SYLLABUS

The Physics of Living Systems II
Phyx 2120 Spring 2009

Instructor: Ajay K. Singh
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Email: ajay.singh@usu.edu
Office Hours: By appointment, phone or e-mail to set an appointment
Prerequisites: Math 1100 or 1210 (can be taken concurrently); Phyx 2110
Texts: Physics, Cutnell and Johnson (Wiley, NY, 2003), 6th or 7th edition
Class Notes, available at the class web site when applicable.
Credits: 4 semester credit hours
Lecture: M W F, ESLC 046, 12:30 – 1:20 pm
Course Web Site: Black board. Here you will find Class Notes and Homework Assignments, and other material related to the course. Check the site frequently for updated information.

Physics Learning Center: The Physics Department maintains a help center in Geol 401 that is staffed during much of the business day. The schedule is posted on the door.

About this course

I. What this course is:
   This course is a continuation of Phyx 2110, which is a BASIC PHYSICS COURSE. This term we will study properties and applications (sound and hearing) of waves, electricity and magnetism (including electromagnetic waves), physical optics, photons, and then quantum mechanics. As you will discover, a main theme of the course is the generation, propagation, and detection of waves.

II. What this course is not:
   This is NOT an applied physics course. However, where possible we will relate the basic physics to life sciences applications.

III. What to expect:
   Do not expect that pure memorization will get you through this course. Although there is a certain amount of material that you will need to remember, physics is based on a relatively small number principles that are then applied to a WIDE RANGE of situations. TO BE SUCCESSFUL YOU WILL LEARN TO APPLY THE PRINCIPLES TO THE SITUATION AT HAND. Therefore you will need to learn to THINK about the problems you are given on the homework assignments, lab situations, and exams. Doing the homework problems is critically important to succeeding in this course because they will give you the opportunity to THINK about the material!

Course Structure: There are three components to the course: lecture, recitation, and laboratory. You must be enrolled in all three components of the course.

I. Lecture
   In lecture we will focus on the CONCEPTS related to the material, including some DISCUSSION OF UPCOMING LABORATORY EXERCISES. EXAMS and REVIEWS for upcoming exams will also happen during scheduled lecture periods. YOU WILL GET MORE OUT OF THE LECTURE IF YOU HAVE READ THE MATERIAL AHEAD OF TIME.

II. Recitation
During recitation you will REVIEW THE HOMEWORK PROBLEMS, be given QUizzes, and GO OVER EXAMS that you have taken.

III. Laboratory
In the laboratory you will PERFORM EXPERIMENTS related to the material being covered in the lecture and recitation periods. A two-hour laboratory period is scheduled most weeks. The labs will focus on DATA COLLECTION and DATA ANALYSIS. There is a $30.00 lab fee that supports the purchase and maintenance of the equipment you will use.

Learning Assessment: The assessment of your learning will be done through laboratory participation, quizzes (on homework assignments), and examinations.

I. Laboratory
Assessment of your laboratory participation and learning is done through questions on the exams and points for each lab awarded by the lab TA. Approximately 1/3 of each exam will involve questions regarding the laboratories. In the lab manual there are five questions at the end of each lab. Maximum of 10 point will be awarded by the lab TA for each lab based on your answers to these questions. Lab attendance will also be recorded and is part of your course grade.

All labs are expected to be completed on time. A missed lab can be made up only DURING THE WEEK that it is scheduled, during some other scheduled lab period that has an open slot. In order to make up the lab you must obtain a note from Shelley Williams in the Physics Department office (SER 250). This note will get you into another lab section that week only.

Penalties for missed labs:
1 lab: No points deducted, but you are still responsible for any exam questions pertaining to that lab.

2 labs: 50 points deducted from your total point score in the course.

3 labs: YOU WILL FAIL THE COURSE.

II. Homework Assignments and Quizzes
There will be weekly homework assignments, posted in Blackboard Vista (Occasionally on the class web site: http://www.physics.usu.edu/classes/2120_Spr/Index.htm, when Blackboard Vista has problems).

