**Introduction to Environmental Science and Policy**

**ESP 2110 (4 credits – lecture and laboratory)**

Spring Semester 2016

Instructor: Dr. Lisa Doner

Environmental Science and Policy Dept.

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Office Hours: MWF 1-3 pm, or by appointment, or drop-in

Required textbook: ***Environmental Science: Foundations and Applications***.

Authors: Friedland, A., Relyea,, R., and D. Courand-Hauri. (2012).

Publisher: Freeman and Company, p. 574s

Free online materials:

The Habitable Planet - <http://www.learner.org/channel/courses/envsci/index.html>

The Encyclopedia of Earth - <http://www.eoearth.org>

**Course Introduction And Rationale**

This course expands upon the introduction to Environmental Science begun with ESP 2100, to include the myriad and complex issues associated with human population growth. This includes social issues of environmental health and environmental risk; physical issues of energy use, pollution, climate change; and resources issues of land, food supply, and waste. These concepts are integrated as we examine how regulations are use to mitigate and control the impacts of population on the environment. This course also develops and enhances skills needed to fully engage in advanced courses within the major, including technical and visual data management, analyses and interpretation.

**Specific Learning Goals**

The intent of this course is to help you acquire and develop:

* an understanding of scientific knowledge of, and proactive social responses to, the world's most pressing environmental issues,
* critical-thinking and environmental literacy sufficient to read, analyze, and accurately communicate environmental information,
* a basis in physical science and applied mathematical techniques that enables informed, logic- and data-based decision-making capability on environmental issues,
* skills needed to engage in life-long learning including the ability to data-mine, conduct literature reviews, and evaluate the credibility of environmental information,
* advanced capabilities in technological and mathematical uses of computer and Internet resources, GIS-interfaces, and other forms of data communication, and
* analytical techniques, including data generation and tabulation, graphing, basic statistical analyses, calculations/extrapolations, and critical analysis.

**Instructional Approach**

This course is both lecture and laboratory and each contribute to the final grade.

* Lecture time is provided to present and illustrate environmental information and concepts, to clarify understanding through back and forth discussion and to use critical-thinking methods to debate ideas within the environmental discipline. Frequent, in class, unannounced quizzes will be given throughout the term to assess the quality of individual learning. Because only a small fraction of information can be conveyed by lecture presentations, the bulk of ­­information provided on each topic is in out-of-class readings. Students are expected to read the assigned text chapters, complete assignments from the textbook and turn in assigned homework assessments. **Exams, quizzes and homework will include a significant amount of material from reading assignments**.
* Laboratory periods are primarily for collecting, tabulating, managing and analyzing data on various environmental topics, to provide hands-on experience with the ideas presented in lecture. Computers will be essential - bring your laptops to labs.
* Many of the laboratory activities are a combination of group and individual efforts, with in-class and homework assignments every week. Attendance for lab is essential. There are two lab sections offered in this course. Students may (by advance permission only) make up a missed lab by attending the other section.

**Course Requirements And Evaluation Procedures**

Each student is expected to be an active participant in all components of the course. This means:

* attending and paying attention in lecture and laboratory sessions (cell phones put away!)
* participating in class discussions, laboratory exercises and online activities,
* completing all assigned work by the due date (usually within 1 week of the assignment),
* notifying the instructor ahead of time for expected absences (see PSU's attendance policy at: https://www.plymouth.edu/undergraduate/files/2010/11/Class-Attendance-Policy.pdf
* and completing any make-up lab, assessment or other assignment within two weeks of the original absence.
* Assignments include assigned readings from the textbook, handouts and online materials, data visualization and analysis, case study reports, written and oral presentations and reports. Lab homework is due by the next lab meeting unless specified otherwise.

**COURSE OUTLINE** (Refer to Moodle for specific due dates)

Textbook Chapters covered: 1, 2, 7, 8, 12, 13, 15-17, 19, 20

**Weeks 1-5: Humans in the Environment: Resource Use & Health Risks**

Ch 1&2 - Energy Conversions & Chemistry, pressure & partial pressure

Lab 1: Converting and scaling - atomic mass units to Gigatons

**Math** - Calculate masses & density, convert units, assess logically

**Graphing** - graphing rates of change (mass vs volume)

**Mapping -** changes in density of atmosphere with height

Ch 7 - Human population & demographics

Lab 2:

**Math** - Calculate population density & growth for various countries with varying birth, death, and maturation rates

**Graphing** - graph data vs exponential growth curve, analyze graphs to estimate resource needs (we'll give minimum daily requirements & today's energy usage)

**Mapping** - practice different mapping methods to show the population & resource needs data; use maps to assess potential future global population density and growth challenges

Ch 8: Agriculture & soil, Soil formation, texture, erosion, & groundwater (p. 219-226)

