

Physics 1 Summer Syllabus

Instructor: Dr. Johnson

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Textbook: OpenStax College Physics

This textbook can be obtained free online from openstax.org. The physics is algebra-based and the book is relatively straightforward and accessible to high school and middle school students.

Material Covered

This course covers one-dimensional kinematics, two-dimensional kinematics, and forces, as well as the necessary trigonometry skills.

Class Structure

Except for the first day, the first hour is spent reviewing the previous day's homework and quiz or exam. Over the next two hours we cover new material, with example problems solved by the students throughout. During the last 30 minutes there is a comprehensive quiz with an emphasis on that day's material. On Fridays, there is only one hour of new material followed by 30 minutes of a modern physics topic voted on by the class, then the students take an hour-long comprehensive exam. Each class will include three breaks of ten minutes each.

Schedule

Week 1

- M: **Introduction, Displacement, Velocity, Acceleration, Vectors**
Lecture, in-class problems, quiz
HW: Read Ch. 1 (quickly), Ch. 2.1-2.4 (carefully), Handout
- T: **One-Dimensional Kinematic Equations**
Lecture, in-class problems, comprehensive quiz
HW: Ch. 2.5, 2.6, 2.7, Handout
- W: **Gravity, Graphs of Motion**
Lecture, in-class problems, comprehensive quiz
HW: Ch. 2.8, 2.9, Handout
- Th: **Two Dimensional Kinematic Equations**
Lecture, in-class problems, comprehensive quiz
HW: Ch. 3.1, 3.2, 3.3, Handout
- F: **Projectile Motion, Relative Motion, A Modern Physics Topic**
Lecture, in-class problems, review, an interesting physics topic, exam
HW: Ch. 3.4, 3.5, Handout

Week 2

- M: **Newton's First and Second Laws, Free-body Diagrams**
Lecture, in-class problems, comprehensive quiz
HW: 4.1, 4.2, 4.3, Handout
- T: **Newton's Third Law, Normal Forces, Tension**
Lecture, in-class problems, comprehensive quiz
HW: 4.4, 4.5, 4.6, Handout
- W: **The Fundamental Forces, Friction**
Lecture, in-class problems, comprehensive quiz
HW: 4.7, 4.8, 5.1, Handout

Th: **Drag, Elasticity**

Lecture, in-class problems, comprehensive quiz

HW: 5.2, 5.3, Review Handout

F: **Review of Course Material, Modern Physics Topic**

Review, an interesting physics topic, comprehensive final exam

- Do the reading and the homework. I will go over the material in class beforehand. Physics, like mathematics, is comprehensive. If you don't understand an important concept, you won't be able to learn future material that builds on it.
- Do all examples in the reading. Try to work them out without looking at the answer. This is a good way to judge whether you truly understand the concepts.
- Do the homework and make note of particularly difficult or confusing problems. I can spend extra time going over those problems.
- Solve problems carefully. You might be tempted to skip steps or plug in numbers early to save time. Resist these urges. Solve the problem to the end before plugging in any numbers, that way you can find mistakes without having to solve the entire problem again from scratch.
- In this course, I will teach you how to solve all the problems using systematic methods. But, often physics problems can be solved in clever, faster ways. Physics III focuses on teaching quick and clever solutions to problems, but you are encouraged to watch for them now.