

# DRAFTING AND DESIGN TECHNOLOGIES

## Associate of Applied Science Degrees

- Architectural Technology
- Civil/Survey Technology
- Mechanical Drafting and Solid Modeling
- Pre-Architecture

**Certificates of Completion** - Important information about the educational debt, earnings, and completion rates of students who attend these certificate programs can be found on the following <https://dacc.nmsu.edu/gainfulemployment/>.

- Architectural Technology
- Civil/Survey Technology
- Drafting and Graphics
- Geographical Information Systems
- Mechanical Drafting and Solid Modeling

The Drafting and Design Technologies Program provides students with a strong foundation in Computer-Aided Drafting (CAD), Architecture/Design, and relevant theory and concepts necessary to become successful in various related fields. These fields include

- Architecture,
- Architectural Technology,
- Civil/Survey Technology and,
- Mechanical Drafting/Solid Modeling.

Excellent job and salary opportunities are available nationwide for Drafters/CAD specialists, technicians, architects, and engineers. With its rapid growth, southern New Mexico also has strong employment possibilities for graduates of the Drafting and Design Technologies Program. Students with previous related training and/or formal education may qualify for more advanced positions, such as construction inspector or supervisor, contractor, or senior drafter.

Within the Drafting and Design Technologies Program are four courses of study leading to associate of applied science degrees. These allow students to tailor their studies to their own interests and career aspirations.

- **Architectural Technology:** Architectural 2D and 3D drafting, residential design, construction estimating, construction technology, architectural rendering and animation, green building (LEED), and Building Information Modeling (BIM)
- **Civil/Survey Technology:** Civil engineering drafting, surveying fundamentals, roadway construction drafting, land development drafting, and GIS training
- **Mechanical Drafting and Solid Modeling:** Mechanical drafting, machine/manufacturing fundamentals, basic mechanical design, parametric solid modeling, and animation
- **Pre-Architecture:** Architectural theory and drawing; design studio/culture; architectural history; computer applications; introduction to construction principles and construction documents; presentation techniques

In addition to the associate degrees, the program also offers certificates of completion specializing in five areas:

- Architectural Technology,
- Civil/Survey Technology,
- Drafting and Graphics,
- Mechanical Drafting/Solid Modeling, and
- Geographical Information Systems.

While pursuing this program, whether taking classes or working in a co-op position, students will be required to perform the same job duties and be able to meet the same physical requirements that they will as a graduate in the field including working at a computer for an extended period of time and the ability to lift 25 to 50 pounds. Courses, as well as careers, in Drafting and Design Technologies will require a person to be able to work at computers, communicate verbally and in writing, and participate in an online environment.

Future students who are still in high school are encouraged to take courses in mathematics, science, English, and drafting. Furthermore, Dual credit opportunities are available for high school students who wish to earn college credit while still in high school. These credits may apply to their high school credit requirements as well as the DACC Drafting and Design Technologies requirements. (For more information, refer to the section titled, "Dual Credit Program (<http://catalogs.nmsu.edu/dona-ana/general-information/dual-credit-program/>)," within this catalog.)

## Pre-Architecture Program Overview

Students planning to pursue a professional career in architecture may find it more convenient and economically advantageous to begin their studies closer to home. The DACC Pre-Architecture program, which culminates in an associate of applied science degree, consists roughly of the first two years of a standard, bachelor's degree curriculum in architecture. Currently, the most popular transfer universities for DACC Pre-Architecture students are the University of New Mexico and Texas Tech University. Both offer in-state tuition rates and have signed articulation agreements with DACC providing for the smooth and efficient transfer of credits.

However, acceptance into a transfer university's architecture program is not automatic nor is it guaranteed. Students must follow the regular application procedures of the chosen university.

In addition, DACC cannot guarantee placement into a transfer university's architecture program at any particular level, as such matters are totally dependent on how the university in question may evaluate transcripts, portfolios and other required materials against its own acceptance criteria. For example, in order to be accepted at UNM, a final grade of *B-* or better is required in ARCT 101 Introduction to Architecture and ARCT 104 Introduction to Architectural Drawing, and a final grade of *C-* or better is required in all other courses in the DACC Pre-Architecture curriculum.

