

Engineering Design Technology

Overview

The Engineering Design Technology Department teaches courses in (1) building architectural, mechanical, electrical, plumbing and piping design and drafting for residential and commercial buildings and (2) CAD programs such as AutoCAD, REVIT, and CREO (Pro/E) software for work in any industry which utilizes CAD.

After completing the EDT Program, students can (1) work as designers and drafters in the fields of Architecture and Engineering with a two-year degree or (2) enhance their skills and knowledge of building design prior to transfer to a four-year institution to continue work toward an architectural or engineering degree (3) work in any industry where Computer-Aided Drafting (CAD) is used.

Career Options

This degree and certificate program is designed for students pursuing employment or upgrade in employment in the fields of building design utilizing Manual and CAD drafting applications in architectural, engineering, or construction related offices. This program is designed for students pursuing entry level employment in Architecture, Electrical and Mechanical Engineering, and commercial construction drafting fields. Depending on their technical field of interest and capabilities, students who complete the program may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer Trainee, Electrical Drafter/Designer Trainee, Structural Drafter/Designer Trainer, Topographical Drafter/Designer Trainee, General Construction Drafter/Designer Trainee, General Construction Estimator Trainee, Computer Aided Drafter, or Technical Sales representatives. Some students may also pursue four-year degrees in Architecture, Engineering, Construction, or Project Management.

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Associate Degrees

A.S. in Architectural/Structural Design

This degree is designed for students pursuing employment or upgrade in employment in the fields of building Architectural design utilizing CAD design and drafting applications in architectural, engineering, manufacturing, or construction related offices.

Some students may also pursue four-year degrees in Architecture, Engineering, Manufacturing, Construction, or Project Management.

Engineering Design Technology is studied in lecture and drafting practice classes. Mathematics, science, and engineering fundamentals, which are all related to the content of this program, are studied in the Engineering Design Technology program or through recommended elective courses.

Program Costs: Normal student expenses for textbooks, personal equipment, and supplies are required. These expenses may vary each semester. If these expenses create a financial burden, students should consult the Financial Aid Office for possible assistance.

Recommended High School Preparation: Completion of English and general mathematics. It is desirable, but not required, that a student complete courses in drafting, industrial arts shop courses, one year of algebra, plane geometry, general science, and introduction to computers.

The program is open to all students. For information call (916) 650-2758 or (916) 558-2491.

Catalog Date: June 1, 2020

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
EDT 310	Technical Graphics With CAD I	3
EDT 312	Technical Graphics With CAD II	3
EDT 316	REVIT-Architectural	3
EDT 317	REVIT-MEP	3
EDT 318	Beginning 3D Modeling-CREO	3
EDT 320	Architectural/Structural Drafting	4
A minimum of 6 units from the following:		6
EDT 332	Building Mechanical Design Documents (3)	
EDT 336	Building Mechanical Systems Design (3)	
EDT 340	Plumbing and Piping Systems Design I (3)	
EDT 342	Plumbing and Piping Systems Design II (3)	
EDT 352	Building Electrical Design Documents (3)	
EDT 356	Building Electrical Systems Design (3)	
EDT 498	Work Experience in Engineering Design Technology (1 - 4)	
MATH 335	Trigonometry with College Algebra (5)	

COURSE CODE	COURSE TITLE	UNITS
SURVY 300	Elementary Surveying (4)	
SURVY 310	Survey Map Production (4)	
Total Units:		25

The Architectural/Structural Design 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 SCC graduation requirements.

Student Learning Outcomes

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

- prepare architectural plans for buildings using CAD software that conform with current industry standards.
- demonstrate the process of architectural design by applying design principles to building design projects.
- demonstrate application of CAD software programs used by industry in the design process.
- demonstrate proficiency in CAD software programs (AutoCAD, REVIT, and CREO) by preparing 3D computer engineering and architectural models.

Career Information

Depending on their technical field of interest and capabilities, students who complete the program may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer, Electrical Drafter/Designer, Structural Drafter/Designer, Topographical Drafter/Designer, General Construction Drafter/Designer, General Construction Estimator, Computer Aided Drafter, or Technical Sales representatives. Some students may also pursue four-year degrees in Architecture, Engineering, Manufacturing, Construction, or Project Management.

A.S. in Electric (Power-Lighting Systems)

This degree is designed for students pursuing employment or upgrade in employment in the fields of (1) building Electrical power and lighting systems design or (2) mechanical component design utilizing 2D and 3D CAD design and drafting software applications in architectural, engineering, manufacturing, or construction related offices.

Some students may also pursue four-year degrees in Architecture, Engineering, Manufacturing, Construction, or Project Management.

Engineering Design Technology is studied in lecture and drafting practice classes. Mathematics, science, and engineering fundamentals, which are all related to the content of this program, are studied in the Engineering Design Technology program or through recommended elective courses. General Education courses complete the recommended classes for the Engineering Design Technology curriculum.

Program Costs: Normal student expenses for textbooks, personal equipment, and supplies are required. These expenses may vary each semester. If these expenses create a financial burden, students should consult the Financial Aid Office for possible assistance.

Recommended High School Preparation: Completion of English and general mathematics. It is desirable, but not required, that a student complete courses in drafting, industrial arts shop courses, one year of algebra, plane geometry, general science, and introduction to computers.

The program is open to all students. For information call (916) 650-2758 or (916) 558-2491.

Catalog Date: June 1, 2020

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
EDT 310	Technical Graphics With CAD I	3
EDT 312	Technical Graphics With CAD II	3
EDT 316	REVIT-Architectural	3
EDT 317	REVIT-MEP	3
EDT 318	Beginning 3D Modeling-CREO	3
EDT 352	Building Electrical Design Documents	3
EDT 356	Building Electrical Systems Design	3
A minimum of 6 units from the following:		6
EDT 320	Architectural/Structural Drafting (4)	
EDT 332	Building Mechanical Design Documents (3)	
EDT 336	Building Mechanical Systems Design (3)	
EDT 340	Plumbing and Piping Systems Design I (3)	
EDT 342	Plumbing and Piping Systems Design II (3)	
EDT 498	Work Experience in Engineering Design Technology (1 - 4)	
MATH 335	Trigonometry with College Algebra (5)	
SURVY 300	Elementary Surveying (4)	
SURVY 310	Survey Map Production (4)	
Total Units:		27

The Electric (Power-Lighting Systems) 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 SCC graduation requirements.

Student Learning Outcomes

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

- perform design calculations and prepare electrical plans for building electrical systems that conform with current industry and ANSI standards.
- demonstrate the process of electrical design by applying design principles to building design projects.
- demonstrate proficiency in CAD software programs (AutoCAD, REVIT and CREO) by preparing 3D computer engineering and architectural models.
- demonstrate the processes of rapid prototyping of components represented by 3D computer engineering and architectural models.

Career Information

This program is designed for students pursuing entry level employment in architectural, electrical, and mechanical engineering, and commercial construction drafting fields. Some students may also pursue four-year degrees in Architecture, Engineering, Construction, or Project Management. Depending on their technical field of interest and capabilities, students who complete the program may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer Trainee, Electrical Drafter/Designer Trainee, Structural Drafter/Designer Trainer, Topographical Drafter/Designer Trainee, General Construction Drafter/Designer Trainee, General Construction Estimator Trainee, Computer Aided Drafter, or Technical Sales representatives.

