Draft Syllabus
Urban Plants and Public Health (PLSCI 4450/6450)

Instructor: Dan Katz (dankatz@cornell.edu)
Credits: 3
Prerequisites: Advanced undergraduates; others must obtain permission from the instructor. Students must have taken a college-level statistics class and be comfortable reading peer-reviewed journal articles.
Lectures: Tues, Thurs 10:10 – 11:25 am

Course overview

This class examines how urban plants affect public health (e.g., air pollution reduction, temperature regulation, etc.,). We will also explore the causes and health consequences of variation in urban plant composition, environmental justice perspectives, the effects of policies and management approaches, and the impacts of climate change. This class centers on peer-reviewed literature; students will read several journal articles each week. Students will work in small groups to extract equations from the literature and use them to quantify the ecosystem (dis)services provided by street trees in Ithaca. Groups will share their results in presentations and written reports and revise their reports in response to peer reviews. Students enrolled in the graduate portion of the class will synthesize these reports into a manuscript that we aspire to submit to a peer-reviewed journal.

Course learning objectives

By the end of this class, you will be able to:

- Describe the public health relevance of urban trees;
- Independently identify and interpret peer-reviewed journal articles and extract quantitative data from them;
- Analyze the public health consequences of plant-human interactions in a case study;
- Create written and verbal summaries of your research findings from the case study; and
- Synthesize case studies into a submission-ready manuscript.

Expert groups

As a class, we will quantify the public health benefits of street trees in Ithaca. Each student will participate in a small "expert group" that will focus on a particular topic (e.g., the effects of trees on air pollution). Students in each group will extract data and equations from the literature to quantify the per tree effect on their ecosystem service or disservice. These equations will then be applied to the Ithaca street tree dataset to quantify the cumulative public health effect of these publicly owned trees. Groups will assemble their results, visualize them, and write up their topic as a brief paper, including an introduction, methods, results, and discussion sections. Groups will present their findings to the class during the scheduled week and will be provided with reviews (comments and suggestions) from their peers and the instructor. Each group will respond to the suggestions point by point and revise their written brief papers.

Students enrolled in the graduate portion of the class will work together outside of class to combine the brief papers from the expert groups into a single cohesive manuscript. This will

include discussion of framing, key research questions, and target journal with the instructor. They will also conduct additional analyses to compare the different health-relevant services and disservices provided by these trees. Students will synthesize these findings into a manuscript that we hope to submit to a peer-reviewed journal.

Reading assignments
We will read extensively from the primary literature; there is no textbook for the class. Before class on Tuesdays, we will read the assigned paper(s) and fill out a brief reading response/quiz to ensure that we are all prepared to discuss the paper in class. For Thursday on weeks where an expert group is presenting, students not in that group will independently find a relevant paper on that topic. They will cite that reference in their comments on that expert group's manuscript.

Learning assessment
Each assigned reading will be accompanied by a short quiz on Canvas that must be completed before class.

Expert groups will be graded based on several components:

- Grading by the whole class on their presentation and brief article (each student outside of the expert group will fill out a rubric).
- Grading by the instructor based on the expert group's responses to their peer-reviews and final brief article.
- Grading between each member of an expert group (based on a rubric that includes contributions and participation from each group member).

Class members will also be graded based on the quality and quantity of their comments provided to each other expert group.

Grading
The percentage breakdown of your grade in the course is:
Assigned reading quizzes = 25% (the lowest three scores will be dropped)
Attendance, participation, and engagement = 15% (two unexcused absences are permitted)

Expert group:

- Whole class grading of presentation and article = 15%
- Grading by the instructor on revised brief report and responses to comments = 15%
- Grading by other members of the expert group = 15%

Quality and quantity of a students' comments to each expert group = 15%

For students enrolled in the graduate version of this class, 25% of their grade will be the final cross-group synthesis manuscript; other components will be reduced commensurately.

Academic integrity

All students are expected to follow Cornell's Code of Academic Integrity. Failure to do so will result in a failing grade in this course.

We will decide as a class what our policy is for the use of generative AI (e.g., ChatGPT).

Co-creating belonging
As a community, we value all perspectives, insights, and experiences and cherish your holistic engagement with each other and the material. Throughout this class we will strive for inclusive excellence in our curriculum and inter-personal interactions.

Your personal wellbeing is vital to your academic success. Below are some support services offered by Cornell - if you need additional support or access to resources, please reach out to the instructor.

CALS Diversity and Inclusion: https://cals.cornell.edu/diversity-inclusion
LGBTQ+ Resource Center: https://scl.cornell.edu/LGBTRC
Mental Health Care: https://health.cornell.edu/services/mental-health-care
Student Disability Services: https://sds.cornell.edu/
Learning Strategies Center: https://lsc.cornell.edu/
Writing Center: https://knight.as.cornell.edu/wc
Mann Library: https://mann.library.cornell.edu/
IT Support Services: https://it.cornell.edu/students
Cornell Health: Assault, Harassment, and Bias: https://health.cornell.edu/resources/health-topics/assault-harassment

DATES	**TOPICS**	**Pre-lecture readings/assignment due**	**Class**
August 27		Read the syllabus, fill out background survey/questionnaire	Lecture: Class overview lecture Activity: students choose their expert group, decide class policy on generative AI
August 29	Intro to public health, environmental epidemiology, and exposure science; why plants matter	Assigned papers: • Env. health paper 1 • Env. health paper 2	Lecture: Basics of public/environmental health Brief guest researcher presentation on environmental health Activity: Small group discussions of papers, expert groups have first meeting.
Sept 3	What do we know about urban plant composition?	Assigned papers: • i-Tree Eco paper	Lecture: why do species differences matter? What about size? Activity: Introduction to working with tree databases; download Ithaca's street tree database and visualize tree composition

