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ENSC 360.01: Applied Ecology

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Prof Vicki.watson@umontana.edu, 101 Natural Science, 243-5153, office hours = 12-2 Wed (usually)
 TA Michael.Canetta@umontana.edu, M-5 Rankin, (messages 243-6273), office hours = 11:30 to 12:30 TR; 12-1 Wed

Purpose: Understanding the principles & concepts of ecology & how they inform real life decisions about human interactions with the environment. Will emphasize conservation of biodiversity and watersheds and design of field studies. **Prerequisites:** freshman biology & chemistry, statistics, ENST 201 (or similar courses)

References: EOE8 = Smith's Elements of Ecology 8th edition OR EFB6 = Smith's Ecology & Field Biology 6th ed
 OR M4 = Molles' Ecology 4th ed (OR ANY basic ecology text – just read appropriate sections based on topic)
 AND N = E. Newman's Applied Ecology & Env. Management 2nd ed In bookstore or on library reserve
On reserve & eres: Cox's General Ecology 'Lab' Manual – read chs 1-4 (other chapters based on interest).
 Brower et al. Field & Lab methods for General Ecology is also a useful reference for methods.
 Some items will be on e-reserve later in the semester, accessible at eres.lib.umt.edu

Week Lecture Topics Overview & references (you select your readings using table of contents & index)

8/28 Course goals/mechanics. What is Applied Ecology & field studies? *First chapter of text ; Cox manual chs 1-4*

Ecological Literacy--Ecological concepts (& methods) that inform human decisions

9/11 **Ecosystem concepts** EOE8 Part 1 & Part 6 OR M4 Ch 18-19 OR EFB6 Ch (2,3,4),27

to All life and economic activity depends on earth support systems (ecosystem services).

9/27 Resources/services come from ecosystems & depend on their health/integrity/condition.

Support systems have limited **capacity** to supply goods/services & to assimilate change.

Natural **change** contributes to diversity but makes it hard to identify human-caused change.

Support systems are **connected**, so our actions have unexpected, indirect effects.

Local populations/communities/ecosystems are linked in global systems

(parts \leftrightarrow whole); importance of incremental, cumulative effects

Energy flow & productivity EOE8 ch 21 OR M4 Ch18 OR EFB6 ch 24

Material cycles (esp. water) EOE8 ch 3(water cycle) & ch 22-23 OR M4 Ch 19 OR EFB6 ch 25-6

Env. fate of chemicals Newman ch 9 (p 263-80)

10/2 **Community concepts** EOE8 ch14-19 (fig 17.12); & in Part 7, read about the type of ecosystem at your study site

EFB6 Ch 20,21,23 (read about your studied community ch 28-30); OR M4 Ch 13-17 & 20

to Niche & Habitat—every species has a role (keystone, foundation, indicator, umbrella species)

10/16 Interactions/connections—competition, predation, mutualism/symbiosis, coevolution

Change (ch 19)—succession, disturbance, stability, resilience, flexibility, predictability, shifting baselines

Diversity (ch 29)—types & significance of diversity; Why and how to maintain biodiversity

10/18 Organisms & their adaptations; EOE8 ch5-7; or M4 Ch 4-6; or EFB6 Ch 5 (6-8 if relevant to your study),

10/23 **Population concepts** EOE8 Ch 5, 8-12, Newman Ch 10

to What are populations (local & meta), subspecies, and species? EOE8 Ch 5,8,12 (especially p 233)

11-6 change in quantity—rate/regulation of growth, carrying capacity, ecofootprint EOE8 ch 9-11

change in quality—evolution, genetic diversity, flexibility, pop. viability analysis EOE8 ch5& 29 esp p576-7

11/8-12/4 **Applying Ecological Literacy in decision making for a sustainable society** EOE8 part 8 Human Ecology

Possible topics (reading will be assigned after class selects topics): Energy, Carbon and Climate N ch2, EOE8 ch 30

