

## Drafting/CAD/AutoCAD (DRAF)

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### Courses

#### **DRAF 120 Introduction to Drafting (2 Hours)**

This course should be taken by students without prior drafting experience. Upon successful completion of this course, the student should be able to identify and apply the essential, basic skills necessary to proceed through the drafting program, including, measuring, geometric construction, sketching, isometrics, orthographic views, section views, dimensioning and auxiliary views. Drafting classes that have additional lab have either the time and room listed or TBA (to be announced) with the room number listed. 1hr. lecture, 2hrs. lab/wk.

#### **DRAF 123 Interpreting Machine Drawings\* (2 Hours)**

**Prerequisites or corequisites:** DRAF 120 or department approval.

This course is a required course in the computer-aided drafting and design technology program. Upon successful completion of this course, students should be able to interpret graphics used to fabricate, assemble, maintain and operate the equipment and products of industry. General detail and assembly prints will be evaluated for title block information, general notes, dimensioning, tolerance specification and symbology. Specialized drawings will include cams, gears, numerical control, plastics, sheet metal and instrumentation.

#### **DRAF 129 Interpreting Architectural Drawings (2 Hours)**

This beginning course will explain the fundamentals of interpreting (reading) architectural drawings. Upon successful completion of this course, students should be able to understand plan and elevation views, sections, details, schedules, specifications, symbols and abbreviations found on most residential and commercial construction drawings. 2 hrs. lecture/wk.

#### **DRAF 130 Introduction to CAD Concepts - AutoCAD\* (3 Hours)**

**Prerequisites or corequisites:** DRAF 120 or department approval.

This course provides a basic knowledge of AutoCAD. Students will learn to use CAD equipment, including input/output devices and microcomputers as drafting tools. Emphasis will be on a basic understanding of CAD terms and concepts as they are applied in the industry. Students will be provided an overview of many of the key features of a major microcomputer CAD package with hands-on experience at a workstation. Basic instruction will be provided on drawing setup, drawing commands, editing commands and screen control. The important concepts of layering, standard symbols and dimensioning will be introduced. 2 hrs. lecture, 3 hrs. open lab/wk. Drafting classes that have an additional lab have either the time and room listed or TBA (to be announced) with the room number listed.

#### **DRAF 132 Exploring AutoCAD (3 Hours)**

This course is for non-drafting students/users who wish to casually use Autodesk's AutoCAD (computer aided drafting) software. It provides a basic knowledge of how to manipulate AutoCAD commands on a Windows or Mac platform to create drawings. Covered topics include creating and setting up a drawing, using blocks and wblocks, editing a drawing, saving completed drawings, developing template drawings, printing from paper space, dimensioning, layering, drawing defaults and hatching. 2 hrs. lecture, 3 hrs. open lab/wk.

#### **DRAF 135 Graphic Analysis\* (3 Hours)**

**Prerequisites :** DRAF 130 or department approval.

This course expands on introductory knowledge in drafting and CAD. Upon successful completion of this course, the student will solve descriptive geometry problems, and locate intersections of geometric shapes. Most assignments in this course will be completed using AutoCAD software.

#### **DRAF 142 Exploring Autodesk Fusion 360 (2 Hours)**

This course will cover the commands and techniques required to create solid, surface, and form models; automated and generative design (AI) models; mesh editing; and animated assemblies. Students will make digital models which can be used for additive and subtractive manufacturing, such as 3D printing and CNC cutting, and generate scaled, 2D drawings from the model for fabrication. The course is intended for students interested in learning the capabilities of Fusion 360 and are interested in enhancing their knowledge of 3D modeling programs.

#### **DRAF 143 Introduction to BIM Building Information Modeling\* (2 Hours)**

**Prerequisites :** DRAF 129 or Department approval.

This course introduces students to the concepts and usage of BIM: Building Information Modeling in the building construction field. Students will use Building Information Modeling software to interact with a virtual building model. Upon successful completion of this course, students will manipulate the software interface to model, interpret, access data, and view the building model. The student will use the software to model and access plan views, elevations, sections, 3-D views, structural elements, schedules and support files found in a 3-D building model. The REVIT software package is currently used.

