

ESM 232 Environmental Modeling Spring 2017

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Computer-based modeling and simulation are widely used tools in both practical environmental problem solving and in environmental research. Models give us a way to look at the world through a mixture of data and theory. A good model can help us to understand how the world works and how decisions that we make might change the world in ways that are important to us. There are many different types of models, from simple to complex, and models are often tailored to answer a specific questions. This course will give you skills that help you to choose which model, or modeling technique, is right for you - given the task at hand. The course will cover both designing a new model and evaluating existing models. We will emphasize best practices that help to design models that are useful, reliable and get the job done. This is a skills based course and we will use R (a data analysis and programming environment) as our basic platform. Topics to be covered are listed below (this is a tentative list - we may change it as the course progresses to adapt to class interest/abilities).

There are 10 assignments and a project. Some assignments will be individual, others will be done in pairs. Assignments will vary in length, some will be short coding assignments with a 1-paragraph write up, others will be longer requiring some analysis and 1-2 page write up. For the project, you will work in small groups to develop a multi-component model on a topic of your choosing.

Assignment	Grade
Conceptual Model	10
Building Models: Crop Example	10
Multi-component model	20
Diffusion	5
Disturbance	5
Predator prey	5
Weather Gen	5
Sensitivity	5
Project Eval	5
Validation / Calibration	10

Assignment	Grade
Project	20

	Lecture Topic	Assignment Given	Assignment Due
April 3	Intro		
April 5	Conceptual Models	Conceptual Model	
April 10 P	R make up if needed		
April 12 P	No class		
April 17P	No class		
April 19	Writing functions i R		Conceptual Model
April 24	Writing functions in R-II	Building Models: Crop Example	
April 25 (16-19pm)	Making packages, testing documenting, R		
April 26	Multi-component models		Building Models: Crop Example
May 1	Multi-component models	Multi-component model	
May 3	ODE's - basics	<i>Project</i>	
May 7	ODE's - diffusion		Multi-component model
May 10	ODE's - population	Diffusion	
May 15	Stability and Disturbance	Disturbance	
May 17	ODE's competition	Preditor prey	Diffusion
May 22	Stochastic Models - Weather Generation	Weather Gen	Disturbance
May 24	Sensitivity Analysis	Sensitivity	Preditor Prey
May 29	Choosing models	Project Eval	Weather Gen Project 1st report
May 31	Validataion/Calibration	Validation / Calibration	Sensitivity
June 5	Memorial Day		
June 7	Validation Calibration		Validation/Calibration - Part 1 Project Eval
June 12			Project Report Validation - Part II

