

2023-2024 Catalog

Engineering

Overview

The Engineering Associate in Science degree is designed to meet lower division requirements for various majors in engineering. Completion of the Associate in Science degree should qualify the student to transfer at the upper division level to an engineering program at a four-year institution. The degree has a common engineering core requirement as well as specific field requirements. The specific field requirements do vary depending on the four-year institution to which the student will transfer. Thus, requirements for specific universities should be checked before selecting specific field courses.

Degrees Offered

- A.S. in Engineering, Civil Engineering
- A.S. in Engineering, Electrical/Computer Engineering
- A.S. in Engineering, General
- A.S. in Engineering, Mechanical/Aeronautical Engineering

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Associate Degrees

A.S. in Engineering, Civil Engineering

The Engineering Associate in Science degree is designed to meet lower division requirements for various majors in engineering. Completion of the Associate in Science degree should qualify the student to transfer at the upper division level to an engineering program at a four-year institution. The degree has a common engineering core requirement as well as specific field requirements. The specific field requirements do vary depending on the four-year institution to which the student will transfer. Thus, requirements for specific universities should be checked before selecting specific field courses.

Catalog Date: January 1, 2024

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CHEM 400	General Chemistry I	5
ENGR 300	Introduction to Engineering	1
ENGR 310	Engineering Survey Measurements	4
ENGR 405	Engineering Problem Solving (3)	3 - 4
or CISP 360	Introduction to Structured Programming (4)	
ENGR 412	Properties of Materials	4
ENGR 422	Engineering Mechanics, Statics	3
MATH 400	Calculus I	5
MATH 401	Calculus II	5
MATH 410	Introduction to Linear Algebra	3
MATH 420	Differential Equations	4
PHYS 410	Mechanics of Solids and Fluids	5
PHYS 420	Electricity and Magnetism	5
Subtotal Units:		47 - 48

Transfer Pathway (actual course requirements for transfer vary by institution)

COURSE CODE	COURSE TITLE	UNITS
CHEM 401	General Chemistry II (5)	3 - 5 ¹
or ENGR 312	Engineering Graphics (3)	
or MATH 402	Calculus III (5)	
or PHYS 430	Heat, Waves, Light and Modern Physics (5)	
Transfer Pathway (actual course requirements for transfer vary by institution) Units:		3 - 5
Total Units:		50 - 53

¹One course from this group is required to earn an AS degree. For students transferring in Civil Engineering to a four-year institution, all courses from this group may be required by the desired transfer institution; please see a counselor to determine which of these courses are required for successful transfer.

The Engineering, Civil Engineering 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:

- solve problems by applying knowledge of mathematics including differential and integral calculus, differential equations, and linear algebra.
- solve problems by applying knowledge of science including chemistry and physics.
- use technology to enhance productivity.
- apply knowledge of mathematics, science, and engineering to identify, formulate, and solve basic civil engineering problems.
- demonstrate an understanding of the ethical and professional responsibilities of an engineer and how engineering solutions can impact society.
- communicate thoughts in both written and oral forms to team members and larger audiences.
- seek transfer at the junior level into a Civil Engineering program at a four-year institution.

A.S. in Engineering, Electrical/Computer Engineering

The Engineering Associate in Science degree is designed to meet lower division requirements for various majors in engineering. Completion of the Associate in Science degree should qualify the student to transfer at the upper division level to an engineering program at a four-year institution. The degree has a common engineering core requirement as well as specific field requirements. The specific field requirements do vary depending on the four-year institution to which the student will transfer. Thus, requirements for specific universities should be checked before selecting specific field courses.

Catalog Date: January 1, 2024

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CHEM 400	General Chemistry I	5
ENGR 300	Introduction to Engineering	1
ENGR 400	Introduction to Electrical Circuits and Devices	3
ENGR 405	Engineering Problem Solving (3)	3 - 4 ¹
or CISP 360	Introduction to Structured Programming (4)	
MATH 400	Calculus I	5
MATH 401	Calculus II	5
MATH 402	Calculus III	5
MATH 420	Differential Equations	4
PHYS 410	Mechanics of Solids and Fluids	5
PHYS 420	Electricity and Magnetism	5
Subtotal Units:		41 - 42

Transfer Pathway (actual course requirements for transfer vary by institution)

COURSE CODE	COURSE TITLE	UNITS
MATH 410	Introduction to Linear Algebra (3)	3 - 5 ²
or PHYS 430	Heat, Waves, Light and Modern Physics (5)	
or CISP 400	Object Oriented Programming with C++ (4)	

COURSE CODE	COURSE TITLE	UNITS
or CISP 430	Data Structures (4)	
or CISP 440	Discrete Structures for Computer Science (3)	
or ENGR 412	Properties of Materials (4)	
Transfer Pathway (actual course requirements for transfer vary by institution) Units:		3 - 5
Total Units:		44 - 47

¹For students who need CISP 400 to meet transfer requirements, CISP 360 is a prerequisite.

²One course from this group is required to earn an AS degree. For students transferring in Electrical/Computer Engineering to a four-year institution, all courses from this group may be required by the desired transfer institution; please see a counselor to determine which of these courses are required for successful transfer.

