

## COMPUTER AIDED DESIGN

Department of Applied Computing & Electronics  
Certificate of Applied Science (C.A.S.) Program

### Program Description:

The Computer Aided Design Program introduces students to graphic communications; computer-aided design and modeling systems; geographic information systems; surveying; written communication; and business practices. Graduates are prepared to pursue entry-level, professional careers as technicians supporting engineers, architects, surveyors, and land-use planners.

Regions throughout the Western United States continue to wrestle with issues involving new development, subdivisions, revitalization projects, appropriate land-use, transportation systems and infrastructure. The demand for a workforce educated with the technical skills to assist engineers, architects, surveyors, and land-use planners will continue. As a STEM-related (Science, Technology, Engineering, and Mathematics) career field, individuals trained in Computer Aided Design play a critical role in designing solutions for the economic and societal well-being of our world. Academically prepared students can complete this Certificate of Applied program certification in one year.

### Student Outcomes:

Upon completion of the program, students will:

- Develop and produce engineering documents using computer-aided technologies and hand-drawn graphics.
- Demonstrate proficiency in surveying equipment, GPS/GIS technologies, and computing systems to collect and analyze spatial field data.
- Effectively utilize information technology as a research and productivity tool.
- Demonstrate the workplace skills of effective communication, problem solving, collaboration, critical thinking, and leadership.
- Solve technical problems involving mathematics at the level of college algebra

### Related Job Titles:

- CAD Operator
- Drafting Technician
- Land-use Planning Assistants
- Surveying Assistants
- Engineering Technician

### Related Occupations (U.S. Department of Labor Occupations Handbook):

- Drafters <http://www.bls.gov/oco/ocos111.htm>
- Engineering Technicians <http://www.bls.gov/oco/ocos112.htm>
- Surveyors, Cartographers, Photogrammetrists, and Surveying and Mapping Technicians <http://www.bls.gov/oco/ocos040.htm>

### Further Educational Opportunities:

The Computer Aided Design Certificate of Applied Science is a first step for individuals interested in building a technical skill set for a career involving engineering technology. It is part of a ladder credential approach involving a one-year certificate and a four-year baccalaureate degree. The 31 credits completed in the Computer Aided Design Certificate fulfill partial requirements for a Bachelor of Applied Science (B.A.S.) degree through The University of Montana.

### Suggested Sequence of Courses\*:

<b>Courses</b>	<b>Autumn</b>	<b>Spring</b>
CRT 111 Fluency in I.T.	3	
CRT 182T Computer Aided Design I	2	
CRT 195 Special Topics: Computer Aided Design II	3	
CRT 195 Special Topics: Graphics Communication	3	
HEO 195 Special Topics: Surveying	3	
M 121 College Algebra	3	
<b>Total</b>	<b>17</b>	
BUS 103S Principles of Business		3
CRT 172 Intro to Computer Modeling		3
CRT 175 Geospatial Technologies		3
CRT 184 Civil Design Technologies		4
WRIT 101 College Writing I		3
<b>Total</b>		<b>16</b>

\*Curriculum is subject to change depending upon course availability.

### Course Descriptions:

**BUS 103S Principles of Business 3 cr.** Offered autumn and spring. Introduction to the world of business. Examines capitalism, the economic environment, the types of business organizations, management, marketing, production, labor, financing, and business/governmental relations. Credit not allowed for both BUS 103S and BADM 100S.

**CRT 111 Fluency in Information Technology 3 cr.** Offered autumn and spring. Prereq., CRT 100 or demonstrated computing experience. Introduces the skills and concepts of information technology, both from practical and a more theoretical point of view. During lectures and interactive computer labs, students will explore a wide range of digital and information technologies, including common PC applications, networking, databases, privacy, and security. Credit not allowed for both CRT 111 and CS 111.

**CRT 172 Introduction to Computer Modeling 3 cr.** Offered autumn and spring. Prereq., CRT 100 or demonstrated computing experience. Problem solving and data modeling using computer productivity software. Emphasis using spreadsheets and databases for data analysis. Formal presentation of results. Credit not allowed for both CRT 172 and CS 172.

**CRT 175 Geospatial Technologies 3 cr.** This course will cover the basics of geospatial technologies; remotely sensed imagery, GIS, and GPS and how each of the individual areas can be used together to analyze spatial datasets.

**CRT 182T Computer Aided Design and Drafting 2 cr.** Offered autumn. Prereq., CRT 100 or demonstrated computer experience. An introduction to computer aided design and drafting software for production of drawings and plans for architecture and engineering systems. Fundamentals of two dimensional drafting and drawing management for professional design.

**CRT 184 Civil Design Technologies 4 cr.** Prereq. CRT182T. The use of AutoCAD Civil 3D Software for common Survey and Engineering Design and Drafting tasks including: Importing and Managing Survey Data; Creating Coordinate Geometry; Creating Surfaces; Horizontal and Vertical Design Alignments; Generating Profile Views; Using Parcels for Subdivision and Land Planning; Road Design and Corridor Modeling; Underground Utilities for Storm Water and Sanitary Sewer Systems; Site Grading and Drainage Plans; Survey Staking; Using the AutoCAD® Map 3D® software for Civil Engineering Tasks; Data Management; Construction Documentation and Plan Production; 3D Visualization

**CRT 195T Special Topics: Computer Aided Design and Drafting II 3 cr.** Prereq. CRT182T. An in-depth study of core computer aided design and drafting concepts. Topics covered include drawing objects, templates, blocks, layers, tables, views, 2 plotters, and three-dimensional rendering. This course is the second in a two-part series on Computer Aided Design a core CAD software application.

**CRT 195T Special Topics: Principles of Graphics Communications 3 cr.** An introduction to concepts related to communicating using technical graphics. Student will learn to read blueprints, technical sketches, and schematics. Students will create simple free-hand, technical sketches and pictorial drawings. Topics covered will include views, ISO symbols, standards, dimensions, and cross-sections.

**HEO 195T Special Topics: Surveying 3 cr.** Offered autumn. Basic principles of surveying and the use of surveying equipment. Calculation of angles and distances to determine grade elevations. Introduction to Global Positioning Systems, lasers and their relationship to the heavy equipment operator.

**M 121 College Algebra 3 cr.** Offered autumn and spring. Prereq., MATH 111 or appropriate placement score. Intended to strengthen algebra skills. The study of functions and their inverses; polynomial, rational, exponential, and logarithmic functions. Credit not allowed for both MAT 118 and any of MAT 120, MATH 121, or MATH 112.

**WRIT 101 College Writing I 3 cr.** Offered every term. Prereq., WTS 090T or passing score on placement test. Instruction and practice in both the expository writing and research process. Emphasis on the use of specific techniques of writing to develop style, unity, clarity, and force of ideas, and structure. Students are expected to write without major errors in sentence structure or mechanics. Credit not allowed for both COM 101 and ENEX 101. Grading A-F, or NC.