AGR 6932 & ABE 6933

Crop Modeling DSSAT

Computer Simulation of Crop Growth and Management Responses

Summer Semester C, 2017

Instructors: Dr. K. J. Boote and Dr. Gerrit Hoogenboom (University of Florida)

3 Semester Hour Class

CLASS CONDUCT

The students will participate in the DSSAT training course at Griffin, GA held May 15-21, 2017, consisting of lectures and exercises. The lecture powerpoint-pdf files will be placed on the website to download; these will be very helpful to the students. In addition to the lectures and discussions with instructors, students are required to complete homework exercises and submit them for grading. The approximately 10-12 exercises will be submitted within 2 weeks after the end of the DSSAT course, and they will count 50% of the final grade. The exercises should be written up in a typed report style that somewhat mimics a paper, to include what you did for the exercise (the "methods"), the results/outcome (either tables or "cut-and-paste" graphics examples) that answer the questions posed in the exercise, and interpretation by you.

COURSE MATERIALS

The following course material is required:

- DSSAT v4.6. This software is free and is available from the DSSAT foundation. Students will be provided with the software at the DSSAT course (via download site). The software is licensed, and you will own a license that will continue after the course.
- A text book that describes the models and applications, Tsuji et al., *Understanding Options for Agricultural Development*. The books cost $100 each and are part of the registration for the DSSAT course.
- Each student is expected to provide his/her own computer, preferably a notebook that can be brought to the discussion periods.

FINAL EXAM

We will administer a one-hour exam during early July, based on material covered in the lectures, discussions, and selected chapters in the text book. The exam will count 25% of the final grade.

SPECIAL PROJECT

Each student will select a topic for a course project and develop or use a model for analyzing a particular system. This project will count 25% of the grade. In the first class meeting during the last week of May, you will present plans for the project in a 1-2 page submission and obtain feedback from the instructors. Students will present their special projects on an agreed-upon date during July (using video conferencing if necessary for distant students), with the final written report due in late July 1 week after the presentation.

CLASS SCHEDULE

May 15-20	All day meeting, attend DSSAT course lectures, begin homework assignments
May 30	Deadline for 1-page special topic description
June 6	First 6 homework exercises are due
June 9	Meet to discuss first homework exercises and discuss special topics.
June 16	Remainder of homework exercises due
June 21	Meet to discuss remainder of homework exercises, review for exam
July 2nd wk	*Date*: Final Exam (date to be agreed on)
July 3rd wk	*Date*: Powerpoint presentations of Special Project report (date to be agreed on)
July 4th wk	*Date*: Final submission of Special Project Reports (date to be agreed on)

Possible Topics for Special Projects: Using crop models to….

1. Use your own data to adapt a model and then apply the model for an analysis (such as a comparison of management options, climate risks, soil nutrients, irrigation, etc.
2. Evaluate physiological traits to improve genetic yield potential or crop adaptation to particular environments.
3. Evaluate crop model response to climatic factors by comparison to published data.
4. Study carbon sequestration relative to crops and management practices.
5. Study benefits of crop rotation to subsequent crops (only N and water effects will work) under particular weather conditions.
6. Evaluate best management practices (BMPs) to minimize nitrate leaching or irrigation water use.
7. Evaluate crop management (water, N, cultural practices, etc.) to maximize crop yield or net profit.
8. Evaluate weather risks to production (yield and net profit) for various world sites (soils and weather).
9. Linkage of crop models with GIS for spatial analysis of yield variability.
10. Use of a model in DSSAT CSM to quantify yield losses to different factors that occur in a particular experiment (yield gap analysis).
11. Modify sections of the CROPGRO or CERES code to accomplish something new or improve crop model performance. Example could be improving prediction of ET. Improving root growth algorithms.
12. Using the model in an optimization mode to solve for crop or genetic traits.

Example of what your written paper should look like, regardless of topic:

The paper should have 8-10 pages of text (double-spaced). This page number recommendation is in addition to what will probably be many pages used for appropriate visuals (figures, tables, etc.) to document what you did for the crop modeling exercise. Structure the paper like a scientific paper, including the introduction/problem/objectives, methods and materials, results and discussion, and references. The instructors will be available and pleased to give feedback on topics, progress in the project, and in the approach for writing the project paper.