#### **DRAF 145 Introduction to Parametric Design: Inventor\* (2 Hours)**

**Prerequisites :** DRAF 123 or Department approval.

This course is an introduction to parametric design. The course will cover parametric modeling fundamentals, solid geometry concepts, parametric constraints fundamentals and geometric construction tools. Basic software commands will also be covered to give the student ability to demonstrate parametric modeling knowledge.

## **DRAF 152 3D Modeling with SketchUp (2 Hours)**

The course will teach how to model (draft in 3D) with SketchUp, a popular software program. Students will learn how to sketch their ideas for prototypes, floor plans and buildings, embellish a drawing for presentation purposes, make animations of their model, export the model into different file formats and 3D print the model. 2 hrs. lecture/wk.

## **DRAF 162 3D Printing (2 Hours)**

This course will teach how to digitally model prototype ideas that can be 3D printed. Multiple solid, reality capture, analysis and slicing programs are taught. Students will learn about the 3D printing process, how to make a digital model 3D-printable, different types of 3D printers and filaments. Students will also learn how to generate a file from the digital model for a Computer Numeric Control (CNC) cutting machine. 2 hrs. lecture/wk.

## **DRAF 211 Engineering Design Problems\* (3 Hours)**

**Prerequisites :** MATH 130 or MATH 171 or Department approval.

**Prerequisites or corequisites:** (CPCA 110 or CSS 110) and (CPCA 111 or CSS 111).

This course introduces the student to a variety of engineering design concepts. Topics include structural loading conditions, steel member selection, pressurized fluid flow, open channel flow and stormwater/hydrology. Students apply these concepts to solve practical problems found in industry. This course is typically offered in the spring semester.

## **DRAF 222 Mechanical Design and Drafting\* (3 Hours)**

**Prerequisites :** DRAF 123 and DRAF 135 and DRAF 230 and DRAF 245.

**Prerequisites or corequisites:** DRAF 211.

Students successfully completing this course should be able to draw details and assembly views of mechanical parts. The types of parts discussed in this class include castings, sheet metal pieces, jigs and fixtures, and gauges. Important concepts include dimensioning, form and position tolerancing, coordinate tolerancing, and calculations related to material allowances and manufacturing. Students will use the Machinery's Handbook and other technical publications to research and design projects. Project assignments will be completed using computer-aided drafting (CAD) software.

## **DRAF 225 Civil Drafting\* (3 Hours)**

**Prerequisites :** DRAF 230 or Department approval.

**Prerequisites or corequisites:** DRAF 211 and DRAF 244.

Upon successful completion of this course, the student should be able to apply drafting techniques used in civil engineering offices. Topics covered include the surveying process, property legal descriptions, topographic maps, plan and profile drawings, roadway cross sections and earthwork calculations. The student will use CAD software in drawing projects. This course is typically taught in the fall semester. 2 hrs. lecture, 3 hrs. lab/wk.

## **DRAF 230 Intermediate CAD: AutoCAD\* (3 Hours)**

**Prerequisites or corequisites:** DRAF 130 or department approval.

This course provides an increased knowledge of AutoCAD as it is used in today's industries. Students will build on their CAD experience by learning new commands and techniques that increase system productivity. Special emphasis will be on developing construction techniques and command usage to increase CAD proficiency. Additional study of standard symbols, layers and editing functions will occur. Concepts covered will include dimensioning variables and styles, attributes and external referencing, as well as paper space and model space, as used in multiple-view drawings. 2 hrs. lecture, 3 hrs. open lab/wk.

## **DRAF 238 Architectural Design and Drafting\* (3 Hours)**

**Prerequisites :** DRAF 129 and DRAF 135 and DRAF 230 and DRAF 243.

**Prerequisites or corequisites:** DRAF 211.

This course is an introduction to the production of architectural drawings for residential and commercial construction. Upon successful completion of this course, the student will be able to design and draw floor plans, sections, elevations, dimensions and schedules. Industry standard code and reference books, such as the International Residential Code and Architectural Graphic Standards books, will be used in the research and design process. Projects will be completed using computer-aided drafting (CAD) software.

