subject to change

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Class Goals: Provide students with opportunities to make a difference;
Help students build: scientific literacy; skills in critical thinking, research & self-instruction;
an understanding of the scientific basis of environmental issues, policies, laws;
habits of informed, active participation in social decisions, sustainable living,
and of service to their community and the earth.

Date	LECTURE TOPICS at a glance	References (identified at page bottom*)
30-Aug	Course goals & mechanics; What is Env. Science?	FP p1-20; C ch1; www.earthcharter.org
1-Sep	**Literacy—Scientific & Ecological**	C ch3; FP p13-14 (science or philosophy?)
6-Sep	Ecosystems—energy flow, matter cycles, watersheds	C chs 6.4 & 7 & 12.1 to 12.5
8-Sep	env. fate (you can't throw it away), biomagnification	FP p21-22 water cycle; AO ch 4 recommended
13-Sep	ecological services, climate change	C ch 8; check out web sites on FP p23
15-Sep	Communities—connections—your actions have many effects	C ch 6 & 10: communities, species interactions
20-Sep	all creatures have a role; kinds of biodiversity	see world community types (ecoregions) at
	Change/succession, disturbance, condition	WWF's ecoregion map clickable list
22-Sep	Populations— evolution/adaptation, flexibility	C ch 4.1-4.2 & 4.5-4.7
27-Sep	population growth, limits, carrying capacity (K)	C Ch 4.3-4.4 & **5;** Hardin on Cultural K in FP p18
29-Sep	Ecofootprints, Ecohandprints	FP p25.1 to 25.7, http://footprintnetwork.org
	carbon and water footprints	FP p23, www.panda.org/livingplanet see reports
4-Oct	*****EXAM 1******* grades posted by Oct 13**; *last day to drop/change grade system 'easily' Oct 31***	
	Scientific Basis of US Env Laws & Policies	C ch 2 on env law/policy; FP p26a&b (NEPA)
6-Oct	Scientists & env policy, NEPA, Tragedy of Commons	FP p24; full article at dieoff.org/page95.htm
11-Oct	LAND (MUSY,NFMA, Wilderness Act, etc)	C ch 14 + fire ecology web sites on FP p12
13-Oct	WATER (Clean Water Act, etc) & Watershed CPR	C ch12.8-12.9 & 18.1; FP p27 (CWA); AO ch 10
18-Oct	LIFE/Biodiversity (ESA, etc)	C ch 11
20-Oct	AIR (Clean Air Act) Ben Schmidt Msl Air Quality program	C ch 9 & 8
25-Oct	WASTE (RCRA, etc) & TOXICS (TSCA, etc)	C ch 18 & 19 (especially 19.3)
	Using Science to Meet Our Basic Needs Sustainably	www.umt.edu/greeningUM
27-Oct	Shelter--*Steve Loken*, LokenBuilders.com	green building web sites listed on FP p12
1-Nov	Transportation--*Jordan Hess* , ASUM trans; *Bob Giordano* , MIST	C ch 17.5
3-Nov	Water—*Michelle Hutchins, Travis Ross* , Msl Water Quality District	ch 12.4
8-Nov	ELECTION DAY VOTE!!	**DiverseU** Nov2-3 www.umt.edu/diverseU
10-Nov	Energy —*Diana Maneta* , montanarenewables.org	C ch 15 & 16 & EROEI web site on FP p23
15-Nov	Food —*Josh Slotnick* , PEAS, www.gardencityharvest.org	C ch 13; www.agroecology.org
17-Nov	*****EXAM 2 *******	
22-Nov	films & food	Nov 24 Thanksgiving (Think Globally,Gobble Locally)
29-Nov	Class choice of topics: Story of Stuff, Permaculture,	Eco Literacy & MT Constitution by Watson
1,6 Dec	Env impacts of War; Watershed CPR in MT	or student presentations or other class exercises
8-Dec	Living Sustainably & Equitably, evaluations & fun	C ch 20; & rest of FP
14-Dec	******MAKEUP EXAM**, comprehensive, by appointment only***	**NOTE: WED, Dec 14, 3:20 to 5:20pm**

