

## Engineering Dual Degree Requirements

### Energy Engineering & Astronomy and Astrophysics

University Core Curriculum				Common Engineering			
<b>Common Core Requirements</b>				<b>Mathematics</b>			
FYS	101	First Year Seminar	Credits 3	MA	106	Calculus & Analytical Geometry 1 <sup>+</sup>	Credits 4
FYS	102	First Year Seminar	3	MA	107	Calculus & Analytical Geometry 2 <sup>+</sup>	4
GHS	201-209	Global and Historical Studies	3	MA	208	Calculus & Analytical Geometry 3 <sup>+</sup>	4
GHS	201-209	Global and Historical Studies	3	MA	215	Linear Algebra	3
				MA	334	Differential Equations	3
<b>General Core Requirements</b>				<b>Science</b>			
TI		Text and Ideas	Credits 3	CH	105	General Chemistry 1	Credits 5
PCA		Perspectives in the Creative Arts	3	CH	106	General Chemistry 2	5
SW		The Social World (SW 220-EC) <sup>3</sup>	3	PH	201	Introduction to Analytical Physics 1	-
AR		Analytical Reasoning (exempt)	3	PH	202	Introduction to Analytical Physics 2	-
NW		The Natural World (exempt)	5				
PWB		Physical Well-Being	1	<b>Engineering</b>			
		Core Credits	22(30)	DD	190	Elementary Engineering Design	Credits 3
<b>Additional Core Requirements</b>				DD	297	MATLAB	1
BCR		Butler Cultural Requirement	8 events	CS	142	Intro to Computer Science & Prog <sup>+</sup>	3
ICR		Indianapolis Community Requirement	1 course	<b>Other</b>			
SAC		Speaking Across the Curriculum	1 course	COM	101	Rhetoric and the American Demo	Credits 3
WAC		Writing Across the Curriculum	1 course	TCM	250	Career Planning for Engineers	1
<b>Liberal Arts and Science Requirements</b>				TCM	360	Comm in Engineering Practice (WAC/SAC)	2
		Credits	28-36	ENGR	200	Engineering Internship	1
Foreign Language (min 6 cr 200 level or above)		Credits	6-14			Credits	42
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<b>Astronomy &amp; Astrophysics</b>				<b>Energy Engineering</b>			
AS	102	Modern Astronomy	Credits 5	ECON	201	Microeconomics <sup>3</sup>	Credits -
AS	301	Modern Astronomical Techniques	3	PH	351	Analog Electronics (WAC)	4
AS	311	Astrophysics I	3	MA	359	Probability and Statistics	3
AS	312	Astrophysics II	3	ME	200	Thermodynamics <sup>2</sup>	3
PH	201	Introduction to Analytical Physics 1	5	ME	272	Mechanics of Materials	3
PH	201	Introduction to Analytical Physics 2	5	ME	314	Heat & Mass Transfer	3
PH	301	Modern Physics	3	ME	482	Control Systems	3
PH	303	Electromagnetic Waves and Optics	3	ECE	321	Electromechanical Motion Devices	3
PH	321	Intermediate Classical Mechanics <sup>1</sup>	-	ECE	495	Fundamentals of Electrical Energy	3
PH	331	Electromagnetic Theory I (WAC)	4	EEN	220	Fund of Electrochem Mat & Energy Engr	3
PH	495	Senior Seminar	1	EEN	225	Energy Engineering Lab 1	1
		Credits	35	EEN	240	Basic Engineering Mechanics <sup>1</sup>	4
<b>Recommended Courses</b>				EEN	250	Energy Engineering Lab 2	1
PH	311	Experimental Modern Physics	3	EEN	260	Sustainable Energy	3
PH	325	Thermodynamics & Statistical Physics <sup>2</sup>	-	EEN	262	Engr Design, Ethics, & Entrepreneurship	2
PH	421	Quantum Theory I	4	EEN	310	Fluid Mechanics	3
PH	461	Computational Physics	3	EEN	325	Energy Engineering Lab 3	1
				EEN	330	Dynamic Sys Modeling & Measurements	3
				EEN	345	Renewable Energy Systems	3
				EEN	350	Energy Engineering Lab 4	1
				EEN	425	Energy Engineering Lab 5	1
				EEN	445	Compressible Flow & Renewable KE	3
				EEN	462	Capstone Design	3
				EEN Electives			12
				Tech Elective			2
						Credits	71
<b>176 - 184 Total Credits</b>							

<sup>1-3</sup> used as equivalents for degree requirements

<sup>+</sup> also required for Astronomy and Astrophysics major