

Design & Engineering Technology

Degree: A.A. - Design Technology
A.S. - Engineering Technology
Certificate: Design Technology
Engineering Technology

Area: Technical Education
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Design Technology

ARC's design technology program provides a background in skill and theory to qualify the student for employment as a design draftsman.

The ARC Design Technology Program emphasizes the basic skills needed for success in architectural, mechanical and engineering occupations. These include the design process, drafting standards and practices, technical communication, and design critique and presentation.

The use of computers and CADD software is emphasized throughout the program since they are the tools of choice in the industry.

Career Opportunities

Whether building a bridge, a satellite, a television set, a skyscraper or a home, workers rely on drawings that show the exact dimensions and specifications of the entire object and each of its parts.

Using traditional or computerized drawing tools, design draftsmen prepare design and detailed drawings from rough sketches, specifications and calculations provided by engineers, architects and designers.

Civil, mechanical, electrical, aeronautical, structural and architectural design drafting are major fields of employment.

Although accomplished design technicians usually specialize, the ARC program prepares graduates for entry-level positions in all these principal areas of employment.

Employment of design technicians is expected to increase as a result of the increasingly complex design of products and processes. If you plan a career in design technology you should be prepared to do both freehand sketching and detailed computer-assisted drawings of three-dimensional objects with a high degree of accuracy. You must also be able to function as a part of a team, since you will work directly with engineers, architects and craft workers.

Requirements for Degree Major: 39 units

DESGN 100	3
DESGN 102	3
DESGN 300	3
DESGN 308	3
DESGN 310	3
DESGN 320	3
DESGN 330	4
DESGN 340	5
DESGN 350 or ENGR 310	4
DESGN 360	5
DESGN 405	3

Recommended Electives

CHEM 305 or 310; CISA 310 and 311; ENGR 300; HORT 320; MATH 330; PHYS 310, 350

Requirements for Certificate: 39 units

DESGN 100	3
DESGN 102	3
DESGN 300	3
DESGN 308	3
DESGN 310	3
DESGN 320	3
DESGN 330	4
DESGN 340	5
DESGN 350 or ENGR 310	4
DESGN 360	5
DESGN 405	3

General Education Graduation Requirements:

Students must also complete the general education graduation requirements for an A.A. degree. See Graduation requirements.

Engineering Technology

Students gain a background in skill and theory to qualify them for employment as an engineering technician with government or industry.

While scientists discover new products and principles, and the engineers design ways of putting these discoveries to practical use, it is the engineering technicians and technologists who often do the testing, implementation, fabrication, and trouble shooting of these engineering designs.

All engineering technicians require a common academic background. The ARC engineering technician program is designed to give the student this basic preparation in physics, mathematics, drafting, computer-aided drafting and design (CADD), chemistry,

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manufacturing processes, engineering materials and other subjects necessary for the well trained technician.

Upon completion of the A.S. degree the engineering technician will be prepared to go directly into the employment market as a technical assistant to engineers, or other technical employment, or to transfer to California State University, Sacramento, with junior standing, in their mechanical engineering technology or construction management programs.

The two-year A.S. degree program provides options for special concentration: engineering technology, architectural engineering technology, civil engineering technology, electrical engineering technology, or mechanical engineering technology.

In addition, the college offers special transfer options to California State University, Sacramento, including Mechanical Engineering Technology and Construction Management.

A certificate program in engineering technology is also offered by the college. See also *Engineering*, page 109.

Career Opportunities

For every engineer, several technicians are required. Engineering technicians are needed in the fields of manufacturing, architecture, construction, materials testing, public utilities and many other fields. Salaries are dependent upon local industries.

Requirements for Degree Major

18 units of transfer level course work in addition to other graduation requirements. Courses may be selected from astronomy, chemistry, engineering, geology, mathematics, physical geography, physical science, physics and statistics. See graduation requirements.

Requirements for Degree Major:	39 units
CHEM 305 (5 units) or CHEM 310 (4 units)	4
CISA 310	1
CISA 311	1
DESGN 100	3
DESGN 102	3
DESGN 300 or ENGR 307	3
DESGN 308	3
DESGN 310 or ENGR 312	3
DESGN 330 or ENGR 320	3
DESGN 340 or DESGN 360	5
DESGN 350 or ENGR 310	4
MATH 330	3
PHYS 310 (3 units) or PHYS 350 (4 units)	3

Recommended Electives

BUS 310, 340; DESGN 320; ET 300, 301; ENGR 300; ENGR 342; MATH 350, 351; SPEECH 301; STAT 301; WELD 300

Requirements for Certificate:	39 units
CHEM 305 (5 units) or CHEM 310 (4 units)	4
CISA 310	1
CIS A 311	1
DT 100	3
DESGN 102	3
DESGN 300 or ENGR 307	3
DESGN 308	3
DESGN 310 or ENGR 312	3

DESGN 330 (4 units) or ENGR 320 (3 units)	3
DESGN 340 or 360	5
DESGN 350 or ENGR 310	4
MATH 330	3
PHYS 310 (3 units) or PHYS 350 (4 units)	3

Engineering Technology Degree Concentrations

As an option to the two-year Engineering Technology degree, a student may petition to have a specific area of concentration noted on the transcript. To qualify for a concentration the following courses must be completed (note that some courses are in addition to the degree core).

