

**SOCR 322: Principles of Microclimatology**  
**SOCR 522: Plant Canopy Meteorology**

Instructor: Dr. Jay M. Ham  
 Professor  
 Department of Soil and Crop Sciences  
 C107 Plant Science  
 e-mail: [jay.ham@colostate.edu](mailto:jay.ham@colostate.edu); Phone: 491-4112  
 website: <http://soilcrop.colostate.edu/ham/index.html>

Time and Location: MWF 10:00, Shepardson 120

Office Hours: To be announced

Recitation: To be announced

Text: Campbell, G.S., and J.M. Norman. 1998. An Introduction to Environmental Biophysics. Second Edition. Springer. New York. †

<b>Course Topic:</b>	<b>Reading<sup>†</sup></b>
Biophysical Laws and Concepts Basic physical laws and concepts Review of Meteorological Parameters	Chap. 1
Temperature Air, soil, and canopy temperature Biological development and thermal time <i>Instrumentation:</i> Air and soil thermometers	Chap. 2
Water Vapor and Carbon Dioxide Methods for defining humidity in air Temporal and spatial variations of water vapor and CO <sub>2</sub> <i>Instrumentation:</i> Humidity Sensors	Chap. 3
Precipitation Spatial and Temporal Patterns of Precipitation <i>Instrumentation:</i> Rain Gauges	Handouts
Atmospheric Pressure and Physical Properties of Air Pressure as a function of altitude <i>Instrumentation:</i> Barometers	Handouts
Wind and the Turbulent Boundary Layer Wind speed profile Momentum transport, surface similarity, and drag <i>Instrumentation:</i> Anemometers	Chap. 5
Heat and Mass Transport Latent heat flux and sensible heat flux Flux equations, conductances, and resistance analogs Turbulent transport in the surface layer (field scale)	Chap. 6, 7  Exam 1

<b>Course Topic:</b>	<b>Reading</b>
Radiation Environment Radiation physics Sun-Earth relationships, sun angles, day length Radiation in plant canopies Net radiation <i>Instrumentation:</i> Radiometers	Chap. 10, 11, 15
Surface Energy Balance Energy balances of leaves, soil, and vegetated surfaces	Chap. 14
Evapotranspiration (ET) and the Field Water Balance Water balance concepts Potential and Reference ET Stomata and canopy conductance Crop water use Predicting and modeling ET using weather data <i>Instrumentation:</i> Eddy covariance, etc.	Chap. 14
Canopy Photosynthesis, Ecosystem Carbon Fluxes, and Yield Leaf and canopy photosynthesis Radiation use efficiency, Water use efficiency Yield - Evapotranspiration relationships	Chap. 14
Global Climate Change and Air Quality	

Exam 2/Final

**Problem Sets:** Six homework assignments (approx. every two weeks). Most homework will involve making calculations using a calculator or spreadsheet. One unique aspect of the class is that students can work in groups on the homework. However, each student is expected to turn in an original document showing all details of the calculations.

**Exams:** Two Exams, a 1-hour midterm exam and a final. The final will represent the second exam and include content from the last 1/2 of the semester (not comprehensive).

**Extra Project: SOCR 522 Only**

Students enrolled in 522 will be required to complete an extra project involving the development of an Excel Spreadsheet for calculating evapotranspiration.

**Grading SOCR 322:** Problems Sets 60%, Exams 40%

**Grading SOCR 522:** Problems Sets 50%, Exams 40%, Extra Project 10%

**Recitation:** In the weeks leading up to the exams, an optional recitation period will be provided. This class period will be used to answer questions and work example problems on the board.

**RamCT:** Many resources will be posted on RamCT throughout the semester (example problems, class notes, videos, Excel spreadsheets, etc.).