Potential architecture students should contact a Pre-Architecture advisor at DACC for assistance with course scheduling and transfer procedures (575) 527-7592.

## Credit Transfer to Bachelor's Degrees in Engineering Technology at NMSU

The Architectural Technology, Civil/Survey Technology, and Mechanical Drafting and Solid Modeling associate degree programs include elective courses that allow students to earn credits that may be transferable

into one of the engineering technology programs offered by NMSU. These elective courses allow students to maximize the number of credits applicable to an NMSU Engineering Technology program, while also making it possible to earn an associate degree for immediate employment in a drafting related field. Students should contact a Drafting and Design Technologies program advisor for the most current information and requirements related to these credit transfer opportunities (575) 527-7592.

## Additional Program Information

Students receive training from highly qualified faculty in modern classrooms and drafting and design laboratories equipped with the latest in computers, peripheral equipment, and professional software. The Drafting and Design Technologies program is housed at the DACC East Mesa Campus (see map (<https://dacc.nmsu.edu/marketing/wp-content/uploads/sites/11/2015/09/Map-to-East-Mesa.pdf>)).

Classes are scheduled during the day and evening hours, as well as during the summer, to serve both full- and part-time students, including local high school students who are participating in the dual credit enrollment program. Courses are available at the various DACC locations, as well as selected high schools in the area.

Students gain professional development and leadership skills through the Drafting and Graphics Association (DAGA) or the American Institute of Architecture Students (AIAS). These student organizations are affiliated with at least one of the following:

- American Design Drafting Association (ADDA),
- SkillsUSA,
- National Association of Home Builders (NAHB), and
- American Institute of Architecture Students (AIAS).

Students actively participate in numerous events and activities. Members also take part in activities sponsored by other professional associations, recruiting at high schools, and participating in community service projects. Students can compete in statewide and nationwide drafting contests sponsored by SkillsUSA and other organizations.

## Additional Graduation Requirements

A final grade of *C-* or better is required in all DRFT courses. A final grade of *C* or better is required in ENGL 111G. A final grade of *B-* or better is required in ARCT 101 Introduction to Architecture and ARCT 104 Introduction to Architectural Drawing; in all other ARCT courses, a minimum final grade of *C-* is required.

Architectural Technology - Associate of Applied Science (<http://catalogs.nmsu.edu/dona-ana/academic-career-programs/drafting-design-technologies/architectural-technology-associate-applied-science>)

Civil/Survey Technology - Associate of Applied Science (<http://catalogs.nmsu.edu/dona-ana/academic-career-programs/drafting-design-technologies/civil-survey-technology-associate-applied-science>)

Pre-Architecture - Associate of Applied Science (<http://catalogs.nmsu.edu/dona-ana/academic-career-programs/drafting-design-technologies/pre-architecture-associate-degree>)

Mechanical Drafting and Solid Modeling - Associate of Applied Science (<http://catalogs.nmsu.edu/dona-ana/academic-career-programs/drafting-design-technologies/mechanical-drafting-solid-modeling-associate-applied-science>)

Architectural Technology - Certificate of Completion (<http://catalogs.nmsu.edu/dona-ana/academic-career-programs/drafting-design-technologies/architectural-technology-certificate-completion>)

Civil/Survey Technology - Certificate of Completion (<http://catalogs.nmsu.edu/dona-ana/academic-career-programs/drafting-design-technologies/civil-survey-technology-certificate-completion>)

Drafting and Graphics Technology - Certificate of Completion (<http://catalogs.nmsu.edu/dona-ana/academic-career-programs/drafting-design-technologies/general-drafting-graphics-certificate-completion>)

Geographical Information Systems - Certificate of Completion (<http://catalogs.nmsu.edu/dona-ana/academic-career-programs/drafting-design-technologies/geographical-information-systems-certificate-completion>)

