CE/OE 593 Urban (Coastal) Meteorology
Fall 2017

Course Information

Time: Friday 1:00- 3:30 pm
Location: Davidson Lab conference room (room 231)
Instructor: Prof. Julie Pullen
Office Hours: Wednesday 10-12 (or e-mail for an appointment)
Contact: (201) 216-8574, Davidson Lab room 224
Email: julie.pullen@stevens.edu

Textbook: Urban Climates (Paperback – September 14, 2017)
by T. R. Oke, G. Mills, A. Christen, J. A. Voogt

Alternate Textbook:
1. Coastal Meteorology by S.A. Hsu

References:
1. Tracking and Predicting the Atmospheric Dispersion of Hazardous Material Releases: Implications for Homeland Security, National Research Council, 2003

2. Urban Meteorology: Forecasting, Monitoring, and Meeting Users' Needs, National Research Council, 2012

Catalog Description

This course will cover the dynamics of meteorology in urban environments with a focus on coastal settings. The course will explore urban heat islands and how they arise, and common circulation patterns impacting cities. The course will examine ways to measure and model heterogeneous cityscapes and their emission characteristics. A portion of the course will address transport of airborne contaminants in urban environments. Sensor technologies and airborne release studies will be examined for insight on transport and dispersion in urban canyons and other heterogeneous environments.

The course will also study the basics of modeling methodologies (e.g., mesoscale and computational fluid dynamics) as tools to predict urban airflow at various scales.

Course Objectives

1. Develop understanding of fundamental meteorological processes operating in cities. Students will gain an in-depth understanding of the dynamics of weather in urban areas. They will be able to articulate the governing equations and

modeling techniques used to understand and predict urban meteorology, as well as the local dynamics of coasts, tropics, mountains in which a city is situated.

2. Anticipate how a changing climate and changes to urban environments and surfaces could modify weather. By examining surface/interface characteristics, the students will be able to anticipate how modifications (e.g., green roofs) could alter the energy balance at city and regional scales.

3. Understand the transport mechanisms for urban air contaminants. Students will develop a deep understanding of how the cityscape influences air patterns through pressure-driven and thermal heating effects at the neighborhood scale.

List of Course Outcomes

1. Students will understand how the location (coastal, mountain, tropical), size, and composition (short or tall) of cities contribute to the observed weather and airflow patterns.

2. Students will be familiar with the modeling approaches (mesoscale to microscale) employed for weather and airflow around cities, and be able to critically evaluate model strengths and weaknesses for prediction purposes.

3. Common sensor methodologies for urban weather and airflow studies will be examined, and students will gain exposure to crowd-sourced urban measurements. Students will be able to design an urban sampling study to accomplish defined scientific goals.

4. Students will anticipate challenges to cities posed by a changing climate – and be able to examine and evaluate mitigation approaches.

Grading

Homework will account for: 40% of you grade
The Midterm will account for: 20% of your grade
The Final Project will account for: 25% of your grade
Class Participation/Attendance/Office Hours will be 15% of your grade

Regular attendance in class with your full attention is expected.