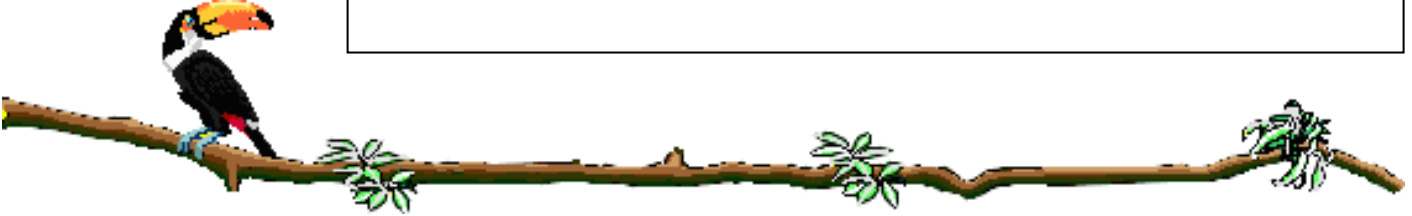


MAT 116 Modeling Sustainability Issues in the Rain Forest Syllabus Short Term 2000



Director(s): Jan Pearce with Sean Clark and Carolyn Orr

Course Description: Sustainability of our world's rain forest is an issue of interest to everyone interested in global security. It is of particular interest for Berea students with environmental concerns. Any scientific evaluation of sustainability involves mathematical modeling, so this course focuses on mathematical trend analysis of crucial issues related to the sustainability of the rain forest. This will include human populations, acreage development, wildlife populations, and others. Costa Rica has become known around the world for its environmental successes. In this course students will live and work in Costa Rica at Escuela de Agricultura de la Region Topical Humeda a.k.a. EARTH College (which translates as The College of the Humid Tropics), a leading information center in the area of sustainable development and natural resources in the tropics. Students will collect mathematical data first-hand through field excursions and discussions with local people. This data will then be modeled using the computer. Students will use these models to make predictions and to develop sustainability policy statements based upon these predictions. Results will then be compared to actual governmental data and policies of the region. **This course satisfies the Quantitative Reasoning requirement.**

Texts: (Included in the course fee)

- Michael Gillman and Rosemary Hails, *An Introduction to Ecological Modelling: Putting Theory Into Practice*, Blackwell Science Ltd. 1997.
- J. Kritcher, *A Neotropical Companion*, Princeton University Press, 1999.
- Raul Solorzano et al, *Accounts Overdue: Natural Resource Depreciation in Costa Rica*, World Resources Institute, 1991.

Attendance Policy: Students must remain with the group 24 hours per day everyday.

Course Outcomes and Goals: In a time when environmental concerns and resource management are often at odds, this course introduces the students to resources first-hand through experiences such as hiking among the trees in the rainforest. Through such experiences, students will gain a better understanding of why certain areas need to be preserved for future generations. Students should be able:

- 1) To discuss and apply the modeling cycle.

- 2) To apply linear and exponential models effectively and to use these models predictively.
- 3) To explain mathematical ideas both to those with similar mathematical backgrounds as well as to the general public.
- 4) To discuss sustainability issues and the importance of modeling in the consideration of these issues.
- 5) To discuss the role of mathematical modeling in government decision-making processes.
- 6) To understand the importance of the rain forest in the context of the global ecosystem.

Program at EARTH College: We will spend January 13-24 at EARTH College in Costa Rica which is described in the literature as "a private non-profit, international college contributing to sustainable development of the humid tropics through education in the agricultural sciences and natural resources." Each student will be placed in one of three research teams studying Accounts of Forests, Soils, Fisheries, or Mangroves and Coastal Resources. Students will be responsible for conducting background research, generating specific research objectives, gathering data, identifying appropriate modelling techniques, applying these techniques to the data, using the models predictively and testing the reasonability of these results by collecting current mathematical data through any method including first-hand through field excursions or discussions with local people, presenting their findings in the form of oral progress reports, and producing a polished final written report.

Tentative Timeline:

Monday, Jan 3	General Overview of Course
Tuesday, Jan 4	Begin Mathematical Modelling Discussions
Wednesday, Jan 5	Continue Modeling Discussions
Thursday, Jan 6	Leave from Ag. Building at 4:00 AM for Costa Rica via Lexington
Friday, Jan 7	Visit Parque Nacional Volcan Poas then to Ecolodge San Luis
Saturday, Jan 8	Santa Elena de Monteverde
Sunday, Jan 9	Cloud Forest Tour, etc.
Monday, Jan 10	Travel by Bus and Ferry
Tuesday, Jan 11	Reserva Natural Absolito Cabo Blanco
Wednesday, Jan 12	Hike into Oldest Protected Area in Costa Rica which is in the Reserve
Thursday, Jan 13	Arrive at EARTH College
Friday, Jan 14	Conduct Background Research of Assigned Topic
Saturday, Jan 15	Identify Appropriate Modelling Techniques for Data
Sunday, Jan 16	Day of Rest
Monday, Jan 17	Begin Analyzing Data
Tuesday, Jan 18	Create Initial Models
Wednesday, Jan 19	Conduct Research for Current Data
Thursday, Jan 20	Check Mathematical Models with Current Data
Friday, Jan 21	Make Needed Adjustments to Models and Prepare Draft of Report
Saturday, Jan 22	Prepare for Final Presentations
Sunday, Jan 23	Day of Rest
Monday, Jan 24	Give Final Presentations and Prepare for Departure from EARTH College
Tuesday, Jan 25	Travel Back to San Jose
Wednesday, Jan 26	Return to Berea at Midnight
Thursday, Jan 27	Classtime and Work on Final Reports in Berea

Friday, Jan 28

Final Written Reports and Research Journal Due

Grading Percentages: *

Project Report (Group)	20%
Presentations (Both individual and group)	20%
Research Journal and Tests	20%
Personal Journal	10%
Professional Behavior and Participation	15%
Group Discussions	15%

Possible Grades:

A - All Aspects Outstanding
B - Overall Good Work
C - Acceptable Competence
D - Minimally Adequate
F - Unworthy of Credit

* Please see page 49 of the Berea College Catalog 1999-2001 for a more detailed explanation of the College-wide meanings of assigned grades.