The Engineering, Electrical/Computer Engineering 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:

- solve problems by applying knowledge of mathematics including differential and integral calculus, differential equations, and linear algebra.
- solve problems by applying knowledge of science including chemistry and physics.
- use technology to enhance productivity.
- apply knowledge of mathematics, science, and engineering to identify, formulate, and solve basic electrical/computer engineering problems.
- demonstrate an understanding of the ethical and professional responsibilities of an engineer and how engineering solutions can impact society.
- communicate thoughts in both written and oral forms to team members and larger audiences.
- seek transfer at the junior level into an Electrical/Computer Engineering program at a four-year institution.

A.S. in Engineering, General

The Engineering Associate in Science degree is designed to meet lower division requirements for various majors in engineering. Completion of the Associate in Science degree should qualify the student to transfer at the upper division level to an engineering program at a four-year institution. The degree has a common engineering core requirement as well as specific field requirements. The specific field requirements do vary depending on the four-year institution to which the student will transfer. Thus, requirements for specific universities should be checked before selecting specific field courses.

Catalog Date: January 1, 2024

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CHEM 400	General Chemistry I	5
ENGR 300	Introduction to Engineering	1
ENGR 312	Engineering Graphics	3
ENGR 405	Engineering Problem Solving (3)	3 - 4
or CISP 360	Introduction to Structured Programming (4)	
ENGR 412	Properties of Materials	4
ENGR 422	Engineering Mechanics, Statics	3
MATH 400	Calculus I	5
MATH 401	Calculus II	5
MATH 402	Calculus III	5
MATH 420	Differential Equations	4
PHYS 410	Mechanics of Solids and Fluids	5
PHYS 420	Electricity and Magnetism	5
Subtotal Units:		48 - 49

Transfer Pathway (actual course requirements for transfer vary by institution)

COURSE CODE	COURSE TITLE	UNITS
CHEM 401	General Chemistry II (5)	3 - 5 ¹
or ENGR 400	Introduction to Electrical Circuits and Devices (3)	
or MATH 410	Introduction to Linear Algebra (3)	
or PHYS 430	Heat, Waves, Light and Modern Physics (5)	

COURSE CODE	COURSE TITLE	UNITS
Transfer Pathway (actual course requirements for transfer vary by institution) Units:		3 - 5
Total Units:		51 - 54

¹One course from this group is required to earn an AS degree. For students transferring in Engineering to a four-year institution, all courses from this group may be required by the desired transfer institution; please see a counselor to determine which of these courses are required for successful transfer.

The Engineering, General 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:

- solve problems by applying knowledge of mathematics including differential and integral calculus, differential equations, and linear algebra.
- solve problems by applying knowledge of science including chemistry and physics.
- use technology to enhance productivity.
- apply knowledge of mathematics, science, and engineering to identify, formulate, and solve basic engineering problems.
- demonstrate an understanding of the ethical and professional responsibilities of an engineer and how engineering solutions can impact society.
- communicate thoughts in both written and oral forms to team members and larger audiences.
- seek transfer at the junior level into an Engineering program at a four-year institution.

A.S. in Engineering, Mechanical/Aeronautical Engineering

The Engineering Associate in Science degree is designed to meet lower division requirements for various majors in engineering. Completion of the Associate in Science degree should qualify the student to transfer at the upper division level to an engineering program at a four-year institution. The degree has a common engineering core requirement as well as specific field requirements. The specific field requirements do vary depending on the four-year institution to which the student will transfer. Thus, requirements for specific universities should be checked before selecting specific field courses.

Catalog Date: January 1, 2024

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CHEM 400	General Chemistry I	5
ENGR 300	Introduction to Engineering	1
ENGR 312	Engineering Graphics	3
ENGR 400	Introduction to Electrical Circuits and Devices	3
ENGR 405	Engineering Problem Solving (3)	3 - 4
or CISP 360	Introduction to Structured Programming (4)	
ENGR 412	Properties of Materials	4
ENGR 422	Engineering Mechanics, Statics	3
MATH 400	Calculus I	5
MATH 401	Calculus II	5
MATH 402	Calculus III	5
MATH 420	Differential Equations	4
PHYS 410	Mechanics of Solids and Fluids	5
PHYS 420	Electricity and Magnetism	5
Subtotal Units:		51 - 52

Transfer Pathway (actual course requirements for transfer vary by institution)

COURSE CODE	COURSE TITLE	UNITS
CHEM 401	General Chemistry II (5)	3 - 5 ¹
or MATH 410	Introduction to Linear Algebra (3)	
or PHYS 430	Heat, Waves, Light and Modern Physics (5)	
Transfer Pathway (actual course requirements for transfer vary by institution) Units:		3 - 5
Total Units:		54 - 57

¹One course from this group is required to earn an AS degree. For students transferring in Mechanical/Aeronautical Engineering to a four-year institution, all courses from this group may be required by the desired transfer institution; please see a counselor to determine which of these courses are required for successful transfer.

