

## **Physics** (Department, Major, Courses, Faculty)

As the most basic of the physical sciences, physics can serve as the building block for many different careers. Using their understanding of physical principles, physicists have been at the forefront of many of the most exciting discoveries of the twentieth century and will continue to lead the way to many exciting discoveries in the future. They have contributed to a wide range of areas, including, but not limited to, biology, chemistry, communication, computer science, electronics, engineering, finance, managerial consulting, geophysics, medical physics, and transportation.

The SIUC Physics department focuses on applied physics. Therefore the department seeks to provide undergraduate students with the skills necessary to apply their basic understanding of physics to real-world problems for which the solutions are of near-future concern. With this in mind, the physics department at SIUC offers a first-rate undergraduate program with four different specializations in applied physics -biomedical physics, computational physics, material science/nanophysics, and the traditional physics curriculum. These specializations are targeted to high-demand areas of science and take advantage of the expertise of our faculty. Members of the physics faculty are involved in a wide range of physics research projects, both theoretical and experimental, including low temperature physics, surface physics, materials physics, superconductivity, magnetism, synchrotron radiation, infrared spectroscopy, solid-state physics, quantum mechanics, quantum computation, computational physics, and statistical mechanics. Participation in faculty research projects by students is strongly encouraged and can be very useful to students since it provides them with faculty mentors, and experience applying learned skills to real-world physics problem-solving.

Physics is an exciting field; its graduates are in high demand and enjoy high salaries and job security. Employment opportunities in physics are varied and abundant, from industrial research and development to teaching. Physicists are employed by all sectors of society, including health care, various corporations, government, and universities. Students who wish to learn more are encouraged to contact the physics department directly or visit the department web site at <http://www.physics.siu.edu>.

A minimum GPA of 2.0 in all physics and mathematics course work is needed in order for a student to receive a degree in Physics. In terms of credit hour requirements toward a degree in Physics, a course will be counted only once. A student may not repeat a course or its equivalent in which a grade of B or better was earned without the consent of the department.

## Bachelor of Science Degree in Physics, College of Science:

### Physics, Material Science/Nanophysics, and Computational Physics

<i>University Core Curriculum Requirements</i> .....	41	
College of Science Requirements.....	9 <sup>1</sup>	
Biological Science (Not University Core).....	3 <sup>1</sup>	
Supportive Skills.....	6	
Choose six hours from the following:		
One to two semesters of any foreign language offered at Southern Illinois University Carbondale		
English 290 or 291 or Management 202 (select only one)		
Computer Science 105, 201,202, Engineering 222 (select one)		
<i>Requirements for Major in Physics</i> .....	72 <sup>1</sup>	
Chemistry 200, 201, 210, 211.....	10 <sup>1</sup>	
Mathematics 150, 250, 251, 305, 221 .....	17	
Mathematics 306 or 405 or 406 or 407 or 409 or 475.....	3	
Physics 205A, 255A, 205B, 255B, 205C, 255C, 301, 310, 320, 420, 430, 440, 445, 450 .....	38	
Physics electives chosen from: 100, 328, 390, 424, 425, 428, 431, 432, 458, 475, 470, 490, CS 220, CS 475.....	0-10 <sup>2</sup>	
<i>Total</i> .....		122

<sup>1</sup>Three of these hours count toward the 41 hours required for the core curriculum.

<sup>2</sup>This number depends on the physics degree concentration option, if chosen.

