

PROGRAM/CERTIFICATE/AREA OF EMPHASIS MODIFICATION

1. Type of Modification:

- Associate Degree
- Certificate
- Area of Emphasis

Title: Electrical and Computer Engineering

2. INITIATED BY: Keenan Murray, Engineering & Physical Sciences
(Instructor, Division/Department)

3. CHECK ITEMS TO BE MODIFIED: From the current catalog, provide a copy of the **existing** program with the modifications indicated.

- Associate Degree Title
- Associate Degree Major Requirements
- Associate Degree Description
- Certificate Requirements
- Certificate Description
- Area of Emphasis
- Program Screening Requirements
- Other

4. REASON FOR MODIFICATION: Provide a concise statement explaining why this program/certificate is being modified and how it will improve the department and the campus-wide curriculum.

The Physics courses have been renumbered so we are updating the prerequisite to fit the new system

5. DOES THIS MODIFICATION AFFECT AND/OR DUPLICATE ANOTHER ASSOCIATE DEGREE, CERTIFICATE OR AREA OF EMPHASIS? At Cuyamaca College Yes No At Grossmont College Yes No

If yes, identify the division or department to whom a Letter of Intent has been sent, with the accompanying proposed program and evidence of response in order that articulation may be arranged. In cases where it affects a program or certificate at Cuyamaca College, please notify the applicable chair/coordinator and submit a Modification of Program. Attach the original Letter of Intent showing the response from the division or department. The Curriculum Committee will not review any proposal that affects Grossmont or any division or department at Cuyamaca unless the completed Letter of Intent is attached.

Division/Department	College	Date Sent	Date Returned
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I have reviewed this form for completeness and recommend this modification:

Keenan Murray
Department Chair/Coordinator

3/19/23
Date

do not recommend this modification:

Kim Dudzik
Division Dean

3/20/23
Date

Vice President, Instruction
(following Curriculum Committee action)

Date

Note:

- Students pursuing an emphasis in biochemistry should also take the following courses: BIO 230, 240.
- Students who intend to enroll at UCSD should take MATH 285 and check with the Counseling Center regarding program options.

ENGINEERING

This degree program is designed to cover the first two years of a four-year program leading to the bachelor's degree in engineering at most four-year colleges and universities. While the bachelor's degree is usually the minimum needed to practice as an engineer, the associate degree will permit an individual to find work in most engineering firms as an engineering aide.

CAREER OPPORTUNITIES

- * Aerospace Engineer
- * Agricultural Engineer
- * Architectural Engineer
- * Biomedical Engineer
- * CAD/CAM Engineer
- * Chemical Engineer
- * Civil Engineer
- Civil Engineering Technician
- * Computer Engineer
- * Electrical Engineer
- Electrical Engineering Technician
- * Environmental Engineer
- * Geological Engineer
- * Industrial Engineer
- Industrial Engineering Technician
- * Manufacturing Engineer
- * Marine Engineer
- * Materials Engineer
- * Mechanical Engineer
- Mechanical Engineering Technician
- * Mining Engineer
- * Nuclear Engineer
- * Petroleum Engineer
- * Structural Engineer
- * Systems Engineer
- * Robotics Engineer
- * Bachelor's degree or higher required

I. CIVIL ENGINEERING

Program Learning Outcomes

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

- Draw conclusions about simple and complex systems by collecting, assessing, and analyzing information.
- Communicate technical ideas in group and professional settings in both written and oral form.

Associate in Science Degree Requirements:

Course	Title	Units
CHEM 141	General Chemistry I	5
ENGR 100	Introduction to Engineering and Design	4
ENGR 119	Basic Engineering CAD	3
or		
CADD 120	Introduction to Computer-Aided Drafting and Design	3
ENGR 120	Engineering Computer Applications	3
ENGR/SURV 218	Plane Surveying	4
ENGR 225	Mechanics for Civil Engineers	3
ENGR 260	Engineering Materials	3
MATH 160	Elementary Statistics	4
MATH 180	Analytic Geometry and Calculus I	5
MATH 280	Analytic Geometry and Calculus II	4

MATH 281	Multivariable Calculus	4
MATH 285	Differential Equations	3
PHYC 190	Mechanics and Heat	5
PHYC 200	Electricity and Magnetism	5
Total Required		55
Plus General Education Requirements		