Mechanical Drafting and Solid Modeling - Certificate of Completion (<http://catalogs.nmsu.edu/dona-ana/academic-career-programs/drafting-design-technologies/mechanical-drafting-solid-modeling-certificate-completion>)

### DRFT 101. Introduction to Drafting and Design Technologies

#### 1 Credit

Professional and student organizations associated with the Drafting and Design Technologies program, degree requirements, employment skills and work habits, and university and college policies and procedures will be explored. Students will be introduced to the current learning management system and career-readiness certification. Restricted to Community Colleges only.

### DRFT 105. Technical Drawing for Industry

#### 3 Credits (2+2P)

Technical sketching, basic CAD, and interpretation of drawings with visualization, speed and accuracy highly emphasized. Areas of focus include various trades such as machine parts, welding, heating and cooling, and general building sketches/plan interpretation.

### DRFT 108. Drafting Concepts/Descriptive Geometry

#### 2 Credits (1+2P)

Basic manual drafting skills, sketching, terminology and visualization. Graphical solutions utilizing applied concepts of space, planar, linear and point analyses. Metric and S.I. units introduced.

### DRFT 109. Computer Drafting Fundamentals

#### 3 Credits (2+2P)

Introduction to principles and fundamentals of drafting using both manual drawing techniques and computer-aided drafting (CAD) applications. May be repeated up to 3 credits. Crosslisted with: E T 109 and C E 109. Restricted to Community Colleges campuses only.

### DRFT 112. Drafting Concepts/Computer Drafting Fundamentals I

#### 4 Credits (2+4P)

Basic drafting skills, terminology, and visualization. Introduction to principles and fundamentals of computer-aided drafting. Same as E T 106.

**Prerequisites:** OECS 207, OECS 125 or consent of instructor.

### DRFT 113. Drafting Concepts/Computer Drafting Fundamentals II

#### 4 Credits (2+4P)

Drafting for mechanical/industrial applications; machine part detailing, assemblies in orthographic, isometric, auxiliary, oblique, and sectional views. Two-dimensional AutoCAD with introduction to 3-D AutoCAD. Same as E T 216. Restricted to: Community Colleges only.

**Prerequisite:** DRFT 112.

**DRFT 114. Introduction to Solid Modeling****3 Credits (2+2P)**

2D mechanical drafting and 3D mechanical solid modeling utilizing the latest version of AutoCAD software. Industry dimensioning and annotation standards will be emphasized. 2D multi-view working drawings, 3D solid models, and basic 3D model assemblies will be introduced. Restricted to Community Colleges campuses only.

**Prerequisite(s):** DRFT 109.

**DRFT 115. General Construction Safety****3 Credits**

Overview of general construction safety related to building, highway and road construction, and surveying field work for entry-level individuals. Students will also have the opportunity to earn a 10-hour construction industry OSHA card. May be repeated up to 3 credits. Restricted to Community Colleges campuses only.

**DRFT 120. Survey Equipment Fundamentals****2 Credits**

Introduces the application and the setup to the following surveying equipment: Automatic Level, Total station, and Global Positioning Systems. Field safety knowledge is required. Restricted to Community Colleges only.

**DRFT 124. Introduction to Geometric Dimensioning and Tolerancing****3 Credits (2+2P)**

Introduction to geometric dimensioning and tolerancing (GD&T) for the mechanical CAD drafting, solid modeling, mechanical engineering technology, mechanical engineering, and manufacturing industries. Related industry standard finishes and fasteners will also be introduced and explored.

**Prerequisite(s)/Corequisite(s):** DRFT 114. Restricted to Community Colleges campuses only.

**DRFT 130. General Building Codes****3 Credits (2+2P)**

Interpretation of the Building Code, local zoning codes, A.D.A. Standards and the Model Energy Code to study construction and design requirements and perform basic plan checking. Restricted to: Community Colleges only.