A.S. in Engineering Design Technology

This degree is designed for students pursuing employment or upgrade in employment in the fields of component design or building design utilizing CAD drafting applications in architectural, engineering, manufacturing, or construction related offices.

Some students may also pursue four-year degrees in Architecture, Engineering, Construction, or Project Management.

Engineering Design Technology is studied in lecture and drafting practice classes. Mathematics, science, and engineering fundamentals, which are all related to the content of this program, are studied in the Engineering Design Technology program or through recommended elective courses. General Education courses complete the recommended classes for the Engineering Design Technology curriculum.

Program Costs: Normal student expenses for textbooks, personal equipment, and supplies are required. These expenses may vary each semester. If these expenses create a financial burden, students should consult the Financial Aid Office for possible assistance.

Recommended High School Preparation: Completion of English and general mathematics. It is desirable, but not required, that a student complete courses in drafting, industrial arts shop courses, one year of algebra, plane geometry, general science, and introduction to computers.

The program is open to all students. For information call (916) 650-2758 or 558-2491.

Transfer Students: Students who, after completing this program, are planning to continue specialization in this field by transferring to a four-year college, should consult the Requirements of Transfer Institutions section in this catalog and the engineering or related major sections of the specific catalog for the institution to which they wish to transfer. Consultation with an SCC counselor is advised.

Catalog Date: June 1, 2020

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
EDT 310	Technical Graphics With CAD I	3
EDT 312	Technical Graphics With CAD II	3
EDT 316	REVIT-Architectural	3
EDT 317	REVIT-MEP	3
EDT 318	Beginning 3D Modeling-CREO	3
EDT 320	Architectural/Structural Drafting	4
EDT 332	Building Mechanical Design Documents	3
EDT 336	Building Mechanical Systems Design	3
EDT 340	Plumbing and Piping Systems Design I	3
EDT 342	Plumbing and Piping Systems Design II	3
EDT 352	Building Electrical Design Documents	3
EDT 356	Building Electrical Systems Design	3
Total Units:		37

The Engineering Design 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 SCC graduation requirements.

Student Learning Outcomes

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

- prepare architectural, mechanical, and electrical plans for buildings that conform with current industry and ANSI standards.
- demonstrate the processes of building architectural, mechanical, and electrical design by applying design principles to building design projects.
- demonstrate proficiency in CAD software programs (AutoCAD, REVIT, and CREO) by preparing 3D computer engineering and architectural models.
- demonstrate the processes of rapid prototyping of components represented by 3D computer engineering and architectural models.

Career Information

This program is designed for students pursuing entry level employment in Architecture, Electrical and Mechanical Engineering, and commercial construction drafting fields. Depending on their technical field of interest and capabilities, students who complete the program may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer Trainee, Electrical Drafter/Designer Trainee, Structural Drafter/Designer Trainer, Topographical Drafter/Designer Trainee, General Construction Drafter/Designer Trainee, General Construction Estimator Trainee, Computer Aided Drafter, or Technical Sales representatives. Some students may also pursue four-year degrees in Architecture, Engineering, Construction, or Project Management.

A.S. in Mechanical (HVAC/Piping/Plumbing Systems)

This degree is designed for students pursuing employment or upgrade in employment in the fields of (1) building Mechanical design (Heating, Ventilation, and Air Conditioning HVAC, Plumbing and Piping or (2) mechanical component design utilizing 2D and 3D CAD design and drafting software applications in architectural, engineering, manufacturing, or construction related offices.

Some students may also pursue four-year degrees in Architecture, Engineering, Manufacturing, Construction, or Project Management.

Engineering Design Technology is studied in lecture and drafting practice classes. Mathematics, science, and engineering fundamentals, which are all related to the content of this program, are studied in the Engineering Design Technology program or through recommended elective courses. General Education courses complete the recommended classes for the Engineering Design Technology curriculum.

Program Costs: Normal student expenses for textbooks, personal equipment and supplies are required. These expenses may vary each semester. If these expenses create a financial burden, students should consult the Financial Aid Office for possible assistance.

Recommended High School Preparation: Completion of English and general mathematics. It is desirable, but not required, that a student complete courses in drafting, industrial arts shop courses, one year of algebra, plane geometry, general science, and introduction to computers.

The program is open to all students. For information call (916) 650-2758 or (916) 558-2491.

Catalog Date: June 1, 2020

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
EDT 310	Technical Graphics With CAD I	3
EDT 312	Technical Graphics With CAD II	3
EDT 316	REVIT-Architectural	3
EDT 317	REVIT-MEP	3
EDT 318	Beginning 3D Modeling-CREO	3
EDT 332	Building Mechanical Design Documents	3
EDT 336	Building Mechanical Systems Design	3
EDT 340	Plumbing and Piping Systems Design I	3
EDT 342	Plumbing and Piping Systems Design II	3
A minimum of 5 units from the following:		5
EDT 320	Architectural/Structural Drafting (4)	
EDT 352	Building Electrical Design Documents (3)	
EDT 356	Building Electrical Systems Design (3)	
EDT 498	Work Experience in Engineering Design Technology (1 - 4)	
MATH 335	Trigonometry with College Algebra (5)	
SURVY 300	Elementary Surveying (4)	
SURVY 310	Survey Map Production (4)	
Total Units:		32

The Mechanical (HVAC/Piping/Plumbing Systems) 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 SCC graduation requirements.

Student Learning Outcomes

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

- perform design calculations and prepare mechanical and plumbing plans for building mechanical and plumbing systems that conform with current industry and ANSI standards.
- demonstrate the processes of mechanical and plumbing design by applying design principles to building design projects.
- demonstrate proficiency in CAD software programs (AutoCAD, REVIT, and CREO) by preparing 3D computer engineering and architectural models.
- demonstrate the processes of rapid prototyping of components represented by 3D computer engineering and architectural models.

Career Information

This program is designed for students pursuing entry level employment in architecture, electrical and mechanical engineering, and commercial construction fields. Depending on their technical field of interest and capabilities, students who complete the program may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer Trainee, Electrical Drafter/Designer Trainee, Structural Drafter/Designer Trainer, Topographical Drafter/Designer Trainee, General Construction Drafter/Designer Trainee, General Construction Estimator Trainee, Computer Aided Drafter, or Technical Sales representatives. Some students may also pursue four-year degrees in Architecture, Engineering, Construction or Project Management.

A.S. in Surveying/Geomatics

The curriculum provides the student with instruction in survey theory and fundamentals of office and field practice. The objective is to prepare students for employment as described above. Material is sufficient, when coupled with the legally required experience, to prepare the student for the State licensing examinations conducted by The Board of Registration for Professional Engineers. There are numerous specialties in survey employment, and early counseling is suggested to help select the proper optional classes.

Recommended High School Preparation: Courses in algebra, trigonometry, physics, and geography.

Catalog Date: June 1, 2020

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
SURVY 300	Elementary Surveying	4
SURVY 320	Advanced Survey	4
SURVY 330	Special Surveying Projects	4
SURVY 340	Basics of Photogrammetry	3
SURVY 350	Boundary Control and Legal Principles	4
SURVY 352	Evidence and Procedures for Boundary Location	4
A minimum of 3 units from the following:		3
SURVY 310	Survey Map Production (4)	
SURVY 360	Survey Business Practices (3)	
Total Units:		26

The Surveying/Geomatics 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 SCC graduation requirements.

