MATERIALS SCIENCE AND ENGINEERING, COMPREHENSIVE MAJOR

(Code 251-001)

University Requirements

GRADUATION REQUIREMENTS FOR BACALAUREATE DEGREE

Credit Requirements

Minimum total for graduation \(^1\) 120
Upper division credits (courses numbered 300 and higher) 39
Liberal Education Core (http://catalog.uwec.edu/undergraduate/graduation-requirements/#header1) 36
Academic Concentrations (http://catalog.uwec.edu/undergraduate/graduation-requirements/#header16)
Grade Point Requirements (http://catalog.uwec.edu/undergraduate/graduation-requirements/#header14) \(^2\)

Total 2.00 average
Resident 2.00 average
Major 2.00 average
Minor 2.00 average
Certificate 2.00 average

University Residency Requirements (http://catalog.uwec.edu/undergraduate/graduation-requirements/#header15)

Minimum total 30
Senior year 23
Major, Standard, upper division in residence 12
Major, Comprehensive, upper division in residence 21
Certificate 25 percent of credits

Procedures Required for Graduation

Obtain admission to the degree program and/or the College offering it.
Apply for graduation on CampS.

\(^1\) Certain programs exceed this minimum.
\(^2\) See special requirements in each College.

Applicability of Credits Toward Graduation

Junior College or Two-Year College Credits. A maximum of 72 semester credits earned in a junior college or two-year college will be accepted as degree credits at UW-Eau Claire.

Extension Credits. Credits earned in credit outreach courses offered by UW-Eau Claire are treated as resident credits. Credits earned in extension courses offered by other units of the University of Wisconsin System are treated as transfer credits. All other (non-UW) extension and correspondence credits are normally limited to one-fourth of the total required for graduation from any curriculum.

WTCS Credits. A maximum of 72 semester credits earned in college parallel programs at Madison Area Technical College, Milwaukee Area Technical College, Nicolet Area Technical College, or Chippewa Valley Technical College may be accepted as degree credits at UW-Eau Claire. A set number of general education courses will be accepted from other technical schools. Occupational and technical courses may also be considered for transfer if the quality and content of the course work from the technical college is judged to be comparable to course work at UW-Eau Claire. Refer to the Transfer Credit Wizard (https://my.uwec.edu/psp/PUBLIC/EMPLOYEE/HRMS/c/EAU_SS_CUSTOM.EAU_TRNCRDWZ.GBL) or contact the UW-Eau Claire Admissions Office for information about the current transfer policy.

USAFI Credit. UW-Eau Claire will accept up to 32 semester credits for work done through the United States Armed Forces Institute, under the provision for non-UW correspondence credit (see Extension Credits above).

Activity Credit (band, chorus, drama, KINS 100-184 courses) Students may count toward graduation no more than one credit of KINS 110-184 courses. Students may count toward graduation no more than four credits earned in any single activity course and no more than 12 credits resulting from any combination of activity courses (excluding KINS 110-184 courses).

Other Restricted Credits. For other University restrictions, see the following: Cooperative Education; Credit by Examination; Satisfactory/Unsatisfactory Registration; Transfer of Credits. College or departmental restrictions may also be placed on Independent Study (399-499 courses), Directed Study (395-495), and other types of credits.

APPLICABILITY OF CREDITS TOWARD GRADUATION

<table>
<thead>
<tr>
<th>Credit Restrictions</th>
<th>Credit</th>
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<tbody>
<tr>
<td>Satisfactory/Unsatisfactory</td>
<td>Total degree credit maximum 12</td>
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<tr>
<td></td>
<td>Major, Standard maximum 1 course</td>
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<tr>
<td></td>
<td>Major, Comprehensive maximum 2 courses</td>
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<tr>
<td>Minor</td>
<td>maximum 1 course</td>
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**Liberal Education Core**

The University of Wisconsin-Eau Claire measures learning outcomes to ensure that its graduates have achieved a liberal education and prepared themselves to contribute to a complex society. Upon graduation, each undergraduate will have met the four learning goals of our liberal education core and the 11 learning outcomes they comprise.

