

ENGINEERING TECHNOLOGY

Natural and Applied Sciences Division

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Engineering Technology A.S. Degree

The Engineering Technology A.S. Degree/Certificate Program has been designed under the guidance of an industry advisory board for students who have a strong interest in hands-on technical work based in electronics, manufacturing, and design drafting. Employment opportunities await our graduates locally, in the Silicon Valley, and globally. Upon entering the workforce, our graduates perform duties requiring a combination of the theoretical knowledge of an engineer and the skills of a craftsperson. The following are a sampling of the many fields our graduates qualify for: engineering technician, design drafting, manufacturing, electronics, and computer animation. The Engineering Technology Department at Cabrillo College offers an A.S. Degree and a Certificate of Achievement, as well as six Skills Certificate options. Additionally, several courses carry transfer credit to baccalaureate degree granting institutions.

Note: We strongly recommend CS 1 and CS 1L for all students enrolling in computer-based Engineering Technology courses. Please refer to the Cabrillo College *Catalog* descriptions of these courses to determine if you possess equivalent knowledge.

Learning Outcomes

1. Analyze and troubleshoot electrical circuits and mechanical systems based upon industry protocols and standards. (Critical Thinking)
2. Develop a portfolio of laboratory reports that demonstrate skills acquired within a particular technology. (Communication, Professional Development)
3. Demonstrate mastery of an engineering knowledge “base equivalent” to passing an industry level certification exam from such vendors as: AutoDesk, Graphisoft, and PTC. (Global Awareness, Critical Thinking)
4. Demonstrate written and verbal communication skills through technical documentation and oral presentations. (Communication, Professional Development, Critical Thinking)

A.S. General Education

21 Units

Core Courses (27 units)

ETECH 24	Introduction to AutoCAD	3
ETECH 31	Introduction to Electronic Circuit and Schematic Design	3
ETECH 40	3D Animation	3
ETECH 41	Advanced AutoCAD.....	3
ETECH 60	Architecture/Green Design: Principles and Practices.....	3
ETECH 61	Architecture/Green Design: Planning and Construction.....	3
ETECH 62	Architecture/Green Design: Implementation using AutoCAD.....	3

ETECH 75	BIM and Sustainable Design Strategies I.....	3
ETECH 130	Introduction to Creo and Solidworks	3
Approved Program Electives (5 Units)		
BUS 20	Introduction to Business.....	3
CEM 155	Blueprint Reading.....	3
CIS 71	Information & Communication Technology Essentials.....	4
DM 2	Digital Publishing I	4
DM 4	Digital Graphics	3
ETECH 43	Intermediate 3D Animation	3
ETECH 131	Intermediate Creo and Solidworks.....	3
ETECH 199C	Career Work Experience Education	3

Electives:

(Any Course numbered 1-199)..... 7

Total Units

60

Engineering Technology Certificate of Achievement

Learning Outcomes

1. Develop a portfolio of laboratory reports that demonstrate skills acquired within a particular technology. (Communication, Professional Development)
2. Analyze and troubleshoot electrical circuits and mechanical systems based upon industry protocols and standards. (Critical Thinking)
3. Demonstrate mastery of an engineering knowledge “base equivalent” to passing an industry level certification exam from such vendors as: AutoDesk, Graphisoft, and PTC. (Global Awareness, Critical Thinking)

Core Courses (27 units)

Units

ETECH 24	Introduction to AutoCAD	3
ETECH 31	Introduction to Electronic Circuit and Schematic Design	3
ETECH 40	3D Animation	3
ETECH 41	Advanced AutoCAD.....	3
ETECH 60	Architecture/Green Design: Principles and Practices.....	3
ETECH 61	Architecture/Green Design: Planning and Construction.....	3
ETECH 62	Architecture/Green Design: Implementation using AutoCAD.....	3
ETECH 75	BIM and Sustainable Design Strategies I.....	3
ETECH 130	Introduction to Creo and Solidworks	3

One of the following:

ENGL 100	Elements of Writing.....	3
or		
ESL 100	High Advanced Academic ESL	4-6
or		
ENGL 1A/1AH/1AMC/1AMCH	3
or		
CABT 157	Business and Technical Writing.....	3

