

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

http://www.arc.losrios.edu/Programs_of_Study/Technical_Education/Design_Technology.htm

DEGREES AND CERTIFICATES

Design Technology Degree and Certificate

Major Code, degree: 011284A01
 Major Code, certificate: 011284C01

This degree and certificate emphasizes the knowledge and skills required for entry level success in the architectural, civil, and mechanical engineering professions. These include graphic standards and practices, technical analysis and communication, material sciences, and the design and critique processes. In addition, projects include environmental (sustainable) design, product economics, and legal considerations. Current computer technologies and various design software for three dimensional modeling and two dimensional drafting are used throughout the program. Graphic documentation and a portfolio of work are created for each course.

NOTE TO TRANSFER STUDENTS:

It is critical that students meet with an ARC counselor to select and plan the courses required for transfer to a four-year college or university in order to pursue a bachelor's degree in Architecture and/or Engineering Technology. Colleges vary widely in terms of the required preparation. The courses that ARC requires for an associate's degree in this major may be different from the requirements needed for the bachelor's degree.

Admission to accredited Schools of Architecture/Engineering technologies is highly competitive. It is recommended that students keep a portfolio of all design/engineering technology coursework completed at ARC to present for evaluation by college program advisors. Some colleges require portfolios prior to granting transfer credit or gaining admission.

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- solve architectural and engineering technical problems by applying design and engineering process methodologies. Critique and analyze the success or failure of the process and the solutions.
- apply the appropriate use of representational media, including study and presentation models (electronic and physical), freehand and conceptual drawing, technical documentation, and diagramming, to convey envisioned ideas at each stage of the design process.

- organize a set of documents for land planning and site development, commercial and residential buildings, and product assemblies that include material selections, cross-referencing, code review, checklists, and coordination.
- create design solutions that demonstrate knowledge and understanding of historical, cultural, human, aesthetic, environmental (sustainable) and social issues.
- communicate architectural and engineering design solutions effectively through individual and cooperative group efforts including speaking, writing, presentation, and the use of various design graphics and technical software.

Career Opportunities

A student who has earned a degree or certificate in design technology is well prepared to enter the architecture or engineering field as a design technician. Design technicians are involved in all phases of the design process and duties may include the preparation of technical and presentation drawings, specifications, reports and cost estimates. Design technicians primarily work with architects, mechanical engineers, structural engineers and civil engineers.

See losrios.edu/gainful-emp-info/gedt.php?major=011284C01 for Gainful Employment Disclosure.

Requirements for Degree or Certificate		37 - 38 Units
DESGN 300	Introduction to Design Resources	3
DESGN 302	Technical Documentation with CADD	3
DESGN 310	Graphic Analysis and Documentation	3
DESGN 320	Three Dimensional Graphics and Design	3
DESGN 325	Architectural Modeling and Design.....	3
DESGN 328	Engineering Modeling and Design.....	3
DESGN 330	Engineering Systems and Design	5
DESGN 340	Architecture and Construction.....	5
DESGN 350	Surveying and Land Planning (5).....	4 - 5
or ENGR 310	Engineering Survey Measurements (4)	
DESGN 360	Commercial Engineering Design and Drafting	5

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 and Certificate

Major Code, degree: 011108A01

Major Code, certificate: 011108C01

This degree and certificate emphasizes the knowledge and skills required for entry level success in the engineering professions. These include a basic preparation within the scientific fields including physics, mathematics, chemistry, and material sciences. These sciences are applied to technical analysis and graphic communication standards and practices. In addition, projects include environmental and sustainable design issues, product economics, and legal considerations. Current computer technologies and various analytical design and documentation software are emphasized throughout the program.

NOTE TO TRANSFER STUDENTS:

It is critical that students meet with an ARC counselor to select and plan the courses required for transfer to a four-year college or university in order to pursue a bachelor's degree in Engineering Technology. Colleges vary widely in terms of the required preparation. The courses that ARC requires for an associate's degree in this major may be different from the requirements needed for the bachelor's degree.

Admission to accredited Schools of Engineering Technologies is highly competitive. It is recommended that students keep a portfolio of all design/engineering technology coursework completed at ARC to present for evaluation by college program advisors. Some colleges require portfolios prior to granting transfer credit or gaining admission.

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- solve technical engineering problems by applying design and engineering process methodologies. Critique and analyze the success or failure of the process and the solutions.
- apply the appropriate use of representational media, including study and presentation models (electronic and physical), freehand and conceptual drawing, technical documentation, and diagramming.
- organize a set of engineering product development documents and technical reports per industry standards.
- research and design for engineering products that demonstrate knowledge and understanding of historical, cultural, human, aesthetic, environmental (sustainable) and social issues.
- communicate engineering design solutions effectively through individual and cooperative group efforts including speaking, writing, presentation, and the use of various design graphics and technical software.