Probably the most important thing that you can do to succeed in the course is to do the homework assignments and understand the concepts behind the homework questions and problems. Typically, each Tuesday you will review that week's assignment. On Thursday, there will be a quiz on that week’s and/or the previous week’s homework assignment.

There will be 10 quizzes, each worth 24 points. A missed quiz gives your zero points for that quiz. Making up a quiz is at the discretion of your TA. Each quiz will contain one qualitative and one quantitative question, similar to the questions on the homework assignments.

III. Exams
General info:
The exams will test on material in the lectures, reading assignments, homework assignments, and laboratories. At the exam you may use the following: (1) a writing and erasing instrument, (2) a calculator, and (3) a 3” × 5” card with anything you want handwritten on it. The card may NOT be larger than 3” × 5”, and whatever is on the card must be handwritten.

There will be four 50 minute exams, 3 during the course of the semester and one during final-exam week at the regularly schedule final exam time.
Exam Scoring:
Exams will contribute to your overall grade in the following manner. At the time they are grades, each exam will be scored out of 220 points. However, at the end of the term the lowest exam score will be rescaled to a maximum of 110 points. For example, if you score 200, 180, 170, and 160 on the exams, your exam grade will be calculated as $200 + 180 + 170 + (160/2) = 630$ (out of a maximum of 770 points).

IF YOU MISS ONE EXAM, YOUR ZERO ON THAT EXAM WILL BE YOUR LOWEST EXAM SCORE.

IF YOU MISS TWO EXAMS, YOU WILL FAIL THE COURSE.

THE FIRST THREE EXAMS WILL BE INDIVIDUALLY RESCHEDULED ONLY AT THE DISCRETION OF THE INSTRUCTOR. If you know that you will be unable to attend the scheduled time for one of the first three exams, then you must have an exceptionally good reason and make previous arrangements with the instructor to take the exam at some other time.

THE FINAL EXAM MUST BE TAKEN DURING THE SCHEDULED TIME.
The final exam is scheduled for Wednesday, Apr 29, 2009 11:30 a.m. – 1:20 p.m.

Grading Breakdown and Grading Scale: 10 quizzes at 24 points/quiz, 3 best exams at 220 points/exam, lowest exam at 110 points, 80 for eight labs minus any penalties as described above. (Total maximum points = 1090) The grading scale is not flexible: that is, grading will not be curved. Your course grade will solely depend on how you do related to this scale.

A ≥ 1003, 92%
A− ≥ 970, 89%
B+ ≥ 937, 86%
B ≥ 894, 82%
B− ≥ 861, 79%
C+ ≥ 828, 76%
C ≥ 785, 72%
C− ≥ 752, 69%
D+ ≥ 719, 66%
D ≥ 643, 59%

Disability: If you have a disability which requires accommodation in order for you to take this class, please contact me. The disability must be documented by the Disability Resources Center.
## Phyx 2120 Spring 2009 Schedule

