MATERIALS SCIENCE AND ENGINEERING, COMPREHENSIVE MAJOR

(Code 251-001)

University Requirements

GRADUATION REQUIREMENTS FOR BACCALAUREATE DEGREE

Credit Requirements
Minimum total for graduation $^1$ 120
Upper division credits (courses numbered 300 and higher) 39
Liberal Education Core 36

Academic Concentrations

Grade Point Requirements $^2$
Total 2.00 average
Resident 2.00 average
Major 2.00 average
Minor 2.00 average
Certificate 2.00 average

University Residency Requirements
Minimum total 30
Senior year 23
Major, Standard, upper division in residence 12
Major, Comprehensive, upper division in residence 21

Credit by Examination

Total degree credit maximum ¼ of total
Major or minor maximum ½ of total

Two-Year College Credits

Total degree credit maximum 72 credits

Activity credit (band, chorus, drama, KINS 100-184)

Total KINS 100-184 maximum 1 credit
Total Band, chorus, drama maximum 12 credits
Single course band, chorus, drama maximum 4 credits

Extension credits

UW-System no maximum
Other extension/ correspondence maximum ¼ of total

USAFI

USAFI maximum 32 credits

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.

$^1$ Certain programs exceed this minimum.

$^2$ See special requirements in each College.
**LIBERAL EDUCATION CORE REQUIREMENTS**

<table>
<thead>
<tr>
<th>Knowledge Goal</th>
<th>Knowledge Outcome 1 (K1): Natural Sciences</th>
<th>Two (2) learning experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One experience in laboratory science must be selected from either K1 or K2.</td>
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<tr>
<td></td>
<td>Knowledge Outcome 2 (K2): Social Sciences</td>
<td>Two (2) learning experiences</td>
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<tr>
<td></td>
<td>One experience in laboratory science must be selected from either K1 or K2.</td>
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<tr>
<td></td>
<td>Knowledge Outcome 3 (K3): Humanities</td>
<td>Two (2) learning experiences</td>
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<td>Knowledge Outcome 4 (K4): Fine Arts</td>
<td>One (1) learning experience</td>
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<tr>
<td>Skills Goal</td>
<td>Skills Outcome 1 (S1): Written and Oral Communication</td>
<td>Two (2) learning experiences</td>
</tr>
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<td></td>
<td>One S1 must meet the University Writing Requirement</td>
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<td></td>
<td>Skills Outcome 2 (S2): Mathematics</td>
<td>One (1) learning experience</td>
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<tr>
<td></td>
<td>One S2 to meet the University Mathematics Requirement</td>
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<td></td>
<td>Skills Outcome 3 (S3): Creativity</td>
<td>One (1) learning experience</td>
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<tr>
<td>Responsibility Goal</td>
<td>Responsibility Outcome 1 (R1): Equity, Diversity, and Inclusivity</td>
<td>Two (2) learning experiences</td>
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<tr>
<td></td>
<td>One R1 must satisfy Design for Diversity</td>
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<tr>
<td></td>
<td>Responsibility Outcome 2 (R2): Global Perspectives</td>
<td>One (1) learning experience</td>
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<tr>
<td></td>
<td>Responsibility Outcome 3 (R3): Civic and Environmental Issues</td>
<td>One (1) learning experience</td>
</tr>
<tr>
<td>Integration Goal</td>
<td>Integration Outcome 1 (I1): Integration</td>
<td>Two (2) learning experiences</td>
</tr>
<tr>
<td>Service-Learning Goal</td>
<td>Service-Learning</td>
<td>30 hours</td>
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</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.

**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 certificate or two majors (if available) may not be elected in the same department or program, except in the approved combinations listed here.

**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.

A minimum of 92 credits is required for the major and a minimum of 128 credits for the degree. 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. In addition to core courses, students must complete two technical electives; electives can be selected from appropriate UW-EC, 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  Physics of Solids  4
MSE 386  MS&E Junior Seminar I  0.5
MSE 387  MS&E Junior Seminar II  0.5
MSE 451  Computational Materials Science  4
MSE 475  Nanomaterials  3
MSE 486  MS&E Capstone I  2
MSE 487  MS&E Capstone II  2

CHEMistry
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

MAThematics
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

PHYSICS
PHYS 231  University Physics I  5
PHYS 232  University Physics II  5
PHYS 255  Statics  3

Elective Courses, Choose from:  6

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
MSCI 395  Directed Studies
MSCI 399  Independent Study - Juniors
MSCI 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 MSCI 395, MSCI 399, MSCI 499, MSE 493, and MSE 494 may count toward the engineering electives.
Consult your Materials Science and Engineering advisor for elective options from other institutions.

Notes:
1. Students must be admitted to the MS&E major to take these courses.
2. Only 6 credits apply to the major.