## Physics Suggested Curricular Guide

<u>FIRST YEAR</u>	<u>FALL</u>	<u>SPRING</u>
ENGL 101,102.....	3	3
PHYS 100.....	-	1
PHYS 205A, 255A .....	-	4
MATH 150, 250.....	4	4
CHEM 200, 201.....	5	-
CHEM 210, 211.....	-	5
Core Humanities.....	3	-
Human Health.....	2	-
<i>Total</i> .....	17	17

<u>SECOND YEAR</u>	<u>FALL</u>	<u>SPRING</u>
PHYS 205B, 255B.....	4	-
PHYS 205C, 255C.....	-	4
MATH 251 .....	3	-
SPCM 101, PHYS 301 .....	3	3
Physics 310 .....	-	4
MATH 305.....	3	-
Core Humanities.....	3	-
PHYS 320.....	-	3
<i>Total</i> .....	16	14

<u>THIRD YEAR</u>	<u>FALL</u>	<u>SPRING</u>
PHYS 420, Biological Science.....	3	3
PHYS 445.....	-	4
PHYS 430, PHYS 440 .....	3	3
PHYS Elective.....	3	3
Supportive Skills.....	3	3
MATH 221.....	3	-
<i>Total</i> .....	15	16

<u>FOURTH YEAR</u>	<u>FALL</u>	<u>SPRING</u>
Fine Arts .....	3	-
Core Social Science.....	3	3
PHYS/MATH Elective.....	3	3
PHYS 450 .....	-	3
Biological Science, Interdisciplinary.	3	3
Multicultural.....	3	-
<i>Total</i> .....	15	12

## Physics Specialization Options

*Computational Physics*,..... 12

For students interested in computational/numerical methods  
in physics.

Required: Nine hours of computer science<sup>1</sup>, PHYS 475,  
and three hours of MATH 475.

*Materials Science/Nanophysics*..... 9

For students interested in applications of physics to nano-scale  
devices and materials

Required: PHYS 425, PHYS 450, and PHYS 475

*Biomedical Physics* .....12

For students interested in the applications of physics in biology  
and medicine.

Required: PHYS 475, BIOL 200a, BIOL 200b, CHEM 340, 341, 350, 351

---

<sup>1</sup>Can include CS 202, 220, and CS 475 which is cross-listed as MATH 475. (See the suggested curricular guide.)

## Computational Physics Suggested Curricular Guide

<u>FIRST YEAR</u>	<u>FALL</u>	<u>SPRING</u>
ENGL 101,102.....	3	3
PHYS 100.....	-	1
PHYS 205A, 255A .....	-	4
MATH 150, 250.....	4	4
CHEM 200, 201.....	5	-
CHEM 210, 211.....	-	5
Core Humanities.....	3	-
Human Health.....	2	-
<i>Total</i> .....	17	17

<u>SECOND YEAR</u>	<u>FALL</u>	<u>SPRING</u>
PHYS 205B, 255B.....	4	-
PHYS 205C, 255C.....	-	4
MATH 251.....	3	-
SPCM 101, PHYS 301 .....	3	3
Physics 310 .....	-	4
MATH 305.....	3	-
CS202, PHYS 320.....	3	3
<i>Total</i> .....	16	14

<u>THIRD YEAR</u>	<u>FALL</u>	<u>SPRING</u>
PHYS 420, Biological Science.....	3	3
PHYS 430, PHYS 440.....	3	3
PHYS 475 .....	3	-
PHYS 445.....	-	4
CS 220.....	3	-
MATH 221, Core Humanities.....	3	3
<i>Total</i> .....	15	13

<u>FOURTH YEAR</u>	<u>FALL</u>	<u>SPRING</u>
Core Social Science.....	3	3
MATH 475 .....	3	3
Fine Arts, PHYS 450 .....	3	3
Biological Science, Interdisciplinary.	3	3
Multicultural, Supportive Skills 2.....	3	3
<i>Total</i> .....	15	15

## Materials/Nanophysics Suggested Curricular Guide

FIRST YEAR	FALL	SPRING
ENGL 101,102.....	3	3
PHYS 100.....	-	1
PHYS 205A, 255A .....	-	4
MATH 150, 250.....	4	4
CHEM 200, 201.....	5	-
CHEM 210, 211.....	-	5
Core Humanities.....	3	-
Human Health.....	2	-
<i>Total</i> .....	17	17