Career Opportunities

Upon completion of the degree or 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.

See losrios.edu/gainful-emp-info/gedt.php?major=011108C01 for Gainful Employment Disclosure.

Requirements for Degree or Certificate 40 - 43 Units

CHEM 305	Introduction to Chemistry (5)	4 - 5
or CHEM 310	Chemical Calculations (4)	
CISA 315	Introduction to Electronic Spreadsheets	2
CISA 316	Intermediate Electronic Spreadsheets	2
DESIGN 300	Introduction to Design Resources	3
DESIGN 302	Technical Documentation with CADD	3
DESIGN 310	Graphic Analysis and Documentation (3)	3
or ENGR 312	Engineering Graphics (3)	
DESIGN 328	Engineering Modeling and Design	3
DESIGN 330	Engineering Systems and Design	5
DESIGN 340	Architecture and Construction (5)	5
or DESIGN 360	Commercial Engineering Design and Drafting (5)	
DESIGN 350	Surveying and Land Planning (5)	4 - 5
or ENGR 310	Engineering Survey Measurements (4)	
MATH 330	Trigonometry	3
PHYS 310	Conceptual Physics (3)	3 - 4
or PHYS 350	General Physics (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.

Design Technology

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. It introduces basic drawings from architecture, mechanical design, electronics and space planning.

DESIGN 298 Work Experience in Design Technology 1-4 Units

Advisory: Eligible for ENGRD 310 or ENGRD 312 AND ENGRD 300; OR ESLR 340 AND ESLW 340.

Enrollment Limitation: Students must be in a paid or unpaid internship, volunteer position, or job related to the architectural and engineering field with a cooperating site supervisor. Students are advised to consult with the Design Technology Department faculty to review specific certificate and degree work experience requirements.

General Education: AA/AS Area III(b)

Hours: 60-300 hours LAB

This course provides students with opportunities to develop marketable skills in preparation for employment or advancement within the architectural and engineering field. It is designed for students interested in work experience and/or internships in associate degree level or certificate occupational programs. Course content includes understanding the application of education to the workforce, completion of Title 5 required forms which document the student's progress and hours spent at the work site, and developing workplace skills and competencies. During the semester, the student is required to attend a weekly orientation and 75 hours of related paid work experience, or 60 hours of unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. First-time participants are required to attend a weekly orientation and a final meeting. Returning participants are required to attend the first class meeting, a mid-semester meeting, and a final meeting and may meet individually with the instructor as needed to complete a work site observation and all program forms, receive updates, and assignments. Students may take up to 16 units total across all Work Experience course offerings. This course may be taken up to four times when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.

DESGN 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.

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. It introduces construction materials and their properties and characteristics that affect construction processes. Environmental and sustainable materials, sustainable building certification, and rating systems are also covered.

DESGN 302 Technical Documentation with CADD 3 Units

Prerequisite: DESGN 100 with a grade of “C” or better

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.

Hours: 36 hours LEC; 72 hours LAB

This course emphasizes using various electronic graphical media software to create standardized technical documentation for architectural, civil, and mechanical applications. A wide range of methods are used to create, print and save 2D, 3D, orthographic, and isometric presentations in a wide variety of output formats using AutoCAD as the primary tool. Section views for mechanical and architectural applications are covered, as well as a variety of drawing and file management topics. This course was formerly DESGN 102.

DESGN 310 Graphic Analysis and Documentation 3 Units

Prerequisite: DESGN 100 with a grade of “C” or better

Advisory: DESGN 302 (Technical Documentation with CADD), AND 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.

Course Transferable to CSU

Hours: 36 hours LEC; 72 hours LAB

This course covers the application of orthographic projection and geometric construction principles as they are used to solve technical problems. Additionally, graphical analysis is used to determine strength, deflection, cost, volume, and green technology ratings. These analyses may utilize design characteristics such as forces, moments, ratios, and areas as well as distance, bearing, and grade. These characteristics are then used in the solution of engineering and architectural problems.

DESGN 320 Three Dimensional Graphics and Design 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.

Course Transferable to UC/CSU

Hours: 36 hours LEC; 72 hours LAB

This course is an introduction to the fundamentals of the design process for architecture and engineering. It includes the application of programming, environmental analysis, sustainable (green) considerations, code guidelines and restrictions, market analysis, and economic considerations on design projects. Technical design solutions with freehand perspective graphics, physical mass modeling prototyping, and virtual concept computer modeling are also covered. The course also includes individual and team studio situations, oral presentations, and formal critiques.

DESGN 325 Architectural Modeling and Design 3 Units

Prerequisite: DESGN 100 (Introduction to Computer Aided Drafting and Design (CADD)) and DESGN 320 (Three Dimensional Graphics and Design) with a grade of “C” or better; AND DESGN 300 (Introduction to Design Resources) or ENGR 307 (Industrial Materials Testing) with a grade of “C” or better

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.