Student Learning Outcomes

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

- operate all surveying measurement instruments commonly in use within the profession.
- demonstrate a knowledge of the techniques and methodology of surveying measurement.
- select appropriate survey measuring instruments to accurately complete a variety of surveying projects.
- list specific requirements of local agencies for approval and filing of survey maps such as, record of surveys, parcel maps, subdivision maps, preliminary and final maps, and also improvement plans.
- demonstrate an understanding of boundary surveying and photogrammetric surveys, theory of geodetic and control surveys, Global Positioning Systems, Geographic Information System and electronic surveys.
- demonstrate knowledge of statutory and common law regulating the surveying industry.
- discuss various types of land ownership and classify effects and intent of various land transfers and transactions.
- prepare and interpret different forms of legal descriptions of land ownership and transfer.

Career Information

Students may find employment in field jobs as surveyor assistants to do specific jobs as rod, chain, level, and instrument person and notekeeper. In office jobs, students may do survey computations, draw maps of property lines, topographic maps and profiles of construction sites, and compute acreage. Employers are private survey and engineering firms and government agencies throughout the United States. Job titles are Boundary, Technicians, Survey Technicians, Engineering Technicians, Engineering Aide, and Survey Aide.

Certificates of Achievement

Architectural/Structural Design Certificate

This Certificate of Achievement is designed for students pursuing employment or upgrade in employment in the fields of building Architectural design utilizing CAD design and drafting applications in architectural, engineering, manufacturing, or construction related offices.

Engineering Design Technology is studied in lecture and drafting practice classes. Mathematics, science, and engineering fundamentals, which are all related to the content of this program, are studied in the Engineering Design Technology program or through recommended elective courses.

Program Costs: Normal student expenses for textbooks, personal equipment, and supplies are required. These expenses may vary each semester. If these expenses create a financial burden, students should consult the Financial Aid Office for possible assistance.

Recommended High School Preparation: Completion of English and general mathematics. It is desirable, but not required, that a student complete courses in drafting, industrial arts shop courses, one year of algebra, plane geometry, general science, and introduction to computers.

The program is open to all students. For information call (916) 650-2758 or (916) 558-2491.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
EDT 310	Technical Graphics With CAD I	3
EDT 312	Technical Graphics With CAD II	3
EDT 316	REVIT-Architectural	3
EDT 317	REVIT-MEP	3
EDT 318	Beginning 3D Modeling-CREO	3
EDT 320	Architectural/Structural Drafting	4
A minimum of 6 units from the following:		6
EDT 332	Building Mechanical Design Documents (3)	
EDT 336	Building Mechanical Systems Design (3)	
EDT 340	Plumbing and Piping Systems Design I (3)	
EDT 342	Plumbing and Piping Systems Design II (3)	

COURSE CODE	COURSE TITLE	UNITS
EDT 352	Building Electrical Design Documents (3)	
EDT 356	Building Electrical Systems Design (3)	
EDT 498	Work Experience in Engineering Design Technology (1 - 4)	
MATH 335	Trigonometry with College Algebra (5)	
SURVY 300	Elementary Surveying (4)	
SURVY 310	Survey Map Production (4)	
Total Units:		25

Student Learning Outcomes

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

- prepare architectural plans for buildings using CAD software that conform with current industry standards.
- demonstrate the process of architectural design by applying design principles to building design projects.
- demonstrate application of CAD software programs used by industry in the design process.
- demonstrate proficiency in CAD software programs (AutoCAD, REVIT, and CREO) by preparing 3D computer engineering and architectural models.

Career Information

This program is designed for students pursuing entry level employment in architectural, electrical and mechanical engineering, and commercial construction drafting fields. Depending on their technical field of interest and capabilities, students who complete the program may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer Trainee, Electrical Drafter/Designer Trainee, Structural Drafter/Designer Trainee, Topographical Drafter/Designer Trainee, General Construction Drafter/Designer Trainee, General Construction Estimator Trainee, Computer Aided Drafter, or Technical Sales representatives.

CAD Technology Certificate

This certificate is designed for students pursuing employment or upgrade in employment in fields that utilize CAD software to perform design, modeling, and drafting, including but not limited to: architecture, engineering, manufacturing, research and construction.

Program Costs: Normal student expenses for textbooks, personal equipment, and supplies are required. These expenses may vary each semester. If these expenses create a financial burden, students should consult the Financial Aid Office for possible assistance.

Recommended High School Preparation: Completion of English and general mathematics. It is desirable, but not required, that a student complete courses in drafting, industrial arts, one year of algebra, plane geometry, general science, and introduction to computers.

The program is open to all students. For information call (916) 650-2758 or (916) 558-2491.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
EDT 310	Technical Graphics With CAD I	3
EDT 312	Technical Graphics With CAD II	3
EDT 315	Beginning 3D Modeling-SolidWorks	3
EDT 316	REVIT-Architectural	3
EDT 317	REVIT-MEP	3
EDT 318	Beginning 3D Modeling-CREO	3
EDT 319	Advanced 3D Modeling/Rapid Prototyping	3
Total Units:		21

Student Learning Outcomes

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

- use CAD and modeling software to the fields of architecture and engineering design, modeling, manufacturing, and construction.
- utilize CAD and modeling software to prepare computer models and design drawings of architectural and engineering related projects.

Career Information

This certificate is designed for students pursuing entry-level employment or upgrade in employment in fields that utilize CAD software to perform design, modeling and drafting, including but not limited to: Architecture, Engineering, Manufacturing, Research, and Construction. Depending on their technical field of interest and capabilities, students who complete the certificate may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer Trainee, Electrical Drafter/Designer Trainee, Structural Drafter/Designer Trainee, Topographical Drafter/Designer Trainee, General Construction Drafter/Designer Trainee, General Construction Estimator Trainee, Computer Aided Drafter, or Technical Sales representatives.

Electric (Power-Lighting Systems) Certificate

This Certificate of Achievement is designed for students pursuing employment or upgrade in employment in the fields of (1) building Electrical power and lighting systems design or (2) mechanical component

design utilizing 2D and 3D CAD design and drafting software applications in architectural, engineering, manufacturing, or construction related offices.

Engineering Design Technology is studied in lecture and drafting practice classes. Mathematics, science, and engineering fundamentals, which are all related to the content of this program, are studied in the Engineering Design Technology program or through recommended elective courses.

Program Costs: Normal student expenses for textbooks, personal equipment, and supplies are required. These expenses may vary each semester. If these expenses create a financial burden, students should consult the Financial Aid Office for possible assistance.

Recommended High School Preparation: Completion of English and general mathematics. It is desirable, but not required, that a student complete courses in drafting, industrial arts shop courses, one year of algebra, plane geometry, general science, and introduction to computers.

