

# **Bachelors of Science-Material Science Engineering**

## Program Description

Materials engineers are responsible for designing and developing new and improved materials for a wide variety of engineering applications. Courses in materials teach students about the structure of materials, how to process them to improve their structure and how the structure affects their properties and performance

Materials science and engineering is concerned with the fundamental relationships between the structure and processing of materials and their properties. Materials engineers apply the principles of chemistry and physics to research, create and produce highly-developed materials used in advanced technologies. They create or select the best material and develop processing techniques to improve its properties, reliability and value.

From cellular phones to artificial hip implants and high-performance bike frames, materials scientists and engineers work to develop products that improve quality of life. By optimizing performance, reducing costs and developing new metals, plastics, ceramics, semiconductors and composites, they bring advances to the automobile, aerospace, construction, manufacturing, electronics, computer and telecommunications industries.

These engineers use highly sophisticated analytical and processing equipment to replicate the characteristics of materials and their components, developing the ability to create and then study findings at an atomic level. Their responsibilities may also include evaluating data on field-tested materials to determine the effects of the environment on materials performance.

## Career Opportunities

Materials engineers are in demand in a wide range of industries, including the automotive, aerospace, electronics, semiconductor, computer and healthcare professions. The career paths in these industries offer opportunities to impact technological advances through working in a team environment with engineers from the chemical, electrical, mechanical, aerospace and other engineering disciplines.

### **Chandler Gilbert Community College Contact**

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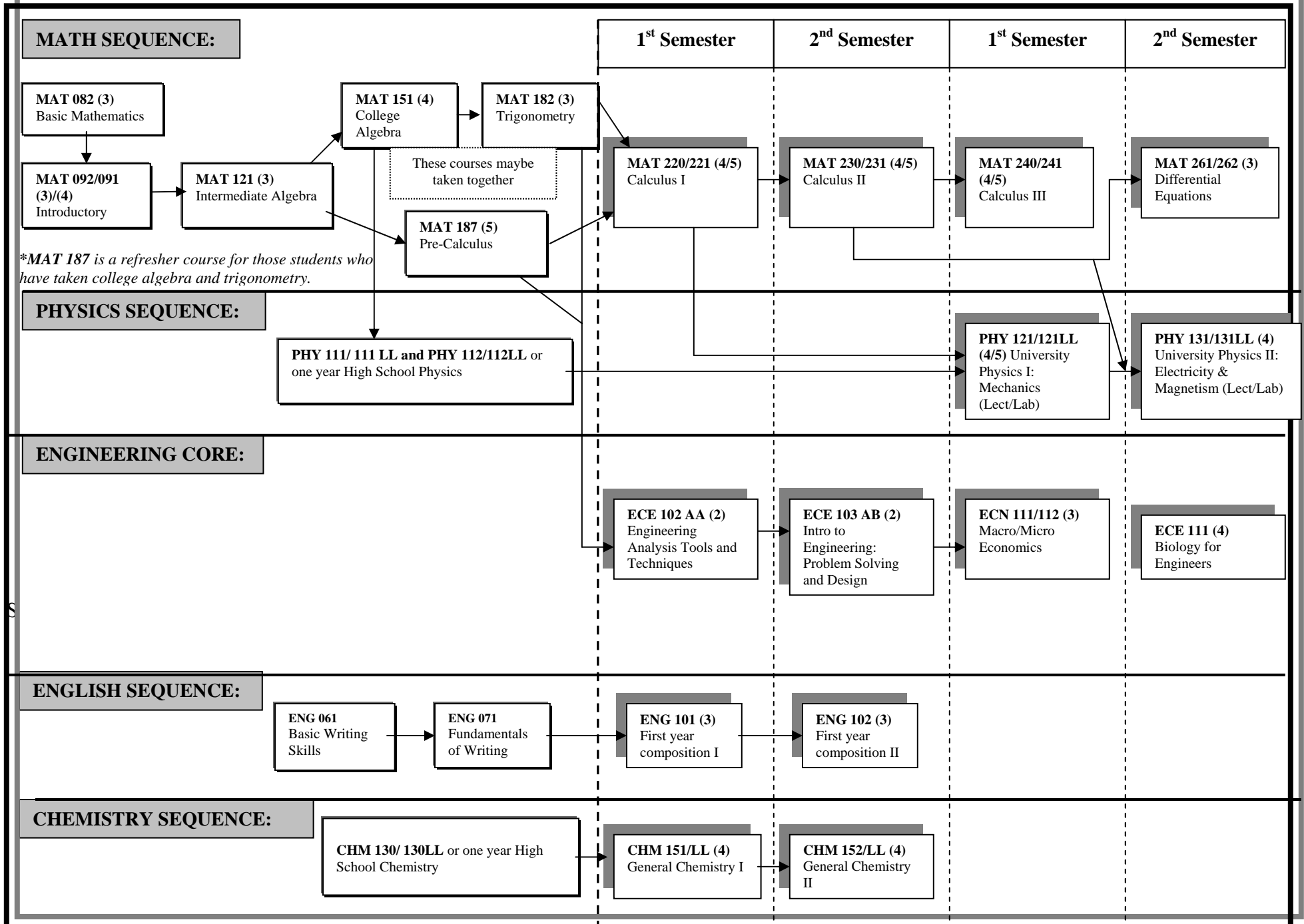
[Materials Program](#) | ECG 303

