### Degree Pathway

**A.S. in Liberal Arts and Sciences (Mathematics and Sciences) – Catalog Year 2020-21**

**Recommended Courses for Students Planning to Pursue a B.S. in Physics**

The A.S. degree in Liberal Arts and Sciences (Mathematics and Sciences) is intended for students who plan to transfer to a 4-year college and university and pursue a bachelor’s degree in a field of science or mathematics. This degree plan is designed for students plan to pursue physics after transfer. Other degree plans are available for students who plan to pursue biology, computer science, mathematics, or chemistry. This Degree Pathway is also designed for students who place into MA-440. Additional Degree Pathways are available for students who place into other levels of mathematics. Please see the degree website or your advisor for more information.

Courses in **Bold Text** are prerequisites for later courses or only offered in the Fall or Spring semester and should be taken where indicated in the sequence.

#### Fall Semester #1

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
<th>Prerequisites and Corequisites¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL-101 English Composition I</td>
<td>3</td>
<td>Prerequisite: Complete developmental requirements in English</td>
</tr>
<tr>
<td>(Required Core 1A: English Composition)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA-440 Pre-Calculus Mathematics²</td>
<td>4</td>
<td>Prerequisite: MA-119 and MA-121 (C or better in both) or MA-114 (C or better)</td>
</tr>
<tr>
<td>(Required Core 1B - Mathematical &amp; Quantitative Reasoning)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP-211 Speech Communication²,³</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>(Flexible Core 2B: U.S. Experience &amp; Its Diversity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One course from Flexible Core 2A, 2C, or 2D³</td>
<td>3</td>
<td>Check individual courses for prerequisites and corequisites</td>
</tr>
<tr>
<td>HE-101 Introduction to Health Education or</td>
<td>1-2</td>
<td>Prerequisite for HE-101: None</td>
</tr>
<tr>
<td>HE-102 Health, Behavior and Society</td>
<td></td>
<td>Corequisite for HE-102: Enrollment in Developmental English</td>
</tr>
</tbody>
</table>

**Total credits for the term 14-15**

#### Spring Semester #1

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
<th>Prerequisites and Corequisites¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL-102 English Composition II</td>
<td>3</td>
<td>Prerequisite: ENGL-101 or placement</td>
</tr>
<tr>
<td>(Required Core 1A: English Composition)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA-441 Analytic Geometry and Calculus I</td>
<td>4</td>
<td>Prerequisite: MA-440 (C or better)</td>
</tr>
<tr>
<td>(Required for Major)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required Core 1C – Life &amp; Physical Sciences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH-421 General Calculus Physics A</td>
<td>5</td>
<td>Corequisite: MA-441</td>
</tr>
<tr>
<td>One course from Flexible Core 2A, 2C, or 2D³</td>
<td>3</td>
<td>Check individual courses for prerequisites and corequisites</td>
</tr>
<tr>
<td>(Recommended: History or Social Sciences course from 2A or 2D)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total credits for the term 15**
Summer Session – Eligible students may apply for a STEM Tuition Waiver to help with the summer term tuition