Achieving Sustainability EOE8 Ch 28; Population Policy, carrying capacity, ecofootprint (assigned reading)

Conservation of Biodiversity N ch10 & EOE8 Ch 29; Ecological restoration-- N ch11 and SER web site

Pollution Ecology, Ecotoxicology and setting standards N ch9; Forest Management N ch7

Ecology of Food Production N ch4 (also 3.5,6); Pest management N ch 8

Env. Impact & Risk Assessment; Watersheds --Clark Fork case study www.epa.gov/region8/superfund/mt/index.html

OR papers selected from Frontiers in Ecology by class

12/6 last regular class day – wrap up/evaluations

12/10 (Mon) 3:20-5:20 Final class meeting, Special surprise speaker

*** 10/29 last day to drop or change grading 'easily'; last day to drop at all is last day of classes Dec 7 ***

Grade based on percentage of 650 points earned**HOW to earn points (maximum possible points shown):**500 pts *Take home essays;*50 pts *Participation in class*100 pts *Field trips & reports on same (10 pts/hr of trip & per 1/2 page of single spaced 10pt font)***reports due about one week after field trip.** Sign up in class or at **M-2 Rankin**

See EVST Conservation calendar for times & meeting places.

HOW to lose points: Unexcused absence from field trip once signed up – drop letter grade.**Late work – Assignments lose half their value after 5pm day due.****Assignments lose rest of their value at 5pm a week later.****Take Home Exam Essays ARE DUE THE WEEKS INDICATED on the exam;****Field Trips schedule for ENSC 360 class Fall 2012**

Unless a different place is specified, EVST field trips (*) leave from the parking lot north of UM's UC (by the tennis courts). Students in EVST 105, 360 & 540 may register for a space in a UM van on a sign up list at Rankin Hall room M-2. Other UM students can ride in the UM van if there is space. Non-students need to provide their own transportation. Some Community group or government agency or other department field trips may count as field trips – get them approved & arrange your own transportation. For more info (time, location, contacts) on field trips, see – www.umt.edu/conservationcalendar

- * Aug 29 Wed (bike) & Aug 31 Fri (walk) **Clark Fork River sampling in town** – meet at 102 Natural Science at 2:10pm
 - * Sept 1-3, Sat-Mon, – **sampling on Clark Fork River.** arrange to ride with VW on any of these days (as space permits).
 - Sept 9,12,13 & 18 —WEN stream monitoring volunteer training at Greenough Park pavilion (all 4 days are same content) RSVP
 - Sept 7 Rapid Forest Assessment Training (I sent an email about this)
 - Sept 7-8 – Missoula Hazardous Waste Collection Days (volunteers needed, great experience & counts for field trip hours)
 - * Sept 8-9, 15-16 – **Gold Creek study field trip** – arranged by class member Todd Blythe
 - * Sept 15, Sat, **Blackfoot Restoration Tour** – meet at 8am at north end of Van Buren Br. (East Gate parking lot). return 6pm.
 - * Sept 22, Sat – **Clark Fork Superfund tour.** meet at 8am at north end of Van Buren br. (East Gate parking lot). return 6pm.
 - * Sept 29 Sat – National Public Land Day (volunteers needed; ecological work at Milltown can count as field trip)
 - Oct 20 – Restoration Ecology class field trip to 9 Mile Creek (may have room for some of our class)
- See also field trips offered by Audubon, Sierra, Great Burn Study Group, etc on www.umt.edu/conservationcalendar

Others field trips that will be organized (in Oct or Nov).

- * **Missoula Wastewater Treatment tour & Ekocompost** -- composts Missoula's sewage sludge; started over 30 years ago by an EVST student!

First Take Home Exam question (later exam questions will be emailed to the class)**Remember to Cite your sources** using the Council of Science Editors style that was used in ENST 201 (ask for a guide if needed).

