

# PHYSICS, B.S.

## ELECTRICAL ENGINEERING SPECIALIZATION (ENGR)

(Fall 2016-Summer 2017)

### PHYSICS BS COURSES & SUPPORTING COURSES (85 credits)

\*Note: 2.0 GPA required in PHYS courses/B.S. degree

- \_\_\_\_\_ 5 PHYS 15200 Mechanics (C- or above)
- \_\_\_\_\_ 5 PHYS 25100 Heat, Electricity and Optics
- \_\_\_\_\_ 3 PHYS 30500 Intermediate Math Physics
- \_\_\_\_\_ 3 PHYS 32200 Intermediate Optics
- \_\_\_\_\_ 3 PHYS 32500 Scientific Computing
- \_\_\_\_\_ 3 PHYS 34200 Modern Physics
- \_\_\_\_\_ 1 PHYS 34300 Modern Physics Laboratory
- \_\_\_\_\_ 1 PHYS 34500 Optics Laboratory I
- \_\_\_\_\_ 1 PHYS 34600 Advanced Laboratory I
- \_\_\_\_\_ 3 PHYS 44200 Quantum Mechanics
- \_\_\_\_\_ 3 PHYS 48001 Senior Thesis I
- \_\_\_\_\_ 0 1 Class in PHYS 48002 Senior Thesis II

### ENGINEERING CORE

- \_\_\_\_\_ 2 ENGR 12000 Graph Communication & Spatial Analysis
- \_\_\_\_\_ 4 ENGR 12100 Computer Tools for Engineers
- \_\_\_\_\_ 2 CS 22700 Introduction to C Programming
- \_\_\_\_\_ 1 CS 22800 Object Oriented Program in C++

### ENGINEERING SPECIALIZATION

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| _____ 4 PHYS 31000 Intermediate Mechanics          | _____ 3 ECE 29300 Measurements and Instrumentation |
| _____ 3 PHYS 41800 Thermal and Statistical Physics | _____ 3 ECE 30100 Signals and Systems              |
| _____ 3 ECE 20100 Linear Circuit Analysis I        | _____ 3 ECE 31100 Electric and Magnetic Fields     |
| _____ 3 ECE 20200 Linear Circuit Analysis II       | _____ 3 ECE <u>or</u> PHYS (Approved elective)     |

### SUPPORTING CHEMISTRY & MATHEMATICS COURSES

- \_\_\_\_\_ 4 CHM 11500 General Chemistry
- \_\_\_\_\_ 4 MA 16500 Analytic Geometry & Calculus I (C- or above)
- \_\_\_\_\_ 4 MA 16600 Analytic Geometry & Calculus II (C- or above)
- \_\_\_\_\_ 4 MA 26100 Multivariate Calculus (C- or above)
- \_\_\_\_\_ 3 MA 35100 Elementary Linear Algebra (C- or above)
- \_\_\_\_\_ 3 MA 36300 Differential Equations

### A&S BS LIBERAL ARTS REQUIREMENTS (14 credits — credits may vary with double counting/language placement – see advisor)

- \_\_\_\_\_ 3 Second Semester Writing (C- or higher) (ENG W140 or ENG W233)
  - \_\_\_\_\_ 3 Speaking Requirement (C- or higher) (COM 11400 or HIST H125)
  - \_\_\_\_\_ 8 Credits Language Sequence (credit/placement required for 2 semesters of foreign language)
    - \_\_\_\_\_ FL (1<sup>st</sup> semester) \_\_\_\_\_ FL (2<sup>nd</sup> semester—one course at second semester level required)
- Options: (Arabic, French, German, Japanese, Latin, Spanish)

### GENERAL EDUCATION REQUIREMENTS (33 Credits)

\*Note: grades of C- or higher required in Gen Ed/2.0 GPA

**\*\*Up to 6 credits in Gen Ed GA1 to GB7 and 3 credits GCAP (C8) may originate in major discipline—see advisor for more information.**

- \_\_\_\_\_ 3 GA1 Category A1 -- Written Communication (See Bulletin or myBLUEprint for **General Education** courses)
- \_\_\_\_\_ 3 GA2 Category A2 -- Speaking and Listening
- \_\_\_\_\_ 3 GA3 Category A3 -- Quantitative Reasoning
- \_\_\_\_\_ 3 GB4 Category B4 -- Scientific Ways of Knowing
- \_\_\_\_\_ 3 GB5 Category B5 -- Social & Behavioral Ways of Knowing
- \_\_\_\_\_ 3 GB6 Category B6 -- Humanistic and Artistic Ways of Knowing
- \_\_\_\_\_ 3 GB7/71 Category B7 or B71 -- Interdisciplinary or Creative Ways of Knowing
- \_\_\_\_\_ 9 Additional Credits -- Category A or B General Education courses
- \_\_\_\_\_ 3 **GCAP Category C8--Capstone Experience** (IPFW course only)