The program is open to all students. For information call (916) 650-2758 or (916) 558-2491.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
EDT 310	Technical Graphics With CAD I	3
EDT 312	Technical Graphics With CAD II	3
EDT 316	REVIT-Architectural	3
EDT 317	REVIT-MEP	3
EDT 318	Beginning 3D Modeling-CREO	3
EDT 352	Building Electrical Design Documents	3
EDT 356	Building Electrical Systems Design	3
A minimum of 6 units from the following:		6
EDT 320	Architectural/Structural Drafting (4)	
EDT 332	Building Mechanical Design Documents (3)	
EDT 336	Building Mechanical Systems Design (3)	
EDT 340	Plumbing and Piping Systems Design I (3)	
EDT 342	Plumbing and Piping Systems Design II (3)	
EDT 498	Work Experience in Engineering Design Technology (1 - 4)	
MATH 335	Trigonometry with College Algebra (5)	
SURVY 300	Elementary Surveying (4)	
SURVY 310	Survey Map Production (4)	
Total Units:		27

Student Learning Outcomes

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

- perform design calculations and prepare electrical plans for building electrical systems that conform with current industry and ANSI standards.
- demonstrate the process of building electrical design by applying design principles to building design projects.
- demonstrate proficiency in CAD software programs (AutoCAD, REVIT and CREO) by preparing 3D computer engineering and architectural models.
- demonstrate the processes of rapid prototyping of components represented by 3D computer engineering and architectural models.

Career Information

This program is designed for students pursuing entry level employment in architectural, electrical and mechanical engineering, manufacturing, or commercial construction fields. Depending on their technical field of interest and capabilities, students who complete the program may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer Trainee, Electrical Drafter/Designer Trainee, Structural Drafter/Designer Trainer, Topographical Drafter/Designer Trainee, General Construction Drafter/Designer Trainee, General Construction Estimator Trainee, Computer Aided Drafter, or Technical Sales representatives.

Engineering Design Technology Certificate

This Certificate of Achievement is designed for students pursuing employment or upgrade in employment in the fields of building design utilizing CAD drafting applications in architectural, engineering, manufacturing, or construction related offices.

Engineering Design Technology is studied in lecture and computer-aided drafting practice classes. Mathematics, science, and engineering fundamentals, which are all related to the content of this program, are studied in the Engineering Design Technology program or through recommended elective courses. General Education courses complete the recommended classes for the Engineering Design Technology curriculum.

Program Costs: Normal student expenses for textbooks, personal equipment, and supplies are required. These expenses may vary each semester. If these expenses create a financial burden, students should consult the Financial Aid Office for possible assistance.

Recommended High School Preparation: Completion of English and general mathematics. It is desirable, but not required, that a student complete courses in drafting, industrial arts shop courses, one year of algebra, plane geometry, general science, and introduction to computers.

The program is open to all students. For information call (916) 650-2758 or (916) 558-2491.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
EDT 310	Technical Graphics With CAD I	3
EDT 312	Technical Graphics With CAD II	3
EDT 316	REVIT-Architectural	3
EDT 317	REVIT-MEP	3
EDT 318	Beginning 3D Modeling-CREO	3
EDT 320	Architectural/Structural Drafting	4
EDT 332	Building Mechanical Design Documents	3
EDT 336	Building Mechanical Systems Design	3
EDT 340	Plumbing and Piping Systems Design I	3
EDT 342	Plumbing and Piping Systems Design II	3
EDT 352	Building Electrical Design Documents	3
EDT 356	Building Electrical Systems Design	3
Total Units:		37

Student Learning Outcomes

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

- prepare architectural, mechanical, and electrical plans for buildings that conform with current industry and ANSI standards.
- demonstrate the process of building architectural, mechanical, and electrical design by applying design principles to building design projects.
- demonstrate proficiency in CAD software programs (AutoCAD, REVIT and CREO) by preparing 3D computer engineering and architectural models.
- explain the processes of rapid prototyping of components represented by 3D computer engineering and architectural models.

Career Information

This program is designed for students pursuing entry level employment in architectural, electrical, mechanical, and commercial construction drafting and design fields. Depending on their technical field of interest and capabilities, students who complete the program may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer Trainee, Electrical Drafter/Designer Trainee, Structural Drafter/Designer Trainer, Topographical Drafter/Designer Trainee, General Construction Drafter/Designer Trainee, General Construction Estimator Trainee, Computer Aided Drafter, or Technical Sales representatives.

Mechanical (HVAC/Piping/Plumbing Systems) Certificate

This Certificate of Achievement is designed for students pursuing employment or upgrade in employment in the fields of (1) building Mechanical design (Heating, Ventilation, and Air Conditioning HVAC, Plumbing and Piping or (2) mechanical component design utilizing 2D and 3D CAD design and drafting software applications in architectural, engineering, manufacturing, or construction related offices.

Engineering Design Technology is studied in lecture and drafting practice classes. Mathematics, science, and engineering fundamentals, which are all related to the content of this program, are studied in the Engineering Design Technology program or through recommended elective courses. General Education courses complete the recommended classes for the Engineering Design Technology curriculum.

Program Costs: Normal student expenses for textbooks, personal equipment, and supplies are required. These expenses may vary each semester. If these expenses create a financial burden, students should consult the Financial Aid Office for possible assistance.

Recommended High School Preparation: Completion of English and general mathematics. It is desirable, but not required, that a student complete courses in drafting, industrial arts shop courses, one year of algebra, plane geometry, general science, and introduction to computers.

The program is open to all students. For information call (916) 650-2758 or (916) 558-2491.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
EDT 310	Technical Graphics With CAD I	3
EDT 312	Technical Graphics With CAD II	3
EDT 316	REVIT-Architectural	3
EDT 317	REVIT-MEP	3
EDT 318	Beginning 3D Modeling-CREO	3
EDT 332	Building Mechanical Design Documents	3
EDT 336	Building Mechanical Systems Design	3
EDT 340	Plumbing and Piping Systems Design I	3
EDT 342	Plumbing and Piping Systems Design II	3
A minimum of 5 units from the following:		5
EDT 320	Architectural/Structural Drafting (4)	
EDT 352	Building Electrical Design Documents (3)	
EDT 356	Building Electrical Systems Design (3)	
EDT 498	Work Experience in Engineering Design Technology (1 - 4)	
MATH 335	Trigonometry with College Algebra (5)	
SURVY 300	Elementary Surveying (4)	
SURVY 310	Survey Map Production (4)	
Total Units:		32

Student Learning Outcomes

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

- perform design calculations and prepare mechanical and plumbing plans for building mechanical and plumbing systems that conform with current industry and ANSI standards.
- demonstrate the processes of mechanical and plumbing design by applying design principles to building design projects.
- demonstrate proficiency in CAD software programs (AutoCAD, REVIT, and CREO) by preparing 3D computer engineering and architectural models.
- demonstrate the processes of rapid prototyping of components represented by 3D computer engineering and architectural models.

Career Information

This program is designed for students pursuing entry level employment in Architecture, Electrical and Mechanical Engineering, Manufacturing, and commercial construction fields. Depending on their technical field of interest and capabilities, students who complete the program may find employment in any of the following types of jobs: Engineering Aide I, Engineering Aide II, Drafting Aide I, Drafting Aide II, Junior Drafter, Architectural Drafter, Mechanical Drafter/Designer Trainee, Electrical Drafter/Designer Trainee, Structural Drafter/Designer Trainee, Topographical Drafter/Designer Trainee, General Construction Drafter/Designer Trainee, General Construction Estimator Trainee, Computer Aided Drafter, or Technical Sales representatives.

Surveying/Geomatics Certificate

The curriculum provides the student with instruction in survey theory and fundamentals of office and field practice. The objective is to prepare students for employment as described above. Material is sufficient, when coupled with the legally required experience, to prepare the student for the State licensing examinations conducted by The Board of Registration for Professional Engineers. There are numerous specialties in survey employment, and early counseling is suggested to help select the proper optional classes.

