

# Engineering

## Overview

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The Folsom Lake College engineering curriculum provides the foundation in mathematics, physics, and engineering necessary to transfer to a university and complete a bachelor's degree in engineering. Engineering involves the application of scientific and mathematical principles needed to solve practical technical problems. Although the first two years of engineering courses for all engineering degrees are similar, students should consult the lower division requirements of the institution to which they wish to transfer.

## Career Options

- Aerospace Engineer
- Architectural Engineer
- Biomedical Engineer
- Chemical Engineer
- Civil Engineer
- Computer Engineer
- Electrical Engineer
- Environmental Engineer
- Mechanical Engineer

*Most career options require more than two years of college study.*

## Highlights

- Challenging and rewarding classes that transfer to four-year universities

## Program Maps

[Science, Technology, Engineering, and Mathematics Undecided Major \(/fkc/main/doc/instruction/program-maps/STEM-Uncecided-major.pdf\)](/fkc/main/doc/instruction/program-maps/STEM-Uncecided-major.pdf)

[Engineering, A.S. Degree \(/fkc/main/doc/instruction/program-maps/Engineering-AS.pdf\)](/fkc/main/doc/instruction/program-maps/Engineering-AS.pdf)

[Engineering, Civil Engineering, CSU Transfer \(/fkc/main/doc/instruction/program-maps/Civil-Engineering-CSU-Transfer.pdf\)](/fkc/main/doc/instruction/program-maps/Civil-Engineering-CSU-Transfer.pdf)

[Engineering, Civil Engineering, UC Transfer \(/fkc/main/doc/instruction/program-maps/Civil-Engineering-UC-Transfer.pdf\)](/fkc/main/doc/instruction/program-maps/Civil-Engineering-UC-Transfer.pdf)

[Engineering, Electrical Engineering, CSU Transfer \(/fkc/main/doc/instruction/program-maps/Electrical-Engineering-CSU-Transfer.pdf\)](/fkc/main/doc/instruction/program-maps/Electrical-Engineering-CSU-Transfer.pdf)

[Engineering, Electrical Engineering, UC Transfer \(/fkc/main/doc/instruction/program-maps/Electrical-Engineering-UC-Transfer.pdf\)](/fkc/main/doc/instruction/program-maps/Electrical-Engineering-UC-Transfer.pdf)

[Engineering, Mechanical Engineering, CSU Transfer \(/fkc/main/doc/instruction/program-maps/Mechanical-Engineering-CSU-Transfer.pdf\)](/fkc/main/doc/instruction/program-maps/Mechanical-Engineering-CSU-Transfer.pdf)

[Engineering, Mechanical Engineering, UC Transfer \(/fkc/main/doc/instruction/program-maps/Mechanical-Engineering-UC-Transfer.pdf\)](/fkc/main/doc/instruction/program-maps/Mechanical-Engineering-UC-Transfer.pdf)

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Department Chair [Daniel Hale \(/about-us/contact-us/faculty-and-staff-directory/daniel-hale\)](/about-us/contact-us/faculty-and-staff-directory/daniel-hale)

Meta-Major [Science, Technology, Engineering, and Mathematics \(/academics/meta-majors/science-technology-engineering-and-mathematics\)](/academics/meta-majors/science-technology-engineering-and-mathematics)

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## Associate Degree

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### A.S. in Engineering

The Engineering A.S. degree provides a comprehensive exposure to engineering and pre-engineering fundamentals in preparation for upper-division engineering courses. The program also prepares students for entry-level employment as technicians in a variety of technical industries. The AS Engineering degree is highly customizable, providing flexibility to meet a variety of student and industry needs.

For students planning to transfer to a 4-year University:

Transfer requirements vary. In general, transfer students should plan on taking specific courses that articulate with required courses at their chosen transfer institution. Transfer students are advised to consult with an FLC counselor, [www.assist.org](http://www.assist.org), and FLC engineering faculty to plan their programs.

For students planning to complete only the A.S. degree at this time:

The Engineering AS degree provides a highly customizable terminal AS degree to prepare students for entry level employment as engineering technicians in a variety of industries. The degree provides a foundation in pre-engineering fundamentals, as well as some exposure to engineering.

Catalog Date: June 1, 2020

## Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CHEM 400	General Chemistry I	5
MATH 400	Calculus I	5
MATH 401	Calculus II	5
MATH 402	Calculus III	5
MATH 420	Differential Equations	4
PHYS 411	Mechanics of Solids and Fluids	4
PHYS 421	Electricity and Magnetism	4
PHYS 431	Heat, Waves, Light and Modern Physics	4
<b>A minimum of 6 units from the following:</b>		6
CISP 360	Introduction to Structured Programming (4)	
ENGR 303	Introduction to Logic Design (4)	
ENGR 312	Engineering Graphics (3)	
ENGR 400	Introduction to Electrical Circuits and Devices (3)	
ENGR 420	Statics (3)	
<b>Total Units:</b>		<b>42</b>

The 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 FLC graduation requirements.

## Student Learning Outcomes

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

- solve problems by applying knowledge of mathematics through differential and integral calculus.
- solve problems by applying knowledge of science including chemistry and physics.
- demonstrate an understanding of the nature of engineering as a discipline and the role of the engineer in society.
- communicate technical information in both written and oral forms to team members and larger audiences.
- seek transfer into an Engineering program at a 4-year institution.

