

Geography 5922: Microclimatological Measurements – Fall 2020

Class times: M, W 3:55-5:15 pm

Classroom: Derby Hall, room 0070 (and 0140)

Instructor: Jim DeGrand

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Office hours: 2:30 – 3:30 pm, M & W, or by appointment

Course Description: This course serves as an introduction to microclimatological instrumentation and fieldwork. We will learn about various environmental sensors: how they work, how they should be deployed and how to store and retrieve information from them. At the end of the course, students will have gained some expertise in and understanding of:

- sensor performance characteristics
- sensor selection, evaluation and deployment
- data acquisition systems
- data analysis and display

Course Mechanics: The Covid19 pandemic has substantially changed how this course will be run in 2020. University guidelines currently in effect prevent us from meeting in person as an entire class during the semester and we must be prepared to suspend all in person activities should the University declare these to be unsafe. Unfortunately, the subject of the course does not lend itself to these guidelines. I cannot imagine presenting a course on instrumentation in which the students do all their work remotely. There simply is no substitute for the experience of physically working with these devices in the field for learning about how they work and how they should (and should not) be used. Given the guidelines, this is how I propose to present this course:

- As much instructional material as possible will be presented on line. This will take several forms: tutorials, videos, powerpoint presentations. The point of these lessons will be to get you ready for what we do in class each week. A substantial proportion of this online material will be lessons selected from the library of material provided through the COMET program run by the National Center for Atmospheric Research. You will have to register for this program (see Carmen page for details), work through the assigned lessons and take the end-of-lesson quizzes. The results of the quizzes will be emailed to me and recorded in the gradebook.
- The class will be divided into 2 cohorts of students (cohorts A and B). Each cohort will meet in class with me once per week: cohort A on Mondays, cohort B on Wednesdays.
- Our in-class meetings will be more like laboratory sessions than lectures. You will be working with meteorological sensors, writing programs for interacting with these sensors, wiring up dataloggers, looking at data. These sessions will focus on specific aspects of instrumentation used in micro-climatology and will

be guided by worksheets which will be due at the end of class. You will be working in groups of 2. We will do our best reduce the possibility of disease transmission by wearing masks and keeping distance between individuals.

- We will meet in small groups on 3 different weekends to set up equipment in the field. Our primary field site will be the OSU Turfgrass Research Center on Waterman Farm. Attendance at these 3 field experiences is mandatory. In addition, there will be an optional 4th opportunity for field work setting up equipment at the Farm Science Review held annually at the Molly Caren Agricultural Research Center just northeast of London, OH. Fieldwork will also be a required component of the instrument comparison project described below.
- The final few weeks of the semester will be devoted to an instrument based project. In this project you will work with 3 - 4 of your fellow students to devise an experiment for comparing multiple sensors measuring the same variable (for example, 2 or 3 different types of sensors for measuring temperature) and explaining the differences observed between sensors. The group will be responsible for defining the experiment, programming the datalogger and sensors involved, setting up the equipment, gathering the data and presenting an analysis of the data in the form of a report.
- One of the more disturbing unknowns about this semester is whether we will get through it without the University suspending all in-person course activities as it did in the Spring of this year. My response to this possibility will depend on where we are in the semester if/when it happens. I have purposely put as many field experiences as I could in the early part of the semester to increase the likelihood that we get some meaningful field time in before the plug is pulled. If we get through the month of September I would be OK with continuing the semester online. Let's hope for that. If in-person instruction is cancelled in the first couple of weeks of the semester I will likely advocate for a suspension of the course.

Participation: This is not the type of course in which you can just read the textbook, take the exams and expect to do well. In this course you have the opportunity to work with research grade meteorological instrumentation; to benefit from this opportunity you have to be present. To encourage you to come to class I will take attendance at each class meeting. To encourage you to come prepared, I have assigned modules and quizzes on Carmen that will be due before the related class meetings.

Evaluation:

Weight	Assignment category
4%	Class participation
6%	Carmen quizzes (4)
14%	Quizzes from COMET lessons (7)
35%	In-class worksheets (7)
6%	Participation in field experiences (3)
35%	Final project

At present I do not plan to offer written exams.

Textbook:

Required: **Oke, T. R., Boundary Layer Climates**, (1987). This text should be available at the Bookstore. Typically, inexpensive used copies can be found online. You all have taken G5921 and this is the required text for that course so I assume you already have a copy. For our purposes, the appendices of this text are particularly useful. In these, the author discusses instrumental approaches to quantifying several important micro-climate variables, particularly those associated with the surface energy balance.

Order of Topics Covered

- Electricity and measurement basics
- Dataloggers and datalogger programming
- Sensors – static and dynamic characteristics
- Sensors – calibration and uncertainty
- Temperature sensors
- Humidity sensors
- Wind sensors
- Radiation sensors
- Precipitation sensors

Academic misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Disability Services

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.