2 Credit Hour
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.
CAD 1501  Special Topics in Computer Aided Design  
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.  
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 1502  Special Topics in Computer-Aided Design  
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.  
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 1503  Special Topics in Computer-Aided Design  
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.  
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 1504  Special Topics in Computer-Aided Design  
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.  
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.
CAD 1507  Special Topics in Computer-Aided Design ................................................................. 1.2 Credit Hour
Prerequisite: CAD 1101 plus additional course(s) based on special topic content needed.
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 1508  Special Topics in Computer-Aided Design ................................................................. 1.2 Credit Hour
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 1509  Special Topics in Computer-Aided Design ................................................................. 1.2 Credit Hour
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2000  Animation Design II ................................................................. 3 Credit Hours
Prerequisite: CAD 1105 or consent of instructor.
This course is designed to build upon the foundation skills learned in Animation Design. Students will develop additional skills to create computer animations and models. Emphasis will be on character modeling, rigging and animation. Students will create animations for various applications for architectural, engineering, gaming, scientific and legal industries; crime scene reconstruction; and machine simulation. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2102  Fundamentals of Part Design and Its Applications ................................................................. 4 Credit Hours
Pre or Corequisite: CAD 1201 or consent of instructor. This course will cover the principles and techniques of creating parts in three dimensions and the basics of generative surface design. Emphasis is also placed on generation of views, text, dimensions and assembly techniques. Some of the topics include: sketcher, part design, drafting, complex and multiple sketch parts, assembly design and generative surface design. The student will use computer hardware and software to solve engineering-related problems using Computer Aided Engineering techniques (CAE). Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2105  Simulation for Design and Manufacturing ................................................................. 3 Credit Hours
Prerequisite: CAD 2102 or consent of instructor.
This course provides the foundation to digitally define and simulate manufacturing processes using DELMIA (Digital Enterprise Leans Manufacturing Interactive Applications), DPM (Digital Process Manufacturing), and 3D data from CATIA V5 or any major CAD system. Heavy emphasis on building assembly simulation, conceptual process plans, and process verification within the new CATIA/DELMIA V5 paradigm is a common thread throughout the course. This course will present how to use the DPM Assembly Process Simulation tools to create assembly build sequences, simulations, and conceptual process plans for visualization, validation, and verification of manufacturing processes. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2110  Unigraphics I ................................................................. 3 Credit Hours
Pre or Corequisite: CAD 1201 or consent of instructor. The student will be introduced to Unigraphics software. Some of the topics include 2-D and 3-D part creation, image manipulation, layer control, curve creation, menu structure, 3-D solid models, feature operations, form features, model manipulation, data organization and others. The student will use a CAD/ CAE system to complete design projects. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2131  Product Design ................................................................. 4 Credit Hours
Prerequisite: CAD 2102 or consent of instructor.
Using a computer aided design and engineering (CAD/CAE) software package, students will be presented with the principles and techniques of advanced part design for product development. Practical applications of parametric modeling are incorporated into this product oriented class. Students will use a CAD/CAE system to complete projects dealing with metals, plastics and composites. The course also includes knowledgeware, use of reference elements, assembly, relational formulas, reverse engineering and rapid prototyping. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2141  Kinematics ................................................................. 3 Credit Hours
Prerequisite: CAD 2102 or consent of instructor.
The students will learn the techniques and concepts of two-dimensional and three-dimensional kinematics. The course involves geometric modeling, kinematic modeling and simulation of kinematic mechanisms, generation of traces and numerical outputs. The course also includes the study of multitude of joints and their limitations, analysis, modification and management of kinematic mechanisms. Refer to current Schedule of Classes for software version(s). Course/lab fees.
