

# Computer Aided Design and Engineering Technology

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## Degrees

- Computer Aided Design and Engineering Technology - Computer Aided Engineering Option (CAD.CAE.AAS) (<http://catalog.oaklandcc.edu/programs/computer-aided-design-drafting-technology/computer-aided-design-drafting-technology-engineering-option-aas/>)
- Computer Aided Design and Engineering Technology - CAD Product Design Option (CAD.PDO.AAS) (<http://catalog.oaklandcc.edu/programs/computer-aided-design-drafting-technology/computer-aided-design-drafting-technology-cad-product-design-option-aas/>)
- Computer Aided Design and Engineering Technology - Computer Aided Vehicle Design Option (CAD.VDO.AAS) (<http://catalog.oaklandcc.edu/programs/computer-aided-design-drafting-technology/computer-aided-design-drafting-technology-vehicle-option-aas/>)

## Certificates

- Computer Aided Design and Engineering Technology - Level II Intermediate (CAD.LV2.CT) (<http://catalog.oaklandcc.edu/programs/computer-aided-design-drafting-technology/level-ii-intermediate-certificate/>)

## Certificates of Achievement

- Computer Aided Design and Engineering Technology - Level I Fundamentals (CAD.LV1.CA) (<http://catalog.oaklandcc.edu/programs/computer-aided-design-drafting-technology/level-i-fundamentals-certificate-achievement/>)

## Computer Aided Design and Drafting Technology Courses

### CAD 1050 Geometric Dimensioning and Tolerancing (GD&T) ..... 4 Credit Hours

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

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. BILLABLE CONTACT HOURS: 4

### CAD 1101 Introduction to CAD ..... 4 Credit Hours

**English/ESL Placement:** Placement into ENG 1055 or higher (or placement into ESL 1011 or higher for students taking the ESL sequence of courses.)

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 the specific section using OCC's online system for software version(s). BILLABLE CONTACT HOURS: 4

### CAD 1105 Animation Design ..... 3 Credit Hours

**English/ESL Placement:** Placement into ENG 1055 or higher (or placement into ESL 1011 or higher for students taking the ESL sequence of courses.)

**Pre- or Corequisite:** CAD 1101 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 the specific section using OCC's online system for software version(s). BILLABLE CONTACT HOURS: 3

### CAD 1151 CAD Architecture / Civil Engineering 3 Credit Hours

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 1101 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

This intermediate course emphasizes the use of CAD systems for architectural, civil engineering, and landscape design presentations. Topics include methods of creating site plans, floor plans, elevations, sections, photo-realistic renderings, dimensioning and related topics utilizing various Autodesk application software packages, including three-dimensional parametric modeling specific to architecture. Refer to the specific section using OCC's online system for software version(s). BILLABLE CONTACT HOURS: 3

**CAD 1160 Revit - Advanced Architectural Applications .....4 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 1151 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 the specific section using OCC's online system for software version(s). BILLABLE CONTACT HOURS: 4

**CAD 1201 Introduction to Engineering Graphics .....4 Credit Hours**

**English/ESL Placement:** Placement into ENG 1055 or higher (or placement into ESL 1011 or higher for students taking the ESL sequence of courses.)

**Prerequisite:** CAD 1101 or consent of instructor.

**Pre- or Corequisite:** DDT 1000 (Recommended)

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

This course presents the techniques and principles for creating orthographic and auxiliary views on a CAD system. Students will create detail drawings by adding the necessary sections, dimensions, 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, and creation of assembly drawings. This course develops skills in 3-D wireframe, surface, and solid modeling techniques. Refer to the specific section using OCC's online system for software version(s). BILLABLE CONTACT HOURS: 4

**CAD 1450 Drafting and Design Co-op Internship .....3 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2102 and consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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. BILLABLE CONTACT HOURS: 3

**CAD 1501 Special Topics in CAD: Fusion 360 Design ..... 2 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 1101 or MTT 1100

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

Fusion 360. BILLABLE CONTACT HOURS: 2

**CAD 2000 Animation Design II ..... 3 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 1105 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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). BILLABLE CONTACT HOURS: 3

**CAD 2102 Fundamentals of Part Design and Its Applications .....4 Credit Hours**

**English/ESL Placement:** Placement into ENG 1055 or higher (or placement into ESL 1011 or higher for students taking the ESL sequence of courses).

