

# ENGINEERING, CERTIFICATE OF ACHIEVEMENT

Engineering, with its many specialties, is a field of study that draws heavily on the foundational concepts of physics and chemistry, and which uses mathematics to analyze relevant numerical data to arrive at solutions to engineering problems. The curriculum offered in the Certificate of Achievement in Engineering is rooted in foundational scientific and mathematical concepts; however, it also encompasses long-standing and evolving principles in engineering and their real-world applications. The Engineering COA is designed for students who are preparing to transfer to a four-year university to complete their Bachelor of Science studies in Engineering. Completion of this COA will effectively prepare students for internship opportunities with local engineering firms. Students earning the Engineering COA may also be eligible to earn the AS in Engineering by completing the additional required courses in the VCCCD General Education Pattern. To earn the Certificate of Achievement in Engineering, students must complete 45 or 47 specified units.

Completion of the lower division required courses is essential in facilitating progress as an upper division engineering student. It is important that student engineers meet with an engineering transfer counselor and/or the Engineering Department for specific requirements for transfer.

## Course List

Course ID	Title	Units/ Hours
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### Required Core Courses

CHEM V01A & V01AL	General Chemistry I and General Chemistry I Laboratory	5
ENGR V01	Introduction to Engineering	3
MATH V21A	Calculus with Analytic Geometry I	5
MATH V21B	Calculus with Analytic Geometry II	5
MATH V21C	Multivariable Calculus	5
PHYS V04 & V04L	Mechanics for Scientists and Engineers and Mechanics Laboratory for Scientists and Engineers	5
PHYS V05 & V05L	Electricity and Magnetism for Scientists and Engineers and Electricity and Magnetism Laboratory for Scientists and Engineers	5

**Required Core Units 33**

**Required Additional Courses (12-14 units) 12-14**

### - List A. Select 3 or 5 units:

CHEM V01B	General Chemistry II	3
CHEM V01BL	General Chemistry II Laboratory	2
MATH V22	Introduction to Linear Algebra	3
MATH V23	Introduction to Differential Equations	3
PHYS V06 & V06L	Optics, Heat, and Modern Physics: For Scientists and Engineers and Optics, Heat, and Modern Physics Laboratory for Scientists and Engineers	5

**- From Lists B and C: Select a total of 9 units, as indicated below:**

### - List B. Select 3 to 9 units:

ENGR V02	Engineering Graphics and Design	3
ENGR V12	Engineering Statics	3
ENGR V14	MATLAB: Programming and Problem Solving	3
ENGR V16	Electronic Circuit Analysis	3
ENGR V16L	Electronic Circuits Laboratory	1
ENGR V18 & V18L	Engineering Materials and Engineering Materials Laboratory	4
<b>- List C. May select 3 or 6 units as part of the 9 units:</b>		
CS V11	Programming Fundamentals	3
CS V13	Object-Oriented Programming	3
CS V15	Data Structures and Algorithms	3
CS V17/MATH V52	Discrete Structures	3
CS V19	Computer Architecture and Organization	3
CS V30	Beginning C++	3
CS V40	Beginning Java	3
CS V42	Intermediate Java	3
<b>Total Required Units</b>		<b>45-47</b>

Required Core Units	33
Restricted Elective Units	12-14
<b>Total Required Major Units</b>	<b>45-47</b>

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

- Analyze and interpret data to make engineering problem decisions.
- Identify, formulate, and solve basic engineering problems