Fall 9-1-2005

FOR 485.01: Watershed Management

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University of Montana, Missoula

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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

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

### PART II. ISSUES IN WATERSHED MANAGEMENT

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

Peterjohn and Correll 1984

Urbanization (0.5)

Effect on water supply

American Rivers 2002

Mining (0.5)

Recreation (0.5)

Marion and Cole 1996
Zabinski et al. 2002

Flow modification (0.5)

Nilsson and Berggren 2000
Rood et al., 1995
Shafroth et al. 2000

Cumulative watershed effects (1)

Macdonald 2000
Reid 1998
Reid 1993

PART III. WATERSHED MANAGEMENT IN PRACTICE

<table>
<thead>
<tr>
<th>Subject</th>
<th>Reading / Reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal rationale for watershed management (NEPA, CWA, TMDL, ESA) (1)</td>
<td>Zieler 1998. MacDonald et al. 1991</td>
<td>Case study: Mitchell Slough</td>
</tr>
<tr>
<td>Developing a water quality monitoring plan; data sources (1)</td>
<td>Montgomery and Buffington 1997 Rosgen 1984 Bunte and Abt 2001 USDA 1998 (SVAP Protocol) Harrelson et al., 1994</td>
<td>Field Trip (Plum Creek Timber Company)</td>
</tr>
<tr>
<td>Runoff modeling (SWAT, WRENSS, DELTA-Q) (1)</td>
<td>Fontaine et al. 2002 Jayakrishnan et al. 2005</td>
<td>Guest lecture: Kyle Flynn, MT-DEQ</td>
</tr>
<tr>
<td>Watershed restoration (1)</td>
<td></td>
<td>Field trip? (Blackfoot Watershed)</td>
</tr>
</tbody>
</table>

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.