Lectures, ecology texts, Newman text, Cox manual are good sources, but find some journal articles also if you can.

Point allocation & due dates for the remaining questions are specified on the exam questions which will be emailed to you.

Restate each part of the question just before you give your answer to it. Using the e-version of the exam saves retyping questions.

- 1) **Scientific methods, approaches, processes used in ecological field studies (part a due Sept 11 @ 5pm; part b due Sept 25 by 5pm)**

A....Identify a published primary ecological FIELD study to use as an example (or construct your own if you are brave).

State the main overall question addressed by the research project (ATTACH a copy of the published study you are using).

Briefly outline the study design – what is observed/measured, when, where, how and why (why do it & why this way)?

How was data analyzed? That is, what statistical tests were used and why? 10 pts

B... Explain the following terms (ie define, give importance to scientific process) and ILLUSTRATE using your study:

The scientific cycle (10pts), induction vs deduction (10pts), description vs experimental manipulation (10), reductionist vs holistic approaches (10, include advantages/disadvantages of each), control/reference (5), replication (5), QA/QC (accuracy, precision, representativeness, comparability, completeness –20) and use of models (10, what are they & how are they used in ecological field science?). Even if a concept does not seem directly applicable to your study, give a short definition & example.

2 points for each relevant, credible, correctly cited source up to 10 pts

Note–I recommend you select study sites in the US (in MT even better) –easier to find info needed for questions.

You will form into small research teams that will select a single study based on common interests. You can work together on researching the questions, but each person will produce his/her own essay answers in his/her own words.

Basic Class Etiquette

You should arrive before class starts and wait until class is over to depart. If you must arrive late, enter as quietly as possible. If you must leave early, let the instructor know in advance and leave as quietly as possible. Avoid scheduling conflicts that would cause late arrivals and early departures. When in class, participate in class activities and avoid disrupting class by talking during lectures. Class etiquette is especially important when guest speakers visit class. They are giving their time to you without pay; respect that.

What constitutes a Pass for P/NP option? Earn 60 % of possible points.

Attendance policy:

Attendance is occasionally taken in lecture (usually when guest speakers appear). Regular attendance at lectures earns points.

Receiving an incomplete: To receive a grade of I or 'incomplete', student must request an incomplete and explain what unexpected emergency made it difficult or impossible for the student to complete course work by the due dates. Student must also agree to a date by which the work will be completed and turned in. Some late work penalties will still apply.

Late work: Assignments lose half of their value for each week late. Hence, work that is 2 weeks late will receive no points. Extreme hardship cases may negotiate some reduction in late penalties but will likely have to request an Incomplete if a large number of assignments must be handed in late.

What are the deadlines of adding, dropping or changing grade options in classes?

According to UM's 'Important Dates' at http://events.umt.edu/?calendar_id=27&upcoming=upcoming&

Sept 7 is the last day to add online;

Sept 17 last day to drop or change grade system online and receive partial refunds.

Oct 29 is the last day to drop (or change grading system) with a simple drop/add form (\$10 charges each drop, & no refund on the classes dropped; you get a W on your transcript). After this date, you must petition to drop (more hassle) and you get a WP or WF on your transcript IF your petition is approved .

Dec 7 is the VERY last day to drop (last day of classes). After that, take your petition to God.

(this is known as the 'drop dead' drop deadline).

Expectations of Auditors -- Auditors must practice the same basic class etiquette as regular students. This is the only expectation of unofficial auditors. Official auditors must attend class regularly (as evidenced by in class essays). Failure to meet these expectations, will result in a notation in the student's academic record indicating that attendance/participation was not satisfactory.

Disabilities -- The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. I will work with you and DSS to provide an appropriate accommodation.

Academic Honesty -- All students must practice academic honesty. Academic misconduct is subject to academic penalty by instructor and/or disciplinary action by UM. All students must be familiar with the Student Conduct Code at http://life.umt.edu/vpsa/student_conduct.php