

Engineering

Science, Mathematics & Engineering

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Pre-Professional Transfer Opportunities

DEGREE

A.S. — Engineering

Program Description

CRC's program 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 Opportunities

Aerospace Engineer	Architectural Engineer
Chemical Engineer	Civil Engineer
Computer Engineer	Electrical Engineer
	Mechanical Engineer, and other types of engineers

Most Career Opportunities require a B.S. degree.

Highlights

- Challenging and rewarding classes that transfer to four-year universities
- A Mathematics, Engineering and Science Achievement (MESA) program

NOTE TO TRANSFER STUDENTS:

If you are interested in transferring to a four-year college or university to pursue a bachelor's degree in this major, it is critical that you meet with a CRC counselor to select and plan the courses for your major. Schools vary widely in terms of the required preparation. The courses that CRC requires for an associate's degree in this major may be different from the requirements needed for the bachelor's degree.

For information about the student learning outcomes for this program, see <http://www.crc.losrios.edu/pslo>

DEGREE

A.S. — Engineering

CODE #1482

This degree is designed to meet common lower division requirements for a major in Engineering.

REQUIRED PROGRAM.....Units

Civil/Mechanical Engineering Option:

CHEM 400 General Chemistry	5
CISP 360 Introduction to Structured Programming	4
ENGR 400 Introduction to Electrical Circuits and Devices	3
ENGR 312 Engineering Graphics.....	3
ENGR 420 Statics	3
ENGR 412 Properties of Materials	3
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
TOTAL UNITS REQUIRED	48

Suggested Electives:

ENGR 310; PHYS 431

Electrical/Computer Engineering Option:

CHEM 400 General Chemistry	5
CISP 360 Introduction to Structured Programming	4
ENGR 400 Introduction to Electrical Circuits Devices	3
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
TOTAL UNITS REQUIRED	39

Electives:

(may be required at some universities; check university requirements): Engineering 303, Introduction to Logic Design; Mathematics 410, Linear Algebra; Physics 431, Heat, Waves, Light and Modern Physics.

G.E. Graduation Requirements for this degree - see pages 20-21

ENGINEERING (ENGR)

ENGR 300

Introduction to Engineering

1 Unit

Prerequisite: None

Course Transferable to UC/CSU

Hours: 18 hours LEC

This course will provide students with information to evaluate the engineering profession as a personal career choice. Students will explore the branches of engineering and the different types of work that engineers do. Participants will investigate personal characteristics which contribute to being happy and successful engineers, and will examine their own traits. They will learn what preparation is needed and strategies for successful completion. Course participants will appreciate the role of engineers in society and understand the responsibilities of engineers in their service to society.

ENGR 303

Introduction to Logic Design

4 Units

Prerequisite: None

Advisory: Any previous or concurrent programming class, MATH 120,

Course Transferable to CSU

Hours: 54 hours LEC ; 54 hours LAB

This is an introductory course in the fundamentals of designing digital computer hardware. This course covers: logic gates, binary number systems, 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. Lab emphasizes the use of a software equation entry tool, the use of schematic entry, and the use of a logic simulation tool. Lab assignments are design oriented. Required for Electrical/Electronics Engineering and Computer Engineering majors. Helpful for Computer Science majors. Recommended for students wishing to sample computer engineering, and for current and future electronics technicians.

ENGR 310

Engineering Survey Measurements

4 Units

Prerequisite: Completion of high school trigonometry or MATH 335 with a grade of "C" or better

Course Transferable to UC/CSU

Hours: 54 hours LEC ; 54 hours LAB

This course covers the theory and practice of measurements for distance and direction, both horizontal and vertical. Applications include layouts, traverse adjustments, areas, state plane coordinates, boundary surveys, mapping, horizontal curves, vertical curves, and earthwork computations. Students will use equipment in the field, learn computational practices, and present project summaries. Students will make field measurements with both traditional and electronic equipment. This course is required for B.S. degrees in civil engineering at many universities.

ENGR 312

Engineering Graphics

3 Units

Prerequisite: None

Advisory: Completion of MATH 112 or high school geometry; and MATH 120.

Course Transferable to UC/CSU

Hours: 36 hours LEC ; 72 hours LAB

Students will learn the graphical tools needed to develop and communicate engineering ideas. They will present three dimensional objects in drawings (basic drafting principles) and solve engineering problems by constructing views of objects from different points of view (descriptive geometry). Participants will create drawings using both pencil and paper and computer aided drafting/design (CADD). Students will learn the steps in a design process and will practice applying it. This course is primarily for Mechanical and Civil Engineering majors.

ENGR 400

Introduction to Electrical Circuits and Devices

3 Units

Prerequisite: PHYS 421 with a grade of "C" or better

Course Transferable to UC/CSU

Hours: 54 hours LEC ; 18 hours LAB

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.

ENGR 412

Properties of Materials

3 Units

Prerequisite: CHEM 400 and PHYS 411 with grades of "C" or better

Course Transferable to UC/CSU

Hours: 36 hours LEC ; 54 hours LAB

This is an introductory course on the relationship of the internal structure of materials to their properties. Topics include crystalline structure, imperfections, phases and phase diagrams, steels and non-ferrous alloys, polymers, ceramics, semiconductors, and corrosion. Students will apply the concepts in laboratory activities and will use typical materials testing equipment and analysis techniques. This course is required for CRC's A.S.-Engineering, Civil/Mechanical Engineering option degree, and many university engineering B.S. degrees.

ENGR 420

Statics

3 Units

Prerequisite: PHYS 411 and MATH 401 with a grade of "C" or better

Course Transferable to UC/CSU

Hours: 54 hours LEC

This course covers analysis of two and three dimensional force systems for bodies in static equilibrium. Vector and scalar analysis methods address forces acting on rigid bodies, trusses, frames, and machines. Students will calculate internal forces in members and will create shear and bending moment diagrams for beams. Friction problems will include slipping vs tipping, and belt friction. Students will learn methods to calculate centroids and moments of inertia for bodies that are combinations of simple geometric shapes. This course is required for most engineering majors.

ENGR 495**Independent Studies in Engineering****1-3 Units***Prerequisite: None**Course Transferable to CSU**See UC Limitations & Counselor**Hours: 18 hours LEC ; 54 hours LAB***ENGR 498****Work Experience in Engineering****1-4 Units***Prerequisite: None**Course Transferable to CSU**Hours: 300 hours LAB*

This course provides students with opportunities to develop marketable skills in preparation for employment or advancement within their current job. Course content will include understanding the application of education to the workforce; completion of required forms, which document the student's progress and hours spent at the work site; and developing workplace skills and competencies. During the course of the semester, the student is required to fulfill an 18 hour orientation and 75 hours of related paid work experience, or 60 hours of unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. The course may be taken again when there is new or expanded learning on the job for a maximum of 16 units.

ENGR 499**Experimental Offering in Engineering****.5-4 Units***Prerequisite: None**Course Transferable to CSU**Hours: 18 hours LEC ; 54 hours LAB*