

BIOL 490: Urban Ecosystem Ecology

Spring 2013

Lecture: T R 1:30-3:10 (OSS 122)

Lab: F 8:00-12:00 (OWS 268)

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Urban Ecosystem Ecology

The study of how energy and materials move through cities
(and how this can be done in a more sustainable way)



The collage consists of six images arranged in two rows. The top row features: 1) Urban agriculture: a field of green plants in an urban setting. 2) Wastewater treatment: a large industrial facility with multiple towers and pipes. 3) Carbon footprint: a map of the United States with red arrows indicating CO2 emissions. The bottom row features: 4) Composting: a bowl filled with organic waste. 5) Power generation: a large industrial facility with multiple towers and pipes. 6) Wastewater treatment: a large industrial facility with multiple towers and pipes.

Urban agriculture

Wastewater treatment

Composting

Power generation

Carbon footprint

Course description: In 1800, there were around 1 billion people on the planet, and only 3% lived in urban areas. Today there are more than 7 billion humans, and more than 50% live in cities. This course will explore how cities function as ecosystems—specifically examining how carbon and nutrients enter the city as food and other resources, and exit as waste. We will be working with the City of Saint Paul through CityLabs on a project to increase nutrient use efficiency in the urban ecosystem.

This course is a biology course, but much of what we will do is inherently interdisciplinary. Through the course, we will develop skills in critically evaluating primary literature, designing experiments, analyzing data, and communicating with both scientific audiences and the general public.

IDEA Learning Objectives

22.	Learning fundamental principles, generalizations, and theories	<i>Important</i>
23.	Learning to apply course material (to improve thinking, problem solving, and decisions)	<i>Essential</i>
25.	Acquiring skills in working with others as a member of a team	<i>Essential</i>

The course material is loosely divided into five units:

1. Introduction to urban ecosystems and sustainability science
2. “Old-school” ecosystem ecology—what can we learn from classic ecosystem studies from the mid-20th century?
3. Households as ecosystems (focusing on Twin Cities Household Ecosystem Project)
4. Cities as ecosystems—analyzing carbon and nutrient budgets for cities
5. Constructed ecosystems within cities (urban agriculture, wastewater treatment, green roofs, etc.)

Projects:

The central focus of this course is a series of interwoven projects through which we will explore how cities function as ecosystems.

1. Compost capacity at community gardens in Saint Paul. We’re working with the City of Saint Paul, through CityLabs, to assess the feasibility of using community gardens as neighborhood composting sites. <https://sites.google.com/a/actc-mn.org/actc/citylabs>
2. Urban ecosystem choreography. Yeah, it sounds a little crazy, so you’ll have to trust me here. In addition to learning about how urban ecosystems work, we’ll also be exploring novel ways to communicate science to the public. We’re collaborating with two other UST classes—Social Dynamics and the Environment (ENVR 212) and Videography (COJO 360)—as well as the Macalester College Dance Department, the Pilobolus Dance Company, and the Ordway Center for Performing Arts, to develop a performance that “communicates how societies and individuals interact with and influence the natural and built environments around them.” Our role is to generate ideas and materials from the science side of things—but there may be opportunities to get involved with the artistic side as well, if you’re so inclined. <http://www.pilobolus.org/home.jsp>
3. Sustainability documentary. A spin-off project from the collaboration described above. Dr. Tim Scully’s Videography class will be producing a series of short public service announcements, and a longer documentary focusing on sustainability projects at UST. We will have several opportunities early in the semester to serve as science advisors to these productions. We’ll also be working with a student videographer, Austin Riordan, to produce some video blogs highlighting these research projects.

4. Exploring the potential for detritus-based urban agriculture. In the lab component of the course, we'll design and carry out experiments assessing the feasibility of building a coupled vermicomposting-aquaponics system on campus—i.e., turning food waste into worms and soil, and turning those worms into fish and vegetables.

Service Learning

This course is officially designated as a Service Learning Course because of the collaboration with the Ordway and Pilobolus.

Grading

- 5% Blogging/journal assignments. We will have regular assignments via Blackboard, reflecting on readings and class discussions. Some of these writings will be further developed and used in our various projects.
- 10% Leading discussions of journal articles, and summarizing class discussion on Blackboard Wiki. (Done in pairs).
- 15% Midterm exam. This will be a take-home exam, done individually.
- 20% Final exam. In-class during final exam period, done individually.
- 50% Projects. For the projects listed above, you'll receive a grade based on instructor evaluation, peer evaluation, and self evaluation (weighted equally), based on a rubric that we will develop together.

Attendance and participation:

Because this course is built around collaborative projects, your attendance and full participation is critical not just to your own success in the course, but to the success of our collective goals as well. I recognize that occasionally, due to illness or other legitimate reasons, you may have to miss class. In that case, it is your responsibility to let me know, as well as any group members with whom you are working. It is your responsibility to make up any missed work.

Credit hour policy:

A credit hour is "an amount of work represented in intended learning outcomes verified by student achievement that approximates one hour of classroom or faculty instruction and a minimum of two hours of out-of-class student work each week for approximately 15 weeks." Because this is a 4-credit hour course, you should expect to spend up to 8 hours per week outside of class on your work. We will have several scheduled events outside of regular class meetings, which you are strongly encouraged to attend.

Textbook and readings:

We do not have a traditional textbook in this course. We'll use a number of primary literature readings, which will be posted on Blackboard.

Over the first month of the course, we'll also use an interactive Ecosystem Ecology text produced by SimBio (it's the Beta version, so it's free!). See instructions below for how to install this software:

Please follow the instructions below to subscribe to SimUText for your **Topics in Biology: Urban Ecosystems SP13** class at **University of St. Thomas - MN**.

1. To subscribe to your SimUText please visit:
<https://simutext.com/student/pages/Welcome.jsp?accesskey=evxs-Z4RX-gpyK-hEz4-eVcJ>
2. You will need to supply your email address as a user name, your name and student ID, and select a password.
3. If you purchased a SimUText Redemption Code from your bookstore, enter that code on the Confirm Course Selection screen. If you did not purchase anything from your bookstore, just click the Continue button.
4. Follow the remaining instructions to subscribe to your SimUText and download the software you will need.

Should you encounter a problem during registration, the access key for this course is **evxs-Z4RX-gpyK-hEz4-eVcJ**.

If you experience any difficulties registering or downloading and installing the software, please visit the [SimUText Support FAQ pages](#).

If you are not able to find the answer to your question, use the link on those pages to email SimUText technical support.

Accommodations for students with disabilities:

Qualified students with documented disabilities who may need classroom accommodations should make an appointment with the Enhancement Program – Disability Services office during the first two weeks of the term. Telephone appointments are available to students as needed. Appointments can be made by calling 651-962-6315 or 800-328-6819, extension 6315. You may also make an appointment in person in OEC 119. For further information you can locate the Enhancement Program on the web at <http://www.stthomas.edu/enhancementprog/>.

UST Academic Integrity Policy:

Honesty and trust among students and between students and faculty are essential for a strong, functioning academic community. Consequently, students are expected to do their own work on all academic assignments, tests, projects and research/term papers. Academic dishonesty, whether cheating, plagiarism or some other form of dishonest conduct related to academic coursework and listed in the *Student Policy Book* under “Discipline: Rules of Conduct” will automatically result in failure for the work involved. But academic dishonesty could also result in failure for the course and, in the event of a second incident of academic dishonesty, suspension from the university. See:

http://www.stthomas.edu/policies/student_policy_book/Academic_Integrity_Policy.asp