ABE6933/AGR 6932

Computer Simulation of Crop Growth and Management Responses

3 credits - Summer C - 2007

8:30 am – 5:00 pm MTWTF [June 11-15, June 22 (1:00-3:00pm), July 23-27]

Instructors: J. W. Jones and K. J. Boote (University of Florida)

Assisted by Dr. G. Hoogenboom (University of Georgia)

OBJECTIVES:

In this course, students will learn how crop simulation models are developed, including relationships used to model processes in the soil, plant and atmosphere. We will focus on the CROPGRO and CERES models in DSSAT. In addition, students will learn how to operate these models for model validation and application to various issues, including climate variability, water management, yield gap analysis, and site-specific management. Specifically, the course will focus on:

- Description of the CROPGRO and CERES models
- Data requirements and collection for model evaluation and application
- Operation of the DSSAT v4.02 software and associated programs
- Application of the models using various tools and methods
- Linking crop models with GIS and other application packages
- Contemporary issues related to crop modeling

The course will describe practical approaches to simulate the effects of soil, climate, management and pest factors and their interactions. It will demonstrate how the processes of crop growth and development, water use, uptake of nutrients and response to irrigation, fertilizer and other management decisions can be simulated. The course will consist of lectures and exercises in which students will perform all of the operations necessary to implement and use crop models. Methods for assessing the economic risks and environmental impacts associated with crop production will be discussed. Procedures for managing soil, crop and weather data will be explored.

The functions of the DSSAT program are: (a) to create an experiment description, which is used to document an experiment and provide inputs to crop models (b) to reformat weather data files and generate weather data (c) to create soil profile inputs, and (d) to analyze crop performance for different management strategies.

Day	Description	Available Files
June 11	History & Overview of DSSAT	DSSAT Overview.pdf
	Introduction to Systems Approaches	Modeling-Systems Approach.pdf
	Simulating Phenological Development	Phenological Development.pdf
	CROPGRO Carbon Balance & Growth	CROPGRO Growth.pdf
	Installation of DSSAT4 Software	Install.DSSAT4.pdf
	Exercise on running crop models	Ex-Running Crop Models.pdf

June 12	CERES Carbon Balance & Growth Streaming Video Minimum Data Set Concepts Streaming Video Learning the DSSAT File System Streaming Video Exercise on Simulating Potential Production Streaming Video	CERES Growth.pdf MDS Concepts.pdf DSSAT Files.pdf Ex.-Simulating Potential Prod
June 13	Concepts-Species & Genetic Coefficients Streaming Video Genetic Coefficients – CROPGRO Models Streaming Video Genetic Coefficients – CERES Models Streaming Video Estimating Genetic Coefficients – Concepts Streaming Video Exercise on Genotype Sensitivity Analysis Exercise on Estimating Genetic Coefficients Handouts:	SPE&CUL Coefficients.Concepts CROPGRO CUL Coefficients (combined with above) CERES CUL Coefficients Concepts-Estimating CUL Coef. Genotypic Sensitivity Analysis Estimating Genetic Coefficients CROPGRO SPE handout CROPGRO CUL handout CERES Rice SPE handout CERES Maize SPE handout
June 14	Simulating Water Limited Production Streaming Video Soil Data Inputs Streaming Video Weather Data Inputs Streaming Video Simulating N-Limited Production: Soil Streaming Video Exercise on Soil Data Files Exercise on Water-Limited Production	Simulating Water Limitations Soil Data Inputs Weather Data Inputs Simulating Nitrogen Limitations Exercise on Soil Data Files Exercise on Water Limitations
June 15	Simulating N-Limited Production: Plant Streaming Video Exercise on N-Limited Production Streaming Video Data Collection for Evaluating Crop Models Streaming Video Experiment Data Files, Utilities Streaming Video Procedures for Calibration Streaming Video Exercise on Creating Experimental Data Files Exercise on Model Calibration	Plant N Processes Exercise on N-Limited Production Data Collection for Evaluation Measurement Data Files Procedures for Calibration Exercise on Observation Data Exercise on Model Calibration

	Modeling N Fixation in legume crops	Draft N fixation report (Boote et al)
July 23	Modeling Crop Response to Temperature & CO_2 Streaming Video Climate Change Applications Streaming Video Weather & Climate Utility Streaming Video Exercise: Weather Data plus Exercise on Climate Change/Forecasting	Temperature Effects Climate Weather Data Inputs Exercise-WeatherMan EXCEL File (GRGR-Rw.XLS)
July 24	Simulating Pest Damage Streaming Video Pest Damage Files-Discussion Testing Model Response to Soil Water Deficit Streaming Video Challenges in Simulating Crop Rotations Streaming Video Exercise – Pest Damage	Pest Damage Improving Response to Soil Water Crop Rotation Simulations Exercise – Pest Damage
July 25	Uncertainty and Risk Analysis Streaming Video Creating File X – Seasonal Analysis Exercise on Seasonal Analysis	Seasonal Analysis Ex-Seasonal Analysis
July 26	Simulating Spatial Variability Streaming Video Demonstration of Spatial Analysis (AEGIS, IDSS)	Spatial Variability Presentation
July 27	Yield Gap Analysis & Yield Improvement Streaming Video Crop Models & Decision Support Systems Phosphorus Model Overview Modeling Root Dynamics Linking Crop & Watershed Models	Yield Gap Analysis Decision Support Systems CSM Phosphorus Model Root Modeling Concepts Root Uptake of Nutrients Linking Crop & Watershed Models