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
<th>Prerequisites and Corequisites¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Elective Courses⁴ - Take one course from the list below</td>
<td>4</td>
<td>Prerequisite: MA-441 (C or better)</td>
</tr>
<tr>
<td>Recommended: MA-442 Analytic Geometry and Calculus II</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total credits for the session</strong></td>
<td><strong>4</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Fall Semester #2**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
<th>Prerequisites and Corequisites¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Elective Courses⁴ - Take one course from the list below</td>
<td>4</td>
<td>Prerequisite: MA-442 (C or better)</td>
</tr>
<tr>
<td>Recommended: MA-443 Analytic Geometry and Calculus III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexible Core 2E – Scientific World</td>
<td>5</td>
<td>Prerequisites: MA-441 and PH-421 (C or better); Corequisite: MA-442</td>
</tr>
<tr>
<td>PH-422 General Calculus Physics B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History or Social Science Course (Required for Major) (If taken in the Common Core, select another Major Elective from list below)</td>
<td>3</td>
<td>Check individual courses for prerequisites and corequisites</td>
</tr>
<tr>
<td>Major Elective Courses⁴ - Take one course from the list below</td>
<td>2-3</td>
<td>Check individual courses for prerequisites and corequisites</td>
</tr>
<tr>
<td><strong>Total credits for the term</strong></td>
<td><strong>14-15</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Spring Semester #2**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
<th>Prerequisites and Corequisites¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Elective Courses⁴ - Take one course from the list below</td>
<td>4</td>
<td>Prerequisite for MA-451: MA 443 (C or better)</td>
</tr>
<tr>
<td>Recommended: MA-451 Differential Equations or MA-461 Linear Algebra</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Flexible Core Course²,³ PH-440 Modern Physics</td>
<td>4</td>
<td>Prerequisite: PH-422</td>
</tr>
<tr>
<td>One course from Flexible Core 2A, 2C, or 2D⁵</td>
<td>3</td>
<td>Check individual courses for prerequisites and corequisites</td>
</tr>
<tr>
<td>One credit course in PE-400, PE-500, or DAN-100 series</td>
<td>1</td>
<td>Check individual courses for prerequisites and corequisites</td>
</tr>
<tr>
<td><strong>Total credits for the term</strong></td>
<td><strong>12</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total credits required for the degree</strong></td>
<td><strong>60</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Prerequisites for a course must be passed before taking the course. Corequisites must be passed before taking the course or taken in the same term as the course.
2. Students are required to take particular courses in some areas of the Common Core that fulfill both general education and major requirements. If students do not take the required courses in the Common Core, they will have to take additional credits to complete their degree requirements.
3. Students must complete one course from each of the Flexible Core categories (2A, 2B, 2C, 2D, and 2E) and one additional course from any one of the categories. SP-211 will satisfy area 2B. The core for area 2E and the one additional flexible core course must be selected from the courses in the list below marked with an asterisk (*).
4. Students must take 9-18 credits of major elective courses to reach 60 credits. See the list below for approved major elective courses. Students must complete two-course sequences in at least two different subject areas (biology, chemistry, computer science, mathematics, and physics).

All students must complete two (2) WI designated classes to fulfill degree requirements.
### Major Elective Courses

