# Materials Science in Engineering Course No. 41355 Credit: 0.5

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| **Student name:**  |  | **Graduation Date:** |  |

Pathways and CIP Codes:Energy (17.2071); **Engineering & Applied Mathematics (14.0101)**

Course Description: An **application level** course designed to teach students the properties, classes, uses, and selection of materials for various applications.

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

## Benchmark 1: Click or tap here to enter text.

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Research key participants & events in the history of materials science & engineering to include: metallurgy, polymers, ceramics, and composite development. |  |
| 1.2 | Identify professional organizations & resources for materials science. |  |
| 1.3 | Recognize, locate, & utilize MSDS information in the workplace. |  |
| 1.4 | Evaluate physical properties of materials: solid, liquid, gas, and plasma. |  |
| 1.5 | Explain materials properties related to:  |  |
|  | 1. Mechanical
 |  |
|  | 1. Electrical
 |  |
|  | 1. Thermal
 |  |
|  | 1. Chemical
 |  |
|  | 1. Optical
 |  |
|  | 1. Acoustical
 |  |
|  | 1. Environmental
 |  |
|  | 1. Atomic & Manufacturing.
 |  |
| 1.6 | Summarize key properties of:  |  |
|  | 1. reactivity
 |  |
|  | 1. toxicity
 |  |
|  | 1. flammability
 |  |
|  | 1. stability.
 |  |
| 1.7 | Distinguish various classes of materials:  |  |
|  | 1. crystals
 |  |
|  | 1. metals
 |  |
|  | 1. semiconductors
 |  |
|  | 1. polymers
 |  |
|  | 1. composites
 |  |
|  | 1. ceramics/vitreous.
 |  |
| 1.8 | Explain the fundamentals of materials in terms of structural properties, behaviors under varying conditions, bonding, conductivity, chemical reaction, and decomposition. |  |
| 1.9 | List examples of specialized usage of materials in industry. |  |
| 1.10 | Defend choices for using one material over another in specific applications. |  |
| 1.11 | Compare and contrast methods of chemical and physical bonding. |  |
| 1.12 | Defend, in various applications, whether it is better to use chemical of physical bonding. |  |
| 1.13 | Define tribology and its importance. |  |
| 1.14 | Detail the impact of biomaterials on industry. |  |
| 1.15 | Research a material that has recently become available or recently adopted for widespread use and how it may impact future design & development. |  |
| 1.16 | Explain how availability of new materials has changed manufacturing processes. |  |
| 1.17 | Compare and contrast techniques for testing the integrity of a part made from a particular material. |  |
| 1.18 | Create 2D or 3D Model(s) that explain understanding of various types of materials related to science and engineering. |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

CTE Pathways Help Desk

(785) 296-4908

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