

# Physical Science

Mr. Braunberger

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10:11am–11:01am

I think it is very important—at least it was to me—that if you are going to teach people to make observations, you should show that something wonderful can come from them.

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—Richard Feynman

## COURSE DESCRIPTION

Physical science is a branch of natural science that studies non-living systems, in contrast to life science. It in turn has many branches, each referred to as a “physical science”, together called the “physical sciences”.<sup>1</sup> Upon successful completion of this course, the student will, among other things, have developed critical thinking skills and have an appreciation for science.

## PROCEDURES, MATERIALS, AND EXPECTATIONS

### MATERIALS

Everyday, the student is expected to bring to class their course binder, a pencil or pen, and a notebook.

### EXPECTATIONS

Science is a subject that builds upon itself and therefore requires study on a regular basis. Issued assignments are to be completed on time. Late work will be accepted; however, late assignments will be automatically docked 30%. Assignments may be completed in pen or pencil, as long as the assignment is neat.

The course will model scientific/mathematical thought: errors are to be expected, discovered, and remedied. Any incorrect answers on homework will be awarded 50% credit if recompleted correctly within a week of receiving the homework.

### DISCIPLINARY PROCEDURE

I’ve heard good things about this particular class section, and I don’t foresee any major issues. Issues will be handled as they arise.

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<sup>1</sup>Wikipedia

## GRADING

Tests and quizzes will be worth 15% of the grade. The final will be worth 20% of the grade. Homework will be worth 65% of the grade.

## THE BOOK

There is no book. I will write it as we go.

## COURSE OUTLINE

### INTRODUCTION TO PHYSICAL SCIENCE

1. Desserts not deserts.
2. Flavors and toppings of physical science.

### INTRODUCTION TO PHYSICS

1. Flavors of physics.
2. Compare and contrast the branches of physics.
3. GUT.
4. M(hmm)–theory.

### CLASSICAL PHYSICS

1. Directions: a double entendre.
2. Motion and momentum.
3. Forces and effects on motion.
4. Various types of forces.
5. Energy: potential and kinetic.

### ELECTRICITY AND MAGNETISM

1. Plumbing.
2. Light bulbs.
3. Computers.
4. Protons and electrons: an introduction.
5. Van de Graaf.
6. Magnets and magnetic fields.

## QUANTUM MECHANICS

1. Atoms and molecules.
2. Various models of atom. Electron cloud. Terminology.
3. Particle identity.
4. Superposition.
5. Exchange symmetry.
6. Pauli exclusion principle.
7. Phonons and photons are bosons: superconductivity.
8. The no clone theorem and perfect encryption.
9. Quantum computing.

## ASTRONOMY NOT GASTRONOMY

1. Turtles all the way down.
2. Location, location, location.
3. Perspective and more perspective.
4. Planetarium.

## SPECIAL RELATIVITY

1. Maxwell's equations.
2. The ultimate speed limit:  $c + 100 = c$
3. Length contraction and time dilation.
4. Time machines.

## GRAVITY

1. Space-time.
2. Elevators: the equivalence principle.
3. Matter space-time interaction: golfing on a trampoline.