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# MATERIALS SCIENCE ENGINEERING

## Prerequisite Courses

## Required Courses



## Material Science Engineering Recommended Study Plan

Year 1		Year 2	
First Semester	Second Semester	Third Semester	Fourth Semester
<b>ECE102 AA (2)</b> Engineering Analysis 1	<b>ECE 103 AB (2)</b> Problem Solving & Design		<b>ECE111 (3)</b> Biology Requirement <b><i>BME 111 (3)</i></b>
ECE102 (2) AND ECE103 (2)= MAE 100 (2)			
<b>MAT 220 (4)</b> Calc 1 <u>Mat 187 or MAT182</u> <b><i>MAT 265 (3)</i></b>	<b>MAT 230 (4)</b> Calc 2 <u>MAT 220</u> <b><i>MAT 266 (3)</i></b>	<b>MAT 240 (4)</b> Calc 3 <u>MAT 230</u> <b><i>MAT267 (4)</i></b>	<b>MAT 261 (3)</b> Differential Equation <u>MAT230</u> <b><i>MAT275 (3)</i></b>
<b>ENG 101 (3)</b> First Year Composition 1 <b><i>ENG 101 (3)</i></b>	<b>ENG102 (3)</b> First Year Composition 2 <b><i>ENG102 (3)</i></b>		<b>PHY 131 (4)</b> University Physics 2 <u>PHY 121, MAT 230</u> <b><i>PHY131 (4)</i></b>
<b>CHM 151/LL (4)</b> General Chemistry 1 <u>HS algebra and HS chemistry</u>	<b>CHM 152/LL (4)</b> General Chemistry 2 <u>CHM 151/LL</u>	<b>ECN 111/112 (3)</b> Macro/Micro Economics	
CHM151 (4)+CHM152(4)=CHM 114 or CHM 116 (4)		<b>PHY 121 (4)</b> University Physics 2 <u>PHY 111, MAT 220</u> <b><i>PHY121 (4)</i></b>	
<b>HU/SB (3)</b>	<b>HU/SB (3)</b>	<b>HU/SB (3)</b>	<b>HU/SB (3)</b>
<b>16</b>	<b>16</b>	<b>14</b>	<b>13</b>

**Underlined = Pre-req      *Italic*= ASU Equivalence**

According to ASU Material Science Engineering advisement sheet:  
Humanities & Social Sciences (HU/SB) (15 hrs minimum)  
(Required: 1 course upper division; 2 courses from the same dept; 2 depts. or more Represented; plus a minimum of two courses that satisfy three awareness areas: Cultural (C), Global (G), and Historical (H). Double counting is permissible between HU or SB and the awareness areas and also within the awareness areas.)