Total Units

30-33

Architecture Drafting and Design Skills Certificate

Learning Outcomes

1. Demonstrate mastery of an architectural knowledge “base equivalent” to obtaining an architectural ADDA certification from American Design Drafting Association. (Global Awareness, Critical Thinking)
2. Design and draft an AEC plan set. (Global Awareness, Professional Development)
3. Troubleshoot and solve design flaws on AEC plan sets. (Critical Thinking)

Required Courses	Units
ETECH 24 Introduction to AutoCAD	3
ETECH 60 Architecture/Green Design: Principles and Practices.....	3
ETECH 61 Architecture/Green Design: Planning and Construction.....	3
ETECH 62 Architecture/Green Design: Implementation using AutoCAD.....	3
ETECH 75 BIM and Sustainable Design Strategies I.....	3
If desired, one required Architecture Drafting and Design course may be replaced with one of the following (listed courses may require the completion of prerequisites):	
CEM 151 Construction Fundamentals: Principles and Practices.....	3
CEM 155 Blueprint Reading.....	3
DM 2 Digital Publishing I	4
DM 4 Digital Graphics	3
ETECH 40 3D Animation	3
ETECH 130 Introduction to Creo and Solidworks	3
ETECH 131 Intermediate Creo and Solidworks.....	3
Total Units	15-16

Civil/Survey Drafting Skills Certificate

Learning Outcomes

1. Demonstrate mastery of a civil/survey knowledge “base equivalent” to obtaining an ADDA Civil certification from American Design Drafting Association. (Global Awareness, Critical Thinking)
2. Design and draft a civil/survey plan set. (Global Awareness, Professional Development)
3. Troubleshoot and solve design flaws on civil/survey plan sets. (Critical Thinking)

Required Courses	Units
ENGR 1A *Surveying	4
ETECH 24 Introduction to AutoCAD	3
Total Units	7

*Requires Trigonometry as a prerequisite (Fall only)

Computer Aided Drafting and Design Skills Certificate

Learning Outcomes

1. Demonstrate mastery of a Computer Aided Drafting and Design knowledge “base equivalent” to obtaining CADD, ADDA certification from American Design Drafting Association. (Global Awareness, Critical Thinking)
2. CAD draft a complete plan set. (Global Awareness, Professional Development)
3. Troubleshoot and solve design flaws on a plan set. (Critical Thinking)

Required Courses	Units
ETECH 24 Introduction to AutoCAD	3
ETECH 41 Advanced AutoCAD.....	3
ETECH 75 BIM and Sustainable Design Strategies I.....	3
ETECH 130 Introduction to Creo and Solidworks	3
If desired, one required Computer Aided Drafting and Design course may be replaced with one of the following (listed courses may require the completion of prerequisites):	
DM 2 Digital Publishing I	4
DM 4 Digital Graphics	3
ETECH 40 3D Animation	3
ETECH 131 Intermediate Creo and Solidworks.....	3
Total Units	12-13

Computer Animation Skills Certificate

Learning Outcomes

1. Demonstrate mastery of an animation knowledge “base equivalent” to obtaining Maya certification from Autodesk Corp. (Global Awareness, Critical Thinking)
2. Animate a short photorealistic scene. (Global Awareness, Professional Development)
3. Troubleshoot and solve design flaws on an animation. (Critical Thinking)

Required Courses	Units
ETECH 24 Introduction to AutoCAD	3
ETECH 40 3D Animation	3
ETECH 43 Intermediate 3D Animation	3
ETECH 130 Introduction to Creo and Solidworks	3
If desired, one required Computer Animation course may be replaced with one of the following (listed courses may require the completion of prerequisites):	
DM 2 Digital Publishing I	4
DM 4 Digital Graphics	3
DM 6 Digital Publishing II	3
ETECH 75 BIM and Sustainable Design Strategies I.....	3
Total Units	12-13

Manufacturing Specialist Skills Certificate

Learning Outcomes

1. Demonstrate mastery of a manufacturing knowledge “base equivalent” to passing an industry level certification such as Cypress Semicon Professional Institute Certification. (Global Awareness, Critical Thinking)

- Analyze existing electrical circuits and mechanical systems and identify weaknesses in their configurations. (Critical Thinking, Global Awareness)
- Build simple electrical circuits and mechanical systems based upon industry protocols and standards. (Critical Thinking, Professional Development)