<table>
<thead>
<tr>
<th>Major Elective Courses</th>
<th>Credits</th>
<th>Prerequisites and Corequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI-201 General Biology I*</td>
<td>4</td>
<td>Complete developmental requirements in English</td>
</tr>
<tr>
<td>BI-202 General Biology II*</td>
<td>4</td>
<td>BI-201</td>
</tr>
<tr>
<td>BI-356 Principles of Genetics</td>
<td>4</td>
<td>BI-201 (C or better)</td>
</tr>
<tr>
<td>BI-357 Bioinformatics/Computational Biology</td>
<td>3</td>
<td>BI-201 (C or better)</td>
</tr>
<tr>
<td>BI-453 Biotechnology</td>
<td>5</td>
<td>BI-201 and permission of instructor</td>
</tr>
<tr>
<td>CH-151 General Chemistry I*</td>
<td>4.5</td>
<td>MA-119 and MA-121 or placement</td>
</tr>
<tr>
<td>CH-152 General Chemistry II*</td>
<td>4.5</td>
<td>Prerequisite: CH-151</td>
</tr>
<tr>
<td>CH-251 Organic Chemistry I*</td>
<td>5</td>
<td>Corequisite: CH-152 or permission of the department</td>
</tr>
<tr>
<td>CH-252 Organic Chemistry II*</td>
<td>5</td>
<td>Prerequisite: CH-251</td>
</tr>
<tr>
<td>CH-900, 901 Cooperative Education in Chemical Instrumental Analysis</td>
<td>1</td>
<td>Corequisite: CH-152 or permission of the department</td>
</tr>
<tr>
<td>CH-911, 912 Independent Study and Research I</td>
<td>1</td>
<td>Corequisite for CH-911: CH-120 or CH-127 or CH-151; Prerequisite for CH-912: CH-911</td>
</tr>
<tr>
<td>CH-913, 914 Independent Study and Research II</td>
<td>1</td>
<td>Prereqs for CH-913: CH-151 and CH-912; Prereqs for CH-914: CH-151 and CH-913</td>
</tr>
<tr>
<td>CS-101 Algorithmic Problem Solving I*</td>
<td>4</td>
<td>Corequisite: MA-441</td>
</tr>
<tr>
<td>CS-201 Computer Organization and Assembly Language*</td>
<td>4</td>
<td>Prerequisites: CS-101 (C or better) and MA-441</td>
</tr>
<tr>
<td>CS-203 Algorithmic Problem Solving II in C++*</td>
<td>4</td>
<td>Prerequisites: CS-101 (C or better) and MA-441</td>
</tr>
<tr>
<td>CS-220 Discrete Structures</td>
<td>3</td>
<td>Prerequisite: MA-471</td>
</tr>
<tr>
<td>MA-442 Analytic Geometry and Calculus II*</td>
<td>4</td>
<td>Prerequisite: MA-441 (C or better)</td>
</tr>
<tr>
<td>MA-443 Analytic Geometry and Calculus III*</td>
<td>4</td>
<td>Prerequisite: MA-442 (C or better)</td>
</tr>
<tr>
<td>MA-451 Differential Equations*</td>
<td>4</td>
<td>Prerequisite: MA-443 (C or better)</td>
</tr>
<tr>
<td>MA-461 Linear Algebra*</td>
<td>4</td>
<td>Prerequisite: MA-442 (C or better)</td>
</tr>
<tr>
<td>MA-471 Introduction to Discrete Mathematics</td>
<td>3</td>
<td>Prerequisite: MA-440</td>
</tr>
<tr>
<td>MA-481 Probability and Statistics</td>
<td>3</td>
<td>Corequisite: MA-442</td>
</tr>
<tr>
<td>PH-240 Computerized Physical Measurement Using Graphical Programming*</td>
<td>3</td>
<td>See catalog</td>
</tr>
<tr>
<td>PH-301 College Physics I*</td>
<td>4</td>
<td>Prerequisite: MA-114 OR MA-121</td>
</tr>
<tr>
<td>PH-302 College Physics I*</td>
<td>4</td>
<td>Prerequisite: PH-301 (C or better)</td>
</tr>
<tr>
<td>PH-303 Scientific Use of Computers</td>
<td>2</td>
<td>Prerequisite: Complete developmental requirements in math</td>
</tr>
<tr>
<td>PH-311 College Physics A*</td>
<td>4</td>
<td>Prerequisite: MA-441 or permission of Department</td>
</tr>
<tr>
<td>PH-312 College Physics B*</td>
<td>4</td>
<td>Pre/corequisite: PH-312</td>
</tr>
<tr>
<td>PH-414 Analytical Mechanics</td>
<td>4</td>
<td>Prerequisite: PH-411 Corequisite: MA-443</td>
</tr>
<tr>
<td>PH-415 Electricity and Magnetism</td>
<td>4</td>
<td>Prerequisite: PH-413 Corequisite: MA-443.</td>
</tr>
<tr>
<td>PH-416 Thermodynamics*</td>
<td>4</td>
<td>Prerequisite: PH-412 and MA-443</td>
</tr>
<tr>
<td>PH-421 General Calculus Physics A*</td>
<td>5</td>
<td>Corequisite: MA-441</td>
</tr>
<tr>
<td>PH-422 General Calculus Physics B*</td>
<td>5</td>
<td>Prerequisites: MA-441 and PH-421 (C or better); Corequisite: MA-442</td>
</tr>
<tr>
<td>PH-431 Calculus Optics</td>
<td>2</td>
<td>Prerequisite: PH-201 or PH-411, MA-441; Corequisite: PH-231 and MA-442</td>
</tr>
<tr>
<td>PH-440 Modern Physics*</td>
<td>4</td>
<td>Prerequisite: PH-422</td>
</tr>
<tr>
<td>PH-450 Introduction to Physics Research</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>PH-900 Research Projects</td>
<td>2</td>
<td>Prerequisites: PH-201, PH-301, or PH-411; Corequisites: PH-202, PH-302, PH-412, or PH-413</td>
</tr>
</tbody>
</table>

Courses marked with an asterisk (*) can be used to satisfy the Flexible Core requirement.