Course Subject and Title <i>(courses in bold/shading are critical)</i>	Hrs.	Upper Division	Completed ATP: <input type="checkbox"/> Yes <input type="checkbox"/> No		Completed AGECE: <input type="checkbox"/> Yes <input type="checkbox"/> No
			Transfer Course/Grade	Minimum Grade if Required	Additional Critical Requirement Notes
<b>TERM ONE: 0-15 CREDIT HOURS</b>					
ASU 101-FSE: The ASU Experience	1	<input type="checkbox"/>			<ul style="list-style-type: none"> <li>Complete MAT 265 with a minimum grade of "C"; CHM 113 or 114; MSE 100.</li> <li>ASU 101-FSE should be completed first semester.</li> <li>Minimum CUM ASU 2.0 GPA required</li> <li>An SAT, ACT, Accuplacer, or TOEFL score determines placement into first-year composition courses</li> <li>ASU Math Placement Exam score determines placement in Mathematics course</li> <li>**If ENG 105 a 3 hr applicable elective must also be taken prior to graduation. See Advisor.</li> <li># Designates Major Course: A minimum cumulative GPA of 2.0 required.</li> </ul>
<b>CHM 114: General Chemistry for Engineers (SQ) OR CHM 113/116 : General Chemistry I/General Chemistry II (SQ)</b>	4	<input type="checkbox"/>			
<b>MAT 265: Calculus for Engineers I</b>	3	<input type="checkbox"/>		Grade of C	
<b># MSE 100: Introduction of Materials Engineering</b>	2	<input type="checkbox"/>			
ENG 101 or 102: First-Year Composition OR ENG 105: Advanced First-Year Composition** OR ENG 107 or 108: English for Foreign Students	3	<input type="checkbox"/>		Grade of C	
Social & Behavioral Science (SB) AND Cultural Diversity in the US (C), Global Awareness (G) or Historical Awareness (H)	3	<input type="checkbox"/>			
<b>TERM TWO: 16-30 CREDIT HOURS</b>					
<b>MAT 266: Calculus for Engineers II</b>	3	<input type="checkbox"/>		Grade of C	<ul style="list-style-type: none"> <li>MSE 250 must be completed by the end of the 4<sup>th</sup> semester with a minimum grade of "C"</li> <li>CHM 116 must be completed for those who took CHM 113</li> <li>Complete MAT 266 with a minimum grade of "C"; and PHY 121 &amp; 122</li> <li>Minimum CUM ASU 2.0 GPA required</li> <li># Designates Major Course: A minimum cumulative GPA of 2.0 required.</li> </ul>
<b># MSE 250: Structure and Properties of Materials</b>	3	<input type="checkbox"/>		Grade of C	
<b>PHY 121/122: University Physics I/Laboratory I (SQ)</b>	3/1	<input type="checkbox"/>			
ENG 101 or 102: First-Year Composition OR ENG 105: Advanced First-Year Composition** OR ENG 107 or 108: English for Foreign Students	3	<input type="checkbox"/>		Grade of C	
Humanities, Fine Arts & Design (HU) AND Cultural Diversity in the US (C), Global Awareness (G) or Historical Awareness (H)	3	<input type="checkbox"/>			
<b>MAT 267: Calculus for Engineers III</b>	3	<input type="checkbox"/>		Grade of C	
<b>TERM THREE: 31-45 CREDIT HOURS</b>					
<b>PHY 131/132: University Physics II Electricity and Magnetism/Laboratory II (SQ)</b>	3/1	<input type="checkbox"/>			<ul style="list-style-type: none"> <li>Complete MAT 267 with a minimum grade of "C"; and PHY 131 &amp; 132</li> <li>Complete First-Year Composition requirement: ENG 101 &amp; 102 OR ENG 107 &amp; 108 or ENG 105</li> <li>Minimum CUM ASU 2.0 GPA required</li> <li># Designates Major Course: A minimum cumulative GPA of 2.0 required.</li> </ul>
BME 111: Engineering Perspectives on Biological Systems	3	<input type="checkbox"/>			
<b>#MSE 215: Materials Synthesis</b>	3	<input type="checkbox"/>			
Social & Behavioral Science (SB) AND Cultural Diversity in the US (C), Global Awareness (G) or Historical Awareness (H)	3	<input type="checkbox"/>			
<b>MAT 275: Modern Differential Equations (MA)</b>	3	<input type="checkbox"/>		Grade of C	
<b>PHY 131/132: University Physics II Electricity and Magnetism/Laboratory II (SQ)</b>	3/1	<input type="checkbox"/>			
<b>TERM FOUR: 46-60 CREDIT HOURS</b>					