Required Courses		Units
PHYS 10	Introduction to Physics.....	3
PHYS 10L	Introduction to Physics Lab.....	1
COMM 6	Listening.....	1
CHEM 3	*Introductory Inorganic Chemistry.....	3
CHEM 3L	Introductory Inorganic Chemistry Laboratory....	1
ETECH 24	Introduction to AutoCAD.....	3

Total Units **12**

*CHEM 3 has a prerequisite of MATH 152 (Intermediate Algebra)

Technology and Trades Skills Certificate

Learning Outcomes

- Demonstrate mastery of a tradesperson’s knowledge “base equivalent” to passing an industry-level certification such as Certificate I in Engineering- Fabrication Trade. (Global Awareness, Critical Thinking)
- Draft and build a simple wood or metal fabrication based upon industry protocols and standards. (Critical Thinking, Professional Development)
- Analyze existing mechanical systems and identify weaknesses in their constructions. (Critical Thinking, Global Awareness)

Required Courses		Units
CEM 178A	Residential Construction Skills 1: “Front End”.....	3
CG 54	*Career Planning.....	1 - 3
CS 1L	Technology Tools.....	2
ENGR 5	Engineering as a Profession.....	2
ETECH 24	Introduction to AutoCAD.....	3
W 150	**Arc Welding.....	2

If desired, one required Technology and Trades course may be replaced with one of the following (listed courses may require the completion of prerequisites):

		Units
ETECH 40	3D Animation.....	3
ETECH 41	Advanced AutoCAD.....	3
ETECH 60	Architecture/Green Design: Principles and Practices.....	3
ETECH 61	Architecture/Green Design: Planning and Construction.....	3
ETECH 62	Architecture/Green Design: Implementation using AutoCAD.....	3
ETECH 130	Introduction to Creo and Solidworks.....	3
W 151	TIG Welding.....	2

Total Units **13 - 15**

*We recommend the online section to avoid scheduling difficulties with other Technology and Trades courses.

**We recommend that students complete high school algebra or MATH 154 prior to enrolling in this course.

Engineering Technology Courses

ETECH 24 Introduction to AutoCAD

3 units; 2 hours Lecture, 4 hours Laboratory

Recommended Preparation: CABT 106.

Repeatability: May be taken a total of 1 time.

Introduces the fundamental operating principles of AutoCAD drafting/design software. Uses AutoCAD for Windows to create and revise two-dimensional drawings. This is a foundation course that can lead to advanced study in a variety of drafting and design field. Some of the class hours for this course may be scheduled as To Be Arranged (TBA). See the *Schedule of Classes* for the details about this course offering.

Transfer Credit: Transfers to CSU; UC.

ETECH 31 Introduction to Electronic Circuit and Schematic Design

3 units; 2 hours Lecture, 4 hours Laboratory

Prerequisite: ETECH 24 or equivalent skills.

Recommended Preparation: CABT 106.

Repeatability: May be taken a total of 1 time.

Presents the use of computer aided drafting software for the design of electronic diagrams, including schematics, wiring diagrams, block diagrams, and printed circuit fabrication drawings. Includes instruction on symbol creation, symbol library maintenance, and hands-on basic electronics. Some of the class hours for this course may be scheduled as To Be Arranged (TBA). See the *Schedule of Classes* for the details about this course offering.

Transfer Credit: Transfers to CSU.

ETECH 40 3D Animation

3 units; 2 hours Lecture, 4 hours Laboratory

Repeatability: May be taken a total of 1 time.

Introduces theories and techniques of 3D computer animation. Includes an introduction to 3D model construction, animation, rigging, simulation, motion capture, and rendering. Some of the class hours for this course may be scheduled as To Be Arranged (TBA). See the *Schedule of Classes* for the details about this course offering.

Transfer Credit: Transfers to CSU; UC, pending review.

ETECH 41 Advanced AutoCAD

3 units; 2 hours Lecture, 4 hours Laboratory

Prerequisite: ETECH 24 or equivalent skills.

Repeatability: May be taken a total of 1 time.

Presents a second level AutoCAD and first level mechanical drafting course. Includes an introduction to the computer aided design of mechanical drawings, detailing the fabrication of mechanical parts, technical sketching, multi-view orthographics, section views, auxiliary views, 3D modeling, dimensioning, and an introduction to computer aided manufacturing. Some of the class hours for this course may be scheduled as To Be Arranged (TBA). See the *Schedule of Classes* for the details about this course offering.

