## Engineering Dual Degree Requirements
### Computer Engineering & Astronomy and Astrophysics

<table>
<thead>
<tr>
<th>University Core Curriculum</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Core Requirements</td>
<td></td>
</tr>
<tr>
<td>FYS 101 First Year Seminar</td>
<td>3</td>
</tr>
<tr>
<td>FYS 102 First Year Seminar</td>
<td>3</td>
</tr>
<tr>
<td>GHS 201-209 Global and Historical Studies</td>
<td>3</td>
</tr>
<tr>
<td>GHS 201-209 Global and Historical Studies</td>
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<table>
<thead>
<tr>
<th>General Core Requirements</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Ti Text and Ideas</td>
<td>3</td>
</tr>
<tr>
<td>PCA Perspectives in the Creative Arts</td>
<td>3</td>
</tr>
<tr>
<td>SW The Social World (SW 220-EC)</td>
<td>3</td>
</tr>
<tr>
<td>AR Analytical Reasoning (exempt)</td>
<td>3</td>
</tr>
<tr>
<td>NW The Natural World (exempt)</td>
<td>5</td>
</tr>
<tr>
<td>PWB Physical Well-Being</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>Additional Core Requirements</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>BCR Butler Cultural Requirement</td>
<td>8 events</td>
</tr>
<tr>
<td>ICR Indianapolis Community Requirement</td>
<td>1 course</td>
</tr>
<tr>
<td>SAC Speaking Across the Curriculum</td>
<td>1 course</td>
</tr>
<tr>
<td>WAC Writing Across the Curriculum</td>
<td>1 course</td>
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<table>
<thead>
<tr>
<th>Liberal Arts and Science Requirements</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Language (min 6 cr 200 level or above)</td>
<td>6-14</td>
</tr>
<tr>
<td>Spanish, French, German, Chinese, Latin</td>
<td></td>
</tr>
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<table>
<thead>
<tr>
<th>Astronomy &amp; Astrophysics</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS 102 Modern Astronomy</td>
<td>5</td>
</tr>
<tr>
<td>AS 301 Modern Astronomical Techniques</td>
<td>3</td>
</tr>
<tr>
<td>AS 311 Astrophysics I</td>
<td>3</td>
</tr>
<tr>
<td>AS 312 Astrophysics II</td>
<td>3</td>
</tr>
<tr>
<td>PH 201 Introduction to Analytical Physics 1</td>
<td>5</td>
</tr>
<tr>
<td>PH 201 Introduction to Analytical Physics 2</td>
<td>5</td>
</tr>
<tr>
<td>PH 301 Modern Physics</td>
<td>3</td>
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<tr>
<td>PH 303 Electromagnetic Waves and Optics</td>
<td>3</td>
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<tr>
<td>PH 321 Intermediate Classical Mechanics</td>
<td>4</td>
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<tr>
<td>PH 331 Electromagnetic Theory I (WAC)</td>
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<tr>
<td>PH 495 Senior Seminar</td>
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<table>
<thead>
<tr>
<th>Recommended Courses</th>
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</thead>
<tbody>
<tr>
<td>PH 311 Experimental Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>PH 325 Thermodynamics &amp; Statistical Physics</td>
<td>4</td>
</tr>
<tr>
<td>PH 421 Quantum Theory I</td>
<td>4</td>
</tr>
<tr>
<td>PH 461 Computational Physics</td>
<td>3</td>
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</table>

<table>
<thead>
<tr>
<th>Common Engineering</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA 106 Calculus &amp; Analytical Geometry 1*</td>
<td>4</td>
</tr>
<tr>
<td>MA 107 Calculus &amp; Analytical Geometry 2*</td>
<td>4</td>
</tr>
<tr>
<td>MA 208 Calculus &amp; Analytical Geometry 3*</td>
<td>4</td>
</tr>
<tr>
<td>MA 215 Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MA 334 Differential Equations</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>Science</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CH 105 General Chemistry 1</td>
<td>5</td>
</tr>
<tr>
<td>CH 106 General Chemistry 2</td>
<td>5</td>
</tr>
<tr>
<td>PH 201 Introduction to Analytical Physics 1</td>
<td>-</td>
</tr>
<tr>
<td>PH 202 Introduction to Analytical Physics 2</td>
<td>-</td>
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</table>

<table>
<thead>
<tr>
<th>Engineering</th>
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<tbody>
<tr>
<td>DD 190 Elementary Engineering Design</td>
<td>3</td>
</tr>
<tr>
<td>DD 297 MATLAB</td>
<td>1</td>
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<tr>
<td>CS 142 Intro to Computer Science &amp; Prog*</td>
<td>3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COM 101 Rhetoric and the American Demo</td>
<td>3</td>
</tr>
<tr>
<td>TCM 250 Career Planning for Engineers</td>
<td>1</td>
</tr>
<tr>
<td>TCM 360 Comm in Engineering Practice (WAC/SAC)</td>
<td>2</td>
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<tr>
<td>ENGR 200 Engineering Internship</td>
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<table>
<thead>
<tr>
<th>Computer Engineering</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ECON 201 Microeconomics</td>
<td>2</td>
</tr>
<tr>
<td>PH 351 Analog Electronics (WAC)</td>
<td>4</td>
</tr>
<tr>
<td>ECE 202 Circuit Analysis II</td>
<td>3</td>
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<tr>
<td>ECE 210 Sophomore Seminar</td>
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<tr>
<td>ECE 264 Advanced C Programming</td>
<td>3</td>
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<tr>
<td>ECE 270 Digital Logic Design</td>
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<tr>
<td>ECE 282 Unix Programming for Engineering</td>
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<tr>
<td>ECE 301 Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 302 Probabilistic Methods</td>
<td>3</td>
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<tr>
<td>ECE 362 Microprocessors Systems &amp; Interface</td>
<td>4</td>
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<tr>
<td>ECE 365 Intro to Design of Digital Computers</td>
<td>3</td>
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<tr>
<td>ECE 401 Engineering Ethics</td>
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<tr>
<td>ECE 408 Operating Systems</td>
<td>3</td>
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<tr>
<td>ECE 487 Senior Design I</td>
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<tr>
<td>ECE 488 Senior Design II</td>
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<tr>
<td>CSCI 240 Advanced Programming</td>
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<tr>
<td>CSCI 340 Discrete Mathematics</td>
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<tr>
<td>CSCI 362 Data Structures</td>
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<tr>
<td>Advanced CmpE Electives</td>
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<tr>
<td>CmpE Electives¹</td>
<td>9</td>
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| 166 - 174 Total Credits | |

¹² used as equivalents for degree requirements
* also required for Astronomy and Astrophysics major
¹ CmpE elective- ECE 311 fulfills PH 331 requirement