<table>
<thead>
<tr>
<th>LIBERAL EDUCATION CORE REQUIREMENTS</th>
<th>a minimum of 36 credits</th>
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<tbody>
<tr>
<td><strong>Knowledge Goal</strong></td>
<td></td>
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<tr>
<td>Knowledge Outcome 1 (K1): Natural Sciences (<a href="http://catalog.uwec.edu/undergraduate/attribute-k1/">http://catalog.uwec.edu/undergraduate/attribute-k1/</a>)</td>
<td>Two (2) learning experiences</td>
</tr>
<tr>
<td>Knowledge Outcome 2 (K2): Social Sciences (<a href="http://catalog.uwec.edu/undergraduate/attribute-k2/">http://catalog.uwec.edu/undergraduate/attribute-k2/</a>)</td>
<td>Two (2) learning experiences</td>
</tr>
<tr>
<td>Knowledge Outcome 3 (K3): Humanities (<a href="http://catalog.uwec.edu/undergraduate/attribute-k3/">http://catalog.uwec.edu/undergraduate/attribute-k3/</a>)</td>
<td>Two (2) learning experiences</td>
</tr>
<tr>
<td>Knowledge Outcome 4 (K4): Fine Arts (<a href="http://catalog.uwec.edu/undergraduate/attribute-k4/">http://catalog.uwec.edu/undergraduate/attribute-k4/</a>)</td>
<td>One (1) learning experience</td>
</tr>
<tr>
<td><strong>Skills Goal</strong></td>
<td></td>
</tr>
<tr>
<td>Skills Outcome 1 (S1): Written and Oral Communication (<a href="http://catalog.uwec.edu/undergraduate/attribute-s1/">http://catalog.uwec.edu/undergraduate/attribute-s1/</a>)</td>
<td>Two (2) learning experiences</td>
</tr>
<tr>
<td>Skills Outcome 2 (S2): Mathematics (<a href="http://catalog.uwec.edu/undergraduate/attribute-s2/">http://catalog.uwec.edu/undergraduate/attribute-s2/</a>)</td>
<td>One (1) learning experience</td>
</tr>
<tr>
<td>Skills Outcome 3 (S3): Creativity (<a href="http://catalog.uwec.edu/undergraduate/attribute-s3/">http://catalog.uwec.edu/undergraduate/attribute-s3/</a>)</td>
<td>One (1) learning experience</td>
</tr>
<tr>
<td><strong>Responsibility Goal</strong></td>
<td></td>
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<tr>
<td>Responsibility Outcome 1 (R1): Equity, Diversity, and Inclusivity (<a href="http://catalog.uwec.edu/undergraduate/attribute-r1/">http://catalog.uwec.edu/undergraduate/attribute-r1/</a>)</td>
<td>Two (2) learning experiences</td>
</tr>
<tr>
<td>Responsibility Outcome 2 (R2): Global Perspectives (<a href="http://catalog.uwec.edu/undergraduate/attribute-r2/">http://catalog.uwec.edu/undergraduate/attribute-r2/</a>)</td>
<td>One (1) learning experience</td>
</tr>
<tr>
<td>Responsibility Outcome 3 (R3): Civic and Environmental Issues (<a href="http://catalog.uwec.edu/undergraduate/attribute-r3/">http://catalog.uwec.edu/undergraduate/attribute-r3/</a>)</td>
<td>One (1) learning experience</td>
</tr>
<tr>
<td><strong>Integration Goal</strong></td>
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</tbody>
</table>

| Integration Outcome 1 (I1): Integration (http://catalog.uwec.edu/undergraduate/attribute-i1/) | Two (2) learning experiences |

<table>
<thead>
<tr>
<th>Service-Learning Goal</th>
<th>30 hours (header13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service-Learning (<a href="http://catalog.uwec.edu/undergraduate/attribute-slr13">http://catalog.uwec.edu/undergraduate/attribute-slr13</a>)</td>
<td></td>
</tr>
</tbody>
</table>

**College Degree Requirements**

**Bachelor of Science Degree (B.S.)**

**University Graduation Requirements.** All candidates for degrees must fulfill the requirements for credits, curriculum, GPA, and University residency as specified in the section of this catalog titled University Graduation Requirements (http://catalog.uwec.edu/undergraduate/graduation-requirements/).

**College Graduation Requirements: Grade Point Averages.** All candidates for degrees in the College of Arts and Sciences must earn minimum resident and total GPAs of 2.00 in the major, the minor, and the certificate. The resident and total GPAs for the major are computed using all attempted credits applicable to the major including those offered by departments other than the major department. The resident and total GPAs for the minor and the certificate are computed similarly.

**Major-Minor and Major-Certificate Requirements.** A standard major (a minimum of 36 credits) must be supplemented by a minor (a minimum of 24 credits) or by a certificate (12 to 18 credits) to meet graduation requirements for completing a first and second degree program. No minor or certificate is required with a Comprehensive Major (60 or more credits) or with two majors of 36 or more credits each.

Certain degree programs which include Comprehensive Majors may require more than the minimum of 120 credits for graduation.

Acceptable academic program combinations are determined at the college level. A major and a minor or a major and certificate or two majors (if available) may not be elected in the same department or program, except in the approved combinations listed here (http://catalog.uwec.edu/undergraduate/arts-sciences/#academicprogramstext).

**College Credits.** Earn at least 90 credits in courses offered by the College of Arts and Sciences.

**Bachelor of Science Degree in the College of Arts and Sciences (B.S.)**

Fulfillment of all University Graduation Requirements (which includes the Liberal Education Core); all College-level degree requirements (major and minor/certificate emphases, GPAs, earning at least 90 credits in Arts and Sciences course work); mathematics competency at the MATH 111, MATH 112 or MATH 113 level. Mathematics competency can be met in one of three ways: (1) Achieve a score on the mathematics placement test that qualifies the student to enter MATH 114. (2) Earn a grade of at least C (not C-) or a mark of S in MATH 111, MATH 112, or MATH 113. (3) Achieve a satisfactory score on the MATH 112 competency test. This test may be attempted no more than two times.