The Engineering, Mechanical/Aeronautical Engineering 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:

- solve problems by applying knowledge of mathematics including differential and integral calculus, differential equations, and linear algebra.
- solve problems by applying knowledge of science including chemistry and physics.
- use technology to enhance productivity.
- apply knowledge of mathematics, science, and engineering to identify, formulate, and solve basic mechanical/aeronautical engineering problems.
- demonstrate an understanding of the ethical and professional responsibilities of an engineer and how engineering solutions can impact society.
- communicate thoughts in both written and oral forms to team members and larger audiences.
- seek transfer at the junior level into a Mechanical/Aeronautical Engineering program at a four-year institution.

Engineering (ENGR) Courses

ENGR 300 Introduction to Engineering

Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Transferable:	CSU; UC
Catalog Date:	January 1, 2024

This course provides an introduction to the different engineering disciplines and careers, the role of the engineer in society, the engineering approach to problem solving, the design process, and engineering ethics. The development of effective communication and study skills required of engineers is emphasized. This course is required of most engineering majors.

ENGR 310 Engineering Survey Measurements

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	MATH 373 with a grade of "C" or better
Advisory:	Completion of or concurrent enrollment in a basic drafting course such as ENGR 312.
Transferable:	CSU; UC
C-ID:	C-ID ENGR 180
Catalog Date:	January 1, 2024

This course covers the basic fundamentals of surveying for engineers. This includes the theory and practice of measurements for distance, elevations and angles, analysis and adjustment of errors (systematic and random), and traverse calculation and adjustments. Additional topics include discussions on profiles and cross-sections, horizontal curves, and vertical curves. This course has an indoor lecture component as well as a required outdoor field component. This course is designed for engineering students and is usually required for civil engineering majors depending on the transfer institution.

ENGR 312 Engineering Graphics

Units:	3
Hours:	36 hours LEC; 72 hours LAB
Prerequisite:	MATH 373 with a grade of "C" or better
Advisory:	It is expected that the student has experience and knowledge of the use of a personal computer.
Transferable:	CSU; UC
C-ID:	C-ID ENGR 150
Catalog Date:	January 1, 2024

This course provides fundamental training in the use of hand-drawing instruments and Computer Aided Design/Drafting (CADD) software to analyze, interpret, and solve engineering problems. Topics covered include elements of drafting, descriptive geometry, multi-view drawing, design process, and solution of engineering problems, culminating in a design project.

ENGR 400 Introduction to Electrical Circuits and Devices

Units:	3
Hours:	54 hours LEC
Prerequisite:	MATH 420 and PHYS 420 with grades of "C" or better; students may be enrolled in MATH 420 concurrently
Transferable:	CSU; UC
C-ID:	C-ID ENGR 260
Catalog Date:	January 1, 2024

This course provides the engineering student with the basic fundamentals of DC and sinusoidal electrical circuit theory and analysis. The following circuit elements are covered: resistors, capacitors, inductors, independent sources, and dependent sources. Topics that are covered include circuit analysis techniques, sinusoidal analysis, phasors, Thevenin and Norton equivalence, natural and step response of first-and second-order circuits, three-phase analysis, complex power, and operational amplifiers.

ENGR 405 Engineering Problem Solving

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	MATH 401 with a grade of "C" or better or concurrent enrollment in MATH 401.
Advisory:	It is expected that the student has experience and knowledge in the use of a personal computer.
Transferable:	CSU; UC
C-ID:	C-ID ENGR 220
Catalog Date:	January 1, 2024

This course uses MATLAB to provide students with the ability to build knowledge of computer-based problem solving methods in engineering. Students will learn the fundamentals of procedural and object-oriented programming, relational and logical operators, selection scripting, numerical analysis, and data structures while implementing computational solutions from practical applications in engineering, physics, and mathematics.

ENGR 412 Properties of Materials

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CHEM 400 and PHYS 410 with grades of "C" or better
Transferable:	CSU; UC
C-ID:	C-ID ENGR 140
Catalog Date:	January 1, 2024

This course covers atomic and crystal structures and mechanical, electrical, and magnetic properties of engineering materials. Also covered are steady and non-steady state diffusion, phase diagram analysis, heat treatment of metals, and corrosion. Laboratory exercises cover both destructive and non-destructive testing of materials.

ENGR 422 Engineering Mechanics, Statics

Units:	3
Hours:	54 hours LEC
Prerequisite:	MATH 401 and PHYS 410 with grades of "C" or better
Transferable:	CSU; UC
C-ID:	C-ID ENGR 130
Catalog Date:	January 1, 2024

This is the first course in engineering mechanics. Topics in this course include two and three dimensional force system analysis using vector techniques, moments and couples in two and three dimensions, centroids and moment of inertia, friction, forces in beams, and truss analysis. This course is required for Mechanical, Civil, and Aeronautical Engineering transfer students and by some Electrical Engineering programs.

ENGR 495 Independent Studies in Engineering

Units:	1 - 3
Hours:	54 - 162 hours LAB
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	January 1, 2024

This course involves an individual student or small group of students in study, research, or activities beyond the scope of regularly offered courses. 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.

ENGR 499 Experimental Offering in Engineering

Units:	0.5 - 4
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	January 1, 2024

This is the experimental courses description.