## **DRAF 243 Advanced BIM: Revit\* (2 Hours)**

**Prerequisites or corequisites:** DRAF 143 or department approval.

This course introduces the student to advanced Building Information Modeling (BIM) concepts used by many architectural and engineering design firms. Topics include advanced modeling and documentation tools, project setup and the design process. Students will model commercial buildings and produce architectural drawings. Emphasis will be placed on the hands-on application of the current software to industrial projects.

## **DRAF 244 Civil 3D\* (2 Hours)**

**Prerequisites or corequisites:** DRAF 225 or department approval.

This course introduces the student to the Civil 3D software used by many land planning, civil engineering and surveying firms. Topics include software commands, project setup and the design process. Survey points, surfaces, topography, road layout and soil volumes are covered in this course. Emphasis will be placed on the hands-on application of the software to industrial projects.

## **DRAF 245 Advanced Parametric Design: Inventor\* (2 Hours)**

**Prerequisites or corequisites:** DRAF 145 or department approval.

This course uses the Inventor Parametric design software used by many industrial and mechanical design firms. Topics include software commands, project setup and the design process. Emphasis will be placed on the hands-on application of the software to industrial projects.

## **DRAF 246 MicroStation for AutoCAD users\* (2 Hours)**

**Prerequisites :** DRAF 230 or department approval.

This course introduces the student to the MicroStation software interface and command structure. The course is intended for students who are familiar with the use of the AutoCAD software and need a transition to the use of MicroStation. Topics include basic operating fundamentals, AccuDraw, working with elements, references and printing.

## **DRAF 247 Revit Systems MEP (Mechanical, Electrical, Plumbing)\* (2 Hours)**

**Prerequisites or corequisites:** DRAF 243 or Department approval.

This course introduces the student to the concepts and principles of basic mechanical, (HVAC), electrical and plumbing/piping systems used in 3D parametric models. Students will utilize commercial models to create, document, and print MEP systems. Emphasis will be placed on the application of MEP concepts to create construction documents.

## **DRAF 252 Structural Design and Drafting\* (3 Hours)**

**Prerequisites :** DRAF 129 and DRAF 135 and DRAF 230 and DRAF 243 or Department approval.

**Prerequisites or corequisites:** DRAF 211.

Upon successful completion of this course, the student should be able to produce structural drawings and details of steel, concrete and wood structures for manufacturing, construction, engineering and architectural firms. The student will use industry standard references and perform design calculations. Project work will be done using CAD.

## **DRAF 264 CAD:Interior Design\* (3 Hours)**

**Prerequisites :** (DRAF 164 with a grade of "C" or higher or ITMD 164 with a grade of "C" or higher) and (ITMD 121 with a grade of "C" or higher) or Department approval.

This course is an introduction to the use of computer-aided drafting (CAD) as used in the interior design field. Upon successful completion of this course, the student should be able to draw floor plans and elevations of interiors using a computer-aided drafting system. AutoCAD LT software will be used. 2 hrs. lecture, 3 hrs. open lab/wk.

## **DRAF 271 Drafting Internship I\* (3 Hours)**

**Prerequisites :** Department approval.

Upon successful completion of this course, the student should be able to apply classroom knowledge to an actual work situation. The internship will provide advanced students the opportunity to develop job- and career-related skills while in a work setting. The work will be developed cooperatively with area employers, college staff and each student to provide a variety of actual job experiences directly related to the student's career goals. 15 hrs. min./wk.

## **DRAF 272 Drafting Internship II\* (3 Hours)**

**Prerequisites :** DRAF 271 and department approval.

Upon successful completion of this course, the student should be able to apply classroom knowledge to an actual work situation. The internship will provide advanced students the opportunity to develop job- and career-related skills while in a work setting. The work will be developed cooperatively with area employers, college staff and each student to provide a variety of actual job experiences directly related to the student's career goals. 15 hrs. min./wk.

## **DRAF 291 Independent Study\* (1-7 Hour)**

**Prerequisites :** 2.0 GPA minimum and department approval.

Independent study is a directed, structured learning experience offered as an extension of the regular curriculum. It is intended to allow individual students to broaden their comprehension of the principles of and competencies associated with the discipline or program. Its purpose is to supplement existing courses with individualized, in-depth learning experiences. Such learning experiences may be undertaken independent of the traditional classroom setting, but will be appropriately directed and supervised by regular instructional staff. Total contact hours vary based on the learning experience.