

# BS in Materials Science & Engineering Curriculum revised May 2022 **Total credits: 127**

| General Requirements    | Non-Technical Elective                   | MSE Core  | MSE Elective           | Engineering Elective                 | Tech Elect |
|-------------------------|--|-----------|------------------------|--------------------------------------|------------|
| <b>First Semester</b>   |  |           | <b>Second Semester</b> |                                      |            |
| APMA 1110               | Single Variable Calculus                 | 4         | APMA 2120              | Multivariate Calculus                | 4          |
| CHEM 1410               | Intro Chemistry I                        | 3         | CS 1110                | Intro to Programming                 | 3          |
| CHEM 1411               | Intro Chemistry I Lab                    | 1         | PHYS 1425              | General Physics I                    | 3          |
| ENGR 1624               | Intro to Engineering                     | 4         | PHYS 1429              | General Physics I Workshop           | 1          |
| STS 1500                | Engineering, Technology, Society         | 3         |                        | Math/Science Elective 1 <sup>3</sup> | 3          |
|                         |  |           |                        | HSS Elective 1 <sup>1</sup>          | 3          |
|                         |  | <b>15</b> |                        |                                      | <b>17</b>  |
| <b>Third Semester</b>   |  |           | <b>Fourth Semester</b> |                                      |            |
| APMA 2130               | Ordinary Differential Equations          | 4         | APMA 3110              | Statistics and Probability           | 3          |
| PHYS 2415               | General Physics II                       | 3         | MSE 3101               | Materials Science Investigations:    | 3          |
| PHYS 2419               | General Physics II Workshop              | 1         |                        | MSE Elec 1 <sup>5</sup>              | 3          |
| MSE 2090*               | Intro to Materials Science               | 3         |                        | Eng Elec 1 <sup>6</sup>              | 3          |
| MSE 2101                | Materials Science Investigations: Proper | 3         | STS 2xxx/3xxx          | STS Elective <sup>2</sup>            | 3          |
|                         | HSS Elective 2 <sup>1</sup>              | 3         |                        |                                      |            |
|                         |  | <b>17</b> |                        |                                      | <b>15</b>  |
| <b>Fifth Semester</b>   |  |           | <b>Sixth Semester</b>  |                                      |            |
| MSE 3050                | Thermodynamics and Phase Equilibria      | 3         | MSE 3070               | Kinetics and Phase Transformations   | 3          |
| MSE 3060                | Structures and Defects of Materials      | 3         | MSE 4320               | Origins of Mechanical Behavior       | 3          |
| MSE 3670                | EMOP                                     | 3         |                        | MSE Elec 2 <sup>5</sup>              | 3          |
|                         | Eng Elec 2 <sup>6</sup>                  | 3         |                        | Tech Elect 1 <sup>4</sup>            | 3          |
|                         | Math/Science Elective 2 <sup>3</sup>     | 3         |                        | HSS Elective 3 <sup>1</sup>          | 3          |
|                         | Unrestricted Elec 1 <sup>7</sup>         | 3         |                        |                                      |            |
|                         |  | <b>18</b> |                        |                                      | <b>15</b>  |
| <b>Seventh Semester</b> |  |           | <b>Eighth Semester</b> |                                      |            |
| STS 4500                | STS and Engineering Practice             | 3         | STS 4600               | The Engineer, Ethics and Profession  | 3          |
| MSE 4592                | Materials Research & Design Capstone 1   | 3         | MSE 4592               | Materials R & D Capstone 2           | 3          |
|                         | MSE Elec 3 <sup>5</sup>                  | 3         |                        | MSE Elec 5 <sup>5</sup>              | 3          |
|                         | MSE Elec 4 <sup>5</sup>                  | 3         |                        | Tech Elect 2 <sup>4</sup>            | 3          |
|                         | Unrestricted Elec 2 <sup>7</sup>         | 3         |                        | Unrestricted Elec 3 <sup>7</sup>     | 3          |
|                         |  | <b>15</b> |                        |                                      | <b>15</b>  |

\* Note that MSE 2090 is offered fall and spring and many students will have taken it during 1st year; students who have taken 2090 should take 3050.

<sup>(1)</sup> HSS electives - 9 credits from chosen list in A122 Thornton Hall

<sup>(2)</sup> STS2X/3X: Any course that meets the Second Writing Requirement, as specified by the College of Arts & Sciences (CLAS), may be substituted.

<sup>(3)</sup> Math/Science Electives - For the first one, choose from PHYS 2620, CHEM 1420, BIOL 2100, BIOL 2200, MSE 2090 or any APMA course over 2000 (APMA 3080 Linear Algebra recommended). For the second one CHEM 3410 or 3610 (Pchem) or any 3000 or higher APMA course (APMA 3140 Partial Differential Equations recommended).

<sup>(4)</sup> Technical Electives - Any 2000 or higher math, science or engineering courses, unless courses for non-science majors, duplicates required MSE course work, or duplicates another previously taken course. Only up to 2 research-for-credit courses permitted - if one has been used as an MSE elective, then only one research for credit may count as a tech elective.. ECE 3103 Solid State Devices (note pre-req ECE 2630) is recommended for students interested in EMOPS; CHEM 2410 Orgo 1 plus 2311 1cr Lab, CHEM 2420 Orgo 2 plus 2321 1cr lab, ChE Polymers 4449 (note pre-req CHE 3321 Transport, which also has pre-reqs), and BME 4414 Intro to Biomaterials (note pre-reqs: BME 2014 Cell/Molecular Bio and BME 2220 Biomechanics) recommended for students interested in soft materials; MAE/CE 2310 Statics & MAE/CE 2320 Strength of Materials recommended for students interested in structural materials.

<sup>(5)</sup> MSE Electives - choose 5 - from MSE 2200 Introduction to Additive Manufacturing and 3-D Printing, MSE 2500 Science of Cooking, MSE 3080 Corrosion, Batteries, and Fuel Cells, MSE/MAE 3610 Aerospace Materials (note pre-requisites of MAE/CE 2310 and 2320), MSE 4200 Additive Manufacturing of Metals, MSE 4055 Nanoscience, MSE 4210 Advanced Materials Processing, MSE 4270 Atomistic Simulations or MSE 4592 Special

<sup>(6)</sup> Engineering Electives - Chosen from any 2000-level or higher engineering course, with the following exceptions: no course in APMA, STS, or ENGR may be used as engineering electives; no course that counts as a Science Elective may be used as an engineering elective; and no course that fulfills the Engineering Business Minor may be used as an engineering elective.

<sup>(7)</sup> Unrestricted Electives - Chosen from any graded course in the University except mathematics courses below MATH 1310; courses that substantially duplicate any others offered for the degree, including PHYS 2010, PHYS 2020, CS 1010, CS 1020; any introductory programming course. APMA 1090 counts as a three credit unrestricted elective for students.