# Minor in Materials Science (EMTS)
# Department of Chemical Engineering & Materials Science

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Background on the minor

There is a constant need for professionals with more knowledge and experience in understanding the behavior of materials from which products such as electronics, sensors, biological implants, transportation vehicles, medical devices and infrastructure are made. The goal of this minor is to prepare students for careers that require training in materials science, including the fundamentals of thermodynamics and kinetics and their effects on phase composition and structure, as well as the complex relationships between composition, structure, processing and behavior/performance. Topics covered include material thermodynamics and kinetics, materials structural analysis, and structure-property relationships for electronic, optical, magnetic and mechanical behavior. The minor is expected to accommodate persons of diverse backgrounds, such as those majoring in engineering, physical sciences, biological sciences, and mathematics.

Completion of the minor

Courses for the minor are listed below. Successful completion of the minor requires the following:

1. Minimum overall GPA of 2.0 for coursework completed in the minor;
2. No grade lower than a C- for any course counted toward the minor;
3. All courses must be taken for a letter grade.

The following courses are required (**12 units**):

| Dept | Course # | Title | Units | Quarter offered | Prerequisites |
|---|---|---|---|---|---|
| EMS | 160 | Thermodynamics of Materials | 4 | F | C- or better in each of the following ENG 45, PHY 9B, MAT 22B; CHE 2C (recommended) |
| EMS | 162 | Structure and Characterization of Engineering Materials | 4 | W | C- or better in each of the following ENG 45, MAT 22, PHY 9B. |
| EMS | 164 | Rate Processes in Materials Science | 4 | W | C- or better in ENG 45, and EMS 160 |

Choose ONE of the following courses (**4 units**):

| | | | | | |
|---|---|---|---|---|---|
| EMS | 172 | Electronic, Optical & Magnetic Properties of Materials | 4 | F | CHE 110A or PHY 9D. ENG 6 or ECM 6 or equivalent(recommended) |
| EMS | 174 | Mechanical Behavior of Materials | 4 | S | C- or better in ENG 45, EMS 162 (recommended) |

Additional units **(4 units minimum)** selected from the following: EMS 147, 162L, 172, 172L, 174, 174L, 180, 181, 182

| Dept | Course # | Title | Units | Quarter offered | Prerequisites |
|---|---|---|---|---|---|
| EMS | 147 | Principles of Polymer Materials Science | 3 | W | CHE 2A, 2B; CHE 8A, 8B or ENG 45; intro PHY |
| EMS | 162L | Structures & Characterization of Engineering Materials Lab | 2 | W | EMS 162 (concurrent enrollment recommended) |
| EMS | 172L | Electronic, Optical & Magnetic Properties Lab | 2 | F | EMS 172 (concurrent enrollment recommended) |
| EMS | 174L | Mechanical Behaviors Lab | 2 | S | EMS 174 (concurrent enrollment recommended) |
| EMS | 180 | Materials in Engineering Design | 4 | S | C- or better in ENG 45 and upper division standing |
| EMS | 181 | Materials Processing | 4 | W | C- or better in ENG 45; ENG 105 or EMS 160 or ECH 152B or equiv.; EEC 140A & EMS 164 recommended |
| EMS | 182 | Failure Analysis | 4 | W | C- or better in ENG 45; EMS 172 recommended |

Transcript notation requires successful completion of the minor. Notation will appear as a minor in "Materials Science".
The College of Engineering Minor Program Petition form can be found on the following website:
http://engineering.ucdavis.edu/undergraduate/majors.html

**Sample Schedule for Materials Minor**

| *Fall Quarter* | *Winter Quarter* | *Spring Quarter* |
|---|---|---|
| EMS 160 (4) | EMS 162 (4)<br>EMS 164 (4) | EMS 174 (4)<br>EMS 180 (4) |

OR

| *Fall Quarter* | *Winter Quarter* | *Spring Quarter* |
|---|---|---|
| EMS 160 (4) | EMS 162 (4)<br>EMS 162L (2) | EMS 147 (4) |
| EMS 172 (4) | EMS 164 (4) | |

***These are only two examples of possible combinations.***