PHSX 111 INTRODUCTORY PHYSICS INFORMATION SPRING 2008

IMPORTANT!!!! *You are responsible for all information on this handout and on the current website.*

Course Website: http://kusmos.phsx.ku.edu/~melott/111.html
Instructor: Adrian L. Melott – Office 4075 Malott Hall, Phone 864-3037
Office Hours for this course: Tuesday 10-11:50 AM and by appointment
E-mail: melott@ku.edu Department Office: 1082 Malott

This is an introductory college-level physics course, sampling many important areas in physics. We will move fast and introduce many modern topics, unlike most courses for science majors which emphasize depth. This course is oriented to those of you who do not plan a career in physical science, but wish to learn what physics is about. In particular, we will not use advanced mathematics, but we will *often use high school algebra*. If you have had physics before, or want a career in science, you should consider taking PHSX 114, 211, or 213. Note that although this course is required for many School of Education students, it is a general survey physics course and not designed especially for future teachers. If you also take PHSX 116, you can meet requirements for a "lab science".

Course Goals:

This is a "physics appreciation" course. Just as a "music appreciation" course doesn't try to teach you how to be a musician, this course won't try to teach you how to be a physicist. Instead, we'll try to teach you what physics is all about and hope that you will come to appreciate its importance, both practical and esthetic. We will discuss as many of the major concepts as we can. We'll do a little problem solving but the emphasis will be on the concepts. We'll start with the classical stuff: Galileo, Newton, and the laws of motion. Then we'll move into the 19th century to explore light and we'll also include the 20th century of Einstein, relativity, and all that good stuff.

Required Texts: Hewitt, *Conceptual Physics,* 10th edition, with supplemental website
Feynman, *Surely You're Joking, Dr. Feynman*

Plan of Study:

It is impossible to give precise dates for when we will do each thing. The list of chapters and dates in order is given on the course website. You should read each chapter for which problems are assigned, before doing those problems. Be sure to check the website for new announcements prior to each class. Note that you may be assigned special events such as lectures, special TV programs, or other events which may be included in the basis for composing tests.

As you go through the Hewitt text, you will find review questions at the end of each chapter which are useful to focus your mind. I will recommend exercises and problems for you to do (posted on the 111 website). These will not be collected and graded. I cannot stress how important it is to really do them. Solutions will be posted on the 111 website. If you do not understand them, please come see me or the people tutoring for 111. Do not expect exam questions to simply repeat things you did for homework. To demonstrate learning of physics is to correctly apply its principles to new situations. The typical exam question will be multiple choice and may reflect verbal knowledge, history, concepts, or the ability to calculate a result.

Because of the time limitations, not every item in every reading assignment can be covered in the lectures, which emphasizes overall patterns and approaches of physics. However, you are still expected to understand and utilize ALL information in the reading assignments. The reading and lectures are designed to complement one another, not replace each other. To make effective use of your time, in class and out, you should: (a) Read all assignments ON TIME in advance of the lectures on the topic; (b)

Attend ALL classes; (c) Do the homework assignments, check your answers against those posted, and make sure you understand any errors; (d) Make sure you understand any exam problems you missed.

Readings assigned from Feynman Text:

First Exam: Part I – He fixes Radios, String Beans, Who Stole the Door?, Always Trying to Escape, The Chief Research Chemist; Part 2 – Surely You're Joking, Dr. Feynman!, Meee!, A Map of the Cat?, Monster Minds, Mixing Paints, A Different Box of Tools, the Amateur Scientist.

Second Exam: Part 3 – Fizzled Fuses, Testing Bloodhounds, Los Alamos from Below, Uncle Sam Doesn't Need You; Part 4 – The Dignified Professor, I Want My Dollar, Lucky Numbers, O Amercano (But beginning with the paragraph which begins "In regard to education in Brazil…" on the 13th page of the essay), An Offer you Must Refuse.

Third Exam: Part 5 – Would You Solve the Dirac Equation?, The 7 Percent Solution, Thirteen Times, But Is It Art?, Is Electricity Fire?, Judging Books, Bringing Culture, Altered States, Cargo Cult Science.

In addition to this reading material, there will be some experimental demonstrations in class. We will also make extensive use of audio-visual materials, such as films, to supplement our presentations. I may assign special University lectures or television programs with class-related content for you to attend/watch. I may sometimes be out of town for meetings on research, and other persons will meet the class for me. You are responsible for class content related to current events with a bearing on physics. This is a big class, but I still urge you to ask questions and make comments.

