

Area: Technical Education  
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Degree: A.A. - Design Technology  
 A.S. - Engineering Technology  
 A.S. - Engineering: Transfer  
 Certificate: Design Technology  
 Engineering Technology

### Design Technology Degree and Certificate

The ARC Design Technology degree and certificate emphasizes the basic skills needed for success in architectural, mechanical, and engineering occupations. These include the design process, drafting standards and practices, technical communication, material sciences, and design critique. The use of computers and various computer aided design and drafting (CADD) softwares are emphasized throughout the program.

<u>Requirements for Degree or Certificate</u>		<u>39 Units</u>
DESGN 100	Introduction to Computer Aided Drafting and Design (CADD) .....	3
DESGN 102	Intermediate Computer Aided Drafting and Design (CADD) .....	3
DESGN 300	Introduction to Design Resources .....	3
DESGN 308	Three Dimensional Design-Solids Modeling .....	3
DESGN 310	Graphic Analysis .....	3
DESGN 320	Three Dimensional Graphics and Design .....	3
DESGN 330	Machine Design .....	4
DESGN 340	Architecture and Construction .....	5
DESGN 350	Surveying and Construction Measurement Techniques .....	4
or ENGR 310	Engineering Survey Measurements (4) .....	4
DESGN 360	Commercial Engineering Design and Drafting .....	5
DESGN 405	Advanced Computer-Aided Drafting and Design (CADD) ...	3

**Associate Degree Requirements:** The Design Technology Associate in Arts (A.A.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

### Engineering Technology Degree

The Engineering Technology degree gives students a basic preparation in physics, mathematics, computer aided design and drafting (CADD), chemistry, manufacturing processes, engineering materials and other subjects necessary for the well trained engineering technician.

#### Career Opportunities

Upon completion of the A.S. degree the engineering technician will be prepared to go directly into employment as a technical assistant to engineers, or other technical employment. 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. Engineering technicians are needed in the fields of manufacturing, architecture, construction, materials testing, public utilities and many other fields.

### Requirements for Degree 41-44 Units

CHEM 305	Introduction to Chemistry (5) .....	4 - 5
or CHEM 310	Chemical Calculations (4) .....	4
CISA 315	Introduction to Electronic Spreadsheets .....	2
CISA 316	Intermediate Electronic Spreadsheets .....	2
DESGN 100	Introduction to Computer Aided Drafting and Design (CADD) .....	3
DESGN 102	Intermediate Computer Aided Drafting and Design (CADD) .....	3
DESGN 300	Introduction to Design Resources (3) .....	3
or ENGR 307	Industrial Materials Testing (3) .....	3
DESGN 308	Three Dimensional Design-Solids Modeling .....	3
DESGN 310	Graphic Analysis (3) .....	3
or ENGR 312	Engineering Graphics (3) .....	3
DESGN 330	Machine Design (4) .....	3 - 4
or ENGR 320	Manufacturing Processes (3) .....	3
DESGN 340	Architecture and Construction (5) .....	5
or DESGN 360	Commercial Engineering Design and Drafting (5) .....	5
DESGN 350	Surveying and Construction Measurement Techniques (4) ..	4
or ENGR 310	Engineering Survey Measurements (4) .....	4
MATH 330	Trigonometry .....	3
PHYS 310	Conceptual Physics (3) .....	3 - 4
or PHYS 350	General Physics (4) .....	4

**Associate Degree Requirements:** The Engineering Technology Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

### Engineering Technology Certificate

The Engineering Technology certificate gives students a basic preparation in physics, mathematics, computer aided drafting and design (CADD), chemistry, manufacturing processes, engineering materials and other subjects necessary for the well trained engineering technician.

#### Career Opportunities

Upon completion of the two-year certificate program the engineering technician will be prepared to go directly into the employment market as a technical assistant to engineers, or other technical employment. For every engineer, several support technicians are required. Engineering technicians are needed in the fields of manufacturing, architecture, construction, materials testing, public utilities and many other fields.

### Requirements for Certificate 41-44 Units

CHEM 305	Introduction to Chemistry (5) .....	4 - 5
or CHEM 310	Chemical Calculations (4) .....	4
CISA 315	Introduction to Electronic Spreadsheets .....	2
CISA 316	Intermediate Electronic Spreadsheets .....	2
DESGN 100	Introduction to Computer Aided Drafting and Design (CADD) .....	3
DESGN 102	Intermediate Computer Aided Drafting and Design (CADD) .....	3
DESGN 300	Introduction to Design Resources (3) .....	3
or ENGR 307	Industrial Materials Testing (3) .....	3
DESGN 308	Three Dimensional Design-Solids Modeling .....	3

