

**Engineering****ENGR****Degrees:**

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

**Division of Mathematics/Statistics & Engineering**

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**Civil Engineering****Associate in Science Degree****Program Information**

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.

**Upon completion of any one or more of these programs, the student will be able to:**

- solve problems by applying knowledge of mathematics through differential and integral calculus, differential equations and linear algebra.
- solve problems by applying knowledge of science including chemistry and physics.
- use technology to enhance their 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.

**Required Program**

	<b>Units</b>
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**

Additional Civil Engineering requirements (consult the Engineering Department Chair and Counseling)

ENGR 310 Engineering Survey Measurements.....	4
MATH 410 Introduction to Linear Algebra.....	3
PHYS 430 Heat, Waves, Light and Modern Physics (5).....	5
or CHEM 401 General Chemistry II (5)	

**Units****12****Total Units Required****63 – 64****Associate in Science (A.S.) Degree**

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.

**Electrical/Computer Engineering****Associate in Science Degree****Program Information**

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.

**Upon completion of any one or more of these programs, the student will be able to:**

- solve problems by applying knowledge of mathematics through differential and integral calculus, differential equations and linear algebra.
- solve problems by applying knowledge of science including chemistry and physics.
- use technology to enhance their 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.

<b>Required Program</b>	<b>Units</b>
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
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
<b>Subtotal Units</b>	<b>41 – 42</b>

Additional Electrical/Computer Engineering Requirements (Consult with the Engineering Department Chair and Counseling)

CISP 310 Assembly Language Programming for.....	4
Microcomputers	
ENGR 412 Properties of Materials.....	4
ENGR 422 Engineering Mechanics, Statics.....	3
MATH 410 Introduction to Linear Algebra.....	3
PHYS 430 Heat, Waves, Light and Modern Physics (5).....	5
or CHEM 401 General Chemistry II (5)	
<b>Units</b>	<b>19</b>

**Total Units Required** **60 – 61**

**Associate in Science (A.S.) Degree**

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.

**Engineering, General****Associate in Science Degree****Program Information**

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.

**Upon completion of any one or more of these programs, the student will be able to:**

- solve problems by applying knowledge of mathematics through differential and integral calculus, differential equations and linear algebra.
- solve problems by applying knowledge of science including chemistry and physics.
- use technology to enhance their 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.

<b>Required Program</b>	<b>Units</b>
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
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
<b>Subtotal Units</b>	<b>41 – 42</b>

Additional General Engineering requirements (consult the Engineering Department Chair and Counseling)

ENGR 312 Engineering Graphics.....	3
ENGR 412 Properties of Materials.....	4
ENGR 422 Engineering Mechanics, Statics.....	3
MATH 410 Introduction to Linear Algebra.....	3
PHYS 430 Heat, Waves, Light and Modern Physics (5).....	5
or CHEM 401 General Chemistry II (5)	
<b>Units</b>	<b>18</b>

**Total Units Required** **59 – 60**

**Associate in Science (A.S.) Degree**

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.

## Mechanical/Aeronautical Engineering

### Associate in Science Degree

#### Program Information

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.

#### Upon completion of any one or more of these programs, the student will be able to:

- solve problems by applying knowledge of mathematics through differential and integral calculus, differential equations and linear algebra.
- solve problems by applying knowledge of science including chemistry and physics.
- use technology to enhance their 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.

#### Required Program

#### 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**

Additional General Engineering requirements (consult the Engineering Department Chair and Counseling)

MATH 410 Introduction to Linear Algebra.....	3
PHYS 430 Heat, Waves, Light and Modern Physics (5).....	5
or CHEM 401	
General Chemistry II (5)	

