

## Cinema Physica, PY103 Fall 2007

A conceptual physics course that examines the physical principles underlying the natural world. These principles will be explored primarily through their representation in popular movies. The course will emphasize a quantitative approach to analyzing scenes from films using elementary physics, simple estimates and dimensional analysis. The films and topics will change from year to year. Examples of films that may be used include: Armageddon; Speed 2; The Sixth Sense; The Abyss; X-Men; Unbreakable; 2001: A Space Odyssey. Representative topics are: kinematics of motion; conservation of mass, momentum and energy; electricity and magnetism; pressure and fluids; strength of materials; quantum description of matter.

**Instructor:** Andrew Cohen, PRB 573, x3-6051 (cohen@bu.edu)

Office Hours: Mon 10:00–11:00, Wed 9:00–10:00 and by appointment

**TF:** Kevin Ann, SCI B13, x3-9436 (kevinann@bu.edu)

### Prerequisites and Requirements:

High School Algebra. Analysis of physical problems in this course will be quantitative, and facility with numbers is essential. This course requires viewing films and film clips. You must be willing to view (and critically examine) the films assigned. These films may contain material that some students find difficult to accept. If so you should consult with the instructor before committing to the course. Students are responsible for viewing all films during the week listed. Films will be available on reserve in the Geddes Language Center (although students are encouraged to arrange group viewings at home with other class participants).

**Text:** *Physics Matters: An Introduction to Conceptual Physics*

**(Required)** J. Tefil and R. Hazen (Wiley, 2004, 720 pages) (available at the BU bookstore)

**References:** *Debunked! ESP, Telekinesis, and other Pseudoscience*

G. Charpak and H. Broch (The Johns Hopkins University Press, 2004, 168 pages)

*A Physicist's Guide to Skepticism*

M. Rothman (Prometheus Books, 1988, 247 pages)

*The Physics of Superheroes*

J. Kakalios (Gotham, 2005, 384 pages)

*One Two Three ... Infinity: Facts and Speculations of Science*

G. Gamow (Dover, 1988, 352 pages)

All references are available on reserve.

**Grade:** 15% Homework  
15% Labs  
10% Class Attendance  
10% Book Review

30% Midterms I and II

20% Final Exam

Late assignments will not be accepted without prior consent of the instructor.

**Website:** <http://physics.bu.edu/cinema>

**Rules and Regulations:**

Students are expected to abide by the code of academic conduct (which may be found at <http://www.bu.edu/cas/academics/programs/conductcode.html>), as well as US copyright law.

## Course Schedule—Spring 2007

Date	Lecture Number	Topics Covered in Lecture	Reading
9-4	1	Science and Pseudoscience	Chapter 1
9-6	2	Dimensions and Units; Estimation	Chapter 2
9-11	3	Dimensional Analysis	
9-13	4	Kinematics: Velocity and Acceleration	Chapter 3
View by 9/12		<b>Speed 2: Cruise Control</b>	
Lab:		Constant Acceleration	
9-18	5	Newton's Laws	Chapter 4
9-20	6	Newton's Laws	Chapter 4
View by 9/19		<b>Armageddon</b>	
9-25	7	Gravitation	Chapter 5
9-27	8	Conservation of Momentum	Chapter 6
<b>Exam I, Oct. 3</b>			
10-2	9	Exam I	
10-4	10	Rotational Motion	Chapter 7
View by 10/3		<b>2001: A Space Odyssey</b>	
Lab:		Torque and moment of inertia	
10-9	x	No Class	
10-11	11	Energy	Chapter 8
View by 10/10:		<b>Independence Day</b>	
10-16	12	Energy	Chapter 8
10-18	13	Atomic Structure	Chapter 9
View by 10/17		<b>Unbreakable</b>	
10-23	14	Properties of Matter	Chapter 10
10-25	15	Heat and Temperature	Chapter 11
View by 10/24		<b>The Sixth Sense</b>	
Lab:		Mechanical Equivalent of Heat	
10-30	16	Waves	Chapter 14
11-1	17	Sound	Chapter 15

Lab: Sound

**Exam II, Nov. 7**

11-6	18	Exam II	
11-8	19	Fluids	Chapter 23
View by 11/7		<b>The Abyss</b>	
11-13	20	Electricity	Chapter 16
11-15	21	Electricity	Chapter 16
View by 11/14		<b>The Matrix</b>	
11-20	22	Magnetism	Chapter 17
11-22	x	No Class	
View by 11/21		<b>X-Men I</b>	
Lab:		Magnetic Forces	
11-27	23	Magnetism	Chapter 17
11-29	24	EM Waves	Chapter 19
View by 11/28		<b>X-Men II</b>	
12-4	26	Quantum World	Chapter 22
12-6	27	Material Properties	Chapter 23
View by 12/5		<b>King Kong</b>	
Lab:		<i>e/m</i> ratio of the electron	
12-11	28	Relativity	Chapter 28
View by 12/12		<b>Contact</b>	
12-??		<b>Final Exam</b> ? :00-? :00.	