Recommended High School Preparation: Courses in algebra, trigonometry, physics, and geography.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
SURVY 300	Elementary Surveying	4
SURVY 320	Advanced Survey	4
SURVY 330	Special Surveying Projects	4
SURVY 340	Basics of Photogrammetry	3
SURVY 350	Boundary Control and Legal Principles	4
SURVY 352	Evidence and Procedures for Boundary Location	4
A minimum of 3 units from the following:		3
SURVY 310	Survey Map Production (4)	
SURVY 360	Survey Business Practices (3)	
Total Units:		26

Student Learning Outcomes

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

- operate all surveying measurement instruments commonly in use within the profession.
- demonstrate a knowledge of the techniques and methodology of surveying measurement.
- select appropriate survey measuring instruments to accurately complete a variety of surveying projects.
- list specific requirements of local agencies for approval and filing of survey maps such as, record of surveys, parcel maps, subdivision maps, preliminary and final maps, and also improvement plans.
- demonstrate an understanding of boundary surveying and photogrammetric surveys, theory of geodetic and control surveys, Global Positioning Systems, Geographic Information System and electronic surveys.
- demonstrate a knowledge of statutory and common law regulating the surveying industry.
- prepare and/or interpret different forms of legal descriptions of land ownership and transfer.
- discuss various types of land ownership and classify effects and intent of various land transfers and transactions.

Career Information

Students may find employment in field jobs as surveyor assistants to do specific jobs as rod, chain, level, and instrument person and notekeeper. In office jobs, students may do survey computations, draw maps of property lines, topographic maps, and profiles of construction sites, and compute acreage. Employers are private survey and engineering firms and government agencies throughout the United States. Job titles are Boundary, Technicians, Survey Technicians, Engineering Technicians, Engineering Aide, and Survey Aide.

Engineering Design Technology (EDT) Courses

EDT 302 Building Trades Blueprint Reading

Units: 2
Hours: 36 hours LEC

Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

This is a course in blueprint reading and sketching related to building trades. Architectural, structural, electrical and mechanical drawings, details, and specification requirements will be examined in detail for residential, commercial, and industrial construction.

Student Learning Outcomes

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

- analyze and comprehend symbols and terminology used on architecture and engineering drawings and specifications.
- demonstrate comprehension of architectural and engineering drawing set interrelationships between disciplines.
- demonstrate an understanding of relationships between architectural and engineering plans and specifications.

EDT 310 Technical Graphics With CAD I

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	None.
Transferable:	CSU; UC (EDT 310,312 and 314 combined: maximum credit, one course)
Catalog Date:	June 1, 2020

This course introduces the process of technical documentation preparation for design, architectural, and engineering students. Topics include basic sketching, scale reading, drafting conventions, industry design terminology, orthographic and pictorial drawings, dimensioning techniques and sections. Computer-assisted drafting (CAD) topics include CAD techniques, software settings, and commands required to produce design drawings that conform to current industry standards. Students prepare a portfolio of their work.

Student Learning Outcomes

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

- demonstrate proficiency in sketching, scale reading, orthographic projection and pictorial drawings preparation, dimensioning techniques, sections, auxiliary views, and working drawing development.
- demonstrate proper application of drafting concepts and conventions by using CAD software to create, edit, scale, and plot architectural and engineering drawings.
- demonstrate proper application of CAD commands, techniques, and settings required to produce complete drawings that conform to current architectural and engineering industry standards.
- use the Windows operating system to perform file management tasks related to AutoCAD that are commonly used in a professional architectural and/or engineering design firm.

EDT 312 Technical Graphics With CAD II

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	EDT 310 with a grade of "C" or better
Transferable:	CSU; UC (310, 312 and 314 combined: maximum credit, one course)
Catalog Date:	June 1, 2020

This is a second course in technical documentation preparation for design, architectural and engineering students. Topics include auxiliary views, revolutions, patterns, isometric drawings, sections and plan set preparation. Advanced CAD topics include geometric calculator; dimensioning styles and techniques; dynamic and parametric symbols; CAD layer management; filters and selection sets; attributes; data extraction; bill of materials; program customization, preferences and profiles; plotting techniques and scripts. This course offers in-service training and upward mobility training to the professional CAD drafter. Emphasis is on in-office related production skills, advanced commands and program customization. Students prepare a portfolio of their work.

Student Learning Outcomes

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

- prepare auxiliary views, sections, revolutions, pattern development, isometric and other advanced orthographic projection drawings.
- apply advanced dimensioning and plotting techniques.
- demonstrate graphic entity data extraction and program integration with other software programs.
- demonstrate speed in operating the AutoCAD program through repetition and program customization.

EDT 314 Advanced Computer Assisted Drafting and Design

Units:	2
Hours:	18 hours LEC; 54 hours LAB
Prerequisite:	EDT 300 and EDT 310 with grades of "C" or better; or equivalent.
Advisory:	EDT 312 with grade "C" or better or equivalent.
Transferable:	CSU; UC (310, 312 and 314 combined: maximum credit, one course)
Catalog Date:	June 1, 2020

This course covers advanced study in computer aided drafting with emphasis on construction related topics. Course topics include, but are not limited to: basic three-dimensional studies, pictorial (isometric) and three dimensional drawings and dimensioning; customization using the AutoLISP programming language; use of database application to integrate drawing and schedule information in project drawing sets; 3D and UCS Coordinate Systems; Spherical and Cylindrical Coordinates; Solids and Primitives; Solid Model Editing 3D Objects; Wireframes; 3D Faces, Rendering; Light Sources and Backgrounds; Raster and PostScript Files, and applications of CAD to drawing development. The concepts also relate to other computer drafting applications.

Student Learning Outcomes

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

- prepare pictorial (isometric) and three dimensional drawings using CAD.
- demonstrate understanding of basic concepts of CAD customization using the AutoLISP programming language.
- use a database application to integrate drawing and schedule information in project drawing sets.

EDT 315 Beginning 3D Modeling-SolidWorks

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	None.
Transferable:	CSU; UC (effective Summer 2020)
Catalog Date:	June 1, 2020

This course provides instruction in the CAD 3D modeling and mechanical design automation software program SolidWorks, and will cover the basics of creating, editing and storing 3D models. Topics include the proper application of design concepts using SolidWorks to create and edit three-dimensional solid parts and assemblies, and orthographic projections from the solid geometry. Rapid prototyping may be presented in the course.

Student Learning Outcomes

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

- apply commands, techniques, and settings required to produce complete drawings that conform to current industry standards.
- apply design concepts using SolidWorks to create, edit, scale, and plot engineering models and drawings.
- analyze the manufacturability of three dimensional models and assemblies.

EDT 316 REVIT-Architectural

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	EDT 310 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides instruction in the AutoDesk software package REVIT with a focus on architecture. Topics covered include but are not limited to: Building Information Modeling (BIM), parametric 3D design, tools for creating and analyzing architectural project designs, and automated tools for documentation.

Student Learning Outcomes

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

- properly apply drafting concepts by using REVIT software to create, edit, scale, and plot architectural and engineering drawings.
- properly apply CAD commands, techniques, and settings required to produce complete architectural and engineering drawings that conform to current industry standards.

EDT 317 REVIT-MEP

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	EDT 310 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides instruction in the AutoDesk software package REVIT with a focus on MEP (Mechanical Electrical Plumbing). Topics covered include but are not limited to: Building Information Modeling (BIM), parametric 3D design tools for creating and analyzing HVAC, plumbing and piping systems, and power, lighting, and signal systems.