## Career Information

Transfer students upon completion of the B.S. degree may expect to find employment in a variety of engineering specialties, such as: Aerospace Engineer; Architectural Engineer; Biomedical Engineer; Chemical Engineer; Civil Engineer; Computer Engineer; Electrical Engineer; Mechanical Engineer, and other types of engineers. Students completing the A.S. degree may seek employment in various technical and support jobs in a variety of industries.

## Engineering (ENGR) Courses

### ENGR 303 Introduction to Logic Design

<b>Units:</b>	4
<b>Hours:</b>	54 hours LEC; 54 hours LAB
<b>Prerequisite:</b>	None.
<b>Advisory:</b>	Some previous exposure to programming at the high school level or above.
<b>Transferable:</b>	CSU
<b>Catalog Date:</b>	June 1, 2020

This is an introductory course in the fundamentals of designing digital computer hardware. This course covers: logic gates, binary number system, conversion between number systems, Boolean algebra, Karnaugh maps, combinational logic, digital logic design, flip-flops, programmable logic devices (PLDs), counters, registers, memories, state machines, designing combinational logic and state machines into PLDs, and basic computer architecture. The lab is design oriented and emphasizes the use of software equation entry tools, schematic entry, and logic simulation tools. Lab assignments are design oriented. This course is required for Electrical/Electronics Engineering and Computer Engineering majors at some universities. This course is also helpful for Computer Science majors, electronics technicians, and for students wishing to sample computer engineering.

## Student Learning Outcomes

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

- identify common elementary digital components such as logic gates, flip-flops, programmable logic devices (PLDs), counters, registers, memories, and state machines.
- analyze a digital design problem using combinational logic, binary and other number systems, Boolean algebra, and Karnaugh maps.
- design a solution to a complex digital logic design problem and implement this solution using one or more simulation tools.
- utilize hierarchical design methodology to combine smaller components into a larger design.

# ENGR 312 Engineering Graphics

<b>Units:</b>	3
<b>Hours:</b>	36 hours LEC; 72 hours LAB
<b>Prerequisite:</b>	None.
<b>Advisory:</b>	MATH 110
<b>Transferable:</b>	CSU; UC
<b>Catalog Date:</b>	June 1, 2020

This course applies the graphical tools needed to analyze, interpret, and solve engineering problems. The engineering design process is taught using manual tools and computer-aided design and drafting (CADD) tools to solve typical engineering problems. Topics include descriptive geometry, vector graphics, orthogonal projection, primary and secondary auxiliary views, geometric dimensioning and tolerancing (GD&T), 3D solid modeling, and an introduction to finite element analysis (FEA) tools. This course is intended for mechanical and civil engineering majors, but may also be required for other programs.

## Student Learning Outcomes

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

- create fully dimensioned orthographic projection drawings of objects by hand and by using CADD software.
- construct sectional and auxiliary views of objects.
- determine appropriate tolerances on components.
- create a solution to a simple design problem, culminating in working drawings.
- utilize 2D and 3D software tools to create layouts and models.

# ENGR 400 Introduction to Electrical Circuits and Devices

<b>Units:</b>	3
<b>Hours:</b>	54 hours LEC
<b>Prerequisite:</b>	PHYS 421 with a grade of "C" or better
<b>Corequisite:</b>	MATH 420
<b>Transferable:</b>	CSU; UC
<b>C-ID:</b>	C-ID ENGR 260
<b>Catalog Date:</b>	June 1, 2020

This course will provide engineering students with circuit analysis concepts and applications that will be of value in any engineering field as well as a solid foundation for electrical engineering and related majors. The course includes the analysis of circuits with resistors, inductors, capacitors, and independent and dependent voltage and current sources. Many analysis techniques will be applied to DC and AC circuits. Differential equations will be used to find the transient response of circuits. Power calculations will be performed on both DC and AC circuits, including an introduction to three-phase AC power. This course is required for most engineering Bachelors of Science degrees.

## Student Learning Outcomes

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

- analyze electric circuits for DC, transient, and AC voltage and current responses.
- simplify networks of passive circuit elements.
- simplify circuits and determine their Thevenin equivalent circuits.
- calculate power in DC and AC circuits (including complex power).
- analyze Y-Y connected balanced three phase circuits.

# ENGR 420 Statics

<b>Units:</b>	3
<b>Hours:</b>	54 hours LEC
<b>Prerequisite:</b>	MATH 401 and PHYS 411 with grades of "C" or better
<b>Transferable:</b>	CSU; UC
<b>Catalog Date:</b>	June 1, 2020

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, aeronautical engineering transfer students and by some electrical engineering programs.

## Student Learning Outcomes

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

- apply vector mathematical principles to determine 2-dimensional and 3-dimensional forces, moments and equivalent force/force-couples.
- apply equilibrium principles to determine the external forces of both 2-dimensional and 3-dimensional rigid bodies in static equilibrium.
- apply equilibrium principles to determine the internal forces of beams, trusses, frames and machines.
- determine the centroids and moments of inertia of 2-dimensional and 3-dimensional bodies using algebra and calculus principles.

## ENGR 495 Independent Studies in Engineering

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

## ENGR 499 Experimental Offering in Engineering

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

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## Science, Technology, Engineering, and Mathematics

[\(/academics/meta-majors\)](#)

This program is part of the Science, Technology, Engineering, and Mathematics meta-major.

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