

Area: Science and Engineering  
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ARC's program provides the foundation in mathematics, physics, and engineering necessary to transfer to a four-year institution and complete a bachelor's degree in engineering. Students should consult the institution to which they wish to transfer for the specific lower division requirements.

Most lower division engineering programs require the following ARC courses: Mathematics 400, 401, 402, 420; Physics 410, 421, 431; Chemistry 400, and Engineering 401, 413, 420, 430. See also *Design & Engineering Technology*.

**ENGR 300 Introduction to Engineering 1 Unit**

*Advisory: ENGWR 102 or 103 and ENGRD 116 or ESLR 320 AND ESLW 320.*

*Course Transferable to UC/CSU*

*Hours: 18 hours LEC*

This course is an introduction to the engineering and engineering technology professions and their place in industry. It includes an explanation of engineering and engineering technology options and curricula involved. The topics include an emphasis on problem-solving techniques used in engineering and engineering technology. This course is recommended for all entering engineering, engineering technology and design technology students.

**ENGR 305 Basic Technical Drawing 3 Units**

*Advisory: ENGWR 102 or 103 and ENGRD 116; or ESLR 320 and ESLW 320, or placement through the assessment process.*

*Course Transferable to CSU*

*Hours: 36 hours LEC; 72 hours LAB*

This course introduces the graphical tools and instruments used to generate, analyze and interpret engineering drawings. This class is required for engineering students. Topics include lettering, geometric construction, or orthographic projection, auxiliary drawings, sectioning, and dimensioning.

**ENGR 307 Industrial Materials Testing 3 Units**

*Prerequisite: MATH 100 with a grade "C" or better.*

*Advisory: MATH 120.*

*Course Transferable to CSU*

*Hours: 54 hours LEC; 36 hours LAB*

This course covers the basic properties of materials used in industry. The course emphasizes the practical use of the materials, but uses sufficient theory to understand these applications well. The course covers metals, concretes, plastics, ceramics, glasses, wood, and other composites. This course is primarily intended for design technology, engineering technicians and other technical students.

**ENGR 310 Engineering Survey Measurements 4 Units**

*Prerequisite: MATH 330.*

*Advisory: ENGWR 102 or 103, and ENGRD 116; or ESLR 320 and ESLW 320.*

*Course Transferable to UC/CSU*

*Hours: 54 hours LEC; 54 hours LAB*

This course covers the basic fundamentals of surveying for engineers. Electronic surveying instruments are used in this course to develop the principles of measurement for distance, elevations and angles.

Additional topics include discussions on systematic and random errors, line directions, profiles and cross-sections, traverse computations, horizontal and vertical curves, and earthwork quantity calculations. This course is intended for civil engineers, but may also be required for other programs. (CAN ENGR 10)

**ENGR 312 Engineering Graphics 3 Units**

*Prerequisite: ENGR 305 or DESGN 300 with a grade of "C" or better.*

*Course Transferable to UC/CSU*

*Hours: 36 hours LEC; 72 hours LAB*

This course applies the graphical tools needed to analyze, interpret and solve engineering problems. The engineering design process is taught using manual and introductory interactive computer-aided design and drafting (CADD) as tools to solve typical three-dimensional engineering problems. Topics include descriptive geometry, vector graphics, orthogonal projection, and primary and secondary auxiliary views. This course is intended for mechanical and civil engineers, but may also be required for other programs. (CAN ENGR 2)

**ENGR 320 Manufacturing Processes 3 Units**

*Prerequisite: ENGR 312 or DESGN 310; ENGWR 103 or 300 or ESLW 340.*

*Course Transferable to UC/CSU*

*Hours: 36 hours LEC; 54 hours LAB*

Principles of manufacturing processes in the areas of material removal, addition, joining, and change of form or condition. Hands-on experience in welding, machinery operation, (e.g. lathe, milling machine drill press, etc.) and various casting techniques (sand casting, etc).

**ENGR 401 Introduction to Electrical Circuits and Devices 3.5 Units**

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

*Corequisite: MATH 420.*

*Course Transferable to UC/CSU*

*Hours: 54 hours LEC; 36 hours LAB*

This course covers the basic fundamentals of electrical circuit theory and analysis for engineers. Topics include circuit analysis techniques, sinusoidal analysis, phasors, first- and second-order circuits with natural and step responses, operational amplifiers, and average power. This course is intended to provide a solid foundation for upper division engineering courses. (CAN ENGR 6)

**ENGR 413 Properties of Materials 4.5 Units**

*Prerequisite: PHYS 410 and CHEM 400 with a grade of "C" or better.*

*Advisory: ENGWR 300 or ESLR 340.*

*Course Transferable to UC/CSU*

*Hours: 72 hours LEC; 27 hours LAB*

This is an introductory course in properties of materials used in engineering. This course places emphasis upon the theory underlying the behavior of engineering materials. The course includes a laboratory component, in which work will cover the testing of metals, polymers, composites, wood and other materials. (CAN ENGR 4)

**ENGR 420 Statics** **3 Units**

*Prerequisite:* MATH 401 and PHYS 410 with grades of "C" or better.  
*Advisory:* ENGR 305 or DESGN 300, and MATH 410.

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This course covers the study of bodies in equilibrium with emphasis on force systems, structures, distributed loads, friction and virtual work. In this course, analytical rather than graphical methods of problem solving will be emphasized. (CAN ENGR 8)

**ENGR 428 Engineering Mechanics** **3 Units**

*Prerequisite:* Physics 410 with a grade of "C" or better.

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This course covers the study of bodies in equilibrium with emphasis on structures and friction, including methods to calculate centroids and moments of inertia. It also includes the fundamental principles of kinematics and kinetics, and the study of motion and force analysis of particles and rigid bodies.

**ENGR 430 Dynamics** **3 Units**

*Prerequisite:* ENGR 420 and MATH 402 with a grade of "C" or better.

*Advisory:* MATH 420; ENGWR 300 or ESLW 340.

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC

This course covers the basic fundamentals of dynamics for engineers. Topics include kinematics and kinetics of particles, systems of particles and rigid bodies; systems with fixed and rotating axes; and the equations of motion, energy and momentum.