Architectural Engineering Technology Concentration

DESGN 320, 340, 350, 360, 405

Civil Engineering Technology Concentration

DESGN 300 or ENGR 307; DESGN 310, 320, 340; DESGN 350 or ENGR 310

Electrical Engineering Technology Concentration

DESGN 102; DESGN 300 or ENGR 307; ENGR 401; ET 300 and 301

Mechanical Engineering Technology Concentration

DESGN 308, 310, 320, 330; ENGR 307 or DESGN 300; ENGR 320

Mechanical Engineering Technology (CSU Transfer option)

A background in skill and theory to satisfy the transfer requirement to California State University, Sacramento, leading to a Bachelor of Science Degree in Mechanical Engineering Technology. This sequence of classes satisfies the Associate of Science Degree in Engineering Technology, and transfers directly to upper division courses at CSUS. Consult Counseling Department for graduation requirements. Students planning to complete a four year degree in Mechanical Engineering Technology should take this option.

Requirements for Degree Major: 68 units

Recommended Course Sequence for Degree Program

First Semester	18 Units
CHEM 305 or 400	5
DESGN 100	3
MATH 350	3
STAT 301	3
Elective	1
Language and Rationality	3
Second Semester	18 Units
PHYS 350	4
CISP 340; or CISP 409 or CISA 310 and CISA 311	2-4
DESGN 102	3
DESGN 310 or ENGR 312	3
MATH 351	3
HUM	3
Third Semester	17 Units
DESGN 308	3
DESGN 350 or ENGR 310	3-4
ENGR 320	3
PHYS 360	4
SOCSC	3
Elective	1
Fourth Semester	18 Units
DESGN 300 or ENGR 307	3
DESGN 330	4
DESGN 340 or DESGN 360	5
SOCSC	3
Elective	3

Recommended Electives

BUS 310, 340; DESGN 320; ET 300, 301; ENGWR 342; WELD 300

**Construction Management
(CSU Transfer option)**

A background in skill and theory to satisfy the transfer requirement to California State University, Sacramento, leading to a Bachelor of Science Degree in Engineering Technology - Construction Management. To satisfy the Associate of Science Degree, for this option, and graduation requirements, consult with the counseling department. Students planning to complete a four year degree in Engineering Technology - Construction Management, should take this option.

Requirements for Degree Major: 68 units

Recommended Course Sequence for Degree Program

First Semester 18 Units

BIOL 303	4
BUS 340	3
CISC 320	1
DESGN 100	3
MATH 350	3
PHYS 350	4

Second Semester 15 Units

CISA 300	1
CISA 310	1
DESGN 102	3
DESGN 310	3
MATH 351	3
PHYS 360	4

Third Semester 19-20.5 Units

ACCT 301	4
DESGN 340 or DESGN 360	5
DESGN 350 or ENGR 310	4
ENGR 307 or 413	3-4.5
ENGWR 300	3

Fourth Semester 16 Units

ACCT 311	4
ENGR 420	3
SPEECH 311	3
STAT 301	3
* Construction Management 22	3

*Students can take CM 22, Construction Documents, as a cross over course prior to transferring to CSUS. Consult with Counseling Department.

DESGN 100 Introduction to Computer Aided Drafting and Design (CADD) 3 Units

Formerly: DESGN 66
Prerequisite: None
Course Not Transferable UC or CSU
Hours: 36 hours LEC; 72 hours LAB

This course is an introduction to computer-assisted drafting and design (CADD) and basic technical drawing. It covers orthographic and isometric projection concepts, utilizing CADD to produce basic technical drawings and applies the editing commands available in the software. It introduces basic drawings from architecture, mechanical design, electronics and space planning. This course may be taken four times using different software releases.

DESGN 102 Intermediate Computer Aided Drafting and Design (CADD) 3 Units

Formerly: DESGN 67
Prerequisite: DESGN 100 with a grade of "C" or better.
Course Not Transferable UC or CSU
Hours: 36 hours LEC; 72 hours LAB

This course emphasizes advanced CADD commands and design graphics drawing principles. Orthographic and isometric projection principles are used for solving missing view problems with CADD as the tool for producing the drawings. Section views for mechanical and architectural applications are covered. Topics encompass architectural design, mechanical design, 3D-drawing, orthographic and isometric projection, sections, developments, attributes, civil drafting, and interior design and space planning. This covers the preparation for professional work skills and advanced design courses. This course may be taken four times using different software releases.