Student Learning Outcomes

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

- properly apply drafting and design concepts by using AutoCAD REVIT software to create, edit, scale, and plot mechanical, electrical, and plumbing engineering drawings.
- properly apply REVIT commands, techniques, and settings required to produce complete mechanical, electrical and plumbing drawings that conform to current industry standards.

EDT 318 Beginning 3D Modeling-CREO

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides an introduction to Creo mechanical design software. Topics covered include, but are not limited to: 3D modeling, parametric design, model relations, tools for creating and analyzing

projects, and detail and assembly drawings.

Student Learning Outcomes

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

- properly apply design concepts using Creo to create, edit, scale, and plot engineering drawings.
- properly apply commands, techniques, and settings required to produce complete drawings that conform to current industry standards.
- analyze the manufacturability of three dimensional models and assemblies.

EDT 319 Advanced 3D Modeling/Rapid Prototyping

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	EDT 318 with a grade of "C" or better
Transferable:	CSU; UC (effective Summer 2020)
Catalog Date:	June 1, 2020

This course provides advanced study in 3D mechanical design software. Topics covered include, but are not limited to: detailing, Geometric Dimensioning and Tolerancing (GD & T), general tolerancing, wire frame, surfacing, parametric 3D solid modeling model relations, tools for creating and analyzing projects, detail and assembly drawings, 3D printing, an introduction to CNC machining, 3D scanning, laser and other cutting technologies, and Rapid Prototyping.

Student Learning Outcomes

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

- apply advanced design concepts using 3D modeling software (including but not limited to: CREO and/or SolidWorks and/or Inventor) to create, edit, scale, and plot 3D models.
- apply commands, techniques, and settings required to perform advanced 3D modeling and to produce complete drawings that conform to current industry standards.
- design, fabricate, and measure test parts.
- explore Additive Manufacturing process limits as well as appropriate applications of these technologies.

EDT 320 Architectural/Structural Drafting

Units:	4
Hours:	36 hours LEC; 108 hours LAB
Prerequisite:	EDT 310 with grades of "C" or better or equivalent (may be taken concurrently with EDT 320).
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides instruction in drafting practices involving building construction drawings and specifications and surveying practices related to architectural and engineering construction work.

Student Learning Outcomes

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

- apply basic principles of architectural and structural design, drafting and detailing.
- describe the roles of the various specialized consultants who interface on an architectural design project.
- describe application of California Title 24 Building Code requirements to architectural and structural design and drafting.

EDT 332 Building Mechanical Design Documents

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	EDT 310 with a grade of "C" or better; or concurrent enrollment in EDT 310
Advisory:	EDT 336 with a grade of "C" or better; or concurrent enrollment in EDT 336.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides instruction in the preparation of mechanical construction documents for building HVAC, plumbing, and piping systems using computer aided drafting programs. Course work involves applying mechanical design calculations to building mechanical systems. EDT 336 should be taken concurrently with this course.

Student Learning Outcomes

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

- prepare mechanical design documents using CAD software for residential and light commercial buildings.
- describe requirements for preparation of mechanical design documents that will meet industry standards.
- apply California Title 24 Building Code requirements to building mechanical design.

EDT 336 Building Mechanical Systems Design

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	Concurrent enrollment in EDT 332.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course focuses on the calculations of heat gain and loss in buildings, psychrometric analyses, types of HVAC systems and equipment selection, environmental comfort considerations, energy conservation strategies, equipment and methodologies, and California Title 24 code requirements. EDT 332 should be taken concurrently with this course.

Student Learning Outcomes

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

- apply the language of the building mechanical system design industry, mechanical terminology, and basic mechanical principles.
- apply mechanical heat gain/loss design calculations for residential and light commercial buildings.
- determine psychrometric conditions of outside air, supply air, return air, and mixed air streams of HVAC systems.
- select HVAC equipment based on load calculations and other constraints.
- interpret and apply California Title 24 building code and Good Practice design requirements to mechanical system design for residential and light commercial buildings.

EDT 340 Plumbing and Piping Systems Design I

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	Concurrent enrollment in EDT 342.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides instruction in the design of domestic water supply, water heating, and gas piping systems for residential, and commercial buildings. Study includes the materials, methods, codes, and practices. EDT 342 should be taken concurrently with this course.

Student Learning Outcomes

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

- design plumbing supply systems and domestic water heating systems for residential and light commercial buildings.
- explain terminology and codes related to the plumbing industry.
- apply Uniform Plumbing Code with California Title 24 Amendments to the design of building plumbing systems.

EDT 342 Plumbing and Piping Systems Design II

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	Concurrent enrollment in EDT 340.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides instruction in the design of plumbing waste, vent, storm drainage, and fuel gas piping systems for residential and commercial buildings. Study includes the materials, methods, codes, and practices. EDT 340 should be taken concurrently with this course.

Student Learning Outcomes

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

- describe the design principles for plumbing waste, vent, storm drainage systems and fuel gas systems for residential and light commercial buildings.
- describe the terminology and codes related to the plumbing industry.
- apply Uniform Plumbing Code with California Title 24 Amendments to building plumbing systems.

EDT 352 Building Electrical Design Documents

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	EDT 310 with a grade of "C" or better; or concurrent enrollment in EDT 310
Advisory:	EDT 356 with a grade of "C" or better; Concurrent enrollment in EDT 356.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides instruction in the preparation of building electrical design documents for residential and light commercial buildings using computer aided drafting programs. Course work involves applying electrical design concepts and calculations to building electrical power wiring, motor, and lighting systems. EDT 356 should be taken concurrently with this course.

Student Learning Outcomes

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

- apply drafting and design skills to prepare electrical design documents for residential and light commercial buildings.
- use the language of the electrical industry, electrical terminology, symbology, and electrical principles.
- describe requirements of the National Electrical Code with California Amendments as applied to residential and light commercial buildings.

EDT 356 Building Electrical Systems Design

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	Concurrent enrollment in EDT 352.
Transferable:	CSU
Catalog Date:	June 1, 2020

This is a basic course on electrical systems for residential and commercial buildings with emphasis on practical industry, materials, methods, and California Title 24 electrical codes. EDT 352 should be taken concurrently with this course.

Student Learning Outcomes

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

- appropriately use and apply the language of the building electrical design industry, electrical terminology, symbology, and basic electrical principles.
- correctly use and apply electrical design calculations for residential and light commercial buildings.
- interpret and apply National Electrical Code with California Title 24 amendments and Good Practice design requirements to building electrical design for residential and light commercial buildings.
- apply electrical lighting design techniques for residential and light commercial buildings.

EDT 494 Topics in Engineering Design Technology

Units:	0.5 - 4
Hours:	9 - 36 hours LEC
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

This specialized course has been developed in cooperation with industry to address emerging training needs.

Student Learning Outcomes

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

- apply special topics related to Engineering Design Technology.
- demonstrate analytical and critical thinking skills as they relate to the study of Engineering Design Technology.
- apply principles of Engineering Design Technology.
- collect and interpret data related to the topic area content.

