Environmental Systems Graduate Program
UNIVERSITY OF CALIFORNIA, MERCED

ES 228 – Ecological Modeling (3 Credits)

Instructor: Teamrat A. Ghezzehei

Schedule Tu/Th 10:00-11:15

Office hours: Tu/Th 8:30-9:45
SE 246

Prerequisites: Graduate standing or approval of instructor.

Course Description: An advanced study of modeling population dynamics and the flow of energy and matter in ecosystems. The course will introduce you to the basic principles and processes of model development, model execution, as well as analysis and interoperation of model results.

Software: Excel (with SOLVER add-on), R (preferably Rstudio), and Mathematica (available for free for UCM grad students).

Format and Procedures: Class time will include lectures, discussion, and exercises. Assignments will include assigned readings and problem sets.

GRADING PROCEDURES
Both letter grading and pass-fail options will be available. For grading on a pass-fail basis, 70% considered a passing grade. The grade in this course will be calculated as follows:

Problem sets and reading summaries	40 %
Proposal for modeling paper	15 %
First submission of modeling paper	20 %
Revision & response to modeling paper	10 %
Review of peers' work	5%
Presentation of term paper	10 %
Total	100 %

MODELING PAPER

Proposal due:	March 4, 2014
First draft of final paper due:	April 24, 2014
Final paper due:	May 13, 2014
Presentation (15 minute):	May 13, 2014

Objective: The modeling-based term paper is intended to provide you opportunity to apply the lessons from this course in your graduate research topic. Select a data analysis and/or modeling work that can be directly included in your thesis and/or be published as a standalone peer-reviewed paper.

Style and formatting: Use formatting guideline of a major peer-reviewed journal relevant for your topic of choice. Limit the paper to less than 5000 words. The first draft to be submitted on April 24 should be in complete final form.

Term-paper evaluation: The first draft of your term paper will be evaluated by all your peers in the class. You will have an opportunity to respond to all the review comments and revise your manuscript.

Academic Integrity: The student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work. You are encouraged to discuss information and concepts covered in manuscripts and discussion with other students or researchers. You can also give "consulting" help to or receive "consulting" help from such students/researchers. However, this permissible cooperation should never involve one student taking credit for work done by someone else. Penalty for violation of this policy can include failure of the course and University disciplinary action.

Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations

TENTATIVE SCHEDULE

Week	Date	Topic
1	21-Jan-14	Introduction, systems, models, warm-up exercises
	23-Jan-14	The modeling process: abstraction, mathematical formulation, dimensional analysis and scaling
2	28-Jan-14	Functions, slopes, gradients, rates
	30-Jan-14	Differential Equations I
3	4-Feb-14	Differential Equations II
	6-Feb-14	Building blocks of Numerical Model
4	11-Feb-14	Parameter Estimation & Validation
	13-Feb-14	Uncertainty & Error Propagation
5	18-Feb-14	Introduction to R
	20-Feb-14	Introduction to R
6	25-Feb-14	Spring Break
	27-Feb-14	Spring Break
7	4-Mar-14	Energy Balance I
	6-Mar-14	Energy Balance II
8	11-Mar-14	Water Balance I
	13-Mar-14	Water Balance II
9	18-Mar-14	Soil-Plant-Atmosphere Continuum
	20-Mar-14	Soil-Plant-Atmosphere Continuum
10	25-Mar-14	Litter Production & Decomposition
	27-Mar-14	Soil & Plant Respiration
11	1-Apr-14	Transport phenomena
	3-Apr-14	Transport phenomena
12	8-Apr-14	Coupled processes
	10-Apr-14	Coupled processes
13	15-Apr-14	Stability & Feedbacks
	17-Apr-14	Stability & Feedbacks
14	22-Apr-14	Spatial Patterns
	24-Apr-14	Spatial Patterns
15	29-Apr-14	Probability I
	1-May-14	Probability II
16	6-May-14	Statistical Models
	8-May-14	Statistical Models
	13-May-14	Presentations