#### Units

**8**

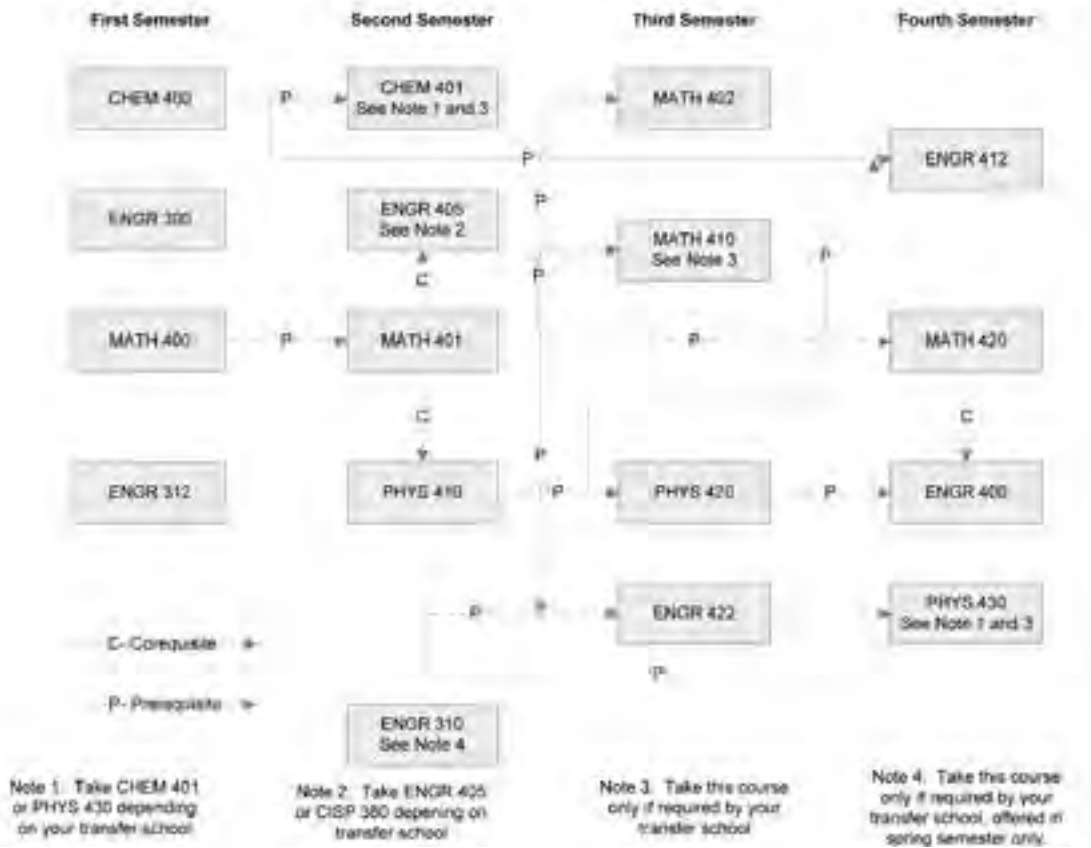
#### Total Units Required

**59 – 60**

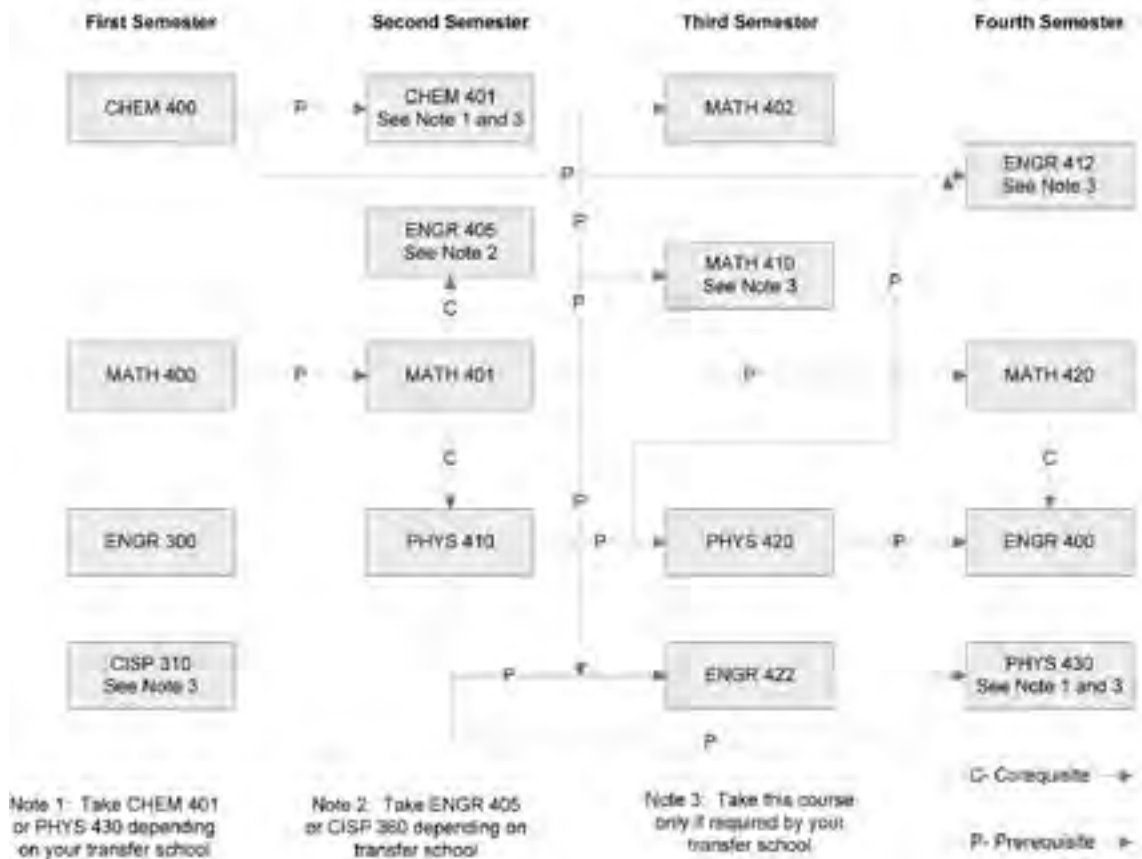
#### Associate in Science (A.S.) Degree

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.

