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REQUEST FOR CORE NATURAL SCIENCE DESIGNATOR

SUBMITTED BY:
Department: Forest Sciences
Prepared by: Jingjing Liang
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College/School: SNRAS
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Faculty Contact: Jingjing Liang

See http://www.uaf.edu/uafgov/faculty/cd for a complete description of the rules governing curriculum & course changes.

1. COURSE IDENTIFICATION:
Dept: NRM  Course #: 410  No. of Credits: 3 or 4

COURSE TITLE: Numerical Methods for Natural Resources Management

CONTACT HOURS PER WEEK: LECTURE 3 hours/week LAB 3 hours/week OTHER 
specify type

Note: To meet the natural science requirement, courses must have 4 credit hours and include a laboratory. See http://www.uaf.edu/uafgov/faculty/cd/credits.html for more information on number of credits.

Existing Course ☐ New Course Pending Approval* X

*Must be approved by appropriate Curriculum Council.

2. CURRENT CATALOG DESCRIPTION AS IT APPEARS IN THE CATALOG: including dept., number, title and credits

Numerical Methods for Natural Resources Management (NRM410) lectures (3 credits) teach the most up-to-date numerical methods for natural resources managers and researchers. Optional labs (1 credit) cover important computer skills to help students excel in modern natural resources management.

3. ALONG WITH THIS FORM PLEASE SUBMIT THE FOLLOWING:

A A course syllabus (see page )
B Titles of all laboratory exercises.
C Title of a representative textbook.
D Detailed outline of 3 laboratory exercises. Please attach an explanation of how these laboratory exercises have been designed to familiarize students with methods for the acquisition and expansion of scientific knowledge, including: a) data collection and analysis, b) hypothesis building, and c) experimentation.
E A list of the major scientific concepts that the course will convey. The attached syllabus should make it clear that the course is organized around these major concepts rather than their application.
F An explanation of how the relationship between science and society will be explored in the course. Identify where the course public science policy and its development are discussed.
G A plan for its effectiveness evaluation.
JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course designator applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the course is not compromised as a result.

APPROVALS:

Signature, Chair, Program Department of: Forestry
Date 8-15-08

Signature, Chair, College/School Curriculum Council for: SNRAS
Date 8-26-08

Signature, Dean, College/School: SNRAS

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

Signature, Chair, Senate Core Review Committee
NRM 410 Contemporary Natural Resources Management Methods
Course Syllabus

Course Information:
NRM 410 Contemporary Natural Resources Management Methods, 3 or 4 credits
Prerequisites: STAT 200 or instructor’s permission
Location: to be determined
Time: 10:00am to 12:00pm, Tuesday and Thursday

Instructor:
Dr. Jingjing Liang, 317 O’Neill, 474-1831, j.liang@uaf.edu

Supplementary Readings:

Course Description:
Contemporary Natural Resources Management Methods teaches the most up-to-date numerical methods for natural resources managers and researchers. Optional labs (1 credit) cover important computer skills to help students excel in modern natural resources management.

Course Objective:
The course is directed towards senior undergraduate or graduate students who are interested in natural resources studies, including students in forest sciences, soil sciences, plant and animal sciences, and geography. This course covers three essential methods for modern natural resources studies: statistics, simulation, and optimization. To make it more practical and less difficult for students, NRM 410 focuses on the application of those numerical methods instead of theories.

Outcomes:
1. Formulate research questions, refine topics, develop hypothesis
2. Evaluate sources critically, discern the strength of evidence and arguments, determine credibility, and identify potential bias and overall quality.
3. Use statistics, simulation, and optimization as tools to address various natural resources management problems and challenges.

Grading:
Students’ level of performance will be evaluated with letter grades A, B, C, D, and F with plus and minus.
Homework (20%)
Three In-lecture quizzes (5% each, 15% in total)
Midterm exam (30%)
Final exam (35%)
Tentative Course Calendar:

Week 1: Introduction to application of statistics in natural resources management. Distributions, confidence intervals.

Week 2: Fitting a straight line by least squares.
Lab: Introduction of computer regression analysis.

Week 3: Testing linear hypothesis.
Lab: F-test, T-test, and Chi square-test with Minitab.

Week 4: General modeling in natural resources management.
Lab: Constructing a deterministic forest growth model.

Week 5: Introduction to stochastic process.
Lab: Constructing a stochastic biological model.

Week 6: Computer simulation.
Lab: Introduction of Microsoft Excel spreadsheet program.

Week 7: Computer simulation II.
Lab: Applying WestProPlus for forest management.
Midterm Exam.

Week 8: Introduction to time series.
Lab: Graphic analysis of time series data.

Week 9: Time series analysis.
Lab: Constructing a lumber price model to forecast future lumber prices.

Week 10: Introduction to system optimization with linear programming.
Lab: Linear programming and Solver software.

Week 11: Applications of linear programming to even-aged forests.
Lab: Wildland restoration planning.

Week 12: Insuring sustainability with linear programming.
Lab: Area and volume control for a boreal forest.

Week 13: Multiple-objective resource management with goal programming.
Lab: Compromising timber production with fire and cost.

Week 14: Long-term investments in natural resources.
Lab: Economics of forest management in Alaska.
Final Exam.
Notes and Advice:
1. Attendance is not mandatory, but highly recommended. Quiz might be given during a lecture and its outcome will influence the final score.

2. To receive full-credit on an exam or homework problem you must justify your answer. A simple conclusion or numerical answer may receive no credit.

3. Notes or the text are not allowed for exams. Exam computations are to be done using definitions (some "calculation formulas" exist - these will not be used on exams).

4. Take lecture notes and complete the details.

5. Write down what you’ve learned and do problems. For some people working with one or two others is helpful. Reading lecture or text material over and over is not of much use.

6. Study regularly. Statistics is best learned in smaller doses (it is also more palatable this way). Not sleeping for nights before an exam is an inefficient way to learn Statistics.

7. Exam problems will resemble homework problems. To gain experience on working on problems with a real time constraint practice on 5 or 6 homework problems you haven’t done for awhile, using the same time limit as the real exam.

8. The instructor will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.