

St. Francis School  
AP Physics C: Mechanics  
2013-2014

B. Studevent-Hickman

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Course Website: <https://sites.google.com/a/stfrancisschool.org/ap-physics-c-mechanics/>

## Syllabus

### *Description*

This course offers a foundation in Newtonian mechanics, in preparation for the College Board's exam on the topic in May. Components include lectures, homework, demonstrations, and hands-on lab experiments, both traditional and inquiry based. Topics include gravitation; Newton's laws of motion; kinematics; linear momentum; circular and rotational motions; angular momentum; work, energy, and power; and oscillatory motions. Analysis of mechanical systems will be stressed throughout the year, and knowledge of basic calculus is required. Multivariable calculus and differential equations will be introduced as needed.

### *Textbook*

David Morin, *Introduction to Classical Mechanics: With Problems and Solutions* (Cambridge UP, 2007).

### *Requirements and Grades*

Requirements include regular attendance in class, readings, homework problems, tests, and the successful completion of labs and lab write-ups. Lectures and discussion take 180 minutes each week; labs are conducted for at least 90 minutes every other week, thus forming 20% of class time. Most labs will be held on A-week Fridays, during meeting period and class time. **Note: Students must keep a lab notebook and or all lab reports to ensure college credit for this course.**

Grades are determined as follows:

Homework and labs:	35%
Tests and quizzes:	50%
Participation, effort, etc.:	15%

### *On Academic Misconduct*

Any clear instance of academic misconduct is grounds for failing the class. This includes both cheating on assessments and plagiarism (the presentation of someone else's images, words, or ideas as your own).

**Schedule of Topics**  
**(\*Denotes Lab Experiment)**

*Fall Semester*

Weeks 1-2: Mechanics Diagnostic and Review

Weeks 3-5: Newton's Law of Gravitation and Kinematics

\*Projectile Motion (Inquiry-based Lab)

Weeks 6-7: Statics

\*Maximum Static Friction (Inquiry-based Lab)

Weeks 8-10: Newton's Second and Third Laws of Motion

\*Acceleration on an Inclined Plane

\*The Atwood Machine

Weeks 11-12: Linear Momentum

\*Collisions and Conservation of Momentum

Weeks 13-16: Work, Energy, and Power

\*Conservation of Mechanical Energy and Heat (Inquiry-based Lab)

Week 17: Review

Week 18: Finals

*Spring Semester*

Week 1: Review of Fall Final

Weeks 2-3: Circular and Rotational Motions

\*Calculating Centripetal Force (Inquiry-based Lab)

Weeks 4-5: Rotational Dynamics

\*The Atwood Machine Revisited (Presentation Required)

\*A Race of Round Objects (Presentation Required)

Week 6: Angular Momentum

Weeks 7-8: Rotational Work, Energy, and Power

\*The Flywheel

Week 9: Gravitation

Week 10-11: Hooke's Law and Elastic Energy

\*Measuring  $k$  Two Ways (Inquiry-based Lab)

Weeks 12-13: Oscillatory Motions

\*The Mass-Spring System and Coupled Oscillations

\*The Simple and Physical Pendulums

Weeks 14-15: Review for AP Exam

Week 16: AP Exams