Physics 100 – Energy in Today’s World-- Fall 2018

**Professor:** Mick Veum

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| **Office Hours:** B207 SCI  Monday 3:00 **to** 3:50 p.m.  Tuesday 1:00 **to** 1:50 pm,  Wednesday 1:00 **to** 1:50 pm,  Thursday 1:00 **to** 2:50 pm  (or by appointment)  **These are for your benefit. Use them!!** |

**Course Description and Objectives:** This course will focus on the physics of energy and how these ideas relate to energy production, energy consumption, and energy policy. A basic understanding of physics is an important component to making informed energy decisions as a voter, as a citizen, and as a consumer. Although this is primarily a course in physics, we will also consider the various economic, political, and social issues associated with energy. To varying degrees, we will cover the following topics: mechanical energy, thermal energy, electrical energy, production and consumption of energy. Upon completing this course you should be able to:

* Explain the fundamental concepts of the physics of energy
* Use algebra and graphs to explain measurements and make predictions
* Describe the issues surrounding energy production, storage, and use
* Explain ways you can personally change your energy footprint

**General Education:** This course satisfies the learning outcomes for the Quantitative Literacy component of the General Education Program. Upon completing this course you should be able to:

* Select, analyze, and interpret appropriate numerical data used in everyday life in numerical and graphical format.
* Identify and apply appropriate strategies of quantitative problem solving in theoretical and practical applications.
* Construct a conclusion using quantitative justification.

This course also satisfies the learning outcomes for the Environmental Responsibility component of the general education program. Upon completing this course you should be able to:

* Recognize areas of interaction between human society and the natural environment.
* Identify the individual, social, cultural, and ecological factors that influence environmental sustainability.
* Evaluate competing scientific claims that inform environmental debates.

**Text:** Energy, Its Use and the Environment, 5th Edition by Hinrichs and Kleinbach.

**Lab Manual:** The required lab manual is available for purchase at UWSP’s bookstore. *Lab meetings will begin in the first week of classes.*

**Calculator:** You will need a basic calculator that is portable for use both in and out of class sessions. The calculator need not be a fancy graphing calculator, but it must be capable of calculating basic trig, exponential, and logarithmic functions. Since cell phone use is not allowed during class (see below), and a cell phone cannot serve as your in-class calculator.

**Cell Phone Use:** The use of cell phones is not allowed during class sessions. Cell phones must be turned off and put away during all class sessions.

**Tentative Course Outline (subject to change):** The course will divided into four units, each ending with an exam. The schedule of topics is summarized in the table below. The lab schedule is shown in parentheses.

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| Week | Chs | Description |
|  |  | **Unit I: Mechanical and Thermal Energy** |
| 1 | 2 | Mechanical Energy (Lab 1) |
| 2 | 3 | Conservation of energy (Lab 2) |
| 3 | 4 | Heat and the First Law (Lab 3) |
| 4 | 4 | Heat Engines and the Second Law (No Lab due to exam) |
|  |  | Exam I: Thursday, September 27; Chs. 2, 3, 4 |
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|  |  | **Unit II: Electrical and Nuclear Energy** |
| 5 | 10 | Electric circuits (Lab 4) |
| 6 | 10,11 | Electromagnetism (Lab 5) |
| 7 | 11 | Production and distribution of electricity (Lab 6) |
| 8 | 13,14 | Radioactive decay and nuclear fission (No Lab due to exam) |
|  |  | Exam II: Thursday, October 25; Chs. 10, 11, 13, 14 |
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|  |  | **Unit III: Fossil Fuels and Solar Energy** |
| 9 | 7 | Energy from fossil fuels (Lab 7) |
| 10 | 8,9 | Environmental consequences (Lab 8) |
| 11 | 6,12 | Solar thermal and electrical energy (Lab 9) |
| 12 | 12 | Wind energy (No Lab due to exam and Thanksgiving) |
|  |  | Exam III: Tuesday, November 20; Chs. 6, 7, 8, 9, 12 |
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|  |  | **Unit IV: Future Energy Sources** |
| 13 | 17,18 | Biomass and geothermal energy (Lab 10) |
| 14 | 10,16 | Nuclear fusion and fuel cells (Lab 11) |
| 15 |  | The hydrogen economy (Lab 12) |
|  |  | Final Exam: Wednesday, December 19; Chs. 16-18 and comprehensive |

**Grade Evaluation:** Your grade will be computed based primarily upon your performance in three areas: homework, labs, and examinations *(see below)*.