REFS: FP = Facpac (coursepack); AO = Alice Outwater's *Water* (one chapter from part I & one from part II)
C = Christensen's *Environment & You* **or any env science text** (use table of contents & index to find lecture topics)
******* See EVST's online calendar **www.umt.edu/conservationcalendar** for field trips, service options, etc

Watson Syllabus p.2 Grading & Due Dates

Grade based on percentage of 500 points earned

HOW TO EARN POINTS:

200 pts 2 Midterm Exams (100 each); NOTE: final is a makeup, must have excused absence to take
100 pts Service Project includes: proposal (10) & progress report & final report & thank you letter (90)
90 pts Lecture participation (based on in-class essays)
10 pts Learning Contract (indicating which assignments you plan to do)
100 pts **You choose from among the following possible assignments:**
Research & action project: proposal (10), paper (70), letter to decision maker (20),
Field trips & reports (due one week after the field trip) (10pts per hour up to 10 hours & 100 pts)
Help session participation (up to 50 pts)
Portfolio-- demonstrate your Science Literacy (25 pts)
Presentation (oral, poster, or web page) on service project or research paper (25 pts)
(You may also choose to do up to 50 points of extra credit selected by you from above choices)

HOW TO LOSE POINTS:

Unexcused absence from field trip once signed up – drop a letter grade for course.
Late work – Each week an assignment is late, it loses half its value.

ASSIGNMENTS ARE DUE IN HELP SESSION during WEEK INDICATED BELOW;
***Keep a copy of all assignments turned in*. INSTRUCTIONS FOR ALL ASSIGNMENTS ARE IN FAC PAC**

WEEK OF WHAT HAPPENS IN HELP SESSION – Discuss study questions, lectures, student concerns, and the items below

8-30 Claim a place in a help session; Introduce yourself and your interests; go over fac pac instructions

9-6 Discuss study questions, field trips, service project ideas, learning contracts and extra credit

9-13 Service project proposal (10pts) due; you may change your project later but submit new proposal if you do.

9-20 Project proposals returned and discussed. Be sure your project is approved before proceeding.

9-27 Continue discussing study questions & reviewing for exam; **10-4 EXAM 1; no help sessions this week**

10-11 Return & Review Exam 1, start discussing study questions for Exam 2

10-18 **Learning Contract** (10 pts) and Research Project proposals (10pts) due.

10-25 Research Proposals returned.

11-1 Progress report due on Service Project (short). 11/8 Election Day

11-9 Progress report due on Research project (detailed outline & alphabetized list of references)

11-15 Research paper outline returned. Service project final reports due. Exam Review

11-17 **EXAM 2**

11-22 Help sessions do not meet this week (Thanksgiving)

11-29 ALL Remaining WORK DUE (research papers, any remaining reports, portfolios, presentations)

12-6 ALL graded work must be picked up to get credit. After finals week, IT WILL BE RECYCLED!

12-14 Finals Week -- Help sessions do not meet this week

A. COMMUNITY SERVICE LEARNING PROJECT— up to 100 pts

UM wants all its graduates to develop the habit of community service. This course is a service learning course (see FAQ for definition). Students can earn up to 100 pts by providing community service that protects/restores our environment & builds a more sustainable society (15 hr minimum, including training, travel, & reporting, but at least 10 hrs of actual service). You may do group or individual projects. Provide your TA (help session leader) with a short proposal for your service project (need/environmental benefit, group served, what you will do, time required) & get approval before proceeding. To earn points for your service project, you must submit a final report that includes your proposal, your project evaluation, and a letter of thanks from those served. Your project evaluation should describe: what you did and learned; how it benefited the community and the earth by increasing sustainability; how you used skills or knowledge from this class; how the project contributed to your preparation for life &/or career; your level of satisfaction in the experience; how the project could have been improved. If you worked on a group project, evaluate each member's contribution. Reports must be at least 2 pages long (single spaced, 10 pt font).

