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FOR 485.01: Watershed Management

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**FOR485 WATERSHED MANAGEMENT
FALL 2005**

Instructor: Dr. Scott Woods (tel. 243-5257. e-mail: swoods@forestry.umt.edu).

Class Meeting times: Tuesday and Thursday 8.10am – 9.30am, Journalism 113.

Office hours: Forestry 201B, Tuesday and Thursday, 9.30am – 12pm or by appointment.

Course description: Watershed management is the process of organizing and guiding land use activities on a watershed so as to provide desired goods and services without adversely affecting soil and water resources. Sound watershed management requires the involvement of foresters, ranchers and farmers as well as resource managers and scientists. Embedded in the concept of watershed management is the recognition of the interrelationships among land use, soil and water, and the linkages between upland and downstream areas. Knowledge of the basic hydrologic and geomorphic processes in a watershed is therefore key to effective watershed management. Existing and potential problems concerning the impacts of land-use activities on soil and water resources can be addressed by employing a range of physical, regulatory and economic tools and techniques. This course will provide training in the fundamental principles and practices of watershed management as it is currently practiced in the western United States. Particular emphasis will be given to watershed management issues in the central and northern Rocky Mountain regions, particularly the management of forest operations and forest fire to limit any adverse effects on soil and water resources. The class will also focus wherever possible on methods and techniques for watershed restoration, as this is becoming an increasingly important aspect of watershed management in the United States and elsewhere.

Grading: Your grade will be based on two essay type mid-term exams and an assignment. Both of the mid terms will be take-home exams and you will have at least one week to prepare your answer. The assignment is a group project in which you will conduct a preliminary watershed analysis in the Missoula area. Your group will prepare a report describing the results of the watershed analysis, and each group will make a 30-minute presentation to the class near the end of the semester. Much of your final grade for the class will be based on the quality of the report and the final presentation. Grading in the class is traditional (A through F) with +/- letter grades. Grades are calculated as a weighted average of your letter grades as follows:

Exam 1	25%
Exam 2	25%
Assignment	40%
Participation*	10%

*This is a small class (15 students) so there will be plenty of opportunity to ask questions, raise issues and contribute to discussion. It is very important that you participate in class meetings and that you keep up with the reading, as we will discuss the reading in class.

**FOR485 CLASS SYLLABUS
FALL 2005**

PART I. BASIC PRINCIPLES

Subject	Reading / Reference	Notes
Course preview (1)	<i>Baron et al. 2002</i> <i>Hardin 1968</i> Baker 2003 Service 2004	
Review of runoff and erosion processes in watersheds (2)	Trimble and Crosson 2000 Kirchner et al. 2001 <i>Miller et al. 2003</i>	

PART II. ISSUES IN WATERSHED MANAGEMENT

Subject	Reading / Reference	Notes
Forest management (4)		
<i>Effects on water yield</i>	Troendle and King 1985 Troendle and King 1987 Troendle 1983 <i>MacDonald and Stednick 2004</i>	
<i>Effect on peak flows</i>	Jones and Grant 1996 Thomas and Megahan 1998 Wemple and Jones 2003	
<i>Erosion from forest roads</i>	Luce and Black 1999 Wemple et al. 2001 Megahan et al. 2001	
<i>Road abandonment and removal</i>	Switalski et al. 2004 Madej 2001	
Wildfire and prescribed fire (3)		
<i>Effect of fire on runoff and erosion</i>	Wondzell and King 2003 Martin and Moody 2001 Moody and Martin 2001	
<i>Hydrophobic soils</i>	<i>DeBano 2000</i> Huffman et al. 2001 Shakesby et al. 2000	
<i>Post-fire erosion control</i>	<i>Robichaud et al. 2001</i> Wagenbrenner et al. 2005	
<i>Fuels Reduction</i>	Elliot and Robichaud 2001	
<i>Salvage logging</i>	Beschta et al. 1995 McIver and Starr 2001 Karr et al 2004	
Grazing and agriculture (1)		
<i>Grazing impacts on streams</i>	Myers and Swanson 1992 Clary and Kinney 2002 Sidle and Sharma 1996	

<i>Water quality and agriculture</i>	Peterjohn and Correll 1984	
Urbanization (0.5)		
<i>Effect on water supply</i>	American Rivers 2002	
Mining (0.5)		
Recreation (0.5)	Marion and Cole 1996 Zabinski et al. 2002	
Flow modification (0.5)	Nilsson and Berrggren 2000 Rood et al., 1995 Shafroth et al. 2000	
Cumulative watershed effects (1)	Macdonald 2000 Reid 1998 <i>Reid 1993</i>	

PART III. WATERSHED MANAGEMENT IN PRACTICE

Subject	Reading / Reference	Notes
Legal rationale for watershed management (NEPA, CWA, TMDL, ESA) (1)		Case study: Mitchell Slough
Developing a water quality monitoring plan; data sources (1)	Ziemer 1998. <i>MacDonald et al 1991</i>	Field Trip (Plum Creek Timber Company)
Stream channel assessment (Rosgen, Montgomery and Buffington, Pfankuch, Win XSPRO etc) (1)	Montgomery and Buffington 1997 Rosgen 1984 <i>Bunte and Abt 2001</i> <i>USDA 1998 (SVAP Protocol)</i> <i>Harrelson et al., 1994</i>	
Runoff modeling (SWAT, WRENSS, DELTA-Q) (1)	Fontaine et al. 2002 Jayakrishnan et al. 2005	Guest lecture: Kyle Flynn, MT-DEQ
Erosion modeling (WATSED, WEPP, RUSLE) (1)	Dunne 1998 Renard et al. 1991 Ketcheson et al. 1999 Elliot and Foltz 2001 <i>Dube et al. 2004</i> Elliot et al. 1999	Guest lecture: Kevin Hyde USDA-Forest Service
Watershed analysis (1)	<i>USDA 1998</i> Montgomery et al. 1995 Reid 1994 Collins and Pess 1997 <i>Regional Ecosystem Office 1995</i> <i>Regional Ecosystem Office 1996</i>	Watershed Analysis Assignment
Watershed restoration (1)		Field trip? (Blackfoot Watershed)

Notes

1. Items in the reading and reference lists that are in normal text should be read prior to class. Items in *italics* are for reference and/or use when answering questions on the midterm exams. All of the assigned reading and the reference material is available on electronic reserve at the library website. The password to access e-res is **water**.
2. The numbers in parentheses after each subject heading indicate the approximate number of class meetings dedicated to that topic.
3. Approximately eight class meetings will be used to discuss progress on the watershed analysis assignment and for the class presentations that form part of that assignment. For these classes you need to come prepared to discuss progress on the assignment.