II. ELECTRICAL AND COMPUTER ENGINEERING

Program Learning Outcomes

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

- Visualize 3D objects and sketch them accurately in 2D.
- Solve engineering problems through computer modeling, employing a computer language such as C or Java.
- Design and write computer programs that employ linked list memory management, stacks, tree data structures, and searching and sorting algorithms.
- Determine the DC and steady-state AC voltages and currents everywhere in an electric circuit composed of passive components.
- Model linear systems of arbitrary size and complexity using linear algebra.
- Model transient and steady-state electrical systems using systems of 2nd order differential equations.
- Apply Green's theorem, Stokes' theorem, and Maxwell's equations to solve simple problems in electrostatics and electromagnetism.
- Analyze and design combinational and sequential digital logic systems of arbitrary complexity, including (for example) Moore and Mealy sequential machines.

Associate in Science Degree Requirements:

Course	Title	Units
CHEM 141	General Chemistry I	5
CS 181	Introduction to C++ Programming	4
or		
CS 182	Introduction to Java Programming	4
CS 281	Intermediate C++ Programming	4
or		
CS 282	Intermediate Java Programming and Fundamental Data Structures	4
ENGR 100	Introduction to Engineering and Design	4
ENGR 210	Electric Circuits	4
ENGR 270	Digital Design	4
MATH 180	Analytic Geometry and Calculus I	5
MATH 245	Discrete Mathematics	3
or		
MATH 281	Multivariable Calculus	4
MATH 280	Analytic Geometry and Calculus II	4
MATH 284	Linear Algebra	3
MATH 285	Differential Equations	3
PHYC 190	Mechanics and Heat	5
PHYC 200	Electricity and Magnetism	5
Total Required		53-54
Plus General Education Requirements		
PHYC 201	Mechanics and Waves	5
PHYC 202	Electricity, Magnetism, & Heat	5

III. MECHANICAL AND AEROSPACE ENGINEERING

Program Learning Outcomes

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

- Visualize 3D objects and draw them in 2D, both by sketching and through the use of computer-aided drafting software; produce a complete set of drawings sufficient to manufacture a part, including dimensions and tolerances.
- Solve engineering problems through computer modeling, employing an engineering computer language such as Matlab.

- Design a rigid structure such as a bridge, determining forces in each part of the structure. Determine the weight and location of the structure's center of gravity.
- Design a dynamic system such as a piston or linkage and compute forces, accelerations, and speeds of all components of the system.
- Select an appropriate material for manufacturing a part or product and determine the appropriate material processing techniques to produce the part. Justify the choice of material on the basis of macroscopic mechanical properties as well as microstructure.
- Determine the DC and steady-state AC voltages and currents everywhere in an electric circuit composed of passive components.
- Model vibrating systems using systems of 2nd order differential equations.

Associate in Science Degree Requirements:

Course	Title	Units
CHEM 141	General Chemistry I	5
ENGR 100	Introduction to Engineering and Design	4
ENGR 120	Engineering Computer Applications	3
ENGR 200	Engineering Mechanics--Statics	3
ENGR 210	Electric Circuits	4
ENGR 220	Engineering Mechanics--Dynamics	3
ENGR 260	Engineering Materials	3
MATH 180	Analytic Geometry and Calculus I	5
MATH 280	Analytic Geometry and Calculus II	4
MATH 281	Multivariable Calculus	4
MATH 285	Differential Equations	3
PHYC 190	Mechanics and Heat	5
PHYC 200	Electricity and Magnetism	5
PHYC 210	Wave Motion and Modern Physics	5
Total Required		56
Plus General Education Requirements		

ENVIRONMENTAL SCIENCE FOR TRANSFER (AS-T)



Associate Degree for TransferSM

The AS-T in Environmental Science for Transfer is an inter-disciplinary program that presents the student with a rigorous and broad foundation in the sciences most relevant to environmental issues including biology, chemistry, physics, earth science, statistics and mathematics. The AS-T in Environmental Sciences is specifically designed to prepare students for transfer to California State University, where a baccalaureate degree may be earned in Environmental Science or a closely related field.

The following is required for the AS-T in Environmental Science for Transfer degree:

- Minimum of 60 semester or 90 quarter CSU-transferable units.
- Minimum grade point average (GPA) of at least 2.0 in all CSU-transferable coursework.
- Minimum of 18 semester or 27 quarter units in the major.
- A grade of "C" or higher or "Pass" in all courses required for the major.