**DRFT 135. Electronics Drafting I****3 Credits (2+2P)**

Drafting as it relates to device symbols; wiring, cabling, harness diagrams and assembly drawings; integrated circuits and printed circuit boards; schematic, flow and logic diagrams; industrial controls and electric power fields. Drawings produced using various CAD software packages.

**Prerequisites:** DRFT 108 and DRFT 109.

**DRFT 143. Civil Drafting Fundamentals****3 Credits (2+2P)**

Introduction to drafting in the field of Civil Engineering. Drawings, projects, and terminologies related to topographic, contour drawings, plan and profiles, and street/highway layout. Crosslisted with: E T 143. Restricted to Community Colleges only.

**Prerequisite(s):** DRFT 109.

**DRFT 151. Construction Principles and Print Reading****3 Credits (2+2P)**

Introduction to construction materials, methods, and basic cost estimating and print reading applicable in today's residential, commercial, and public works industry. Instruction by print reading and interpretation, field trips, and actual job-site visits and progress evaluation.

**DRFT 153. Survey Drafting Applications****3 Credits (2+2P)**

Introduction to drafting in the field of survey engineering. Drawings, projects and terminologies related to Point Data, topography, land/boundary surveys, legal descriptions and plat surveys. Using the current Autodesk software. Crosslisted with: SUR 143. Restricted to: Community Colleges only.

**Prerequisite(s):** DRFT 109.

**DRFT 160. Construction Take-Offs and Estimating****3 Credits (2+2P)**

Computing and compiling materials and labor estimates from working drawings using various techniques common in general building construction and in accordance with standard specifications and estimating formats. Use of spreadsheets and estimating software introduced.

**Prerequisite:** DRFT 151.

**DRFT 161. Introduction to Construction Management****3 Credits**

Introduction to the construction industry and construction management; construction documents and contracts; project planning, scheduling and administration; construction site management; and the role of Building Information Modeling (BIM) in construction management. Pre/ Restricted to: Community Colleges only.

**Corequisite(s):** DRFT 151 or consent of instructor.

**DRFT 164. Intermediate Mechanical Drafting/Solid Modeling****3 Credits (2+2P)**

Intermediate 3D mechanical parametric solid modeling and assembly creation utilizing the latest version of Autodesk Inventor software. The creation of 2D working drawings from 3D solid models will be emphasized. Geometric Dimensioning and Tolerancing (GD&T), basic material properties, and industry standard fastening and manufacturing methods will be introduced.

**Prerequisite(s)/Corequisite(s):** DRFT 114. Restricted to Community Colleges campuses only.

**DRFT 165. Introduction to Building Information Modeling****3 Credits (2+2P)**

Introduction to Building Information Modeling (BIM) in the development of virtual 3D building models, construction documents, renderings and basic animations related to architectural, structural, and mechanical/electrical/plumbing building components. Utilizes the latest BIM technologies in the integration one, parametric BIM. Restricted to Community Colleges campuses only.

**DRFT 176. Solid Modeling, Rendering and Animation****3 Credits (2+2P)**

Introduction to three dimensional drafting and solid modeling, rendering and animation for architecture and engineering fields. Material application, mapping, and scene lighting will be introduced. Restricted to: Community Colleges only.

**Prerequisite(s):** DRFT 109.

**DRFT 180. Residential Drafting****3 Credits (2+2P)**

Basic residential drafting including, floor plans, foundation plans, sections, roof plans, exterior and interior elevations, and site plans. Applicable residential building and zoning codes, construction methods and materials, adaptable residential design, and drawing and sheet layout for architectural drafting will be introduced. Restricted to Community Colleges campuses only.

**Prerequisite(s):** DRFT 109.

**DRFT 181. Commercial Drafting****3 Credits (2+2P)**

Drafting principles, plan coordination, and code analysis applicable in the development of working drawings for commercial, public, and industrial building projects. Students will utilize National Cad Standards, ADA Standards, and will be introduced to modern office practice. Pre/Restricted to: Community Colleges only.