--Lectures, Reading Assignments, Lab, Homework, and Recitation--

<table>
<thead>
<tr>
<th>Week of</th>
<th>Monday (lecture)</th>
<th>Tuesday (recitation)</th>
<th>Wednesday (lecture)</th>
<th>Thursday (recitation)</th>
<th>Friday (lecture)</th>
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<tbody>
<tr>
<td>Jan 5</td>
<td>Waves (16.1-16.3) No meeting</td>
<td>Sound (16.5-16.7)</td>
<td>HW set 1 Part I</td>
<td>Hearing (16.8,16.11)</td>
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<td>Jan 12</td>
<td>Superposition (17.1-17.3) HW set 1 Part II</td>
<td>Standing Waves Lab 1 demo (17.5-17.6)</td>
<td>Quiz (1) on HW set 1</td>
<td>Charge &amp; electric force (18.1-18.4)</td>
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<td>Jan 19</td>
<td>Martin Luther King Day HW set 2</td>
<td>Coulomb's Law, electric field (18.5-18.6)</td>
<td>Quiz (2) on HW set 2</td>
<td>E field lines, electric flux, Gauss’ Law (18.7-18.9)</td>
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<tr>
<td>Jan 26</td>
<td>REVIEW Lab 1 for Mon 21st, group HW set 3</td>
<td>EXAM I (HW 1–3; Lab 1)</td>
<td>Exam I return and review</td>
<td>Electric potential difference (19.1-19.2)</td>
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<td>Feb 2</td>
<td>Equipotential surfaces and electric field Lab 2 demo (19.3-19.4) HW set 4</td>
<td>Capacitance / dielectrics &amp; E fields(19.5)</td>
<td>Quiz (3) on HW set 4</td>
<td>Ohm's law, resistance, &amp; power (20.1-20.4)</td>
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<td>Feb 9</td>
<td>Series and parallel wiring Lab 3 demo (20.6-20.8) HW set 5</td>
<td>Kirchhoff's rules (20.10-20.11)</td>
<td>Quiz (4) on HW set 5</td>
<td>Capacitors, RC circuits Lab 4 demo (20.12-20.13)</td>
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<td>Feb 16</td>
<td>Presidents Day <strong>MONDAY LECTURE</strong> Magnetic fields intro (21.1-21.2)</td>
<td>B fields and moving charges (21.3-21.5)</td>
<td>HW set 6</td>
<td>B-field source, magnetic materials (21.7,21.9)</td>
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<td>Feb 23</td>
<td>REVIEW HW set 7</td>
<td>EXAM II (HW 4–7; Labs 2–3)</td>
<td>Exam II return and review</td>
<td>Induced emf (22.1-22.3)</td>
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<td>March 2</td>
<td>Faraday &amp; Lenz (22.4-22.5) HW set 8</td>
<td>Inductance &amp; transformers (22.8-22.9)</td>
<td>Quiz (5) on HW set 8</td>
<td>Reactance (23.1-23.2)</td>
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<td>March 09</td>
<td>Spring Break</td>
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### March 16
**Lab 5: LCR Circuits**
- LCR circuits and resonance
  - Lab 5 demo (23.3-23.4)
- HW set 9
- EM waves – origin and spectrum (24.1-24.2)
- Quiz (6) on HW set 9
- EM waves – speed & energy (24.3-24.4)

### March 23
- EM waves – Doppler shift, polarization (24.5-24.6)
- HW set 10
- Refraction (26.1-26.4)
- Quiz (7) on HW set 10
- Dispersion, thin Lenses (26.5-26.8)

### March 30
- REVIEW
- HW set 11
- EXAM III (HW 8–11; Labs 4–6)
- Exam III return and review
- Eye, eyeglasses (26.9-26.10)

### April 06
**Lab 6: Refraction and Thin Lenses**
- Color perception
  - (class notes 1)
- HW set 12
- Double slit, multiple slits, & diffraction gratings (27.1-27.2, 27.7, 27.9)
- Quiz (8) on HW set 12
- Thin films, single slit & resolving power (27.3, 27.5-27.6)

### April 13
**Lab 7: Diffraction**
- EM waves are particles
  - (29.1,29.4)
- HW set 13
- Particles are waves (29.5-29.6)
- Quiz (9) on HW set 13
- The hydrogen atom and spectra (30.1-30.3)

### April 20
**Lab 8: Optical Spectroscopy**
- X-Rays
  - (30.7)
- HW set 14
- The Laser (30.8 – 30.9)
- Quiz (10) on HW set 14
- REVIEW

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**Final Exam**
**Wednesday, April 29,**
**11.30 a.m. – 1.20 p.m.**

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**Top Ten List:** The following are the top ten items that will help you succeed in the course.

10. **Start with a positive attitude!**
9. STUDY the text and/or class notes BEFORE lecture
8. ACTIVELY LISTEN to the lectures
7. Do the Homework BEFORE recitation
6. GO to recitation
5. Ask Questions / Get help when you need it
4. PARTICIPATE in the laboratories
3. UNDERSTAND the CONCEPTS related to each homework problem
2. Do the example exams under EXAM CONDITIONS
1. Finish up with a positive attitude!

**Possible Errors:** The instructor reserves the right to correct any possible errors to this syllabus.