

Syllabus
Geological Sciences 130/Physics 119/Chemistry 108
The Physical World
Winter 2008

Instructors: Prof. Peter van Keken, 4502 CC Little, keken@umich.edu
 GSI: Alex Lechler, 1006 CC Little, lechler@umich.edu
Lectures: TTh 8:40-10a, 1528 CC Little
Discussions: W3-4p, Th2-3p, Th3-4p, all in 2512 CC Little
 Discussions start in the week of January 9.
Required text: Krauskopf and Beiser, "The Physical Universe", 12th edition,
 McGraw-Hill, 2008 (ISBN 978-0-07-305010-2).

The discussion/recitation section is meant to broaden the scope of the lecture and to help study the material in a more quantitative manner. A problem set will be handed out every week. The grade will be based on three exams (55%), the weekly problem sets (35%) and a number of short homework assignments and quizzes (10%).

Tentative lecture schedule

<i>Week</i>	<i>Topics</i>	<i>Reading</i>
1	Introduction, philosophy of the course, the scientific method illustrated by the work and ideas of Ptolemy, Copernicus, Kepler, Newton.	Ch. 1
2	Gravity, motion, acceleration. Force, mass, weight: power and work.	Ch. 2,3
3	Energy, momentum, relativity, matter.	Ch. 3
4	Temperature, heat, density, pressure, kinetic theory, liquids, solids, thermodynamics, entropy.	Ch. 4
5	Electricity and magnetism, conductivity, voltage, current	Ch. 5
	Exam I (to be arranged)	
6	Waves, sound, refraction, reflection, interference, diffraction, music, EM waves, light, lenses, color.	Ch. 6
7	The atom, radioactivity, radiometric dating, nuclear energy, fission and fusion, elementary particles, photons, X-rays, atomic spectra, the hydrogen atom.	Ch. 7, 8
8	Quantum theory of the atom, elements and compounds, the periodic law, metals and non-metals, shells and sub-shells, bonding, chemical equations, crystals, ions.	Ch. 8, 9, 10
9	Solutions, polar and nonpolar liquids, acids, bases, pH, combustion, exothermic and endothermic reactions, activation energy, fuels, catalysts, electrolysis	Ch. 10, 11
	Exam II (to be arranged)	
10	Rock classification, Big Bang, stellar evolution, origin of the solar system.	Ch. 14, 16-18, notes
11	Formation and evolution of the planets.	Ch. 16, notes
12	Earth's atmosphere, environment and global change	Ch. 13, notes
13	Plate tectonics, earthquakes, volcanoes.	Ch. 15, notes
14	CO ₂ : calcite formation, fossil fuels, paleoclimate and global warming.	notes
	Exam III (last day of class)	