Transfer Credit: Transfers to CSU.

ETECH 43 Intermediate 3D Animation

3 units; 2 hours Lecture, 4 hours Laboratory

Prerequisite: ETECH 40.

Repeatability: May be taken a total of 1 time.

Presents a second-level course in the use of 3D animation software to create animation using 3D computer models. Includes advanced 3D model construction, rendering, and animation using camera, target, and object motion. Some of the class hours for this course may be scheduled as To Be Arranged (TBA). See the Schedule of Classes for the details about this course offering.

Transfer Credit: Transfers to CSU; UC pending review.

ETECH 60 Architecture/Green Design: Principles and Practices

3 units; 3 hours Lecture

Repeatability: May be taken a total of 1 time.

Provides an overview of the field of architectural drafting and green design for those interested in pursuing this occupational area of study. Includes an introduction to the professional fields of architecture, engineering, city planning, and landscape architecture. The language of architecture and the historical development of green construction principles will also be emphasized.

Transfer Credit: Transfers to CSU; UC.

ETECH 61 Architecture/Green Design: Planning and Construction

3 units; 2.5 hours Lecture, 1.5 hours Laboratory

Repeatability: May be taken a total of 1 time.

Presents an introduction to green architectural drafting/design with an emphasis on drafting construction details, and the application of green construction processes/materials. AutoCAD computer aided drafting software will be introduced as a means of creating simple design projects.

Transfer Credit: Transfers to CSU.

ETECH 62 Architecture/Green Design: Implementation using AutoCAD

3 units; 2 hours Lecture, 4 hours Laboratory

Prerequisite: ETECH 24 or equivalent skills.

Repeatability: May be taken a total of 1 time.

Covers intermediate topics in AutoCAD-based green architectural drafting techniques/practices, including wood construction methods/processes, preparation of construction documents, site plans, floor plans, sections, elevations, and specific tions. Some of the class hours for this course may be scheduled as To Be Arranged (TBA). See the *Schedule of Classes* for the details about this course offering.

Transfer Credit: Transfers to CSU.

ETECH 75 BIM and Sustainable Design Strategies I

3 units; 2 hours Lecture, 4 hours Laboratory

Recommended Preparation: CABT 106 or equivalent skills.

Repeatability: May be taken a total of 1 time.

Introduces multiple industry standard Building Information Modeling (BIM) software programs found in the architecture profession. Focuses on the basic concepts and tools needed to create a 3D virtual architectural model. Also introduces a variety of output capabilities including energy analysis software. Some of the class hours for this course may be scheduled as To Be Arranged (TBA). See the *Schedule of Classes* for the details about this course offering. May be offered in a Distance-Learning Format.

Transfer Credit: Transfers to CSU.

ETECH 130 Introduction to Creo and Solidworks

3 units; 2 hours Lecture, 4 hours Laboratory

Repeatability: May be taken a total of 1 time.

Covers an introduction to the fundamental operating principles of Creo and Solidworks software applications. Uses Creo and Solidworks for Windows to create and revise drawings. This is a foundation course that can lead to advanced study in a variety of drafting and design field . Some of the class hours for this course may be scheduled as To Be Arranged (TBA). See the *Schedule of Classes* for the details about this course offering.

Transfer Credit: Non-transferable.

ETECH 131 Intermediate Creo and Solidworks

3 units; 2 hours Lecture, 4 hours Laboratory

Prerequisite: ETECH 130.

Repeatability: May be taken a total of 1 time.

Covers intermediate-level operating principles of Creo and Solidworks software applications. Uses Creo and Solidworks for Windows to create and revise drawings. The second of a two part Creo and Solidworks course series. Some of the class hours for this course may be scheduled as To Be Arranged (TBA). See the *Schedule of Classes* for the details about this course offering.

Transfer Credit: Non-transferable.

ETECH 190A-Z Special Topics in Engineering Technology

0.5 – 3 units; 0.5 - 3 hours Lecture

Repeatability: May be taken a total of 1 time.

Selected topics in Engineering Technology not covered by regular catalog offerings. Each special topic course will be announced, described, and given its own title and letter designation in the *Schedule of Classes*. The structure and format of the classes will vary depending on the subject matter.

Transfer Credit: Non-transferable.