SOIL 7170
AGRICULTURAL MICROMETEOROLOGY
January-April 2012

Course Syllabus

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Class Schedule: Tuesday and Thursday 1:00 – 2:30
Starting January 17
No classes February 2 and March 20

Class Location: Room 344 Ellis

Course Description:

SOIL 7170 has three modules (see course outline below), each with lectures, literature review and an assignment.

Students will prepare a term paper in an area of micrometeorology relevant to their graduate research and make an oral presentation of the material in their term paper to the class.

Expected Learning Outcomes:

i) Students will gain an understanding of fundamental principles of agricultural micrometeorology including the factors affecting energy and mass flux in the planetary boundary layer.
ii) Students will learn to apply micrometeorological techniques in research through the review of studies previously conducted and published in the peer-reviewed literature as well as through the application of micrometeorology to their own research.
iii) Students will become proficient in micrometeorological data handling and analysis through practice in the assignments.
iv) Students will exercise their critical thinking and communication skills through discussion and presentation.

Course Material:
The slides used in the lectures will be posted to the class web page in JUMP called “Agricultural Micrometeorology”. On the left-hand side there is a link marked “Files”. Click on this link and it will show you a sub-directory containing the slides for each section of the course. You should download these files and have them available in class.

Course Evaluation:	Assignments	60%	(3 assignments – 20% each)
	Class presentation	20%	
	Term Paper	20%	

Grades:	Letter	Numerical
	A+	90 – 100
	A	80 – 89
	B+	75 – 79
	B	70 – 74
	C+	65 – 69
	C	60 – 64
	D	50 – 59
	F	< 50

Academic Dishonesty:

The penalties for academic dishonesty are serious. Students can check the section on this subject in the General Academic Regulations and Policy of the University General Calendar for details.

Assignments:
Each assignment is worth 20% of the mark for the class.

Assignment 1
For this assignment, each student will download 3 specific datasets from the Ameriflux website. The assignment requires analysis and comparison of the radiation components, energy partitioning, energy balance closure and surface characteristics from 3 contrasting sites.
Tentative Assignment Distribution – January 26, Tentative Due Date – February 7

Assignment 2
This will be a formal paper review.
Tentative Assignment Distribution – February 16, Tentative Due Date – March 1

Assignment 3
Given the software, each student will calculate various quantities of net ecosystem production using eddy covariance.
Tentative Assignment Distribution – March 15, Tentative Due Date – March 29

Class Presentations:

One class period from March 22 through April 5 will be assigned to each student for a presentation, class discussion and review of a specified topic area. The topic of the presentation will focus on a particular subject in Agricultural Micrometeorology that will directly benefit their research project. Each student will finalize their presentation topic by the end of January. A detailed outline, summary and two key references for the paper are due on March 1. A key reference paper for each student's topic will be circulated to all the other students a week prior to the presentation on that topic. All students will review the paper that has been circulated prior to the class presentation.

The presenter will make a 30 minute oral presentation. All the other students will prepare two questions relevant to the topic in the session. These must be "open-ended" or "thinking-type" questions that are not answered by a simple "yes" or "no". After the presentation, the other students will pose their questions as a basis for discussion in the topic area. The students will submit a written copy of their questions to the instructor. The questions posed to other students will form part of the grade for this section of the class.

Graduate student advisors will be invited to the presentations and will also be given an opportunity to ask questions and contribute to the discussion.

<u>Class Presentation Evaluation Criteria</u>

Introduction (10 marks)
- provide suitable context for the topic
- attract audience attention

Body of Presentation (30 marks)
- logical organization of points
- clear transitions between sections
- clear tables, graphs, illustrations
- clear and concise interpretation of data
- maintain audience interest

Summary and Conclusion (20 marks)
- logical summary of main points
- interesting and memorable conclusion

Voice, Manner and Audio-Visual Aids (15 marks)
- adequate volume, clarity of speech, appropriate pace
- confidence, sincerity, enthusiasm, posture, eye contact
- effective use of clear and legible slides

Questions posed to other presenters (15 marks)
- demonstrates insight and understanding of the subject area
- raises a good point for discussion

The class presentation is worth 20% of the total mark in the class.

Term Paper:

Each student will submit a written term paper based on the content of their oral presentation. The term paper is due on April 12, after classes and all presentations are finished. It is expected that the paper will be a review-type that will cover a minimum of six refereed publications on the selected subject and include relevant tables and figures, if required. Depending on writing style, it is expected that the paper will be between 15 and 20 pages in length (12 point font, double-spaced).

Term Paper Evaluation Criteria

Introduction (10 marks)
- place the topic into a practical and relevant context
- define the issue(s)
- provide a focus and a purpose for the paper

Literature Cited (20 marks)
- references are current and credible
- references provide a range of research opinions
- references provide adequate coverage of the topic
- literature is pertinent to the topic

Discussion (30 marks)
- literature is appropriately interpreted
- captures the relevance and implications of the research, especially to the student's project
- intelligent observations

Summary and Conclusions (30 marks)
- identify knowledge gaps and future research needs
- logical summary of main points and how they relate to the purpose in the introduction

Editing (10 marks)
- spelling, grammar
- layout
- figures and tables
- proper reference section format

The term paper is worth 20% of the total mark in the class.

Course Outline

Module 1 Energy Flux – Dr. Paul Bullock
- Planetary boundary layer and sublayers
- Radiation components
- Surface energy partitioning
- Vegetation and energy exchange

Module 2 Water Flux – Dr. Tim Papakyriakou
- Soil water and soil water flux
- Turbulence and turbulent fluxes
- Heat and mass transport at water surfaces

Module 3 Net Ecosystem Production using Eddy Covariance Measurements – Dr. Brian Amiro
- Principles of turbulent exchange
- Measurements using eddy covariance
- Calculation of net fluxes
- Corrections to high-frequency data and half-hourly data
- Turbulence thresholds
- Gap-filling
- Uncertainties in measurements