**Pre- or Corequisite:** CAD 1201 (Recommended) or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 the specific section using OCC's online system for software version(s). BILLABLE CONTACT HOURS: 4

**CAD 2110 NX I .....3 Credit Hours**

**English/ESL Placement:** Placement into ENG 1055 or higher (or placement into ESL 1011 or higher for students taking the ESL sequence of courses.)

**Pre- or Corequisite:** CAD 1201 (Required) or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

This is an introductory course to NX software. The student will learn how to navigate in NX using the Ribbon Bar Interface: WCS, Layers, Creation of Primitives, Form Features, Basic Curves and Miscellaneous Operators (Extrude, Taper Edge Blend, Chamfer, Trim Curves, Editing Features, Boolean Operations, Swept Features, Revolve, Sweep Along Guide, Shell, Instance Feature, Guide Curves and Sketcher). Refer to the specific section using OCC's online system for software version(s). BILLABLE CONTACT HOURS: 3

**CAD 2131 Product Design ..... 4 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2102 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 knowledgware, use of reference elements, assembly, relational formulas, reverse engineering and rapid prototyping. Refer to the specific section using OCC's online system for software version(s). **BILLABLE CONTACT HOURS: 4**

**CAD 2141 Kinematics ..... 3 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2102 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 the specific section using OCC's online system for software version(s). **BILLABLE CONTACT HOURS: 3**

**CAD 2151 Introduction to Generative Surface Design ..... 4 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2102 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 surfacing problems dealing with metals, plastics and composites. Refer to the specific section using OCC's online system for software version(s). **BILLABLE CONTACT HOURS: 4**

**CAD 2161 Finite Element Modeling and Analysis ..... 3 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2102 and PHY 1610 (or higher) or APP 2170 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 the specific section using OCC's online system for software version(s). **BILLABLE CONTACT HOURS: 3**

**CAD 2190 NX II ..... 3 Credit Hours**

**Equivalent:** CAD 1350

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2110 or consent of instructor.

**Pre- or Corequisite:** DDT 1150 (Recommended)

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

This course introduces students to a wide range of intermediate and advanced modeling techniques. Topics include constructing parametric models, understanding and using reference features, creating expressions, working with advanced concepts of Sketcher, properly organizing part files, and learning to use best modeling practices. This course also covers advanced concepts of curves: trimming, extracting, projecting, cutting sections and associativity concepts. All design concepts are applicable to tool/machine, product, and body design industries. Refer to the specific section using OCC's online system for software version(s). **BILLABLE CONTACT HOURS: 3**

**CAD 2201 Unigraphics Product Design and Assembly Layout ..... 3 Credit Hours**

**Equivalent:** CAD 2200

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2190 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 the specific section using OCC's online system for software version(s). **BILLABLE CONTACT HOURS: 3**

**CAD 2340 Tool and Die Design ..... 4 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2110 or consent of instructor.

**Pre- or Corequisite:** CAD 2190 or consent of instructor. (Recommended)

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 learn basic techniques to design blanking, piercing, compound blanking, 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 the specific section using OCC's online system for software version(s). **BILLABLE CONTACT HOURS: 4**

**CAD 2450 Advanced Drafting and Design Co-op Internship .....3 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Pre- or Corequisite:** CAD 1450 and consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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. **BILLABLE CONTACT HOURS: 3**

**CAD 2602 Vehicle Underbody Design and Assembly ..... 4 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2151 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

This course covers an automotive-based approach to developing a typical vehicle underbody. Including the creation of individual component parts, assemblies will be designed, positioned, and analyzed, using both student-created components and supplied parts to understand the interaction of multiple components within the full underbody assembly. Component development utilizing CATIA software will incorporate automotive practices and methods. Refer to the specific section using OCC's online system for software version(s). **BILLABLE CONTACT HOURS: 4**

**CAD 2702 Vehicle Upper Body Surface Design and Assembly ..... 4 Credit Hours**

**English/ESL Placement:** Placement into ENG 1060 or higher (or placement into ESL 2510 or higher for students taking the ESL sequence of courses).

**Prerequisite:** CAD 2151 or consent of instructor.

**Note:** Prerequisites for courses in this department are not automatically waived for College Guest students and students with a bachelor's degree or higher from a U.S. institution.

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 the specific section using OCC's online system for software version(s). **BILLABLE CONTACT HOURS: 4**