**Homework:** Roughly ten homework problems will be assigned on a weekly basis and will be collected for grading (There will also be roughly ten suggested conceptual questions for you to consider). The total score on your homework assignments will count toward 12% of your final grade in the class. **Only two of the assigned problems will be graded. The graded problems will be chosen at random *after* the due date.** Solutions to the homework assignments will be provided after the due date. While I encourage you to discuss homework problems with your classmates, your final write-up should be **your own** work, should be written in **your own** words, should represent **your own** understanding of the material, and should **not** be shared directly with other students. If you have any questions as to what constitutes acceptable collaboration, please see me. Copying the solution from the internet is also not acceptable. **In order to earn full credit for a homework problem, you must show your work and include explanations of your approach. Being able to effectively communicate the solution to a problem is an important course objective.**  On the weeks with an exam, you will not turn in your homework. I will provide solutions for you to use in preparing for the exam. **Problems will not be accepted late, but your assignment with the lowest score will not count toward your semester grade. The drop-grade is intended to allow for unforeseen circumstances such as an illness. It is highly recommended that you reserve your drop-grade for such a purpose.**

*As part of the first homework assignment, you will be given the task of providing me a photo of yourself and filling out a survey. This is to help me learn names and get to know students in the class. Details about this assignment will be given during the first week of class.*

**Laboratory:** There will be twelve graded laboratory sessions during the semester. Each session will be of equal weight, and labs will contribute to 12% of your semester grade. *One lab score is dropped*. This drop-grade is intended to allow for unforeseen circumstances such as an illness. It is highly recommended that you reserve your drop-grade for such a purpose. **Be warned:** Since this course satisfies a lab requirement, it is necessary to pass the lab portion alone in order to pass the course. In other words, if your lab average is below 60% you fail the course regardless of your homework and exam averages.

**Examinations:** There will be four examinations. Three of them will be 50-minute exams given during the scheduled lecture time. The fourth exam will be administered during the scheduled final examination period. The final will have two parts. One part will be similar in format to the previous three exams, testing you on Unit IV. There will also be a second part that is cumulative for the semester.

**Exam Schedule:**

Exam 1 …………………………………Thursday, September 27, during lecture

Exam 2 …………………………………Thursday, October 25, during lecture

Exam 3………………………………….Tuesday, November 20, during lecture

Exam 4 (final)…………………………...Wednesday, December 19, 10:15 a.m. – 12:15 p.m.

**Semester Grade Calculation**:

Homework 12 %

Labs 12 %

Midterm Exams (3 @ 15% each) 45 %

Final Exam (15% for each part) 30%

Photo Assignment 1 %

Total 100 % (crazy how that works)

Your grades on individual assignments will be posted periodically on D2L (updated every 2-3 weeks). If you have any questions on the grades posted, please contact me immediately so any errors can be corrected. The scale for the final semester grade is shown to the right.

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| **A** | 93-100% |
| **A-** | 90-92.99% |
| **B+** | 87-89.99% |
| **B** | 83-86.99% |
| **B-** | 80-82.99% |
| **C+** | 77-79.99% |
| **C** | 73-76.99% |
| **C-** | 70-72.99% |
| **D+** | 67-69.99% |
| **D** | 60-66.99% |
| **F** | <60% |

**Attendance:** Attendance will not be kept for regular lectures. *Attendance to labs and exams is mandatory and students are responsible for all material discussed and announcements made during any scheduled class meeting*. Make-up work will only be accepted in the case of excused absences. Excused absences include death in the immediate family, illness with a note from the appropriate health care professional, religious observance, an event in which you officially represent the University of Wisconsin – Stevens Point and the event directly conflicts with an exam or lab. **Excused absences must be approved with documenting materials prior to the date of absence**. Unexcused absences from a lab or exam will result in a grade of zero.

In the case of a potential conflict between class and religious observances, University of Wisconsin policy requires the student to notify the instructor within the first two weeks of class in order to expect that accommodations be made. If there is any possibility that you will miss a lab or exam due to religious observances, please notify me of the specific dates that will be missed within the first two weeks of class.

**E-mail:** Occasionally it will be necessary to make class-related announcements outside of class. This will be done primarily through e-mail. If you’re not already in the habit of frequently checking your e-mail, it will be useful to develop that habit.

**Extra Credit:** It is possible for you to earn up to 1% of extra credit applied toward your semester grade. To do so, find an article in the news that is related to the material in class. Write a one-page summary of the article and turn it in to me with a copy of the article **within 7 days of when the article was published**. Each article will be worth a total of 10 points. If for some reason you don’t receive full credit for your summary, you can keep submitting new articles until you have a total of 10 points of extra credit. I will be rigidly adhering to the grading scale shown above, so I strongly encourage you to take advantage of this opportunity. 1% is enough to raise a person’s semester grade if she or he is at the border. All extra credit assignments must be received no later than the last day of classes.

**Photo Assignment:** As part of your first homework assignment, you will also complete a survey to help me learn names and get to know students in the class. See the sheet that was handed out with the syllabus.