**Prerequisite(s):** DRFT 109.

**Corequisite(s):** DRFT 180.

**DRFT 190. Finding and Maintaining Employment****2 Credits**

Techniques in self-evaluations, resume writing, application completion, job interviewing, and job retention. Exposure to work ethics, employee attitudes, and employer expectations.

**DRFT 204. Geographic Information Systems Technology****3 Credits (2+2P)**

The use of digital information for which various digitized data creation methods are captured. Users will capture, store, analyze and manage spatially referenced data in a modeled mapping procedure. May be repeated up to 3 credits. Restricted to Community Colleges campuses only.

**DRFT 214. Advanced Solid Modeling****3 Credits (2+2P)**

Advanced 3D mechanical parametric solid modeling and assembly creation utilizing the latest version of Solidworks software. The creation of 2D working drawings from 3D solid models and the creation of 3D models for machining/manufacturing will be emphasized. Geometric Dimensioning and Tolerancing (GD&T), material properties, and industry standard fastening and manufacturing methods will be further explored.

**Prerequisite(s)/Corequisite(s):** DRFT 114. Restricted to Community Colleges campuses only.

**DRFT 215. Construction Site Safety Management****3 Credits**

Construction safety, compliance, documentation, and reporting requirements for individuals with construction site safety management responsibilities. Students will have the opportunity to earn a 30-hour construction industry OSHA card. Consent of Instructor required. Restricted to Community Colleges campuses only.

**DRFT 222. Surveying Fundamentals****3 Credits (2+3P)**

Theory and practice of geomatics as applied to plane surveying in the areas of linear measurements, angle measurements, area determination, differential and trigonometric leveling, and topographic mapping. Crosslisted with: SUR 222. Restricted to Community Colleges campuses only.

**Prerequisite(s):** MATH 190G.

**DRFT 230. Building Systems Drafting****3 Credits (2+2P)**

Development of working drawings for electrical, plumbing, and HVAC systems, for residential and commercial building through the applications of both 2D Drafting and 3D Building Information Modeling (BIM) techniques. Basics of project setup, National CAD Standards, ADA Standards, modern office practice, code analysis, as well as Sustainability and LEED for new construction. Restricted to: Community Colleges only.

**Prerequisite(s):** DRFT 180 or DRFT 181.

**DRFT 231. Construction Methods and Equipment****3 Credits (2+2P)**

Introduction to methods and equipment utilized in the construction industry including, common construction equipment, equipment utilization, equipment operating costs, site and earthwork, applicable specifications and testing, and related planning and safety considerations. Restricted to Community Colleges campuses only.

**Prerequisite(s):** DRFT 151.

**DRFT 240. Structural Systems Drafting****3 Credits (2+2P)**

Study of foundations, wall systems, floor systems and roof systems in residential, commercial and industrial design/construction. Produce structural drawings including foundation plans, wall and building sections, floor and roof framing plans, shop drawings and details; schedules, materials lists and specifications. Use of various software. May be repeated up to 3 credits.

**Prerequisite(s)/Corequisite(s):** DRFT 180 or DRFT 181. Restricted to Community Colleges campuses only.

**DRFT 242. Roadway Development Drafting****3 Credits (2+2P)**

Advanced civil/survey technology and drafting related to roadway development. Emphasis is on relevant terminology, codes/standards, and the production of complex working drawings such as topographical/grading, drainage, master utilities, roadway P P/details/etc., according to agency standards. May be repeated up to 3 credits. Restricted to Community Colleges campuses only.

**Prerequisite(s):** DRFT 143.

**DRFT 243. Land Development Drafting****3 Credits (2+2P)**

Advanced civil/survey technology and drafting related to land development. Emphasis is on relevant terminology codes/standards, and the production of complex working drawings such as subdivision plats, local utility and drainage plans, construction details roadway P P, etc., according to local development/ agency standards.