**Major Requirements**

(Code 251-001)

The Bachelor’s of Science in Materials Science and Engineering (MS&E) is a traditional engineering major, rigorously structured and grounded in science and math. Students in this major develop a strong foundation in mathematics, and the major emphasizes science themes more strongly than...
other engineering disciplines. As with all engineering degrees, the application of fundamental ideas through design is central to the major.

Students, who typically begin their study as Pre-MSE majors, must apply to be admitted to the MS&E major (application materials available at the Materials Science office). A minimum average GPA of 2.5 in “foundation” courses (CHEM 115 or CHEM 103 & CHEM 104 or CHEM 105 & CHEM 106 & CHEM 109, MATH 114 & MATH 215, MSE 120 & MSE 221, PHYS 231, and WRIT 114, WRIT 116, or WRIT 118) is required for admittance to the major; students should apply during registration in the spring semester of their sophomore year.

A minimum of 92 credits is required for the major and a minimum of 128 credits for the degree. In addition to core courses, students must complete two technical electives; electives can be selected from appropriate UW-Eau Claire, UW-River Falls, UW-Stout, or Chippewa Valley Technical College courses.

Core courses:

**MATERIALS SCIENCE**
- MSE 120 Introduction to Engineering 2
- MSE 221 Living in a Materials World 3
- MSE 256 Introduction to Computer Aided Design 1
- MSE 315 Materials Characterization 4
- MSE 334 Soft Materials 4
- MSE 350 Thermodynamics of Materials 4
- MSE 357 Phase Transformation & Kinetics 3
- MSE 362 Microelectronic Materials Processing 2
- MSE 367 Macroprocessing of Materials 3
- MSE 368 Macroprocessing Materials Lab 2
- MSE 372 Transport Phenomena 3
- MSE 374 Electrical, Optical and Magnetic Properties of Materials 4
- MSE 386 MS&E Junior Seminar I 1
- MSE 387 MS&E Junior Seminar II 1
- MSE 451 Computational Materials Science 4
- MSE 475 Nanomaterials 3
- MSE 486 MSE Capstone I 1
- MSE 487 MSE Capstone II 1
- CHEM 115 Chemical Principles 6
- or CHEM 103 & CHEM 104 General Chemistry I and General Chemistry II 2
- or CHEM 105 & CHEM 106 & CHEM 109 General Chemistry I Lecture and General Chemistry I Laboratory and General Chemistry II with Lab 2
- CHEM 325 Organic Chemistry I with Laboratory 4

**CHEMISTRY**
- MATH 114 Calculus I 4
- MATH 215 Calculus II 4
- MATH 312 Differential Equations and Linear Algebra 4
- MATH 345 Introduction to Probability and Mathematical Statistics 4

**MATHEMATICS**
- PHYS 231 University Physics I 5
- PHYS 232 University Physics II 5
- PHYS 255 Statics 3

**Elective Courses, Choose from:**

**UW-EC**
- CHEM 213 Quantitative Analysis
- CHEM 326 Organic Chemistry II with Laboratory
- CHEM 352 Fundamentals of Biochemistry
- CS 145 Programming for New Programmers
- CS 163 Introduction to Programming in C++
- CS 170 Computing for the Sciences and Mathematics
- CS 245 Advanced Programming and Data Structures
- CS 252 Computer Systems
- CS 330 Programming Languages
- MATH 216 Calculus III
- MATH 313 Digital Signal Processing
- MATH 314 Discrete Mathematics
- MATH 315 Advanced Calculus I
- MATH 316 Introduction to Real Analysis
- MATH 317 Introduction to Real Analysis II
- MATH 318 Introduction to Complex Variables
- MATH 324 Linear Algebra
- MATH 351 Numerical Analysis I
- MATH 352 Numerical Analysis II
- MATH 354 Introduction to Mathematical Modeling
- MATH 355 Linear Programming
- MATH 358 Introduction to Optimization
- MATH 440 Digital Image Processing
- MATH 441 Linear Regression Analysis, with Time Series
- MATH 443 Experimental Design and Analysis
- MSC 395 Directed Studies
- MSC 399 Independent Study - Juniors
- MSC 499 Independent Study - Seniors
- MSE 363 Microelectronic Materials Processing Lab
- MSE 493 Collaborative Internship
- MSE 494 Off-campus Materials Science Internship
- PHYS 340 Optics
- PHYS 350 Electric and Electronic Circuits
- PHYS 356 Dynamics
- PHYS 360 Electronics
- PHYS 361 LabVIEW Basics
- PHYS 362 LabVIEW Applications

A maximum of three credits from MSC 395, MSC 399, MSC 499, MSE 493, and MSE 494 may count toward the technical electives.

Consult your Materials Science and Engineering advisor for elective options from other institutions.
Students must be admitted to the MS&E major to take these courses.
Only six credits apply to the major.