Syllabus, Spring 2005
Meteorology 454 - Micrometeorology
Lectures 12:12-1:10 MWF, 110 Walker
Class web page: http://www.meteo.psu.edu/~davis/meteo454

Course goals: By the end of the course, you should:

- be able to describe basic characteristics of the atmospheric boundary layer and atmospheric turbulence both qualitatively (in English) and quantitatively (using mathematical forms of physical laws suitable for numerics).
- be able to engage in non-quantitative, intuitive reasoning to explain phenomena concerning boundary layers and turbulence, and to formulate hypotheses to explain micrometeorological phenomena;
- recognize the tools and methods used to study micrometeorology, and have experience with some of these tools and methods;
- be able to read texts or research papers concerning micrometeorology;
- understand micrometeorological applications to topics such as air quality, weather and climate modeling, cloud formation, and meteorological conditions at the earth's surface;
- have improved your quantitative analysis skills, individual and group learning skills, and presentation skills (written and oral).

Professor:
Kenneth Davis, Associate Professor, Department of Meteorology
512 Walker Building, 814-863-8601, davis@met.psu.edu.
Office hours: 10-11am Monday and Thursday. You are free to stop by my office outside of office hours, but to guarantee that I will be available, call or email in advance to set up an appointment. Come and visit! Ask questions!

Prerequisites:
Freshman physics, differential and integral calculus, introductory differential equations and statistics, thermodynamics (e.g. Meteorology 431), fluid mechanics/dynamic meteorology (e.g. Meteorology 421). The course is calculus-based and is built upon the principles of thermodynamics and fluid mechanics. Some basics will be reviewed. The course is intended for upper-level undergraduate meteorology majors and other students in the physical sciences or engineering. Graduate students are also welcome.

Class Expectations and Norms:

- Students should participate actively in class, complete home-work assignments promptly, ask questions when they have them, and make a good effort on exams.
- Classes will most often be lecture format but fairly interactive. Towards the end of the semester student presentations will become more common. We will integrate some field work/experimentation into the class schedule.
- Some active and cooperative learning techniques will be used, and questions and discussions are always encouraged. If you learn to ask questions, either in class or at office hours, your progress and my teaching will both benefit.

- Reading will be assigned and is best done in advance of the relevant lectures since you can ask me questions about what didn't make sense when you read it. Do not worry if you don't understand everything the first time you read it. Instead try to complete the reading prior to lecture even if some portions of the reading don't make much sense. NOTE: The book for this course is full of things you won't need to read in detail (if at all). I will try to guide you through what is central vs. tangential.
- Homework assignments, research projects, and preparing for exams are the primary means of actively assimilating the lecture and reading material. Homework is graded. Due dates will be enforced. Collaboration on homework is allowed, but make sure that you are able to solve the problems yourself. Try the problems on your own before consulting with classmates or with me. Plagiarism is not allowed. My goal is to assign 8 homework sets. These will be followed with self-assessment quizzes.
- There will be two mid-term exams. The exams will be comprehensive, but emphasize the topics covered since the last exam. Questions will include simple factual questions, simple applications of basic facts and laws, and more complex synthesis of course materials. Exam questions will be very similar to the homework assignments and self-assessment quizzes.
- You will do independent research that merges into part of a broader group research project. You will be asked to present portions of this research to the class. More details will be presented as the course progresses.
- You are encouraged to comment (constructively) on all aspects of the class. Your active involvement is a service to all of us.
- Academic honesty is required. This course abides by college's policies for academic honesty, http://www.ems.psu.edu/students/integrity/index.html. Exams must be entirely your own work. You are allowed to collaborate to a limited extent on homework and research projects, but the assignments you turn in must be your own work.

Materials:
Most reading and some homework problems will be taken from *An Introduction to Boundary Layer Meteorology* by Roland Stull. There are several other texts that you might find useful. I'll mention them as the semester progresses.

Special needs:
If you have a disability that requires accommodation in this course, please notify me as soon as possible. Appropriate accommodations will be made given reasonable advance notice.

Grading:
If grades run high, grades will be assigned on an absolute basis: 90% and above = A, 80-89 = B, etc. I reserve the right to make this grading scale easier. If assignments and exams prove more difficult than the scale above, I will curve the grades. I will endeavor to give everyone a good feel for the course grading fairly early in the semester. The overall course grade will be weighted approximately as follows:

Homework	20% (approximately 8 assignments)
Exams	50% (25% each, 2 of them)

Research projects 30% (total – weighting of various portions will follow)
This might change as the semester develops. If so, you will be warned promptly, and the change will reflect where most of your work/learning is happening.

Schedule:
The first third of the class will focus on developing the basic equations and mathematics required to understand the applications, which are the focus of the second third of the course. The final third of the course will focus primarily on your research projects.