SECOND YEAR	FALL	SPRING
PHYS 205B, 255B.....	4	-
PHYS 205C, 255C.....	-	4
MATH 251,.....	3	-
SPCM 101, PHYS 301 .....	3	3
Physics 310 .....	-	4
MATH 305.....	3	-
Core Humanities.....	3	-
PHYS 320.....	-	3
<i>Total</i> .....	16	14

THIRD YEAR	FALL	SPRING
PHYS 420, Biological Science.....	3	3
PHYS 445.....	-	4
PHYS 430, PHYS 440 .....	3	3
PHYS 425 .....	-	3
PHYS Elective .....	3	-
Supportive Skills.....	3	3
MATH 221.....	3	-
<i>Total</i> .....	15	15

FOURTH YEAR	FALL	SPRING
Core Social Science.....	3	3
PHYS 475 .....	3	-
Fine Arts .....	-	3
PHYS Elective.....	4	-
PHYS 450 .....	-	3
Biological Science, Interdisciplinary.	3	3
Multicultural.....	3	-
<i>Total</i> .....	16	12

## Bachelor of Science Degree in Physics, College of Science:

### Biomedical Physics

<i>University Core Curriculum Requirements</i> .....	41	
College of Science Requirements.....	9 <sup>1</sup>	
Biological Science (Not University Core).....	3 <sup>1</sup>	
Supportive Skills.....	6	
Choose six hours from the following:		
One to two semesters of any foreign language offered at Southern Illinois University Carbondale		
English 290 or 291 or Management 202 (select only one)		
Computer Science 105, 201,202, Engineering 222 (select one)		
<i>Requirements for Major in Biomedical Physics</i> .....	72 <sup>1</sup>	
Biology 200a, 200b .....	6	
Chemistry 200, 201, 210, 211, 340, 341, 350, 351.....	20 <sup>1</sup>	
Mathematics 150, 250, 251, 305 .....	14	
Physics 205a, 255a, 205b, 255b, 205C, 255C, 301, 310, 320, 420, 430, 445 .....	32	
Physics electives chosen from: PHYS 100, 328, 390, 424, 425, 428, 431, 432, 458, 475, 470, 490, CHEM 451a , 451b <sup>2</sup> .....	6	
<i>Total</i> .....		122

<sup>1</sup>Three of these hours count toward the 41 hours required for the core curriculum.

<sup>2</sup>Substitutions must be approved by the chair of the department.

## Biomedical Physics Suggested Curricular Guide

<u>FIRST YEAR</u>	<u>FALL</u>	<u>SPRING</u>
ENGL 101,102.....	3	3
PHYS 205A, 255A .....	-	4
MATH 150, 250.....	4	4
CHEM 200, 201.....	5	-
CHEM 210, 211.....	-	5
Core Humanities.....	3	-
Human Health.....	2	-
<i>Total</i> .....	17	16

<u>SECOND YEAR</u>	<u>FALL</u>	<u>SPRING</u>
PHYS 205B, 255B.....	4	-
PHYS 205C, 255C.....	-	4
MATH 251.....	3	-
SPCM 101, PHYS 301 .....	3	3
PHYS 310 .....	-	4
MATH 305.....	3	-
Core Humanities.....	3	-
PHYS 320.....	-	3
<i>Total</i> .....	16	14

<u>THIRD YEAR</u>	<u>FALL</u>	<u>SPRING</u>
BIOL 200a, BIOL 200b.....	4	4
PHYS 420, 445.....	3	4
CHEM 340,341.....	5	-
CHEM 350,351.....	-	5
Supportive Skills 1.....	3	-
<i>Total</i> .....	15	16

<u>FOURTH YEAR</u>	<u>FALL</u>	<u>SPRING</u>
Fine Arts, .....	-	3
PHYS 430 .....	3	-
PHYS 475 .....	3	-
CHEM 451a,CHEM 451b.....	3	3
Multicultural, Interdisciplinary.....	3	3
Core Social Science .....	-	3
Supportive Skills 2 .....	3	-
<i>Total</i> .....	15	12