The Engineering program offers courses necessary to transfer to a four-year university where students can complete a bachelor’s degree in various branches of engineering.

Most lower division engineering programs require the following ARC courses: Mathematics 400, 401, 402, 420; Physics 410, 421, 431; Chemistry 400; Engineering 401, 413, 420. Students should consult the institution to which they wish to transfer for specific lower division requirements.

### Engineering

**ENGR 300 Introduction to Engineering** 1 Unit
Advisory: ENGWR 102 and ENGRD 116 with a grade of “C” or better, OR ESLL 320 and ESLR 320 and ESLW 320 with a grade of “C” or better.
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 the engineering and engineering technology options and curricula involved. 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 and ENGRD 116 with a grade of “C” or better; OR ESLL 320 and ESLR 320 and ESLW 320 with a grade of “C” or better.
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. Topics include lettering, geometric construction, or orthographic projection, auxiliary drawings, sectioning, and dimensioning.

**ENGR 310 Engineering Survey Measurements** 4 Units
Prerequisite: MATH 330 with a grade of “C” or better
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 to develop the principles of measurement for distance, elevations and angles. Additional topics include 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.

**ENGR 312 Engineering Graphics** 3 Units
Advisory: ENGR 305
Course Transferable to UC/CSU
Hours: 36 hours LEC; 72 hours LAB

This course covers the application of graphical tools to analyze, interpret, and solve engineering problems. The engineering design process is taught using manual and introductory interactive computer-aided design and drafting (CADD) 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 engineering majors but may also be required for other programs.

**ENGR 401 Introduction to Electrical Circuits and Devices** 4 Units
Prerequisite: PHYS 421 with a grade of “C” or better
Corequisite: MATH 420
Course Transferable to UC/CSU
Hours: 72 hours LEC

This course covers the fundamentals of electrical circuit theory and analysis for engineers. Topics include time domain circuit analysis techniques, circuit reduction techniques, frequency domain circuit analysis, first- and second-order circuits with natural and step responses, and operational amplifiers. This course provides a solid foundation for upper division engineering courses.

**ENGR 413 Properties of Materials** 4.5 Units
Prerequisite: CHEM 400 and PHYS 410 with grades of “C” or better
Advisory: ENGWR 102 and ENGRD 116 with a grade of “C” or better, OR ESLL 320 and ESLR 320 and ESLW 320 with a grade of “C” or better.
Course Transferable to UC/CSU
Hours: 72 hours LEC; 27 hours LAB

This is an introductory course in the properties of materials used in engineering. This course places emphasis upon the theory underlying the behavior of engineering materials. It includes a laboratory component, which covers the testing of metals, polymers, composites, wood, and other materials.

**ENGR 420 Statics** 3 Units
Prerequisite: MATH 401 and PHYS 410 with grades 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 force systems, structures, distributed loads, friction and virtual work. In this course, analytical rather than graphical methods of problem solving are emphasized. (C-ID ENGR 130)
ENGR 495  Independent Studies in Engineering  1-3 Units

Prerequisite: None
Course Transferable to CSU
Hours: 54-162 hours LAB

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.