EDT 495 Independent Studies in Engineering Design Technology

Units:	1 - 3
Hours:	54 - 162 hours LAB
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course is for students who wish to develop an in-depth understanding in fundamental topics of Engineering Design Technology and to learn to work in a collaborative atmosphere with instructors and other students. Instructor approval is required to enroll in this course. UC transfer credit will be awarded only after the course has been evaluated by the enrolling UC campus. The units completed for this course cannot be counted towards the minimum 60 units required for admissions.

Student Learning Outcomes

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

- demonstrate the ability to select a suitable topic for investigation and to appreciate its relationship with current developments in the respective subject areas.
- demonstrate the ability to define clear research objectives and to select and review secondary sources that are relevant to the research questions in a structured and organized manner.
- design appropriate primary research projects that address the defined research objectives.
- deduce meaningful conclusions and recommendations from the sources reviewed and research conducted.
- work collaboratively with an instructor or instructors and other students.

EDT 498 Work Experience in Engineering Design Technology

Units:	1 - 4
Hours:	60 - 300 hours LAB
Prerequisite:	EDT 310 with a grade of "C" or better
Enrollment Limitation:	According to Education Code Title V regulations, a student cannot earn academic credits in a Work Experience class unless s/he has either a job or an internship.
Transferable:	CSU
General Education:	AA/AS Area III(b)
Catalog Date:	June 1, 2020

This course provides students with opportunities to develop or add marketable skills related to their vocational study programs. Course content will include understanding the application of the student's education to the workforce; the responsibilities of an internship (where applicable); completion of Title V Education Code papers (the student's Application, Learning Objectives, Time sheet, and Evaluations), which document the student's progress and hours spent at the work or internship site; and developing workplace (soft) skills identified by the Secretary's Commission on Achieving Necessary Skills (SCANS) Competencies, as well as by local employers. In addition, the student is required to fulfill 18 hours lecture and 75 hours of related, paid work experience or 60 hours of volunteer work experience for one unit; 75 or 60 hours of related work experience for each additional unit. The program allows the transfer student to combine practical, paid or non-paid work experience with college training. The course may be taken up to four times when there is new or expanded learning on the job for a total of 16 units. Only one Work Experience course may be taken per semester.

Student Learning Outcomes

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

- apply classroom study through application of planned, supervised on-the-job experience.
- develop practical workplace (soft) skills, acquire knowledge, and build confidence in the workplace.
- evaluate himself/herself in the following Career/Life Planning Process: Self-Awareness; Career Awareness; Decision Making & Goal Setting; Job Search & Workplace Success; Balanced Lifestyle.
- improve his/her potential for promotion in the workplace.
- develop skills to conduct himself/herself in a professional manner in the workplace.

EDT 499 Experimental Offering in Engineering Design Technology

Units:	0.5 - 4
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

Surveying (Geomatics) (SURVY) Courses

SURVY 300 Elementary Surveying

Units:	4
Hours:	45 hours LEC; 81 hours LAB
Prerequisite:	None.
Advisory:	MATH 335 with a grade of "C" or better.
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
Catalog Date:	June 1, 2020

This course provides an introduction to the principles and practices of plane surveying. Survey instrumentation and methods of measuring distances, angles, and differences in elevation will be presented. Fundamental surveying methods including traversing, area computations, and use and care of electronic survey equipment will be stressed. Computation methods associated with surveying will be covered.

Student Learning Outcomes

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

- select appropriate survey equipment for a specific task; operate, maintain, and check it while completing a typical surveying assignment.
- interpret, collect, analyze, and present data needed to complete various types of survey and mapping projects
- create an orderly formatted, organized, logical presentation of surveying problems and their solutions in accordance with standards of surveying practice.
- apply consistently logical and methodical measurement techniques in acquiring and furnishing survey data and measurements.
- summarize the survey professions functions and services, and describe its relationship to other industries and society in general.
- demonstrate knowledge of statutory authority and responsibilities of a professional land surveyor.

SURVY 310 Survey Map Production

Units:	4
Hours:	45 hours LEC; 81 hours LAB
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides an exposure to the special procedures and requirements unique to computer-assisted survey mapping. Fundamental survey drafting methods and types of maps will be stressed. Conformance with local agency and State of California mapping requirements will be addressed. Students will work with state of the art computer hardware and software to produce industry standard survey maps.

Student Learning Outcomes

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

- demonstrate proficiency using a Computer Assisted Drawing (CAD) work station hardware to produce survey drafting/design work.
- access appropriate AutoCAD commands by using; a.) tool bars; b.) pull-down menus; c.) keyboarding; d.) the mouse; and e.) the mouse.
- define how the AutoCAD program is structured and is adaptable various survey industry mapping procedures.
- identify and employ appropriate construction and positioning commands required for geometric layout and construction of surveying related mapping.
- select appropriate mapping media and textual expression in conformance with current industry standards and statutory mapping standards.
- narrate surveying computational processes to provide and check survey accurate survey information for map creation.
- demonstrate proficiency in using various AutoCAD commands and settings by establishing or creating; a.) units and sheet size; b.) layers, line types, and colors; c.) precise geometric entries; d.) dimensioned drawings; e.) stored drawing elements; f.) saved drawings; g.) plotted drawings.
- outline State and local agency survey mapping standards for production of all types of survey maps in conformance with current industry standards.

SURVY 320 Advanced Survey

Units:	4
Hours:	45 hours LEC; 81 hours LAB
Prerequisite:	SURVY 300 with a grade of "C" or better; or equivalent.
Advisory:	Completion of, or concurrent enrollment in MATH 335 with a grade of "C" or better.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course focuses on real-world surveying applications such as primary control, construction layout and staking, horizontal and vertical curves, above and underground structural staking, subdivision lotting, and street improvement construction. Introduction to boundary surveying and photogrammetric surveys, California State Plane Coordinate System, and theory of geodetic and control surveys. GPS, GIS, and electronic surveys and mapping are also introduced. Students will need a hand-held electronic scientific style calculator equipped with trigonometric capabilities.

Student Learning Outcomes

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

- choose correct field and office procedures for control, layout, and boundary surveys.
- assist in complex surveying operations to locate or define horizontal and/or vertical positions, directions of lines and distances between points and locate or delineate property boundaries.
- summarize procedures for the basic structure and purpose of the United State Public Lands Survey System.
- apply principles of the basic structure and operation of the California State Plane Coordinate System
- evaluate, analyze, and adjust data obtained from survey operations to assure conformance with project specifications.
- assist in conducting a topographic survey, and generate a topographic map from field data captured by a topographic survey.
- understand and comply with regulations of the California Board of Registration of Professional Engineers and Land Surveyors in pursuing licensure as a Professional Land Surveyor.
- discuss surveys for the location and control of alignment and grade for construction of underground, surface, or aboveground structural facilities, including design and layout of horizontal and vertical highway curves.
- describe basic structure of the the satellite constellation and operation of the Global Positioning System.
- measure and record astronomical data to determine the true meridian for a survey project.

SURVY 324 Global Positioning Surveying (GPS)

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	SURVY 320 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	June 1, 2020

This course is an introduction to the methods, techniques, tools, and applications of GPS for use in Land Surveys. It will also present factors of geodesy for surveying, enabling the student to understand and use the mathematical parameters of the earth's shape and effect on survey measurements.