CAD 2151  Introduction to Generative Surface Design
Prerequisite: CAD 2102 or consent of instructor. 4 Credit Hours
Using a three-dimensional Computer Aided Design and Engineering System, students will be introduced to the concepts and techniques of creating curves and surfaces for product design and manufacturing. Topics included in the course are: simple and complex surfaces, wire frame features, swept and blend surfaces, surface fillets, analysis and repair, laws, and surface-solid integration. Students will solve three-dimensional engineering design and surface design problems dealing with metals, plastics and composites. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2161  Finite Element Modeling and Analysis ....... 3 Credit Hours
Prerequisite: CAD 2102 and either PHY 1610 (or higher) or APP 2170; or consent of instructor.
The student will learn the techniques and concepts of finite element modeling. The focus of the course is the preprocessing stage of preparing geometric models for analysis. The student will design geometry of parts, define mesh, properties, loads, restraints and constraints. An overview of finite element solver and post processor to visualize the model will be presented. The student will use CAD/CAE hardware and software to prepare finite element models. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2190  Unigraphics II .................................. 3 Credit Hours
Prerequisite: CAD 2110 or consent of instructor. Pre or Corequisite: DDT 1150.
Equivalent: CAD 1350
This course introduces students to a wide range of intermediate and advanced modeling techniques. Topics include construction of parametric models utilizing the Sketcher module, working with reference features, using expressions, proper organization of the part files, creation of complex solids, learning to use best modeling practices for design, and utilizing the drafting module to create views, cut sections, and dimension parts. All design concepts are applicable to tool/machine, product, and body design industries. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2201  Unigraphics Product Design and Assembly Layout ........................................ 3 Credit Hours
Prerequisite: CAD 2190 or consent of instructor.
Equivalent: CAD 2200
This course provides students with opportunities for utilizing design concepts learned previously to create master assemblies, layouts and drawings related to body dies, fixtures and product designs. Students will use Sketcher, assemblies and components, basic geometric dimensioning and tolerancing (GD&T) concepts, and drafting processes to work through design changes, create mating parts within specifications, and learn to use the master model concept. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2250  Special topics in CAD II: CATIA V5 Surfacing
Prerequisite: CAD 2250 plus additional course(s) based on special topic content as needed.
CATIA V5 Surfacing Class Course/lab fees. Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2251  Special Topics in CAD II: Autodesk Inventor
Prerequisite: CAD 2251 plus additional course(s) based on special topic content as needed.
Autodesk Inventor Course/lab fees. Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2252  Special Topics in CAD II: Architectural Rendering Using Photoshop Software
Prerequisite: CAD 2252 plus additional course(s) based on special topic content as needed.
Architectural Rendering Using Photoshop Software Course/lab fees. Students will be introduced to and complete computer-based assignments in, software version(s). Course/lab fees.

CAD 2253  Special Topics in CAD II: Architectural Rendering Using Unigraphics Product Design and Assembly Layout
Prerequisite: CAD 2253 plus additional course(s) based on special topic content as needed.
Architectural Rendering Using Unigraphics Product Design and Assembly Layouts Course/lab fees. Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.
CAD 2253  Special Topics in CAD II: Digital Process for Manufacturing Using Delmia CATIA V5 Software, Special Topics in CAD II: .............................................................. 3,4 Credit Hours
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Digital Process for Manufacturing Using Delmia CATIA V5 Software Course/lab fees.. Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2253  Special Topics in CAD II: Digital Process for Manufacturing Using Delmia CATIA V5 Software, Special Topics in CAD II: .............................................................. 3,4 Credit Hours
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Digital Process for Manufacturing Using Delmia CATIA V5 Software Course/lab fees.. Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2254  Special Topics in CAD II: Fundamentals of CATIA V5, Special Topics in CAD II: .............................................................. 3,4 Credit Hours
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Fundamentals of CATIA V5 Course/lab fees.. Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2254  Special Topics in CAD II: Fundamentals of CATIA V5, Special Topics in CAD II: .............................................................. 3,4 Credit Hours
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Fundamentals of CATIA V5 Course/lab fees.. Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2255  Special Topics in CAD II: Part Design CATIA V5, Special Topics in CAD II: .............................................................. 3,4 Credit Hours
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Part Design CATIA V5 Course/lab fees.. Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2255  Special Topics in CAD II: Part Design CATIA V5, Special Topics in CAD II: .............................................................. 3,4 Credit Hours
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Part Design CATIA V5 Course/lab fees.. Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.