Grading:

Lectures and Readings: Exams will be based on the homework, the assigned readings, and anything presented in the lecture (including demonstrations, films, guest speakers, etc.) Be aware that some material may be covered only in lecture or only in the readings. Readings from the chapter should be done in advance of the lecture covering the reading. The lectures are designed to enhance and highlight the readings in the text, not to reiterate them. Lecture time is also your chance to ask questions and make comments on the material. You are strongly encouraged to do so in spite of the class size.

Exams: There are *three exams* tentatively scheduled as described on this course home page. The Final Exam will be as per KU website exam timetable. You should be sure that you have *no other commitments* on those days, make-up exam dates will NOT be scheduled. You can only be excused for a medical reason or personal emergency. In case it is necessary to reschedule these exams for some reason it will be announced in class and on the course home page. Please note that participation in athletic events or other school activities is not an excused absence. You should bring several No. 2 pencils with good erasers to these exams. You may use a hand calculator, but no other aids are permitted. These will be primarily multiple-choice exams.

Weight: For determining the course grade, the following weights will be used:

Three exams……. 23% each
Final exam…… 31%

PHYSICS 111

Introductory Physics

The cast of characters, in approximate order of appearance:

d or x:	distance or position
t:	time
v:	speed or velocity
Δx:	the Δ means "change in" (usually for big changes)
δ:	change in, or error in, a quantity (usually for small changes)
$\bar{v}$:	the $\bar{}$ indicates average, e.g., average speed
a:	acceleration
p:	momentum
g:	acceleration due to gravity at the Earth's surface = 10 m/s^2
F:	force
r:	radius
m, M:	mass
G:	gravitational constant
KE:	kinetic energy
W:	work
P:	power
PE:	potential energy
λ:	wavelength
f:	frequency
v:	wave speed (general) or speed of light (specific) = c (3 x 10^8 m/s)
γ:	Lorentz factor
L:	length (L_o is the "rest" length)
E:	energy
h:	Planck's constant ($\hbar = h/2\pi$)
e:	charge on electron (-) or proton (+)

Some Formulas:

$v = \Delta x / \Delta t$

$\bar{a} = \Delta v / \Delta t$

$d = \frac{1}{2} at^2$ (for constant a)

$\Delta v = at$ (for constant a)

$p = mv$ (definition of momentum)

$F = ma$ (Newton's second law)

$KE = \frac{1}{2} mv^2$ (energy of motion, kinetic energy)

$W = Fd$ (definition of work done)

$P = Fv$ (one way to calculate power , which is energy per unit time)

$PE = mgh$ (gravitational potential energy near the Earth's surface)

$V = r\omega$ (rotational speed)

$L = mrv = I\omega$ (angular momentum)

$F = GmM/r^2$ (Newton's law of universal gravitation)

$\lambda = h/p$ (deBroglie wavelength)

$\delta x \delta p \geq h / 4\pi$ (Heisenberg uncertainty principle)

Relativity: $\gamma = 1/\sqrt{1 - v^2/c^2}$ $\left(\approx 1 + \frac{1}{2} v^2/c^2 \text{, for v<<c}\right)$ $1 < \gamma < \infty$

$I^2 = d^2 - c^2t^2$ (definition of invariant interval)

$L = L_o/\gamma$ (moving objects are shorter)

$t = t_o \gamma$ (moving clocks run slow)

$p = mv\gamma$ (moving objects act more massive compare with the Newtonian formula for p above)

$E = mc^2$ (mass energy conversion)

$\delta t = \frac{ah}{c^2} t$ (gravitational time dilation)

Exponential notation: $1{,}000 = 10^3$, $0.001 = 1/1{,}000 = 10^{-3}$, $10^6 \times 10^{-4} = 10^{(6-4)} = 10^2 = 100$

Note: For these to have any meaning, you must practice using them on the problems. While this is not a problem solving course, working with concepts is often the best way to become familiar with them. Also, we will be discussing things from less than the size of the atomic nucleus to the size of the Universe, and numbers are necessary to compare sizes.

GENERAL INFORMATION FOR STUDENTS IN INTRODUCTORY COURSES IN PHYSICS and ASTRONOMY

We've assembled some general information about the Department of Physics and Astronomy for your convenience. Please feel free to ask your instructor if you have any questions not answered adequately here.

The department occupies the old west wing of Malott. The main office is in 1082. This is the place to go if you need help enrolling in one of our courses or need to leave a message or paper for a faculty member or teaching assistant. The office is generally open from 8:00am through 5:00pm and is staffed by Teri Leahy, Tess Gratton and Kim Hubbel. Kim handles most enquiries related to the undergraduate program. The laboratories for the introductory physics courses are supervised by our director of laboratories, Robert Curry. His office is just south of the main office, 1078 Malott. He approves makeup labs, among other things.