Ideas for service projects (TAs have more; also note Welcome Feast on Oval Sept 4 & Volunteer Fair in UC Sept 15-16)

Help Missoula Health Dept. with its Household Hazardous Waste Collection Sept 16-17
Help restore open space lands on Public Land Day Sept 24; Great Burn wilderness monitoring weekend trips
Help grow food for the food bank at the PEAS farm – all Sept; Bike Walk Bus Week Sept 19-23
Help UM Recycling, ASUM Transportation, or UM Sustainable Campus Committee with projects
Help community groups (MUD, WEN, etc) with their projects (many will come to class)
see also web pages of UM Office of Civic Engagement and Internship Services

and **EVST's online calendar (www.umt.edu/conservationcalendar)**

B. RESEARCH PAPER AND LETTER TO DECISION MAKER — up to 100pts

UM wants its graduates to be informed, active participants in our democracy. Students can earn up to 100 pts by writing a research paper AND a related letter to a key decision maker on a timely environmental issue. Your 1-2 page letter to a key decision maker will be based on your research paper (which should be about 5 pages, single spaced; double space between paragraphs; 10 pt font) . Give your TA a proposal (topic, why it is timely, who is target of letter). Your TA will provide you with feedback on your paper & letter, and you will mail the letter & paper to your target audience. If you develop a portfolio, include the proposal, paper, letter and any response you receive. Possible targets for your letter(s):

elected representatives (national, state, local)– comment on pending legislation, ordinance, plan, voting record
executive agency decision maker (national, state, local)—comment on upcoming decision, such as:
(EIS, management plan, permit, etc)
editor of a newspaper, magazine – note that letters to the editor have word limits

You will be graded on the quality and depth of the research in the paper, not on the opinion or values expressed. You must present verifiable scientific info on a timely environmental issue, but consider your target audience and their knowledge level & attention span. Your research paper should back up the positions in your letter (ie, cite scientific sources & discuss logic—see TA in help session if you are unsure what constitutes a scientific source and logic). You may choose to provide info only, but we urge you to draw conclusions & take a stand; support your arguments with verifiable data & accepted scientific concepts. For topic ideas, see newspapers, newsletters/websites of groups working on environmental issues. Get help with your writing at:
http://www.umt.edu/writingcenter/
Group research papers are allowed (still require 5 pages per person); plan these carefully with your TA.

CITE YOUR SOURCES!!!!!! Very important. Both to show that you really did some research and to avoid plagiarism – that is, taking credit for the ideas or work of others. Plagiarism is grounds for failing the course and for dismissal from the university. Your research paper MUST include a **list of references** that cites all your sources in scientific citation style (not in footnote style). Scientific citation style is described in this course pack, and your TA can explain it further. Remember to cite sources as you use them in the paper as well as collect them all together in a list at the end of the paper (alphabetized by lead author's last name). See instructions for planning your paper (p7), organizing papers (p8) & citing sources (pp 9-10).

A large number of field trips will be offered early in the semester (subject to fire closures). Space in University vehicles is limited and will be allocated to those who sign up first. If space is full, a waiting list will be made. If you decide you cannot attend a field trip, notify instructor at least 48 hours in advance so others can be notified of available space. IF YOU DO NOT NOTIFY INSTRUCTOR, YOU WILL LOSE POINTS.

