## Physical Science and Engineering

*A.S. DEGREE: 60 units*

**DESCRIPTION**

This option provides a broad background in the sciences. Students completing this degree will have learned to integrate math and science to solve problems, have proficiency in laboratory techniques and analysis of experimental data, and will have demonstrated an ability to communicate effectively using written, oral, electronic, and graphical means. This degree will prepare students interested in transferring to four-year colleges or universities to pursue degrees in any of the natural or physical sciences (astronomy, chemistry, geology or geophysics, general science, meteorology, oceanography, physics, etc.) Students electing this major are encouraged to consult the catalogs of the four-year schools to which they plan to transfer early in their Gavilan course work as requirements for transfer vary by institution. Engineers are responsible for designing and building everything that we use – airplanes, roads, machines, computers, buildings, artificial limbs.

**PROGRAM LEARNING OUTCOMES**

Upon successful completion of this program, students will be able to:

- Demonstrate appropriate integration of math and science to solve real-world problems.
- Demonstrate appropriate design and execution of experiments, as well as analysis and interpretation of the data.
- Demonstrate an ability to communicate clearly using written, oral, electronic, and graphical means.

**REQUIREMENTS (43 UNITS)**

| | | |
|---|---|---|
| CHEM1A | General Chemistry | 5 |
| CHEM1B | General Chemistry | 5 |
| MATH1A | Single-Variable Calculus and Analytic Geometry | 4 |
| MATH1B | Single-Variable Calculus and Analytic Geometry | 4 |
| MATH1C | Multivariable Calculus | 4 |
| MATH2 | Linear Algebra | 3 |
| MATH2C | Differential Equations | 3 |
| ENGR5 | Engineering Programming and Problem Solving | 3 |
| PHYS4A | Physics for Scientists and Engineers - Mechanics | 4 |
| PHYS4B | Physics for Scientists and Engineers - Electricity and Magnetism | 4 |
| PHYS4C | Physics for Scientists and Engineers - Heat, Optics, Modern Physics | 4 |

**GENERAL EDUCATION REQUIREMENTS:**

A student may complete the Gavilan College A.A./A.S. general education, the CSU-GE Breadth or the IGETC pattern, plus sufficient electives to meet a 60 unit total. See counselor for details.

NOTE: A course may be used to satisfy both general education and major courses. See "Double Counting Rule"

## Physical Science and Engineering: General Eengineering

*A.S. DEGREE: 60 units*

**DESCRIPTION**

This option constitutes the lower-division core classes suggested by the Engineering Liaison Council (ELC), an organization composed of representatives from two- and four-year colleges and universities. Students completing this degree will have learned to identify various engineering problems and integrate math and science to solve them, have proficiency in the design, execution, analysis, and interpretation of experiments, demonstrate familiarity with the engineering design process, and will have demonstrated an ability to communicate effectively using written, oral, electronic, and graphical means. This degree will prepare students to transfer to four-year colleges or universities to pursue degrees in any of the engineering disciplines (aeronautical, chemical, civil, computer, electrical, industrial, materials, mechanical, etc.). Students electing this major are encouraged to consult the catalogs of the four-year schools to which they plan to transfer early in their Gavilan course work as requirements for transfer vary by institution.

**PROGRAM LEARNING OUTCOMES**

Upon successful completion of this program, students will be able to:

- Identify, compare and contrast engineering problems and demonstrate integration of math and science to solve them.
- Demonstrate appropriate design and execution of experiments, as well as analyze and interpret of the data.
- Demonstrate the engineering design process by designing a system, component or process to meet a desired need.
- Demonstrate an ability to communicate clearly using written, oral, electronic and graphical means.

**REQUIREMENTS (59 UNITS)**

| | | |
|---|---|---|
| CHEM1A | General Chemistry | 5 |
| CHEM1B | General Chemistry | 5 |
| ENGL1A | Composition | 3 |
| ENGR1 | Graphical Communication and Design | 3 |
| ENGR2 | Statics | 3 |
| ENGR3 | Electric Circuit Analysis | 4 |
| ENGR4 | Properties Of Materials | 3 |
| ENGR5 | Engineering Programming and Problem Solving | 3 |