WR 3700
Inventory and Assessment in Natural Resources and Environmental Management

Course Syllabus – Fall 2006

Instructor: Ray Dueser BNR 157 797-8339 dueser@cc.usu.edu

Office hours: **T** 11:30 – 12:30 p.m., **F** 1:30 – 2:30 p.m., or by appointment

Assistant: Ryan Shaw BNR 221 rshaw@cc.usu.edu

TA office hours: TBA

Prerequisites: BIOL/NR 2220, MATH 1100, STAT 2000/3000, CIL

Lecture: **MF** 12:30 – 1:20 p.m., BNR 314

Laboratory: **W** 12:30 – 4:45 p.m., NR 217/QL 306

Course description: WR 3700 introduces students to the art and science of inventory, assessment and monitoring (I,M&A) in natural resources and environmental management. I,M&A is the means by which we assess whether a management or restoration program is producing the desired result(s). I,M&A is central to adaptive resource management. WR 3700 thus focuses on the scientific and strategic considerations that guide effective I,M&A programs, the design and implementation of such programs, and the interpretation and communication of I,M&A results to a broad audience. The central theme is how studies flow from generating hypotheses and setting management/restoration objectives to assessing and reporting management outcomes. Topics include sampling design and methods, data collection and analysis, statistical reasoning, and report writing and presentation. Lab exercises are designed to provide practical experience with these topics. WR 3700 is a prerequisite for WR 3710 (*Monitoring and Assessment in Natural Resource and Environmental Management*).

Learning objectives: WR 3700 emphasizes the *concepts* which guide I,M&A programs rather than I,M&A *techniques* themselves. We will explore a host of statistical models and analytical procedures which enable us apply these basic concepts to real-world data. WR 3700 students will develop a(n):

(1) Understanding and appreciation of adaptive resource management.

(2) Understanding of the principles which underlie the design and

implementation of I,M&A to specific management or restoration objectives.

(3) Ability to write problem statements with specific, quantifiable objectives.

(4) Ability to identify meaningful I,M&A variables, and develop a sampling program, appropriate to a particular objective.

(5) Ability to assess whether I,M&A data and data collection methods are appropriate to meet project objectives.

(6) Understanding of hypothesis formulation, sampling design and hypothesis testing.

(7) Ability to perform simple graphical and statistical analyses to test for (A) the effects of environmental disturbance, (B) differences between experimental treatments, (C) the detection of temporal trends in the environment and (D) relationships between variables.

(8) Ability to write an effective assessment of a natural resource problem, including objectives, data collection, data analysis and interpretation, and synthesis and communication.

Class expectations: WR 3700 is a course for pre-professional natural resource and environmental managers. The expectations are high.

(1) *Attend every class and lab session.* Lab absences are considered to be unexcused UNLESS they are approved by the instructor in advance. Failure to get approval will result in a zero for the missed work.

(2) *Be on time and prepared for each lab*, including assigned readings.

(3) *Do your part a*nytime we work in groups of 2-3 to collect and enter data.

(4) *Discuss the lab exercises freely with your fellow students,* but once you've discussed the material, do your own calculations and written work unless the instructor specifically indicates that a group report is acceptable

(5) *Do not bring children or pets to class.*

(6) *Come to class prepared to participate,* and keep up-to-date in your work.

(7) *Absences due to illness or family emergencies* will be managed on a case-by-case basis.

Required textbooks: We will make use of these books in both lecture and lab.

Fowler, J., L. Cohen and P. Jarvis. 1998. Practical statistics for field biology. 2nd ed. John Wiley & Sons, New York, NY. (ISBN 0-471-98296-2; New $40.00, Used $30.00). (FC&J)

Berk, K.N. and P. Carey. 2004. Data analysis with Microsoft Excel. Brooks/Cole – Thomson Learning, Belmont, CA (ISBN 0-534-40714-5; New $55.00, Used $41.25). (B&C)

Recommended textbook: This book is recommended as a general reference on I, M&A for natural resource managers. Copies of selected chapters will be posted on the course web-site.

Elzinga, C.L., D.W. Salzer, J.W. Willoughby and J.P. Gibbs. 2001. Monitoring Plant and Animal Populations. Blackwell Science, Malden, MA. 230 pp. (ISBN 0-632-04442-X; New $72.95, Used $54.75). (ESW&G)

The USGS Patuxent Wildlife Research Center maintains a useful web-site for the Elzinga et al. text. http://www.esf.edu/efb/gibbs/monitor/popmonroot.html

Electronic Course Reserve web-site:
http://eres.usu.edu/eres/coursepage.aspx?page=info&cid=2992

Go to Libraries on the USU web site (www.usu.edu)
Click on Course Reserves on the left hand side of the page.
Choose Dueser as instructor
Choose FRWS 3700 as course
Enter password due3700

Lecture notes, supplemental readings, and laboratory materials will be available through this site. I will continue to augment this site with related materials as the semester proceeds. You might want to activate the e-mail alert for the web site.

Supplemental readings: In addition to assigned chapters in Fowler et al. (1998) and Berk and Carey (2004), supplemental readings may be assigned from time to time. All supplemental readings will be available through the course web site.