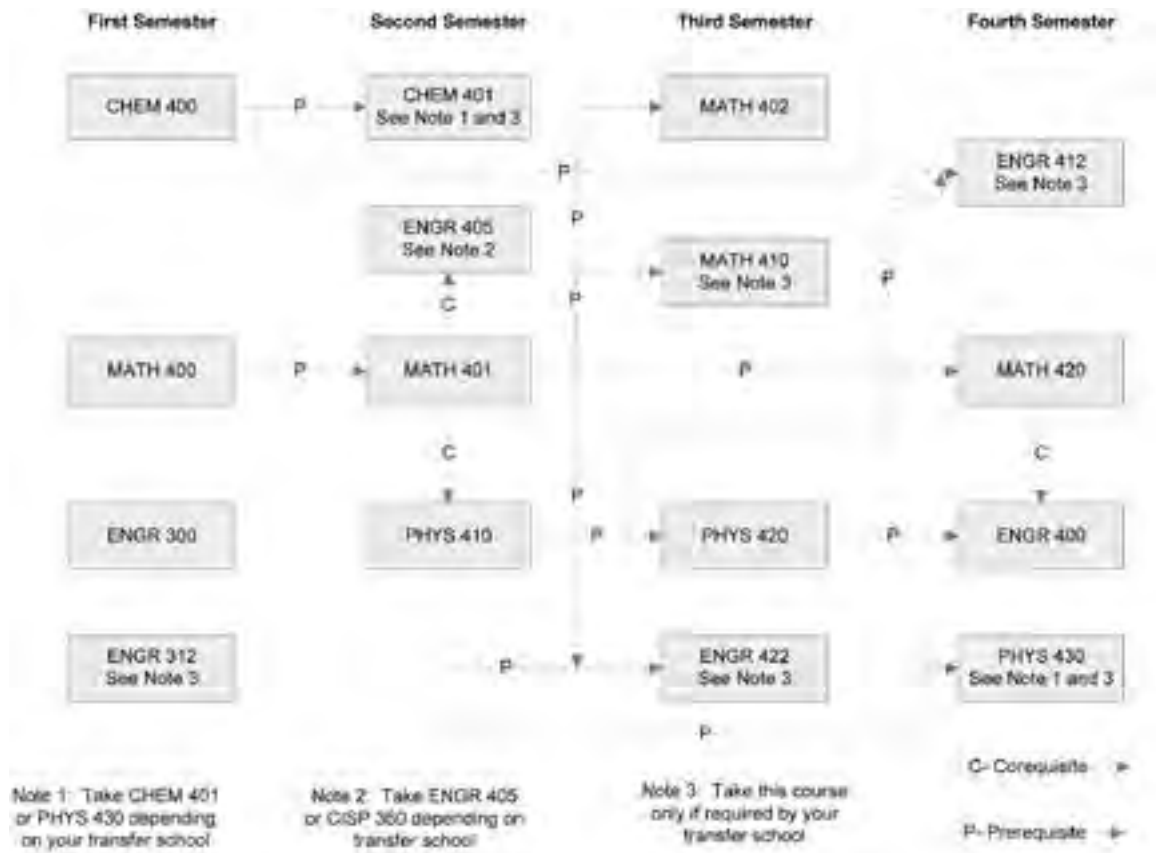
## Civil Engineering Course Flow



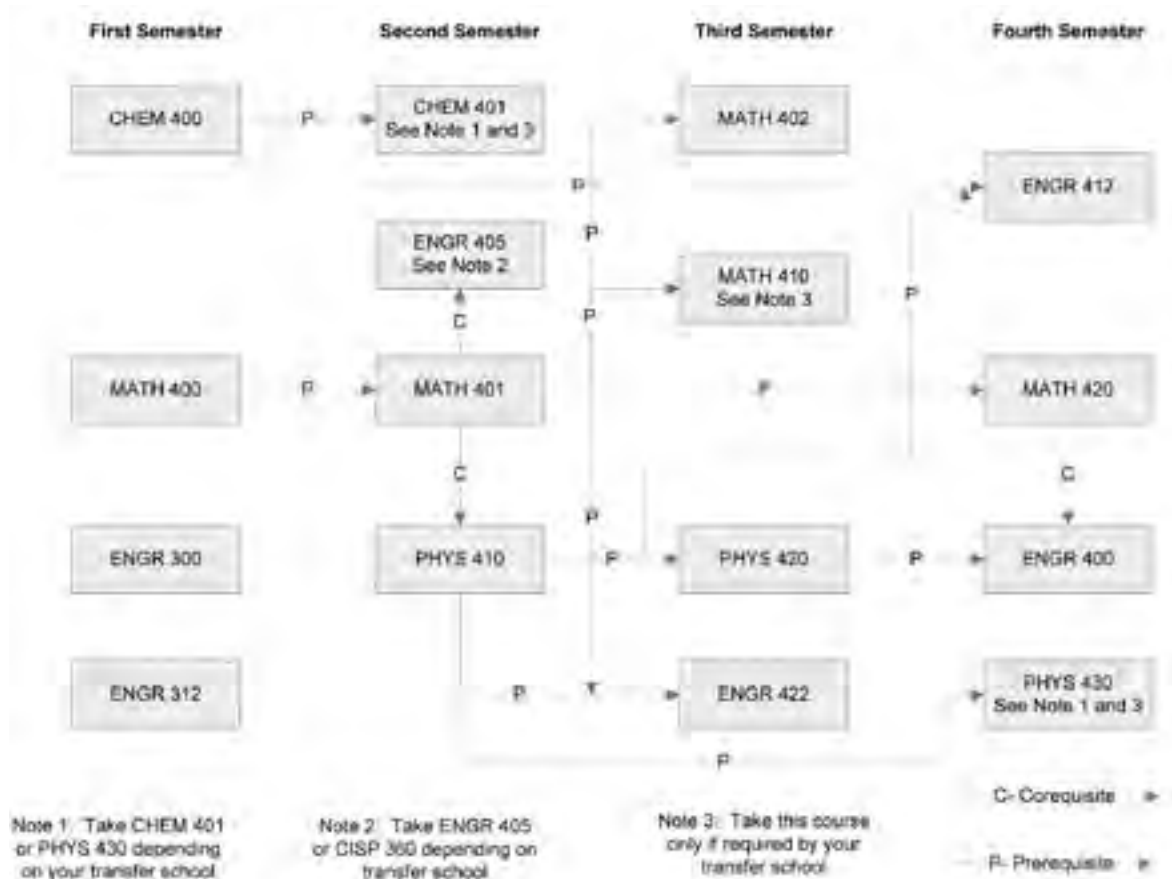
## Electrical/Computer Engineering Course Flow



### General (Undecided) Engineering Course Flow



### Mechanical/Aeronautical Engineering Course Flow



## Engineering (ENGR)

### ENGR 300 Introduction to Engineering 1 Unit

*Prerequisite:* None.

*Course Transferable to UC/CSU*

*Hours:* 18 hours LEC

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 4 Units

*Prerequisite:* MATH 335 with a grade of "C" or better

*Advisory:* Completion of or concurrent enrollment in a basic drafting course such as ENGR 312.

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 54 hours LAB

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. (C-ID ENGR 180)

### ENGR 312 Engineering Graphics 3 Units

*Prerequisite:* MATH 335 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.

*Course Transferable to UC/CSU*

*Hours:* 36 hours LEC; 72 hours LAB

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 3 Units

*Prerequisite:* PHYS 420 with a grade of "C" or better

*Corequisite:* MATH 420

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

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. (C-ID ENGR 260)

### ENGR 405 Engineering Problem Solving 3 Units

*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.

*Course Transferable to UC/CSU*

*Hours:* 36 hours LEC; 54 hours LAB

This course provides an introduction to the use of computers in solving engineering problems using MATLAB. Students will learn to use basic programming techniques including program control, relational and logical operators, selection scripting, and file management while implementing computational solutions.

### ENGR 412 Properties of Materials 4 Units

*Prerequisite:* CHEM 400 and PHYS 410 with grades of "C" or better

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 54 hours LAB

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 3 Units

*Prerequisite:* MATH 401 and PHYS 410 with grades of "C" or better

*Advisory:* Completion of a drafting course prior to enrolling in this course will facilitate the analysis of statics problems.

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

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. Contact an engineering instructor and/or the transfer center for specific transfer institution requirements. (C-ID ENGR 130)

### ENGR 495 Independent Studies in Engineering 1-3 Units

*Prerequisite:* None.

*Course Transferable to UC/CSU*

*Hours:* 162 hours LAB

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 .5-4 Units

*Prerequisite:* None

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 36 hours LAB

See Experimental Offerings. 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.