

# STANFORD UNIVERSITY

## *B.S. in Physics* *Minimum Requirements*

### **REQUIRED PHYSICS COURSES**

<b>Course-40 Series</b>	<b>Units</b>	<b>Course</b>	<b>Units</b>
Physics <b>41</b> Mechanics	4	Math <b>51</b> Linear Algebra/Multi-Variable Calculus (or 51H Honors Adv Calculus)	5
Physics <b>43</b> E&M	4	Math <b>52</b> Vector Calculus (or 52H Honors Adv Calculus)	5
Physics <b>45</b> Light and Heat	4	Math <b>53</b> Linear Algebra/ODE (or 53H Honors Adv Calculus)	5
Physics <b>46</b> Light and Heat Lab	1	Math <b>131</b> PDE	3
Physics <b>70</b> Foundations of Modern Physics <sup>c</sup>	4		
~AND~		~AND~	
Physics <b>44</b> E&M Lab	1		
~OR~		~AND~	
Physics <b>67</b> Intro to Lab. Physics <sup>a</sup>	2	Math <b>100</b> or higher	3
~OR~		~OR~	
<b>Course-60 Series</b>		<b>Course</b>	
	<b>Units</b>		<b>Units</b>
Physics <b>61</b> (Mechanics and Special Relativity)	4	Physics <b>112</b> Math Methods of Phys <sup>f</sup>	4
Physics <b>63</b> (Electricity, Magnetism & Waves)	4	<b>RECOMMENDED PHYSICS COURSES<sup>e</sup></b>	
Physics <b>64</b> (Electricity, Magnetism & Waves Lab)	1	<b>Course</b>	<b>Units</b>
Physics <b>65</b> (Thermodynamics & Foundations of Modern Physics)	4	Physics <b>59</b> Current Research Topics	1
Physics <b>67</b> Intro to Lab. Physics <sup>a</sup>	2	Physics <b>113</b> Computational Physics <sup>e</sup>	4
~AND~		Or	
		AP <b>215</b> Numerical Methods for Physics and Engineers	3
		Physics <b>134</b> Adv Quantum Mech <sup>e</sup>	4
<b>Course-Intermediate</b>			
	<b>Units</b>		
Physics <b>105</b> Int Physics Lab	3		
Physics <b>107</b> Int Physics Lab <sup>b</sup>	4		
Physics <b>108</b> Int Physics Lab	3		
Physics <b>110</b> Int Mechanics	4		
Physics <b>120</b> Int E&M	4		
Physics <b>121</b> Int E&M	4		
Physics <b>130</b> Quantum Mech	4		
Physics <b>131</b> Quantum Mech	4		
Physics <b>170</b> Thermo/Stat Mech	4		
Physics <b>171</b> Thermo/Stat Mech	4		
Elective numbered <b>100</b> or higher <sup>d</sup>			

<sup>a</sup> 67 recommended for prospective majors

<sup>b</sup> Satisfies the Writing in the Major (WIM) reqm

<sup>c</sup> 70 is taken by students who complete the 40 series, or who complete the 50 or 60 series prior to 2005/06.

<sup>d</sup> Students who complete the 60 series take one physics course numbered 100 or higher.

<sup>e</sup> These courses are not required; Ph 113 is recommended for students planning to work in technical fields; Both 113 and 134 are recommended for students who intend to complete a Ph.D. in Physics.

<sup>f</sup> Those wishing to do physics theory in graduate school may wish to take a collection of math courses in the Department of Mathematics rather than PHYSICS 112.

# Minors

## *Non-Technical*

For students whose majors do not require the Physics 40 or 60 series

### Physics

Course	Units
Physics <b>21</b> Mechanics & Heat	3
Physics <b>22</b> Mechanics & Heat Lab	1
Physics <b>23</b> Electricity & Optics	3
Physics <b>24</b> Electricity & Optics Lab	1
Physics <b>25</b> Modern Physics	3
Physics <b>26</b> Modern Physics Lab	1

~AND~

Any combination of Physics courses totaling 15 units or greater. 15

### Astronomy

Course	Units
Physics <b>21</b> Mechanics & Heat	3
Physics <b>23</b> <sup>^</sup> Electricity & Optics	3
Physics <b>25</b> Modern Physics	3
Physics <b>26</b> Modern Physics Lab	1

~AND~

Choose 1 from below:

Course	Units
Physics <b>50</b> Astronomy Lab and Observational Astronomy	3
Physics <b>100</b> Intro to Observational and Laboratory Astronomy	4

~AND~

Choose 2 from below:

Course	Units
Physics <b>15</b> Nature of the Universe	3
Physics <b>16</b> Cosmic Horizons	3
Physics <b>17</b> Black Holes	3

## *Technical*

For students whose majors require the Physics 40 or 60 series

### Physics

Course	Units
Physics <b>41, 43/44, 45/46</b>	14
~OR~	
Physics <b>61, 63/64, 65/67</b>	15
~AND~	
Physics <b>70</b> Modern Physics	4
Any three courses numbered Physics 100 or above	9-12

### Astronomy

Course	Units
Physics <b>41, 43</b> <sup>^</sup> , <b>45/46</b> ,	13
Physics <b>70</b> Modern Physics	4
Physics <b>100</b> Intro to Observational and Laboratory Astronomy	4
~AND~	

Choose 2 from below:

Course	Units
EE 106 Planetary Exploration	3
GES 122 Planetary Systems: Dynamics and Origins	3
Physics <b>160</b> * Intro to Stellar and Galactic Astrophysics	3
Physics <b>161</b> * Intro to Extragalactic Astrophysics and Cosmology	3

\*With approval of the minor advisor and the chair of the Astronomy program, 3 units of Physics 169 (Independent Study in Astrophysics) may be substituted for one of these courses. This independent study can either be constituted as a directed reading program or participation in a research project.  
<sup>^</sup>Students are also strongly encouraged to take the electricity and magnetism/optics lab of one of the appropriate Physics series (24, 44) for one additional unit.