	How do we measure it?	• remote sensing tree ID paper	
Sept 5		Assigned papers: • Paper on urban plant ID and citizen science	Activity: Walking trip to different neighborhoods in Ithaca, basic plant identification: apps (iNaturalist) and dichotomous keys
Sept 10	What human and natural processes have shaped urban plant composition? How has it changed over time? How does it vary within and among cities?	Assigned papers: • MacDonald 2022 paper on redlining	Lecture: on associations between plant composition and environmental variables, invasive species, plant traits
Sept 12		Assigned papers: • Paper on traits/spontaneous vegetation	Lecture: Social determinants of urban plant composition Brief guest presentation by Alex Young and Maya Mangala-Munuma Activity: Small group discussion of papers
Sept 17	Access and equity of ES/D	Assigned papers: • Short history of environmental justice movement	Lecture: Origins of environmental justice movement to contemporary conditions Activity: small group discussion of papers
Sept 19		Assigned papers: Green spaces disparities Microscale pollution mapping paper	Lecture: Racial and economic disparities in exposures; health care access; green spaces Brief guest lecture: Elizabeth Matsui Activity: Explore a public facing health database
Sept 24	Non-exposure related ecosystem services and disservices	Assigned papers: • tree maintenance costs • carbon sequestration • property value	Lecture: Overview of non-exposure related ecosystem services/disservices Activity: Tour from Cornell Horticulture
Sept 26		Assigned papers: • nutrient runoff and HABs	Lecture: Biodiversity and the services provided by plants to other organisms Brief guest lecture: CLWN Activity: bioblitz with i-Naturalist

		• Plants and urban biodiversity	
Oct 1	Vectors and animals	Assigned paper: • links between plants, vectors, animals, and misc.	Lecture: Rats, mosquitos, and vacant lots. Brief research presentation: Malaria researcher Small group paper discussion
Oct 3	Plants and medicine	Assigned paper: • Medicinal properties of plants • Braiding Sweetgrass chapter	Lecture: pharmacology and plants; indigenous perspectives on plants. Activity: visit to healing garden or guest lecture from medical ethnobotany
Oct 8	Allergenic pollen	Assigned papers: • Katz et al. 2023 • Katz et al. 2024	Lecture: Understanding the relevant ecological and geographic processes relevant to allergenic pollen
Oct 10		Find your own paper: • allergenic pollen	Lecture: From exposure to health outcomes Expert group presentation Activity: mapping ragweed
Oct 15	Fall break		
Oct 17	From theory to practice	Assigned paper: plant management; practical considerations	Lecture: Practical limitations on tree selection and management decisions Brief guest research presentation: Alex Young on urban foresters perceptions Graduate students: Manuscript synthesis planning meeting #1
Oct 22	Cooling	Assigned paper: • cooling effects of trees	Lecture: the cooling effects of trees Guest presentation: the Cool Trees project
Oct 24		Find your own paper: • Cooling effects of plants	Lecture: Guest lecture from David Miller Expert group presentation Activity: Google Earth Engine LST exercise
Oct 29	Flooding and wind	Assigned papers:	Lecture: Dropped branches, utility lines, wind, hurricanes, Hurricane Sandy in NYC, Hurricane Harvey and flooding risk maps

		• flooding & water infiltration • NYC water supply protection	
Oct 31		Find your own paper: flooding, wind damage, etc.,	Lecture: Flooding, urban stream syndrome, water-borne diseases, mold exposure and hurricanes Expert group presentation Activity: Extreme events and green infrastructure
Nov 5	Psychological benefits of green spaces	Assigned papers: • psychological benefits of green spaces • paper on hospital views & healing	Lecture: Green spaces, equity in park access Activity: Small-group discussion of papers
Nov 7		Find your own paper on psychological benefits of green spaces	Lecture: Guest lecture from Don Rakow Expert group presentation Activity: Jigsaw style discussion of green gentrification
Nov 12	Air pollutants	Assigned paper: • trees and particulate matter reduction • i-Tree Eco PM benefits, other air pollutants	Lecture: PM reduction and air pollution Short guest research talk from air pollution expert
Nov 14		Find your own paper: • Air pollution and plants	Lecture: Wildfires and forests Expert group presentation Undergraduate students: Guest lecture from postdoctoral researcher working on air pollution and climate modeling Graduate students: Manuscript synthesis planning meeting #2
Nov 19	Climate change and urban forests	Assigned paper: • effects of CO2 and temperature on trees • Effects of CO2 on ragweed paper	Lecture: How will climate change affect urban trees? Brief guest research presentation on climate change and plant physiology

Nov 21	Threats and changes to urban forests	Assigned paper: health effects of EAB	Lecture: Common threats to trees, spread of invasive pests and pathogens Brief guest research presentation on biocontrol of urban pests Activity: What trees are at risk in Ithaca?
Nov 26	Nutrition	Assigned paper: • urban gardens and agriculture Additional assignment: • Bring a small dish to pass, with some connection to our class	Lecture: What role do urban plants play in nutrition? Brief guest research presentation: Urban agriculture Activity: harvest potluck
Nov 28	Thanksgiving break, no class		
Dec 3	Policy dimensions	Assigned reading: Effects of IRA	Lecture: Policy dimensions Debate: How much should Ithaca invest in urban forestry? Guest presentation: Jeanne Grace or Andy Hillman
Dec 5	Last day of class	• Peer review of summary manuscript	Feedback by class for graduate student-led manuscript; Class wrap up