

## 2020-2021 Engineering: Mechanical, Aerospace, Manufacturing Transfer Preparation Certificate of Achievement

Complete the following program of study (Major #C.3014.CA). Major requirements (42 units minimum).

A student earning this certificate of achievement will have completed the lower division coursework necessary to transfer into a bachelor's degree program in Mechanical, Aerospace, or Manufacturing Engineering. In addition, a student earning this certificate of achievement will be prepared for engineering internship opportunities.

**Name:** \_\_\_\_\_ **Student ID:** \_\_\_\_\_ **Date:** \_\_\_\_\_

### Course Overview and Selection

#### Required Core Courses:

Course	Course Description	Units	Completed	In Progress	Planned
<b>ENGR 10</b>	Introduction to Engineering	<b>2</b>			
<b>MATH 5A</b>	Math Analysis I	<b>5</b>			
<b>MATH 5B</b>	Math Analysis II	<b>4</b>			
<b>MATH 6</b>	Math Analysis III	<b>5</b>			
<b>MATH 17</b>	Differential Equations and Linear Algebra	<b>5</b>			
<b>PHYS 4A</b>	Physics for Scientists and Engineers	<b>4</b>			
<b>PHYS 4B</b>	Physics for Scientists and Engineers	<b>4</b>			

**\*Select a minimum of four courses from the following:**

Course	Course Description	Units	Completed	In Progress	Planned
<b>ENGR 2</b>	Engineering Graphics	<b>4</b>			
<b>ENGR 4</b>	Engineering Materials	<b>3</b>			
<b>ENGR 6</b>	Electric Circuits Analysis with Lab	<b>4</b>			
<b>ENGR 8</b>	Statics	<b>3</b>			
<b>**ENGR 40 or **ENGR 5 or **CSCI 40</b>	Programming for Scientists and Engineers <i>or</i> Programming and Problem-Solving in MATLAB <i>or</i> Programming Concepts and Methodology I	<b>4 or 3 or 4</b>			
<b>CHEM 1A</b>	General Chemistry	<b>5</b>			
<b>PHYS 4C</b>	Physics for Scientists and Engineers	<b>4</b>			

#### Notes:

*\*Student should carefully plan which of these courses to take based on their specific major and intended transfer institution(s). Some transfer institutions will have minimum requirements for transfer that will necessitate choosing more than 4 courses from this section.*

*\*\*Student should complete the programming course specifically required by his or her transfer institution of choice. The choices are ENGR 40 Programming for Scientists and Engineers (4 units), ENGR 5 Programming and Problem Solving in MATLAB (3 units), and CSCI 40 Programming Concepts and Methodology I (4 units).*

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## Program Learning Outcomes:

A student who successfully completes this certificate of achievement will be able to:

1. Apply knowledge of mathematics, science, and engineering fundamentals to solve engineering problems.
2. Conduct laboratory experiments. Analyze and interpret the data resulting from these experiments.
3. Make basic design decisions concerning engineering problems.
4. Communicate solutions to engineering problems using effective oral, written, and graphical methods.
5. Demonstrate knowledge of the impact of engineering solutions in a global and societal context.
6. Use the techniques, skills, and software tools of modern engineering practice.

## At the time of graduation, a student completing this course will be able to:

- A student earning this certificate of achievement will have completed the lower division STEM coursework necessary to transfer into a bachelor's degree program in Mechanical, Aerospace, or Manufacturing Engineering. In addition, a student earning this certificate of achievement will be prepared for engineering internship opportunities.
- The college has heretofore had a successful program for general engineering transfer. Associated with this program is an existing AS degree called Engineering. Most engineering transfer students have heretofore transferred successfully without completing the requirements for this degree. The main reason for this has been that the high units loads in the program's STEM areas have precluded the students from taking enough general education units to meet the AS degree requirements. Engineering students at four-year universities have this same issue and are allowed by their institutions to spread their lower division general education coursework over all four years of their degree. This certificate will effectively allow our engineering transfer students to do the same thing while also earning a credential from our college that recognizes their achievement.
- Our existing Engineering AS degree is being replaced by four new more specific certificates of achievement, this certificate of achievement being one of them. The new certificates of achievement recognize that students will likely transfer without fully completing lower division education requirements and also recognize the slight differences in lower division preparation between the different types of engineering BS degrees and guide the students accordingly. These new certificates of achievement proposals follow closely the recommendations of the California FDRG group for lower division engineering preparation. All courses in the new certificates of achievement are existing Clovis Community College courses that students have been using successfully to transfer to four-year engineering programs.
- For students who wish to transfer in engineering and in addition earn an Associate of Science degree, the college has also developed four engineering AS degrees. These are essentially the same as the engineering certificates of achievement, but include the local general education requirements for our AS degrees

## Comments: