

**Center for Talent Development  
Northwestern University**

**Advanced Placement Physics B**

**Course Description:**

This is a college-level elective laboratory course designed specifically for eligible Gifted LearningLinks students. The primary course topics are Mechanics, Fluid Dynamics, Wave Motion, Thermodynamics, Electricity & Magnetism, Sound, Light, Modern Physics, and Nuclear Physics. Stressed are the visualization of physical principles and their practical application through complex problem solving, student-centered laboratory investigations and learning projects.

LearningLinks students have a wide range of interests they would like to address during high school in order to be best prepared for life after graduation. Almost all will go to college, and many wish to pursue careers in medicine, business, and other non-technical (i.e. non-science and engineering) majors. AP Physics B is a *non-calculus* physics course that can earn students college credit if they receive high scores on the AP exam, and it also is meant to prepare them for the SAT II physics exam as well as the physics section of the MCAT exam (medical school entrance exam). This is a class appropriate for those students who have some prior physics experience, have taken Algebra II, and are interested in non-technical science majors in college (such as medicine).

This course is an individually-paced course. That is, students work through the course material at their own pace, with the intention of completing the course at or before the end of the allotted time. Online collaboration between students is encouraged and is facilitated through forums on the Discussion Board. Assignments and graded work will be submitted online, and feedback on this work will be sent to students online as well, primarily through the course website.

**Outcomes:** Upon successful completion of this course, students will:

- a. Explain and analyze how physical systems operate
- b. Apply science process and critical thinking skills
- c. Evaluate scientific solutions to societal problems
- d. Use complex mathematical methods to predict how physical systems will behave
- e. Be prepared to successfully complete the College Board exam

**Resources and Materials:**

- a. College physics – Eighth edition  
Serway & Vuille – Thomson Brooks/Cole 2006  
ISBN: 978-0-495-38693-3
- b. Scientific calculator
- c. Lab notebook

- d. Timing device
- e. Measurement device (meter stick, yardstick, tape measure)

**Schedule:**

SEMESTER ONE				
	Topic/Focus	Activities & Reading Assignments	What do I need to post to the Discussion Board?	What do I need to turn in?
<b>Week 1</b>	Orientation to Online Learning	Orientation Survey	Personal introduction	Survey
<b>Week 2</b>	Basic Measurements	Read Chapter One Chapter One problems		Problems
<b>Week 3</b>	One Dimensional Motion	Read Chapter Two Chapter Two problems Measurement Lab		Problems & Lab
<b>Week 4</b>	Two Dimensional Motion	Read Chapter Three Chapter Three problems 2D Tennis ball toss Lab		Problems & Lab
<b>Week 5</b>	Mechanics Exam	Practice Problems Mechanics Exam		Mechanics Exam
<b>Week 6</b>	Force	Read Chapter Four Chapter Four problems Force Lab	Force Pictures	Problems & Lab
<b>Week 7</b>	Force Exam	Practice Problems Force Exam		Force Exam
<b>Week 8</b>	Energy	Read Chapter Five Chapter Five problems Personal Power Lab		Problems & Lab
<b>Week 9</b>	Momentum	Read Chapter Six Chapter Six problems Personal Power Lab		Problems & Lab
<b>Week 10</b>	Energy & Momentum Exam	Practice Problems Energy & Momentum Exam		Energy & Momentum Exam
<b>Week 11</b>	Circular Motion	Read Chapter Seven Read Chapter 8.1-8.2 Chapter Seven and Eight problems		Problems
<b>Week 12</b>	Circular Motion Exam	Practice Problems Circular Motion Exam		Circular Motion Exam

<b>Week 13</b>	Fluids	Read Chapter Nine Chapter Nine problems		Problems
<b>Week 14</b>	Fluids Exam	Practice Problems Fluids Exam		Fluids Exam
<b>Week 15</b>	Thermal Physics	Read Chapter Ten Chapter Ten problems Cooling Lab	Rate of cooling data	Problems & Lab
<b>Week 16</b>	Laws of Thermodynamics	Read Chapter Eleven & Twelve Chapter Eleven & Twelve problems		Problems
<b>Week 17</b>	Thermodynamics Exam	Practice Problems Thermodynamics Exam		Thermodynamics Exam
<b>Week 18</b>	End of Semester One	Semester One Final Exam	Extra Credit Review packet	Final Exam

**SEMESTER TWO**

	<b>Topic/Focus</b>	<b>Activities &amp; Reading Assignments</b>	<b>What do I need to post to the Discussion Board?</b>	<b>What do I need to turn in?</b>
<b>Week 19</b>	Electric Forces and Fields	Read Chapter Fifteen Chapter Fifteen problems		Problems
<b>Week 20</b>	Electric Energy, Capacitance, Current and Resistance	Read Chapter Sixteen & Seventeen Chapter Sixteen & Seventeen problems		Problems
<b>Week 21</b>	Electric Circuits	Read Chapter Eighteen Chapter Eighteen problems Circuit Lab		Problems & Lab
<b>Week 22</b>	Electricity Exam	Practice Problems Electricity Exam		Electricity Exam
<b>Week 23</b>	Magnetism	Read Chapter Nineteen Chapter Nineteen problems Magnetism Lab		Problems & Lab
<b>Week 24</b>	E&M Induction	Read Chapter Twenty & Twenty One Chapter Twenty & Twenty One problems Electromagnetic lab		Problems & Lab
<b>Week 25</b>	Magnetism Exam	Practice Problems Magnetism Exam		Magnetism Exam

<b>Week 26</b>	Reflection & Refraction	Read Chapter Twenty Two Chapter Twenty Two problems		Problems
<b>Week 27</b>	Ray Optics	Read Chapter Twenty Three Chapter Twenty Three problems Optics Lab		Problems & Lab
<b>Week 28</b>	Wave Optics	Read Chapter Twenty Four Chapter Twenty Four problems	Wave Examples	Problems
<b>Week 29</b>	Optics Exam	Practice Problems Optics Exam		Optics Exam
<b>Week 30</b>	Vibrations & Waves	Read Chapter Thirteen Chapter Thirteen problems		Problems
<b>Week 31</b>	Sound	Read Chapter Fourteen Chapter Fourteen problems	Doppler Effect Link	Problems
<b>Week 32</b>	Sound & Waves Exam	Practice Problems Sound & Waves Exam		Sound & Waves Exam
<b>Week 33</b>	Atomic Physics	Read Chapter Twenty Seven Chapter Twenty Seven problems Photoelectric Lab		Problems & Lab
<b>Week 34</b>	Nuclear Physics	Read Chapter Twenty Eight Chapter Twenty Eight problems		Problems
<b>Week 35</b>	Modern Physics Exam	Practice Problems Modern Physics Exam		Modern Physics Exam
<b>Week 36</b>	Semester Two Final Exam	Semester Two Final Exam	Extra Credit Review packet	Final Exam

### Student Evaluation and Grading Policies for Credit Courses Only:

#### a. CTD Grading scale

<b>A+</b> 97-100	<b>B+</b> 87-89	<b>C+</b> 77-79	<b>D+</b> 67-69	<b>F</b> Below 60
<b>A</b> 93-96	<b>B</b> 83-86	<b>C</b> 73-76	<b>D</b> 63-66	
<b>A-</b> 90-92	<b>B-</b> 80-82	<b>C-</b> 70-72	<b>D-</b> 60-62	

#### b. Breakdown of final grade:

- a. Tests and Quizzes 10%
- b. Problem Sets 25%
- c. Labs 25%
- d. Forum posts 20%
- e. Final exam 20%

**Instructor Biography:**

Steven Lowe is currently in his 8th year teaching all levels of physics at Loyola Academy. Loyola Academy is a College preparatory academy outside Chicago. He received a B.S. in Physics from the Pennsylvania State University, and a M.S. in Education – Concentration in Physics program at the University of Wisconsin – River Falls. This is the third year that Mr. Lowe is teaching in the CTD program.

**Contact Information:**

- a. xxxxxxxx@gmail.com
- b. Students or parents with any questions or concerns are encouraged to call Mr. Lowe at (xxx) xxx-xxxx. You are asked to call before 10:00 pm Eastern standard time.

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