Lab 3 - Soil Lab 1

**Math** - particle-size (calculating means, modes, quartiles) and weathering effects (perimeter:volume)

**Graphing** - soil particle-size (triangular plots; color concentration plots)

**Mapping** - analyze existing GIS maps of health hazards (Gapminder.org)

Ch 11: Agriculture, food security, sustainable diets and

Lab 4 - Soil Lab 2 - Web Soil Survey and lands of prime importance

**Math** - particle-size and water:air pore space

**Graphing** - water content

**Mapping** - surveying & mapping hydric soils on a topo map (Web Soil Survey)

Ch 17 - Environmental Health Risks - Pesticides & Herbicides

Lab 5 - Environmental Health (Ch 17) - exposure risk, safety limits, monitoring data

**Math** - Calculate exposure, maximum dose, bioaccumulation, bioconcentration

**Graphing** - exponential growth curve, dosage exceedance

**Mapping** - analyze existing GIS maps of health hazards

**Exam 1**

**Weeks 6-11): Humans in the Environment: Energy Use and Earth System Consequences**

Ch 12 - Fossil Energy Resource Types, Distribution & Uses

Lab 6: Carbon calculator lab - use an online calculator to estimate C pollution and offsets

**Spring Break**

Ch 13 - Renewable energy - Movie "Switch"

Ch 15 - Air pollution: toxicity & influence on climate

Lab 7: particulates, gases & energy balance

**Math** - determining global emissions

**Graphing** - graphing rates of change (mass vs volume)

**Mapping -** distribution of air pollution

Ch 19 - Climate Change and air pollution

Lab 8: emissions, sources and sinks (carbon, sulfur, nitrogen)

**Math** - determining global emissions: gridded data sets and single point representation

**Graphing** - graphing gridded data, outlier identification, weighted averaging

**Mapping -** anomaly maps, surface area maps

Student presentations: Movie Reviews - Crude Awakening - limits to cheap oil; Gasland and Gasland 2; Petropolis; Mountain Top mining movie.

**Exam 2**

**Weeks 12-15: Humans in the Environment: Long-term Consequences**

Ch 16 - Solid waste - generation, management (RRR), disposal, hazards

Lab 9: Superfund sites

**Math** - fracking waste water - concentration in aquifers

**Graphing** - graphing rates of change (concentration, mass and volume)

**Mapping -** satellite distributions of fracking wells

Ch 17 - Environmental Health - health & energy use (LA methane leak; nuclear risks)

Lab 10: resources & waste

**Math** - radiation decay rates

**Graphing** - exponential decay (halflife)

**Mapping -** nuclear plants around the world, Chernobyl global imprint

Ch 20: Intro to Geology - Solid Earth, Plate Tectonics & Rocks

Ch 20 - Geology - sand as a limited resource (TEDx Sand) - do as a lab exercise later on

 Lab 11: Sand formation and transport rates

**Math** - bedrock weathering rates and coastal dune recovery

**Graphing** - dune vs storm surge height (H. Sandy & Winter Storm Jonas)

**Mapping -** Coastal flooding in NYC area

Lab 12: Earth's layers and magnetic field

**Math** - density (minerals & rocks) vs gravity

**Graphing** - density changes with temperature (mineral phase changes)

**Mapping -** gravity anomaly maps

Lab 13: Plate tectonic theory & dynamic Earth (Movie - How the Earth Made Us)

**Math** - seismic wave velocity vs ground density

**Graphing** - seismic wave velocity versus distance (P wave and S wave)

**Mapping -** velocity & shake maps

Lab 14 - Mineral & rock identification (hardness, color, streak, luster, cleavage)

Lab 15 - Movie - Making of the Earth Part 1 & 2

**Exam 3**

**GRADE BASIS** \* Final Exam period: Friday May 13, 2016 11:00am-1:30 pm

**Lecture - 70% total grade**

* Exams (45% total), 15% each exam
* Homework (15% total)
* Quizzes and Other In-Class Exercises (10% total)

**Labs - 30% total grade**

* in-class lab assignments 15%
* take home lab assignments 15%

There will be no extra credit in this class other than that offered as part of exams and quizzes. ***There will be no curve applied to the exams or course grade.***

**Grading Scale**:

 A 93.00 – 100 B- 80.00 – 82.99 D+ 67.00 – 69.99

 A- 90.00 – 92.99 C+ 77.00 – 79.99 D 63.00 – 66.99

 B+ 87.00 – 89.99 C 73.00 – 76.99 D- 60.00 – 62.99

 B 83.00 – 86.99 C- 70.00 – 72.99 F 0 – 59.99

**Grading policy:** [**https://www.plymouth.edu/undergraduate/academic-policies/**](https://www.plymouth.edu/undergraduate/academic-policies/)

**Course communication:**

Many assignments will be announced in person, in class, but many others will be posted on Moodle. Notifications about new assignments and news articles on Moodle go to your ***plymouth.edu*** email address unless you have set up a different email in your myplymouth preferences. Not all announcements made in class will be posted on Moodle, so please check with me and with classmates for missed announcements if you come in late or miss a class. Check the course Moodle site and your plymouth.edu email account at least once a week.