Student Learning Outcomes

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

- summarize the development of Global Positioning System Surveying (GPS) and its adaptation by the surveying industry.
- set up and manipulate all types of GPS instrumentation in field settings for navigation and survey grade locations.
- recommend appropriate field procedure for horizontal and vertical control surveys utilizing GPS equipment.
- define and illustrate examples of map projection systems and the parameters associated with them.
- compute and convert geodetic and plane coordinates within the various zones of the California State Plane Coordinate System.
- produce the direction of a line and/or establish a meridian by use of GPS survey equipment.
- summarize various uses of GPS surveying instruments.
- reduce, analyze, and compile GPS field data by utilizing post-processing software.

SURVY 330 Special Surveying Projects

Units:	4
Hours:	45 hours LEC; 81 hours LAB
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course focuses on real world surveying applications, construction control, layout and staking, horizontal and vertical curves, above and underground structural staking, subdivision lotting, and street improvement construction. This course will provide an introduction to boundary surveying and photogrammetric surveys, theory of geodetic and control surveys. Global Positioning Systems (GPS), Geographic Information System (GIS), and electronic surveys and mapping are also included.

Student Learning Outcomes

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

- correctly select and properly apply procedures for use of surveying equipment for construction layout surveys, control surveys, and boundary surveys.
- evaluate, compile, archive, and disseminate survey data and information through proper written or electronic recording
- act as lead person in complex surveying computation tasks including: determination of horizontal and vertical positions; direction of lines; distances between points; and boundary limits of property ownership.
- define and compute the directions of lines by GPS and/or astronomic methods.
- employ the California State Plane Coordinate System in performing field surveys, data computation, and production of maps.
- under responsible direction, act as lead person in conducting various types of surveys to gather data or locate lines and points.
- under responsible direction, analyze field and record data to prepare a resurvey of public lands.
- under responsible direction and conforming to local agency requirements, prepare a boundary plat from record and measured survey data
- under responsible direction, prepare staking data and a project layout plan for the construction of above and below ground infrastructure.
- pursue certification as a California Land-Surveyor-in-Training.

SURVY 340 Basics of Photogrammetry

Units:	3
Hours:	54 hours LEC
Prerequisite:	SURVY 320 with a grade of "C" or better, or equivalent work experience.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides an introduction to the theory and practice of Photogrammetry, including image systems and quality, theory of stereo photography, and orientation and design of stereo models. The class will also address design and operating principles of stereo plotting and photogrammetric and orthophoto mapping. This course also focuses on considerations for flight and control planning, control identification techniques, advanced field completion surveys, and property line investigations. Two field trips are required.

Student Learning Outcomes

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

- define and illustrate the general principles and applications of photogrammetry.
- compile and define the photographic processes pertinent to aerial mapping.
- recognize the various types of optical systems used in aerial cameras.
- determine and calculate appropriate geometry of various focal lengths and elevations of cameras to conform with terrain conditions.
- identify and demonstrate stereoscopy and its applications to aerial mapping.
- identify specific terrestrial objects, man-made and naturally occurring, using aerial photography identification and interpretation techniques.
- assess and correctly utilize appropriate stereo plotting equipment and instruments.
- compile, appraise, and compute survey ground control and demonstrate flight planning for aerial mapping projects.

SURVY 350 Boundary Control and Legal Principles

Units:	4
Hours:	72 hours LEC
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides instruction in the concepts and legal principles associated with the historic and current practices of surveying and mapping procedures used in locating boundaries and land ownership lines. This course has been developed for those in the fields of surveying, civil engineering, title insurance, and real estate.

Student Learning Outcomes

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

- summarize the historical development of boundary systems in California.
- evaluate types of land ownership and their effects on transfers.
- describe concepts of sectionalized lands, sequential conveyances, and simultaneous conveyances.

- interpret various types of legal descriptions for land boundary locations.
- analyze the effects of unwritten and senior rights on property surveys.
- identify the concepts of easements, reversions, and riparian rights.
- describe the responsibilities of the professional land surveyor and the guidelines for performance of boundary work.

SURVY 352 Evidence and Procedures for Boundary Location

Units:	4
Hours:	72 hours LEC
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

This is a continuation of boundary location with emphasis on procedures rather than principles. It provides an introduction to the historical development, current concepts, and evidence and procedures used in boundary determination. Techniques of gathering and evaluating evidence used in boundary locations and methods of presenting that evidence in the form of maps and descriptions are emphasized. This course is designed for those in the fields of engineering, land surveying, land law, real estate, and title insurance.

Student Learning Outcomes

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

- summarize the historical development of current common, case, and statutory land law in California and the United States.
- cite concepts, principles, and types of evidence used in boundary determination.
- enumerate types of ownerships and evaluate their effects on transfer of property ownerships.
- interpret and prepare various types of legal descriptions.
- analyze the effects of unwritten title in boundary surveys.
- describe the responsibilities of the professional land surveyor, the court, attorneys, title company, local agencies, and land owners in boundary determination and resolution.

SURVY 360 Survey Business Practices

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

The course provides an introduction to surveying business economics; contracts and specifications; organizing, staffing, hiring, training, and supervision of professional/technical personnel; surveyor-client relationships; and ethics of practice.

Student Learning Outcomes

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

- identify markets and survey business startup, monthly and yearly costs.
- assess the type of business organization to be used for provision of effective surveying services by a small-medium sized firm.
- prepare a surveying service marketing analysis, marketing plan, strategic plan, and a general business plan.
- apply principles of management and marketing relevant to a surveying business.
- evaluate the importance of records retention along with the attendant legal and ethical implications.
- demonstrate an understanding of organization structures.

SURVY 495 Independent Studies in Surveying

Units:	1 - 3
Hours:	54 - 162 hours LAB
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

UC transfer credit will be awarded only after the course has been evaluated by the enrolling UC campus. The units completed for this course cannot be counted towards the minimum 60 units required for admissions.

Student Learning Outcomes

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

- demonstrate the ability to select a suitable topic for investigation and to appreciate its relationship with current developments in the respective subject areas.
- demonstrate the ability to define clear research objectives and to select and review secondary sources that are relevant to the research questions in a structured and organized manner.
- design appropriate primary research projects that address the defined research objectives.
- deduce meaningful conclusions and recommendations from the sources reviewed and research conducted.
- work collaboratively with an instructor or instructors and other students.

SURVY 498 Work Experience in Surveying

Units:	1 - 4
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

This course provides students with opportunities to develop or add marketable skills related to their vocational study programs. Course content will include understanding the application of the student's education to the workforce; the responsibilities of an internship (where applicable); completion of Title V Education Code papers (the student's Application, Learning Objectives, Time sheet, and Evaluations), which document the student's progress and hours spent at the work or internship site; and developing workplace (soft) skills identified by the Secretary's Commission on Achieving Necessary Skills (SCANS) Competencies, as well as by local employers. The program allows the transfer student to combine practical, paid or non-paid work experience with college training.

Student Learning Outcomes

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

- apply classroom study through application of planned, supervised on-the-job experience.
- develop practical workplace (soft) skills, acquire knowledge, and build confidence in the workplace.
- evaluate himself/herself in the following Career/Life Planning Process: Self-Awareness; Career Awareness; Decision Making & Goal Setting; Job Search & Workplace Success; Balanced Lifestyle.
- improve his/her potential for promotion in the workplace.
- develop skills to conduct himself/herself in a professional manner in the workplace.

SURVY 499 Experimental Offering in Surveying

Units:	0.5 - 4
Prerequisite:	None.
Catalog Date:	June 1, 2020

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Science, Math and Engineering

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This program is part of the Science, Math and Engineering meta major.

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