You can earn up to 10 points per hour of field trip time up to 10 hours & 100 pts. You must turn in a report to earn the points, and points received depend on the quality of the report. Reports should be at least ½ page of single-spaced (10 point font) writing per hour of trip. Reports should summarize the important technical info presented on the trip and relate these to concepts discussed in class. Reports should not simply say that you 'learned a lot and thought the trip was great'. Take careful notes on a field trip to help you write a good report. If fires or bad weather result in cancellation of most of our field trips, attendance at certain conferences may be substituted if pre-approved (proof of attendance required). **Reports are due to your TA one week after the trip or conference**. Students have failed for copying reports of others. Write your own.

D. PARTICIPATION/ATTENDANCE AT LECTURE AND HELP SESSIONS (up to 90 & 50 pts)

Students who attend lecture regularly get much more out of the course (or at least earn better grades). To encourage attendance, I will periodically request that a short essay question be answered in class. Those who regularly attend & turn in thoughtful essays will receive up to 90 additional points on their final grade.

Help sessions are intended to provide students with a place to interact in smaller groups with a discussion leader (the TA). Help sessions are a good place to discuss concepts or assignments that confuse you or topics that you feel have not received enough attention in class. Help sessions will also serve as exam review sessions and places to turn in assignments and receive graded work. **Assignments will not be accepted or returned in lecture class—this is too disruptive**. Help sessions should be used as open office hours with TAs. Students who actively participate in help sessions have earned higher grades in the past. To encourage active participation in help sessions, those who regularly participate actively in help sessions will receive up to 50 additional points.

E. PRESENTATIONS ON PROJECTS – up to 25 pts

Students may give a presentation on their service and/or research projects near the end of the semester. Most will probably choose to give oral presentations, but you may develop a poster to display & you are encouraged to find a high visibility place to display it (such as a library or the mall). Or you may develop a web page on your project. Excellent oral presentations may be invited to present to the entire class (but you may decline if you wish).

F. PORTFOLIO –up to 25 points

You can earn up to 25 points by collecting together the work you've done in this class and evaluating it in a portfolio in order to demonstrate you've developed proficiency in Science Literacy. Read UM's historic definition of 'Natural Science Literacy' in this FacPac (p6). This states UM's historic and current goals for science literacy among its graduates. The first section states a number of things that scientifically literate citizens can do. Write an **essay** (1) explaining how you increased your skills in each of these areas in this course; use examples from the work you did in the course (essay tests, letters, research papers, field trips, service projects, etc).

UM's science literacy document then lists a number of desired outcomes for students. Write a short essay on each of these demonstrating your understanding of these concepts. **Essays** should be entitled:

2) The most critical concepts and processes of science I learned in Environmental Science
3) What are basic and applied environmental science, and how do they shape one another?
4) Science and technology—how have they harmed our environment? How can they help restore & protect it?

Your portfolio should be a 3 ring binder with dividers that includes **the above 4 essays, all your exams revised, assignments, & any evaluations** of these you are told to perform, including the one on community service.
For each **exam**, rewrite/improve your essays to demonstrate your knowledge of these subjects. Include your field trip reports.
Note—to receive credit for your portfolio, you must pick it up at the end of the semester.

The course pack (available at the bookstore) clearly explains: Lecture schedule, grading policy, texts, required reading & other assignments, exam schedules, office hours and how to contact the class instructors.

What is Service Learning? Service Learning is a method of teaching and learning in which students, faculty and community partners work together to enhance student learning by applying academic knowledge in a community-based setting. Student work addresses the needs of the community, as identified through collaboration with community or tribal partners, while meeting instructional objectives through faculty-structured service work and critical reflection meant to prepare students to be civically responsible members of the community. At its best, service learning enhances and deepens students' understanding of an academic discipline by facilitating the integration of theory and practice, while providing them with experience that develops life skills and engages them in critical reflection about individual, institutional, and social ethics.

Basic Class Etiquette
Arrive before class starts and stay until class ends. 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.
In help sessions, work with the TA to develop a respectful method of ensuring that all can participate in discussion. Respect all viewpoints, including your own.