Course Transferable to CSU

Hours: 36 hours LEC; 72 hours LAB

This course covers the concepts and applications of three dimensional graphic design using various visualization, modeling, and Building Information Modeling (BIM) programs, such as AutoCAD, SketchUp and Revit Architectural. Topics include the procedures and techniques for producing architectural models and associated technical documentation and presentation. Course projects emphasize sustainable design concepts and include all phases of design.

DESGN 328 Engineering Modeling and Design 3 Units

Prerequisite: DESGN 100 with a grade of “C” or better

Advisory: DESGN 320; 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.

Course Transferable to UC/CSU

Hours: 36 hours LEC; 72 hours LAB

This course covers the concepts and applications of three dimensional graphic design using various visualization, modeling, and Building Information Modeling (BIM) programs, such as AutoCAD, SketchUp, and Revit MEP. Topics include the procedures and techniques for producing surface models, solid models, and their associated technical documentation/presentation components as well as their application to civil engineering, mechanical engineering and green technology. This course was formerly DESGN 308.

DESGN 330 Engineering Systems and Design 5 Units

Prerequisite: DESGN 302 (Technical Documentation with CADD), and DESGN 320 (Three Dimensional Graphics and Design) and, DESGN 328 (Engineering Modeling and Design) with grades of “C” or better AND DESGN 310 (Graphic Analysis and Documentation) or ENGR 312 (Engineering Graphics) with a grade of “C” or better

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.

Course Transferable to CSU

Hours: 54 hours LEC; 108 hours LAB

This course covers machine and mechanical system design and analysis through the study of Mechanical Electrical Plumbing (MEP) system applications. Basic Building Information Modeling (BIM) techniques and technical documentation are applied to a variety of industrial and commercial products utilizing orthographics, sections, auxiliaries, tolerance reviews, Geometric Dimension and Tolerancing (GDT), as well as the creation of facility and production plans. Emphasis is placed on the current American National Standards Institute (ANSI) standard for geometric dimension and tolerancing and its application to working drawings. Applications emphasize green technology concerns, such as water and energy conservation in industrial, commercial, or municipal settings.

DESGN 340 Architecture and Construction 5 Units

Prerequisite: DESGN 302 (Technical Documentation with CADD), AND DESGN 325 (Architectural Modeling and Design) or DESGN 328 (Engineering Modeling and Design) and DESGN 320 (Three Dimensional Graphics and Design), AND DESGN 310 (Graphic Analysis), or ENGR 312 (Engineering Graphics) with grades of "C" or better

Course Transferable to CSU

Hours: 54 hours LEC; 108 hours LAB

This course is an introduction to the residential architectural design process. It covers the fundamentals of construction materials and methodology, basic code requirements, and the introduction of applied engineering concepts for light construction. It also includes the application of a predefined program, environmental analysis, sustainable design, building mass prototyping, and graphical technical documentation.

DESGN 350 Surveying and Land Planning 5 Units

Prerequisite: DESGN 302 (Technical Documentation with CADD), DESGN 328 (Engineering Modeling and Design) AND DESGN 310 (Graphic Analysis and Documentation) or ENGR 312 (Engineering Graphics) with a grade of "C" or better

Advisory: DESGN 320, MATH 120, MATH 124, MATH 129, and MATH 133

Course Transferable to CSU

Hours: 54 hours LEC; 108 hours LAB

This course examines elementary surveying principles and basic civil design and drafting techniques. It covers the instruments, methods, and theories necessary for the measurement of distance, direction, angles, and elevations. Surveyed data is applied to create site layouts, site models, profiles, cut and fill volumes, and traverse computations. Additionally, environmental and sustainable design practices are applied to a variety of projects.

DESGN 360 Commercial Engineering Design and Drafting 5 Units

Prerequisite: DESGN 302 (Technical Documentation with CADD), AND DESGN 325 (Architectural Modeling and Design) or DESGN 328 (Engineering Modeling and Design) AND DESGN 310 (Graphic Analysis), or ENGR 312 (Engineering Graphics) with grades of "C" or better

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 commercial structures, commercial building systems, and environmental systems in buildings. The fundamentals of construction materials and methodology, basic code requirements, and the introduction of applied engineering concepts for heavy construction are introduced. Topics include defined programs, environmental analysis, sustainable design applications, and the development of various mass prototyping based on the given theme. Design solutions are presented by various freehand concept drawings, physical modeling and electronic media applications. A formal graphic portfolio including all course work is required.

DESGN 495 Independent Studies in Design Technology**1-3 Units**

Course Transferable to CSU

Hours: 54-162 hours LAB

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.