IU Physics P310/510, Fall 2015, Course Information

Watch this page as we will update with new info, such as office hours, etc, that may be adjusted as semester progresses.
Rex Tayloe

Course Personnel

Instructor:

Rex Tayloe
Swain West 336
rtayloe@indiana.edu
Office Hours: (tenative, may adjust slightly)
10-12,1-4, Tues
1-4, Thurs

Assistant Instructor:

A. Irfan
airfan@indiana.edu
Office Hours:
Physics Forum (SW246)
4:40-6:35p Th

Schedule

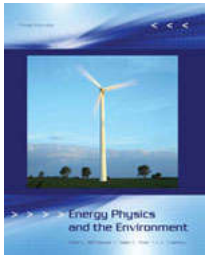
Lecture/Discussion:

- 4:00p-5:15p, TR, Swain West (SW) 220
- P310 and P510 are taught concurrently.

Course Materials

For this course you need the text book and access to a computer in order to view additional reading assignments. A decent calculator will also be of help with calculations.

Textbook



Energy, Physics and the Environment, 3rd Ed, by McFarland/Hunt/Campbell, 2007.
ISBN10: 1-4266-2433-6, ISBN13: 978-1-4266-2433-9.

It is important to get the latest (3rd), edition as many things have been updated. A online version of the text is fine, but watch out that HW problems are the same and in same order as in standard version of text. As of now, I don't see an online or etextbook version available, will update if I do.

This book gives a good overview of energy-related problems and, with its references, provides a solid discussion of energy related topics and their environmental consequences. Many important concepts are explained, examples are provided, and questions are asked to test your grasp of material. Readings from this book will be assigned with expectation that they are read before we discuss those topics in lecture. Many of the homework problems will come from this book.

We will supplement this textbook with current articles from the scientific literature.

A copy of this book is on reserve in Swain Hall Library associated with this class. Will also add some other good resources.

Course Overview

In Physics 310/510 we will attempt a quantitative understanding of the tough problems involved with society, energy, and the environment. We will practice and improve your skills at applying physics and math to these problems. This class has been developed over the past 10+ years by (now) Emeritus Prof. Ben Brabson. He brought a passion and excitement to the class that I will attempt to emulate. In that we'll follow many of his methods. For example, let's start with three goals for the class borrowed from last year's syllabus.

1. Attacking hard problems: The course should raise your comfort level with physics and calculus to the point where you can attack a broad spectrum of real-world environmental problems. For exampke, essentially all human activity involves the need and production of energy. Currently, most of this energy is generated by burning fossil fuels which produce CO2. We will examine the mechanisms of CO2 production, consequences of this CO2 production, and technological strategies for CO2 control. The course will provide the quantitative background and tools necessary to come to grips with this and other energy related problems. With increases in both population and per-capita energy use, we are obliged to move rapidly toward resolving problems arising from our use of energy.
2. Making connections: Most serious problems in environmental science are interdisciplinary. For example, climate change, acid rain, or urban pollution require a cross-disciplinary approach. The discipline of physics is a major player in this effort. So are chemistry, biology, geology, and mathematics.
3. Building your intuition: As with most problems of science, both *an intuitive and a quantitative understanding* are essential to the resolution of problems of the environment. Developing your intuition about energy enhances your ability to make approximations and estimates before doing a detailed calculation.

In addition to these overall goals, I have identified 4 major physics topics as essential within environmental physics:

1. Laws of Thermodynamics
2. Heat Transfer
3. Maxwell's Equations for Electromagnetism
4. Physics of the Atomic Nucleus

We will tackle these head-on with dedicated discussion, examples, and practice problems. Then we will apply them to specific environmental physics problems.

The prerequisites for the class are Physics P201 or P221 (Introductory physics) and MATH-M 211 or M 215. I hope that you have add preparation at that level or higher as we will build on the concepts and tools taught in those classes. I will help with catch-up if you find yourself somewhat rusty in those areas, but let me know early so we can discuss how to do that catch-up.

Course Components

We will study this subject via reading assignments, lectures, homework assignments, two mid-term exams, and a presentation. The idea is, like with any subject, to get you to think about the concepts and then to work through your own answers. The assignment details will be posted on Oncourse. Check there for details on reading, HW etc.

Lectures/Discussions

There are two 75-minute lectures each week, meeting in SW220 4:00-5:15p The lectures will roughly follow the topics in the textbook. However, they will also include important additional information and insights not provided in the text and will omit some information contained in the text. You are responsible for both the assigned materials in the text and what is covered in class. Thus, you are strongly urged to attend every lecture. You may wish to take notes, however, the lecture notes will be posted on Oncourse under "Resources".