MAT 275: Modern Differential Equations (MA)	3	<input type="checkbox"/>			<ul style="list-style-type: none"> <li>Minimum CUM ASU 2.0 GPA required</li> <li>MSE 250 must be completed with a minimum grade of "C".</li> <li># Designates Major Course: A minimum cumulative GPA of 2.0 required.</li> </ul>
MAT 343: Applied Linear Algebra	3	<input checked="" type="checkbox"/>			
<b># MSE 211: Introduction to Mechanics of Materials</b>	3	<input type="checkbox"/>			
IEE 220: Business/Industrial Engineering	3	<input type="checkbox"/>			
<b># Advanced Science Elective</b>	3	<input checked="" type="checkbox"/>			
<b>MAT 343: Applied Linear Algebra</b>	3	<input checked="" type="checkbox"/>			
<b>TERM FIVE: 61-75 CREDIT HOURS</b>					
Math or Science Elective	3	<input type="checkbox"/>			# Designates Major Course: A minimum cumulative GPA of 2.0 required.
<b># MSE 315: Mathematical and Computer Methods in Materials (CS)</b>	3	<input checked="" type="checkbox"/>			
<b># MSE 330: Thermodynamics of Materials</b>	3	<input checked="" type="checkbox"/>			
<b># MSE 355: Materials Structure and Microstructure</b>	3	<input checked="" type="checkbox"/>			
<b># MSE 356: Materials Structure and Microstructure Laboratory</b>	1	<input checked="" type="checkbox"/>			
Humanities, Fine Arts & Design (HU) AND Cultural Diversity in the US (C), Global Awareness (G) or Historical Awareness (H)	3	<input type="checkbox"/>			
<b>TERM SIX: 76-90 CREDIT HOURS</b>					
<b># MSE 335: Materials Kinetics and Processing</b>	3	<input checked="" type="checkbox"/>			# Designates Major Course: A minimum cumulative GPA of 2.0 required.
<b># MSE 358: Introduction to Electronic, Magnetic, &amp; Optical Properties</b>	3	<input checked="" type="checkbox"/>			
<b># MSE 420: Physical Metallurgy</b>	3	<input checked="" type="checkbox"/>			
<b># MSE 421: Physical Metallurgy Laboratory</b>	1	<input checked="" type="checkbox"/>			
<b># MSE 450: Introduction to Materials Characterization</b>	3	<input checked="" type="checkbox"/>			
<b># MSE 451: Introduction to Materials Characterization Laboratory</b>	1	<input checked="" type="checkbox"/>			
<b>TERM SEVEN: 91-105 CREDIT HOURS</b>					
<b># MSE 440: Mechanical Properties of Solids</b>	3	<input checked="" type="checkbox"/>			# Designates Major Course: A minimum cumulative GPA of 2.0 required.
<b># MSE 470: Polymers and Composites</b>	3	<input checked="" type="checkbox"/>			
<b># MSE 471: Introduction to Ceramics</b>	3	<input checked="" type="checkbox"/>			
<b># MSE 482: Materials Engineering Design (L)</b>	3	<input checked="" type="checkbox"/>			
<b># Advanced Science Elective</b>	3	<input checked="" type="checkbox"/>			
<b># MSE 482: Materials Engineering Design (L)</b>	3	<input checked="" type="checkbox"/>			
<b>TERM EIGHT: 106-120 CREDIT HOURS</b>					
<b># MSE 490: Capstone Design Project (L)</b>	3	<input checked="" type="checkbox"/>			# Designates Major Course: A minimum cumulative GPA of 2.0 required.
<b># MSE Technical Elective</b>	3	<input type="checkbox"/>			
<b># MSE Technical Elective</b>	3	<input type="checkbox"/>			
UD Humanities, Fine Arts & Design (HU) OR Social & Behavioral Science (SB)	3	<input checked="" type="checkbox"/>			

**Graduation Requirements Summary:**

Total Hours Regular Curriculum (120)	Total UD Hrs (45 min)	Total Hrs at ASU (30 min)	Cumulative GPA (2.00 minimum)	Major GPA (2.00 minimum GPA )	Hrs Resident Credit for Academic Recognition (56 min)	Total Comm. College Hrs. (64 Max)

**General University Requirements: Legend**

- General Studies Core Requirements:
  - Literacy and Critical Inquiry (L)
  - Mathematical Studies (MA)
  - Computer/Statistics/Quantitative applications (CS)
  - Humanities, Fine Arts, and Design (HU)
  - Social and Behavioral Sciences (SB)
  - Natural Science-Quantitative (SQ)
  - Natural Science-General (SG)
- General Studies Awareness Requirements
  - Cultural Diversity in the US (C)
  - Global Awareness (G)
  - Historical Awareness (H)
- First-Year Composition

**Additional Notes:**