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

Attendance policy: Attendance is often taken in lecture (usually when guest speakers appear) and always taken in help sessions. Regular attendance at lectures and active participation in help sessions earns points. Attendance is taken by having students answer a short question about the lecture. To receive full credit, answers should reflect that the student was present in mind as well as body.

Policy on making up exams: To make up an exam, student must contact Professor Watson before or soon after the exam and explain reason for missing the exam (medical or personal emergency). If a student misses either of the 2 mid term exams, the makeup exam is a comprehensive exam offered during the final exam period for this course. Taking this exam is by appointment only.

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: As course pack says, 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 fall 2016 deadlines of adding, dropping or changing grade options in classes?
According to UM's 'Important Dates' at http://www.umt.edu/registrar/PDF/Autumn2016OfficialDatesandDeadlines.pdf
Sept 7--last day to add online via Cyberbear without consent of instructor; after this, need override form.
Sept 19-- last day to add or drop with override or change to audit or receive partial refunds.
Oct 31-- last day to drop (or change grading system) with a simple drop/add form ($10 charges each drop, & no refund on 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 12 is the VERY last day to drop (last day of classes). After that, take your petition to God. (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) and answer the 4 essay questions described in the portfolio. 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 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. A machine readable version of the course pack is available for those who need this.

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://www.umt.edu/vpsa/documents/Student%20Conduct%20Code%20FULL%20-%20UPDATED%20AUG%2028%202012.pdf

University of Montana's definition of Natural Science Literacy (from 1990 to 2016) p. 6

1990--The natural sciences are fundamental to modern society & the modern university. The intent of these areas of study within the Liberal Arts proficiencies is to provide graduates of UM with the fundamental knowledge & understanding of scientific concepts & processes, skills & attributes needed for active participation in civic & cultural affairs. Scientifically literate citizens are able to:

- make observations, ask questions & find answers related to their experiences in their environment;
- read critically articles about science in the popular press & engage in a dialog about the validity of the presented conclusions;
- identify scientific issues underlying national & local decision making & express positions that are scientifically & technologically informed;
- evaluate quality of the scientific information on the basis of its source & methods used to generate it, &
- pose & evaluate arguments based on scientific evidence & reach conclusions from those arguments.

Scientifically literate students should be able to

1) **Understand the unifying concepts & processes of science**

Concepts & procedures unify the science disciplines & provide students with powerful ideas & tools to understand the natural world. Using the content of a scientific discipline, students will develop an understanding of systems, order & organization; evidence, explanation & models; change, constancy & measurement, evolution & equilibrium; form & function.

2) **Differentiate between science & technology**

Science & technology have different goals. Science seeks to understand the natural world while technology seeks to modify the world to meet human needs & desires. However, the need to answer questions about the natural world can drive technology, and technological needs can drive scientific research.

3) **Describe cultural role of science & technology, including their social, historical & ethical contexts.**

Science is an ongoing, changing human endeavor and has played a profound role in the development of various cultures & the use of technology continues to raise ethical issues.

4) **Engage in scientific inquiry.** Inquiry is a multifaceted activity involving –

making observations, identifying assumptions, posing questions, retrieving existing information; planning investigations, using tools to gather/analyze/interpret data; thinking critically & logically about evidence & explanations; proposing answers, explanations, predictions, constructing & analyzing alternative explanations; communicating study results & scientific arguments.

Student Learning Outcomes for Natural Sciences in UM's 2016 Catalog

Upon completion of UM's general education natural science requirements, a student will be able to:

1. Understand the general principles associated with the discipline(s) studied.
2. Understand methodology & activities scientists use to gather, validate & interpret data related to natural process.
3. Detect patterns, draw conclusions, develop conjectures and hypotheses, and test them by appropriate means and experiments.
4. Understand how scientific laws and theories are verified by quantitative measurement, scientific observation, and logical/critical reasoning.
5. Understand the means by which analytic uncertainty is quantified and expressed in the natural sciences.