Reading Assignments

Readings from our textbook as well as from other sources will be assigned before class meetings. Please be prepared by doing that reading. I will ask for class participation.

Class Participation

I want you to participate during class. I will ask for feedback, discussion, argument, etc during class. In my experience, that is how you really learn a topic and make the class interesting. No matter how good of lecturer I am, we don't want the class to be minutes of listening to me talk. I will put you on the spot, so please do your reading. I will substantiate this by giving points for class participation. You need to come to class and contribute to get those points. I will also ask for participation via the CourseNetworking site that I have set up for this class. I'll count that as class participation as well and set a goal for number of "Anwar seeds". More directions on that will follow.

Homework

You will be required to do homework assignments approximately weekly minus exam weeks, presentation weeks for a total of about 10 assignments. They will consist of problems/exercises similar to those in the book as well as other sources. For grading, a full solution with words and equations (were relevant) is required. Examples will be given. The assignments will appear on Oncourse and you will hand them in before class on tuesdays.

Exams

We will have two in-class exams around the 7th and 14th week of the semester (two total). They will both similar in format to the HW problems on topics that we have discussed in class. We will not have a final exam. The class presentations will replace that.

Class Presentations

During the semester you will be asked to investigate, in some depth, topic relevant to this class. You will present it to class in a 10 minute slot during the last week of class or during our final exam period. More information will be provided with suggested topics and further guidance. **Note: For P510 students, a 10-page paper is required (on same topic) along with presentation.**

Grading

The course grade will be based on the class components described above with following weighting.

- Homework: 25%
- In-class Exams (2: 20% each): 40%
- Final Presentation: 20%
- Class participation: 15%

The scores will be posted in the OC gradebook.

Academic Integrity

All work done in this class must be your own. You may discuss the assignments with fellow students and that is encouraged, but the work that you turn in must be your original work.

You are advised to read the Code of Student Rights, Responsibilities and Conduct especially Part II: "Student Responsibilites It is available on-line at
http://www.indiana.edu/~code/code/responsibilities/academic/index.shtml .

Academic dishonesty will not be tolerated. Academic dishonesty will result in severe penalties and will be reported to the Dean of Students for full disciplinary action.

Absentee Policy

If you have a valid university excuse for any missed assignments then your grade for that assignment will be replaced by your average on the other assignments. Valid university excuses include illness or injury, family emergencies, and university approved curricular and extracurricular activities, and religious holidays. There will be a maximum of three excused absences. If you need to miss more than this amount of work you will not be obtaining the full benefit of the course. Exceptions to this policy will rarely be granted and can only be obtained by scheduling a personal meeting with the course instructor.

Illness or injury excuses require a note from a physician, physicians assistant, or a nurse practioner stating that you were unable to attend at the time of the activity. The note must contain the words "unable to attend". The note must be provided within one week of the missed activity. In the case of extended illnesses the note must be provided within a week of the end of the illness and specify the period of your inability to attend the course.

Family emergencies will be treated only as an excused absence if verifiable documentation is provided. Family emergencies include a death in your immediate family, death of a close friend, sudden hospitalization of a close family member for a grave illness. You should notify the instructor for your activity as soon as possible of your absence. Preferably you should notify the instructor in advance by e-mail. Documentation of the emergency must be provided no later than one week after the absence.

Excuses for university-approved curricular and extra-curricular activities require the student obtain from the unit or department sponsoring the activity a letter (or class absence form) indicating the anticipated absence's). The letter must be presented to the instructor at least one week prior to the first absence.

In the case of religious holidays, the student should notify the instructor by the third week of the course of any potential conflicts.

Makeup exams can not be offered.

Late Policy

The course meetings will begin and end promptly at the assigned times. Late arrival or early departure from the lectures is disruptive and unfair to the other students in the class. Therefore, please try and arrive at these class activities a few minutes early.

Special Accommodations

If any student requires assistance or appropriate academic accommodations for a disability, please contact the instructors after class, during office hours, or by individual appointment. You must have established your eligibility for disability support services through the Office of Disabled Student Services in 096 Franklin Hall, 855-7578.

The Physics Department disabilities representative is Dan Beeker. You are encouraged to contact him if you have questions about or difficulties with departmental accommodations.

Additional Help

The instructors offer office hours that you can use to get additional, more personal, help. In addition, undergraduate students may find additional help in SW246, the Physics Forum. It is staffed by graduate students and faculty and provides free tutoring help. The schedule is posted on door and at http://www.iub.edu/~iubphys/physicsforum.pdf

Scheduling

All course scheduling matters are handled through the Physics Academic Services Office in Swain West 129. Their office hours are 9:00 - 11:55 a.m. and 1:00 - 4:00 p.m. See the IU official calendar for the various registration deadline dates.

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