Laboratory: ***By the end of Week 1: use a computer on the first floor of the Quinney Library to request a Quinney Lab computer account.***

Lab sessions will run in-doors in NR 217 and QL 306. All lab sessions will emphasize problem sets and computer work. We will begin each lab session in NR217.

There will be a separate lab exercise each week. Each exercise is designed to (1) introduce an important concept or set of concepts, (2) illustrate an important sampling and/or analytical procedure, and (3) provide experience with data collection, analysis and interpretation. A Problem Statement will be required for each of these exercises (see below). Preparation of Problem Statements generally will be completed *during the lab session*.

Computation: We will use Excel spreadsheets extensively, enhanced with the Analysis ToolPak and the StatPlus™ Add-In. Excel by itself is inadequate as a statistical package. The StatPlus add-in overcomes the major statistical limitations of Excel, and is now widely used in courses involving data analysis. The enhanced Excel package has the advantage of being more or less universally available.

Exams: There will be three scheduled exams. Each will cover material from lectures, labs and assigned readings. The first two exams are tentatively scheduled for lab time on **October 04** and **November 01**. The final exam is scheduled for **December 13**. The exams are cumulative.

Quizzes: Although I prefer not to give "pop" quizzes, I realize that they can serve as an effective stimulus to serious study. I will not give quizzes as long as you are keeping up with the course material. Asking and answering questions during class is a sure sign of being prepared.

Lab reports: I will provide an I,M&A scenario or data set for each of the first several lab sessions. We will make extensive use of canned, real-world data. In a brief report, you will be asked to develop a problem statement for the lab, state the objectives, identify the data needs, and describe the methods. The primary objectives are to hone your critical thinking skills and help you focus on the core issues involved in each exercise. I will provide a handout detailing problem statements during the first lab session, and further details and tips will be provided on the Electronic Course Reserve web site.

Assessment project: During the last third of the semester, we will integrate inventory, monitoring and assessment concepts in a project using canned data. I will provide a scenario in which you will be asked to develop a monitoring and assessment program for a proposed natural resource or environmental management project. I will provide a handout detailing the assessment project later in the semester, and further details and tips will be provided on the Electronic Course Reserve web site.

Communication intensive: FRWS 3700 is offered as a CI course for the convenience of our majors. That means you do a good bit of critiqued writing. For each of three lab reports, you will first submit a *good* draft. This draft will be read and marked for revision. These comments will raise questions, suggest changes, and provide you with a valuable resource for revising your material for the final draft. You will then submit both the original draft and the revised paper for final grading.

Grading: Course grades will be calculated on the basis of:

Three required exams (#1 – 15%; #2 – 20%; #3 – 20%)
Lab reports (30%)
Assessment project (10%)
Class participation (5%)

Lab and lecture are intimately related. *You must pass both the lab and the exams with an average grade of 60 or above in order to pass the course.*

Letter grades will be assigned at the end of the semester as:

A ≥ 90% of total possible points
B 80 to 89%
C 70 to 79%
D 60 to 69%
F <60%.

Active and enthusiastic participation in discussions and lab sessions is important and expected. Regular attendance, class participation, and steady improvement may influence borderline grades.

Academic integrity: Acts of academic dishonesty, *including cheating, falsification of information and plagiarism*, are specifically identified in the *USU Academic Policies and Procedures Manual* as violations of University standards. Any student discovered to have cheated on a quiz or exam or to have plagiarized all or part of a written assignment will receive an F course grade and be subjected to USU disciplinary proceedings. Proper behavior for students also prominently includes refraining from actions that disrupt class, *including making unnecessary noise, habitually arriving late for class, bringing children or pets to lecture, lab or field trips, and failing to turn-off cell phones.* Please review the Code at http://www.usu.edu/policies/ for further explanation.

Accommodation: I shall attempt to accommodate the needs of every interested and qualified student. Please notify the Disability Resource Center (DRC, University Inn 101, 797-2444, discenter@cc.usu.edu) during the first week of the semester if you have a disability that requires some form of accommodation. Disabilities must be documented by the DRC.

Note: There is a field trip scheduled from Thursday, Sept 07 through Saturday, Sept 09 for WR 3600, 3610 and 3850. This trip is highly recommended but not required for WR 3700 students. You will need to notify instructors of any classes that will conflict with this field trip during the first week of classes.

A Few Useful Web Sites for
Inventory, Monitoring and Assessment

Vertebrates:
http://www.pwrc.usgs.gov/monitoring/
http://www.fws.gov/migratorybirds/statsurv/mntrtbl.html
Insects:
http://www.ipm.uiuc.edu/fieldcrops/imn/
National Parks:
http://science.nature.nps.gov/im/monitor/
Environmental Monitoring program of EPA
http://www.epa.gov/emap/
Forest Inventory and Analysis program:
http://www.fia.fs.fed.us/
Range:
http://rangelandswest.org/az/monitoring.html
http://www.blm.gov
Fisheries:
http://www.napariverfishmonitoring.org/
Air and Water Quality:
http://www.best.usgs.gov/
http://www.epa.gov/Region8/water/monitoring (Specific for Intermountain West)
http://www.arb.ca.gov/aaqm/aaqm.htm
Text Book resources:
http://www.esf.edu/efb/gibbs/monitor/popmonroot.html