

## **Applied Physics**

### **124 Credits**

#### **First Year**

| <b>Fall</b> |                                 |   | <b>Spring</b> |                                  |   |
|-------------|---------------------------------|---|---------------|----------------------------------|---|
|             | HASS Elective <sup>1</sup>      | 4 |               | Free Elective                    | 4 |
| CHEM 1100   | Chemistry I                     | 4 | BIOL 1010     | Introduction to Biology          | 3 |
| MATH 1010   | Calculus I                      | 4 | BIOL 1015     | Intro. to Biology Lab            | 1 |
| PHYS 1150   | Physics I (Honors) <sup>2</sup> | 4 | MATH 1020     | Calculus II                      | 4 |
|             |                                 |   | PHYS 1250     | Physics II (Honors) <sup>2</sup> | 4 |

#### **Second Year**

| <b>Fall</b> |   |   | <b>Spring</b> |  |   |
|-------------|---|---|---------------|--|---|
|             | HASS Elective <sup>1</sup>                | 4 |               | HASS Elective <sup>1</sup>                   | 4 |
| CSCI 1100   | Computer Science I <sup>3</sup>           | 4 | PHYS 4330     | Theoretical Mechanics                        | 4 |
| MATH 2400   | Introduction to<br>Differential Equations | 4 | MATH 2010     | Multivariable Calculus and<br>Matrix Algebra | 4 |
| PHYS 2210   | Quantum Physics I                         | 4 | PHYS 2220     | Quantum Physics II                           | 4 |

#### **Summer Arch**

| <b>Week 1-6</b> |   |   | <b>Week 7-12</b> |  |   |
|-----------------|---|---|------------------|--|---|
| Math 4XXX       | Mathematics Elective <sup>4</sup>       | 4 |                  | HASS Elective <sup>1</sup>             | 4 |
| PHYS 4010       | Fundamentals of<br>Experimental Physics | 2 | PHYS 4020        | Data-Intensive<br>Experimental Physics | 2 |
| PHYS 4030       | Computing for Physicists                | 2 | PHYS 4040        | Mathematical Physics                   | 2 |

#### **Third Year**

| <b>Fall</b> |  |  | <b>Spring</b> |   |   |
|-------------|--|--|---------------|---|---|
|             |  |  |               | Free Elective                               | 4 |
|             |  |  |               | Technical Elective <sup>5</sup>             | 4 |
|             |  |  | PHYS 4210     | Electromagnetic Theory                      | 4 |
|             |  |  | PHYS 4420     | Thermodynamics and<br>Statistical Mechanics | 4 |

### Fourth Year

| Fall      |                                     |   | Spring |                                 |   |
|-----------|-------------------------------------|---|--------|---------------------------------|---|
| PHYS 4XXX | Culminating Experience <sup>6</sup> | 4 |        | Technical Elective <sup>5</sup> | 4 |
|           | Technical Elective <sup>5</sup>     | 4 |        | Free Elective                   | 4 |
|           | Technical Elective <sup>5</sup>     | 4 |        | HASS Elective <sup>1</sup>      | 4 |
|           | HASS Elective <sup>1</sup>          | 4 |        |                                 |   |

#### Footnotes

1. HASS courses shall total 24 credits and meet distribution requirements in the catalog.
2. PHYS 1100 and PHYS 1200 may be substituted for Honors Physics I and II (PHYS 1150 and PHYS 1250), respectively.
3. CSCI 1010 may be substituted for CSCI 1100.
4. MATH 4XXX electives are to be chosen from the following:
  - MATH 4100 - Linear Algebra
  - MATH 4300 - Introduction to Complex Variables: Theory and Applications
  - MATH 4400 - Ordinary Differential Equations and Dynamical Systems
  - MATH 4500 - Methods of Partial Differential Equations of Mathematical Physics
  - MATH 4600 - Advanced Calculus
  - MATH 4700 - Foundations of Applied Mathematics
  - MATH 4800 - Numerical Computing
5. Technical Electives are to be selected with the aid of an adviser in order to create a concentration in an appropriate applied physics field. See "Applied Physics Concentration" below.
6. Students must complete a culminating experience, which may be fulfilled (i) through research participation; (ii) by passing a designated 4-credit senior elective; or (iii) by passing a designated 3-credit course in Physics or Astronomy plus 1 credit of PHYS 4910.

#### Applied Physics Concentration

The applied physics program requires a concentration of 16 credits in technical electives which focus on a specific technological area. Possible concentrations include, but are not limited to optical physics, medical physics, microelectronics, semiconductor physics, optoelectronics, geophysics, biophysics, computational physics, environmental physics, nuclear science, and space science. Two such concentrations are illustrated below.

### **Example 1: Concentration in Optical Physics**

A concentration in optical physics might include four courses from the following list:

- PHYS 2620 - Fundamentals of Optics Credit Hours: 4
- PHYS 4630 - Lasers and Optical Systems Credit Hours: 4
- PHYS 4640 - Optical Communications and Integrated Optics Credit Hours: 4
- PHYS 4720 - Solid-State Physics Credit Hours: 4

### **Example 2: Concentration in Microelectronics**

A concentration in microelectronics might include four courses from the following list:

- ECSE 2050 - Introduction to Electronics Credit Hours: 4
- ECSE 2210 - Microelectronics Technology Credit Hours: 3
- ECSE 4220 - VLSI Design Credit Hours: 3
- ECSE 4250 - Integrated Circuit Processes and Design Credit Hours: 3\*
- MTLE 4160 - Semiconducting Materials Credit Hours: 3
- PHYS 4720 - Solid-State Physics Credit Hours: 4

### **Free Electives**

Applied physics majors planning to pursue graduate study should take advanced physics courses chosen from the following undergraduate- and graduate-level offerings:

- ASTR 4220 - Astrophysics Credit Hours: 4
- ASTR 4240 - Gravitation and Cosmology Credit Hours: 4
- PHYS 4630 - Lasers and Optical Systems Credit Hours: 4
- PHYS 4720 - Solid-State Physics Credit Hours: 4
- PHYS 6510 - Quantum Mechanics I Credit Hours: 4
- PHYS 6520 - Quantum Mechanics II Credit Hours: 4

### **Additional Information**

Students planning on graduate work in astronomy or astrophysics are urged to choose electives from the above list plus the following:

- ASTR 2050 - Introductory Astronomy and Astrophysics Credit Hours: 4
- ASTR 4120 - Observational Astronomy Credit Hours: 4
- ASTR 4220 - Astrophysics Credit Hours: 4
- ASTR 4240 - Gravitation and Cosmology Credit Hours: 4

\*Students cannot receive credit for both ECSE 4250 and MTLE 4160.