The chair of the department is Professor Stephen Sanders. Kim Hubbel keeps his appointment calendar. Professor Philip Baringer is the associate chair and the director of the engineering physics program. Professor Baringer is located in room 3077 Malott.

TUTORING:

For physics classes, free tutoring is available in room 6006; see the posted schedule. There may or may not be ASTR 191 tutoring available, ask your instructor.

The department keeps a list of names of persons who arranged for private tutoring; see Kim for the list. You may not contract with someone who is grading your work for a class or is your T.A. for a lab.

WHERE TO HAND THINGS IN:

Physics lab reports go in the drop boxes near the drinking fountain at the north end of the 2nd floor hallway. Other instructors may ask you to hand papers into their mailbox; these are all in the department office, 1082 Malott. Turn to your left as you enter the main office, and you'll see a rack of wooden mail boxes. Faculty boxes are in red at the right end of this rack. If you need something date-stamped before you turn it in, or aren't sure how to find the correct mailbox, ask one of the office staff for help.

DEPT WEBSITE:

The department coordinates most of its homepage links through our "front door" home page at http://www.physics.ku.edu. Click on "Current Courses" for course information.

DEPARTMENTAL AWARDS:

All courses including our laboratory courses are assessed by surveys at the end of the semester. Your constructive criticisms are very important. Teaching assistants may receive awards based on student comments. Your input on faculty teaching may also be used to determine awards.

STUDENTS WITH DISABILITIES:

The staff of Services for Students with Disabilities (SDD), 22 Strong, 785-864-2620 (v/tty), coordinates accommodations and services for KU courses. If you have a disability for which you may request accommodations in KU classes and have not contacted them, please do so as soon as possible. SSD will provide you with documentation and have you contact your instructor privately.

ACADEMIC MISCONDUCT; FAIRNESS AND PRIVACY ISSUES

Any work presented as your own, must be your own. Beyond the obvious requirements that quizzes and tests must be completed without consultation or conversation with classmates, this also applies to lab reports and homework (it must be your work, and identifiable as your own work, even if you have studied with friends) and to term papers, in which published material must be properly attributed. Penalties imposed by the College for violations of these policies range from reduction of grade, to suspension and expulsion.

The complementary issue to misconduct is fairness; you have the right to expect that your work is evaluated fairly and impartially. You may also expect to have adequate feedback about your performance in the course throughout the semester. You have a right to know, in advance, the criteria by which grades are determined in the class.

You also have a right to expect protection of your privacy—for that reason, your grade cannot be given out over the telephone and can only be given by our office staff if you have your ID with you.

UNIVERSITY POLICIES CONCERNING CONSENTING RELATIONSHIPS:

University policy and accepted professional standards of ethics mean that there should be no romantic or sexual relationships between a student and an instructor (this includes faculty and teaching assistants) with grading or supervisory authority over that student. A full statement of the University policy is available at http://www.registrar.ku.edu/pdf/policies.pdf and in each semester's timetable. You might want to check out the student handbook information at http://www.studenthandbook.ku.edu.

The University also has strong rules prohibiting ethnic, racial or sexual harassment. The department of Physics and Astronomy is committed to a safe and equitable learning environment for all of our students, and we stand firmly behind these rules.

POLICY CONCERNING PROPER USE OF COURSE MATERIALS AND PRESENTATIONS:

Course materials prepared by the instructor, together with the content of all lectures and review sessions presented by the instructor are the property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor is prohibited. On request, the instructor will usually grant permissions for students to audio tape lectures, on the condition that these audio tapes are only used as a study aid by the individual making the recording. Unless explicit permission is obtained from the instructor, digital files (such as posted PowerPoint slides, notes or assignments) and recordings of lectures, presentations and review sessions may not be modified and must not be transferred or transmitted to any other person, whether or not that individual is enrolled in the course.

IF YOU HAVE PROBLEMS OR CONCERNS:

You should feel free to consult ANY faculty member of this department if you have any questions or concerns. Complaints concerning grades should be addressed to the Director of Undergraduate studies, Prof. Phillip Baringer, or the Chair of the Undergraduate Committee, Prof. Barbara Anthony-Twarog. Complaints concerning possible academic misconduct or harassment should be brought to the Department Chair. If the Department Chair is a party to the complaint, you should address your concerns to the Dean of the College of Liberal Arts and Sciences.