**Note-taking:** most students learn by doing, by repeating information in their own words, and by seeing. Taking notes *in class* brings together all of those learning methods. I strongly advise you to bring to class and keep a notebook of your lecture and lab notes, handouts, returned quizzes and homework. In other words, keep all materials for this class in one notebook. To encourage this**, I allow class notes to be used as reference material during quizzes** (not in exams).

**Pencils over Pens** - I greatly prefer students to use pencil when completing labs, because entries can be erased or modified without creating a messy-looking, hard to read product. Also, pencil marks do not smear, run or fade when wet or over time, unlike almost all inks. Mechanical pencils maintain a sharp, ready-to-use point but do require refills; these usually have good erasers. (Note: Chemistry instructors have exactly the opposite philosophy; they want everything in pen so that all entries are permanent).

**Exams**: There will be three major exams for this course, including one during final exam week. Exams will be announced at least one week in advance, in class and on the course *Moodle* site. If you need to miss an exam for any anticipated reason you should notify the instructor at least one class periods before the exam. If you miss an exam because of illness or travel problems, contact the instructor as soon as possible and be prepared to provide documents demonstrating the validity of you excuse (see PSU catalog for excused absence policy).

**Writing Assignments:** There will be several writing assignments. All writing should be properly researched with sources cited in text and fully referenced in a bibliography. Besides required content, each writing assignment will be reviewed and graded for proper spelling and grammar. Students with significant gaps in their writing skillsets will be directed to work with the PSU Writing Center. The Writing Center offers friendly, low stress assessment of written material and offers one-on-one advice about improving writing quality. While everyone has different levels of skill in reading, writing and math, ***proficiency*** at a higher-than-minimum level is expected of college graduates for language, math and critical thinking. If you are concerned about this expectation, come and talk to me about it. PSU also has a PASS office for students with known learning needs.

**Course Requirements And Evaluation Procedures:**

Specific requirements include completion of assigned readings from the text and online materials; analysis of video presentations, scientific papers, and media reports; completion of homework and lab assignments, assigned research reports & student presentations, and participation in class discussions. Work is to be completed by the next class meeting unless specified otherwise. Lab homework is due by the next lab meeting. Bring to class and keep a well-organized notebook that contains all class handouts and your notes on class materials. Bring this notebook to all class meetings.

**Attendance:**

Attendance is more than occupying a seat; it also implies giving your attention to the class. This course is essentially contracted time between you and the instructor for the purposes of learning, but learning cannot occur when students are constantly distracted by outside elements. Therefore, during class time (lectures and labs), cell phones must be silenced. Facebook and other social media accounts must be logged off. Do not take calls, make calls nor respond to text or email messages. Students who are discovered texting, twittering, using class time for socializing or for completing work required for other classes will be asked to leave the room. Take this seriously! For more details about University policy on absences, see: <https://www.plymouth.edu/undergraduate/academic-policies/>

**Academic honesty/integrity -** an academic degree is, in essence, a contract between you and the University, but also between the University and the outside world.Your course grade is an officially documented evaluation of your level of learning in each course. Graduate schools, potential employers and scholarship agencies use these grades as part of your educational history. For this reason, PSU has a very strict policy regarding cheating, plagiarism and other acts where you deliberately misrepresent your abilities. Student work that appears to be a copy of each another's work (with no acknowledging the shared effort) will be reported to the Dept. Chair. If the Chair agrees that cheating has occurred, then the case will be referred to the University Academic Integrity Committee. PSU's policy is available at: <https://www.plymouth.edu/undergraduate/academic-policies/>

**Support Services:**

In order to help you succeed in this class in particular and at Plymouth State University in general, please be aware of the following campus services:

1. **University Writing Center:** Located in the Lamson Learning Commons, ground level. The UWC provides a variety of services to assist you with your writing for any class, at any stage of the writing process. (x5-2831)
2. **Information Technology Services:** The ITS Help Desk is located on the main floor of the Lamson Learning Commons. Call them with questions about email, *Moodle*, etc. (535-2929)
3. **Lamson Library Reference Desk:** Great help in finding what you need at Lamson (535-2455)
4. **PASS and TRIO:** for help in tutoring, special needs, etc (<http://www.plymouth.edu/services/pass>)

**ADA Statement:** Plymouth State University is committed to providing students with documented disabilities equal access to all university programs and facilities. If you think you have a disability requiring accommodations, you should immediately contact the Disability Services Office (DSO) in Plymouth Academic Support Services located in the Lamson Learning Commons (535-2270) to determine whether you are eligible for such accommodations. Academic accommodations will only be considered for students who have registered with DSO. If you have a Letter of Accommodation for this course from DSO, please provide the instructor with that information privately so that you and the instructor can review those accommodations.

Also, if you are struggling academically because of personal reasons (experiencing difficulties in adjusting to life away from home, missing classes, coping with personal or family problems, etc.) there are offices at PSU that can help with academic support as well as career and personal counseling. The PSU Counseling and Human Relations Center (across from Hyde Hall) 5-2461 can direct you to the proper source of help. Confidentiality is assured.