DESIGN 310	Graphic Analysis (3)	3
or ENGR 312	Engineering Graphics (3)	
DESIGN 330	Machine Design (4)	3 - 4
or ENGR 320	Manufacturing Processes (3)	
DESIGN 340	Architecture and Construction (5)	5
or DESIGN 360	Commercial Engineering Design and Drafting (5)	
DESIGN 350	Surveying and Construction Measurement Techniques (4)	4
or ENGR 310	Engineering Survey Measurements (4)	
MATH 330	Trigonometry	3
PHYS 310	Conceptual Physics (3)	3 - 4
or PHYS 350	General Physics (4)	

### Engineering: Transfer Degree

The purpose of the program is to provide academic preparation for transfer to California State University, Sacramento for the Engineering Construction Management Program or the Mechanical Engineering Technology Program. At the completion of the courses in the option, a student will obtain an A.S. Degree and have many of the courses required for transfer. Please check the current Articulation Agreement by Major at [www.assist.org](http://www.assist.org)

#### **Construction Management Option** **70-71.5 Units**

ACCT 301	Financial Accounting	4
ACCT 311	Managerial Accounting	4
BIOL 303	Survey of Biology	4
BUS 340	Business Law	3
CISA 305	Beginning Word Processing	2
CISA 315	Introduction to Electronic Spreadsheets	2
CISC 320	Operating Systems	1
DESIGN 100	Introduction to Computer Aided Drafting and Design (CADD)	3
DESIGN 102	Intermediate Computer Aided Drafting and Design (CADD)	3
DESIGN 310	Graphic Analysis	3
DESIGN 340	Architecture and Construction (5)	5
or DESIGN 360	Commercial Engineering Design and Drafting (5)	
DESIGN 350	Surveying and Construction Measurement Techniques (4)	4
or ENGR 310	Engineering Survey Measurements (4)	
ENGR 307	Industrial Materials Testing (3)	3 - 4.5
or ENGR 413	Properties of Materials (4.5)	
ENGR 420	Statics	3
ENGWR 300	College Composition	3
MATH 350	Calculus for the Life and Social Sciences I	3
MATH 351	Calculus for the Life and Social Sciences II	3
PHYS 350	General Physics	4
PHYS 360	General Physics	4
SPEECH 311	Argumentation and Debate	3
STAT 301	Introduction to Probability and Statistics	3

**And a minimum of 3 units from the following:** 3

CSU course: Construction Management 22 (May be taken prior to transferring, consult with a counselor)

#### **Mechanical Engineering Technology Option** **70-74 Units**

CHEM 305	Introduction to Chemistry (5)	5
or CHEM 400	General Chemistry (5)	
or [CISA 315	Introduction to Electronic Spreadsheets (2)	0-4
and CISA 316	Intermediate Electronic Spreadsheets (2)]	
DESIGN 100	Introduction to Computer Aided Drafting and Design (CADD)	3
DESIGN 102	Intermediate Computer Aided Drafting and Design (CADD)	3
DESIGN 300	Introduction to Design Resources (3)	3
or ENGR 307	Industrial Materials Testing (3)	
DESIGN 308	Three Dimensional Design-Solids Modeling	3
DESIGN 310	Graphic Analysis (3)	3
or ENGR 312	Engineering Graphics (3)	
DESIGN 330	Machine Design	4

DESIGN 340	Architecture and Construction (5)	5
or DESIGN 360	Commercial Engineering Design and Drafting (5)	
DESIGN 350	Surveying and Construction Measurement Techniques (4)	4
or ENGR 310	Engineering Survey Measurements (4)	
ENGR 320	Manufacturing Processes	3
MATH 350	Calculus for the Life and Social Sciences I	3
MATH 351	Calculus for the Life and Social Sciences II	3
PHYS 350	General Physics	4
PHYS 360	General Physics	4
STAT 301	Introduction to Probability and Statistics	3

**And a minimum of 3 units from the following:** 3

One or more transfer level Humanities course (numbered 300-499)

**And a minimum of 3 units from the following:** 3

One or more transfer level Language and Rationality course (numbered 300-499)

**And a minimum of 6 units from the following:** 6

Transfer level Social Science courses (numbered 300-499)

**And a minimum of 5 units from the following:** 5

Transfer level courses (numbered 300-499).

**Associate Degree Requirements:** The Engineering: Transfer Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

#### **DESIGN 100 Introduction to Computer Aided Drafting and Design (CADD)** **3 Units**

*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.

#### **DESIGN 102 Intermediate Computer Aided Drafting and Design (CADD)** **3 Units**

*Prerequisite: DESIGN 100 with a grade of "C" or better.*

*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.

#### **DESIGN 298 Work Experience in Design Technology** **1-4 Units**

*Hours: 72 hours LEC*

#### **DESIGN 300 Introduction to Design Resources** **3 Units**

*Advisory: ENGWR 102 or 103, and ENGRD 116 with a grade of "C" or better; OR ESLR 320 and ESLW 320 with a grade of "C" or better; OR placement through assessment process.*

*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**

*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**

*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**

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

*Course Transferable to CSU*

*Hours:* 36 hours LEC; 72 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**

*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**

*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**

*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**

*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.