DESGN 110 Drafting for Design Majors 1 Unit

Formerly: DESGN 90
Prerequisite: None
Course Not Transferable UC or CSU
Hours: 9 hours LEC; 27 hours LAB

Basic drafting techniques for interior design and theatre arts majors. Not recommended for drafting or engineering majors.

DESGN 300 Introduction to Design Resources 3 Units

Prerequisite: None
Advisory: ENGWR 102 or 103, and ENGRD 116; or ESLR 320 and ESLW 320.
Course Transferable to CSU
Hours: 54 hours LEC

This course is a survey of the resources that are used in the architectural and engineering professions for design planning, evaluation, and selection. It covers the methods and techniques used to determine human resources, evaluate and select materials for design, and disseminate design information.

DESGN 308 Three Dimensional Design-Solids Modeling 3 Units

Formerly: DESGN 410
Prerequisite: DESGN 300, DESGN 100, and DESGN 320 with a grade of "C" or better.
Corequisite: DESGN 102.

Advisory: ENGWR 102 or 103, and ENGRD 116; or ESLR 320 and ESLW 320.
Course Transferable to CSU
Hours: 36 hours LEC; 72 hours LAB

This course will cover the concepts and applications of three dimensional graphic design using AutoCAD solid modeling, mechanical desktop, and solid works software. Topics include the development and techniques for producing wire frame, surface, and solid models and their application in architectural and mechanical design. This course may be taken 4 times on different software releases.

DESGN 310 Graphic Analysis 3 Units

Formerly: DESGN 53
Prerequisite: DESGN 100 with a grade of "C" or better.
Advisory: Design Technology 102.
Course Transferable to CSU
Hours: 36 hours LEC; 72 hours LAB

This course covers CADD applications of the orthographic projection and geometric construction principles to solve technical problems as well as graphical analysis of the true length, true shape, true angle in the solution of engineering and architectural problems. This course satisfies the transfer requirements to CSUS for engineering, engineering technology, and design technology students.

DESGN 320 Three Dimensional Graphics and Design 3 Units

Formerly: DESGN 54

Prerequisite: None

Advisory: ENGWR 102 or 103, ENGRD 116 or ESLR 320 and ESLW 320 or placement through assessment process.

Course Transferable to CSU

Hours: 54 hours LEC; 54 hours LAB

This course includes instruction and practice in freehand engineering and architectural technical expression in various graphic media. Additionally, students will develop design solutions represented in freehand perspectives and 3-D CADD solutions.

DESGN 330 Machine Design 4 Units

Formerly: DESGN 55

Prerequisite: DESGN 310.

Advisory: DESGN 100.

Course Transferable to CSU

Hours: 54 hours LEC; 54 hours LAB

This course covers instruction in machine design and dimensioning of engineering machine drawings. Basic dimensioning of orthographic, sections, auxiliaries, forging, and casting drawings will be studied as well as basic manufacturing techniques. Emphasis will be placed on the latest ANSI Standard for Geometric Dimensioning and Tolerancing and its application to working drawings. Satisfies the transfer requirement for machine drawing to CSUS Mechanical Engineering Technology Program.

DESGN 340 Architecture and Construction 5 Units

Formerly: DESGN 56

Prerequisite: DESGN 102, 310, and 320.

Course Transferable to CSU

Hours: 54 hours LEC; 108 hours LAB

This course covers individual and group exercises simulating typical design, drafting and procedures in architecture and construction. The course focuses on residential design and light commercial wood frame construction.

DESGN 350 Surveying and Construction Measurement Techniques 4 Units

Formerly: DESGN 57

Prerequisite: DESGN 102, DESGN 310 with a grade of "C" or better.

Advisory: Math 120.

Course Transferable to CSU

Hours: 54 hours LEC; 54 hours LAB

This course covers basic measurement and alignment techniques used in light and heavy construction for design technology analysis. Additionally, the course includes site, road staking, cut and fill calculations, and elementary surveying principles.

DESGN 360 Commercial Engineering Design and Drafting 5 Units

Formerly: DESGN 58

Prerequisite: DESGN 102 and 310 with a grade of "C" or better.

Advisory: Design Technology 320.

Course Transferable to CSU

Hours: 54 hours LEC; 108 hours LAB

This course employs individual and group exercises simulating typical design and engineering problems in structures, land planning, and environmental systems in buildings. Design solutions are presented by freehand, manual drafting, and CADD application. The course includes both individual and team design problems.

DESGN 405 Advanced Computer-Aided Drafting and Design (CADD) 3 Units

Prerequisite: DESGN 340 or 360 with a grade of "C" or better.

Course Transferable to CSU

Hours: 36 hours LEC; 72 hours LAB

This course emphasizes the study of electronic graphical data development, manipulation techniques, and research data retrieval within the areas of architectural and mechanical, and civil engineering applications. Data base development is applied to various technical design problems incorporating the design process. This course may be taken four times on different software versions.