CAD 2258  Special Topics in CAD II: Introduction to Solidworks, Special Topics in CAD II 3,4 Credit Hours
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Introduction to Solidworks Course/lab fees, Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2259  Special Topics in CAD II 3,4 Credit Hours
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2259  Special Topics in CAD II 3,4 Credit Hours
Prerequisite: CAD 1101 plus additional course(s) based on special topic content as needed.
Students will be introduced to and complete computer-based assignments in, new software and/or applications in the field of computer-aided design, computer-aided engineering, and design/manufacturing simulations. Refer to current Schedule of Classes for topics, prerequisites, and, software version(s). Course/lab fees.

CAD 2340  Tool and Die Design 4 Credit Hours
Prerequisite: CAD 2110 or consent of instructor; Pre or Corequisite: CAD 2190 or consent of instructor.
This course is designed to acquaint the student with the procedures involved in developing Tool and Die designs. The course covers jigs, fixtures, other tooling devices and includes the preparations of all necessary drawings and supporting documents. The course will also cover the various types of dies and standard die components and will teach basic techniques to design blanking, piercing, compound blanking, piercing, and progressive dies. Design considerations of parts to be stamped and reactions of stock material will be studied along with strip layout, shearing action and stripper construction. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2351  Die Design Applications 4 Credit Hours
Prerequisite: CAD 2110. Pre or Corequisite: CAD 2190.
The student will study the various types of dies and standard die components as used in industry for the manufacture of production parts. The techniques and principles of computer aided design will be applied in the designing of blanking, piercing, compound blanking and piercing, and progressive dies. Design considerations of parts to be stamped and reactions of stock material will be studied along with strip layouts, shearing action and stripper construction. The student will also learn the use of parts catalogs, design standards and how to incorporate safety in die design. Emphasis will be on achieving greater productivity on a CAD system. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2450  Advanced Drafting and Design Co-op Internship 3 Credit Hours
Pre or Corequisite: CAD 1450. The Advanced Drafting and Design Co-op Internship students will continue practical training in the field of Drafting/Design and CAE (Computer Aided Engineering Applications). Students will be employed in a supervised situation under the guidance of a qualified coordinator. During the Advanced Co-op Internship period students will be involved in design activity relating to their specialty area, such as, but not limited to, body design, tool and fixture design, plastics design, etc.

CAD 2602  Vehicle Body Design and Assembly 4 Credit Hours
Prerequisite: CAD 2151 or consent of instructor.
This course presents surfacing scenarios related to different design situations encountered. Students will create new parts from information such as: sections and reference surfaces; scan data; and modification of existing surfaces. Course also teaches the methodology of adding such features as flanges, stiffeners and holes. There will be extensive use of Freestyle and Generative Shape Design workbench programs. Assemblies will be created, positioned and analyzed, using both student-created components and supplied parts. Surface development utilizing CATIA software will incorporate automotive practices and methods. Refer to current Schedule of Classes for software version(s). Course/lab fees.

CAD 2702  Vehicle Upper Body Surface Design and Assembly 4 Credit Hours
Prerequisite: CAD 2151 or consent of instructor.
This course presents surfacing scenarios related to different design situations encountered. Students will create new parts from information such as: sections and reference surfaces; scan data; and modification of existing surfaces. Course also teaches the methodology of adding such features as flanges, stiffeners and holes. There will be extensive use of Freestyle and Generative Shape Design workbench programs. Assemblies will be created, positioned and analyzed, using both student-created components and supplied parts. Surface development utilizing CATIA software will incorporate automotive practices and methods. Refer to current Schedule of Classes for software version(s). Course/lab fees.