**MINOR/ELECTIVES** (to reach 120 credits): \_\_\_\_\_

IPFW Residency Requirements: \_\_\_\_\_ 32 credits at 200 level or above at IPFW \_\_\_\_\_ with 15 of 32 credits at 300-400 in major  
 B.S. Requirements: \_\_\_\_\_ 120 credits \_\_\_\_\_ 30 credits 300-400 level \_\_\_\_\_ 2.0 GPA Degree/Gen Ed \_\_\_\_\_ C- or above in Gen Ed Courses

# PHYSICS, B.S.

## PLAN— ELECTRICAL ENGINEERING SPECIALIZATION (ENGR)

(Fall 2016-Summer 2017)

Term: Year: 20				Term: Year: 20			
Course No.	Course Title	Pre-Reqs	Crs.	Course No.	Course Title	Pre-Reqs	Crs.
MA 165000 (GA3)	Analytic Geometry & Calculus 1	MA 159 or 154 (C- or above); placement	4	MA 16600	Analytic Geometry & Calculus II	MA 165 (C- or above)	4
CHM 11500 (GB4)	General Chemistry	H.S. CHM or CHM 111 (C- or above); MA 154, 227, 229 level	4	PHYS 15200 (Gen Ed A/B)	Mechanics	C: MA 166	5
PHYS 17000	Physics Seminar		1	CS 22700	Intro to C Programming	ENGR 121	2
COM 11400 or HIST H125 (GA2/A&S)	Fundament of Speech or Great Debates		3	CS 22800	Object Oriented Programming in C++	CS 227 or ENGR 221	1
ENGR 12000	Graph Communication & Spatial Analysis	MA 153	2	ENG W131 (GA1)	Read, Writ, & Inquiry I	Self-Place or ENG W129 (C- or above)	3
ENGR 12100	Comp Tools Engineers	MA 154 or 159 (C- or above); C: ENGR 120	2				
<b>Total Semester Credit Hours</b>			<b>16</b>	<b>Total Semester Credit Hours</b>			<b>15</b>

Term: Year: 20				Term: Year: 20			
Course No.	Course Title	Pre-Reqs	Crs.	Course No.	Course Title	Pre-Reqs	Crs.
MA 26100	Multivariate Calculus	MA 166 (C- or above)	4	MA 35100	Elem Linear Algebra	2 sem calc (C- or above grades)	3
PHYS 25100	Heat, Electricity, and Optics	PHYS 152 (C- or above); P or C: MA 261	5	MA 36300	Differential Equations	√	3
ENG W233 (Gen Ed A/B)	Intermed Expos Writing	ENG W131/equiv	3	PHYS 34200	Modern Physics	PHYS 241 or 251 or 261	3
ECE 20100	Linear Circuit Analysis I	MA 26100	3	PHYS 34300	Modern Physics Lab	C: PHYS 342	1
				ECE 31100 or PHYS 31200	Elect & Magnetic Fields or Intermed Elect & Mag	√	3
				GB5	Gen Ed Social/Behavior		3
<b>Total Semester Credit Hours</b>			<b>15</b>	<b>Total Semester Credit Hours</b>			<b>16</b>

Term: Year: 20				Term: Year: 20			
Course No.	Course Title	Pre-Reqs	Crs.	Course No.	Course Title	Pre-Reqs	Crs.
PHYS 31000	Intermediate Mechanics	√	4	PHYS 41800	Thermal & Stat Physics	PHYS 342	3
ECE 20200	Linear Circuit Analysis II	ECE 202; C: MA 363	3	PHYS 30500	Intermed Math Physics	PHYS 251	3
ECE 29300	Measure & Instruments	ECE 201, COM 114 & ENG W131	2	PHYS 32200	Intermediate Optics	PHYS 251/equiv	3
PHYS 34600	Advanced Lab I	PHYS 343	1	PHYS 34500	Optics Lab I	C: PHYS 322	1
ECE or PHYS Elective	ECE or PHYS (Approved elective)	√	3	ECE 30100	Signals and Systems	ECE 202	3
GB6	Gen Ed Hum/Artistic		3	Gen Ed A or B	Gen Ed A or B course		3
<b>Total Semester Credit Hours</b>			<b>16</b>	<b>Total Semester Credit Hours</b>			<b>16</b>

Term: Year: 20				Term: Year: 20			
Course No.	Course Title	Pre-Reqs	Crs.	Course No.	Course Title	Pre-Reqs	Crs.
PHYS 32500	Scientific Counting	√	3	PHYS 48002	Senior Thesis II	√	0
PHYS 44200	Quantum Mechanics	PHYS 342 and MA 363 (C- or above grades)	3	FL 12	Foreign Language 2	FL 1/ placement	4
PHYS 48001 (C8)	Senior Thesis I	√	3	GB7/71	Gen Ed Creat/Interdisc		3
FL11	Foreign Language 1		4	Elective	Free Elective		3
@ @	Free elective (if needed)		1	Elective	Free elective		*2
<b>Total Semester Credit Hours</b>			<b>14</b>	<b>Total Semester Credit Hours</b>			<b>12</b>

√ = See IPFW Bulletin or myBLUEprint for additional course prerequisites

**Summer Courses:**

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**120 credits required for Bachelor of Science degree**  
**2.0 GPA required for Bachelor of Science degree/major**