**Prerequisite:** DRFT 143 and DRFT 153.

**DRFT 250. Principles of Detailing and Design****3 Credits (2+2P)**

Advanced practice in construction documentation in the development and coordination of working drawings & specifications. In particular, will utilize Architectural Graphic Standards, National CAD Standards, and ADA standards to develop detail drawings related to Architectural, Civil, Structural and Building Mechanical systems. Will also be introduced to basic principles, factors, and process of building design such as space planning, site analysis, and basic architectural programming. May be repeated up to 3 credits.

**Prerequisite(s)/Corequisite(s):** DRFT 180 or DRFT 181. Restricted to Community Colleges campuses only.

**DRFT 254. Spatial Data Processing****3 Credits (2+2P)**

Utilizes the tools and technologies of GIS, processing volumes of geodata identifying a numerical, coded or listed map. Involves the analysis of spatial data from various diverse applications and place in a descriptive mapping process. May be repeated up to 3 credits. Restricted to Community Colleges campuses only.

**Prerequisite(s):** DRFT 204.

**DRFT 255. Independent Study****1-3 Credits (1-3)**

Instructor-approved projects in drafting or related topics specific to the student's individual areas of interest and relevant to the drafting and graphics technology curriculum. Consent of instructor required. May be repeated for a maximum of 6 credits.

**DRFT 261. Construction Scheduling and Project Management****3 Credits (2+2P)**

Introduction to construction scheduling and project management. Restricted to Community Colleges campuses only.

**Prerequisite(s):** DRFT 161.

**DRFT 265. Advanced Building Information Modeling Applications****3 Credits (2+2P)**

Advanced applications of Building Information Modeling (BIM) including the creation of, and practice in collaborative work sets, data and design analyses, energy modeling and analysis, preliminary LEED analysis, construction take-offs & estimation, and construction animation, through use of various BIM and related software. Restricted to: Community Colleges only.

**Prerequisite(s):** DRFT 165.

**DRFT 274. GIS Theory and Analysis****3 Credits (2+2P)**

Analyzes the hypothesis in which location and spatial data sufficiently quantifies the appropriate statistical methodology. May be repeated up to 3 credits. Restricted to Community Colleges campuses only.

**Prerequisite(s):** DRFT 254.

**DRFT 276. Computer Rendering and Animation I****3 Credits (2+2P)**

Introduction to technical applications of computer generated renderings and animations for the architecture and engineering fields. 3D models, photo-realistic renderings, and basic animation movie files will be produced utilizing industry standard modeling and animation software.

**DRFT 278. Advanced CAD Applications****3 Credits (2+2P)**

Introduction to advanced CAD commands, applications, usage techniques, and user customization. the latest version of the National CAD Standards will also be explored. Restricted to: Community Colleges only.

**Prerequisite(s):** DRFT 109.

**DRFT 288. Portfolio Development****3 Credits (2+2P)**

Production of a portfolio consisting of previously produced student work related to the student's individualized degree option. Process shall include the compilation and organization of working and presentation drawings, construction documents, BIM Models, and renderings/animations. Students will learn the basics of design layout and online portfolio documentation. Job search and resume preparation activities will also be required. Production of new material and content may also be required. This course is designed as a last semester course in the Drafting & Design curricula. May be repeated up to 3 credits. Restricted to Community Colleges campuses only.

**Prerequisite(s):** Consent of Instructor.

**DRFT 290. Special Topics****1-4 Credits (1-4)**

Topics subtitled in the Schedule of Classes. May be repeated for a maximum of 12 credits.

**DRFT 291. Cooperative Experience****1-6 Credits (1-6)**

Supervised cooperative work program. Student is employed in an approved occupation and supervised and rated by the employer and instructor. Student meets with advisor weekly. Graded S/U.

**Prerequisite:** consent of instructor.

**DRFT 295. Professional Development and Leadership DAGA****1 Credit**

Students gain experience in leadership, team building, performing community service, and membership and/or leadership in a student organization. May be repeated up to 6 credits. Restricted to Community Colleges campuses only.

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