

Marine Urban Ecology

I. Course Description:

Urban ecology is an emerging, interdisciplinary field that aims to understand how human and ecological processes can coexist in human-dominated systems. This course will focus on the modern-day ecological challenges of the greater Boston area, as a result of current or historical human-induced disturbance. Topics include the impact of local oil spills & other toxic releases, invasive species, coastal and urban development, fishing and whaling, and politics on ecosystems such as the rocky intertidal, saltmarshes, local rivers (Charles, Mystic, and Neponset), the Boston Harbor, and Cape Cod. In the laboratory portion of the course, students will collaborate on original research projects investigating a single urban event and determining how to test the ecological ramifications thereof. Projects will be evaluated based on both a scholarship component and an experimental design component. The course will include fieldtrips and guest lectures by a number of local experts. This course is offered during Block 2 of the Fall 2012 Marine Semester.

II. Prerequisites: Admission to the Marine Semester.

III. Instructor:

Dr. Randi Rotjan
New England Aquarium
Office Hours: Individually arranged appointments;
Phone: 617-226-2139 (office) / 617-791-1985 (cell)
E-mail: rrotjan@neaq.org

IV. Grading

30% of your grade will be based on the quality of your research and a final oral research report.
40% of your grade will be based on the seminar discussions (lead AND participation).
30% of your grade will be based on course assignments, presentations, quizzes, and exams.

V. Readings (*no purchase required*)

- *Boston: A Topographical History* by Walter Muir Whitehill and Lawrence W. Kennedy
- *Urban Ecology* by Marzluff, Shulenberger, Endlicher, Alberti, Bradley, Ryan, Simon, ZumBrunnen
- *Urban Ecology: Patterns, Processes, and Applications* by Niemela, et al.
- *Mapping Boston*, by Krieger, Cobb, and Leventhal
- *Political Waters – A history of the Boston Harbor* by Eric Jay Dolin

- *Selections from the primary literature, TBD*
- *Selections from the popular literature, TBD*

VI. Lecture & Research Schedule

Attendance at all lectures, paper discussions, collecting trips, and laboratory sessions is mandatory. Your final grade will be penalized 2.5% for each unexcused absence from a lecture or lab session.

WEEK 1

Monday, October 1

Readings

- Schochat et al. 2006 TREE
- Urban Ecology & the Marine Realm: TREE 2008
- Science 2011 – Update & projections on human population

AM: **Lecture 01.** Course layout, description, and expectations

Class Introductions: Why are we all here?

Lecture 02. What is urban ecology? / Water services in urban landscapes

PM: **Lecture 03.** The Ecology of Urban Ecology, part 1

Seminar Discussion: TREE 2008 paper

Prep for Nahant field trip

Tuesday, October 2

Readings

- The Asphalt Jungle
- Evolution Right Under Our Noses
- Habitat analogues and reconciliation ecology in urban and industrial environment

AM: **Field trip: Nahant (low tide = 7:04 am)**

PM: **Lecture 04.** The Ecology of Urban Ecology, cont'd

Seminar Discussion: all readings Led by: _____

Wednesday, October 3

ALL DAY Scavenger Hunt in the field! (lunch included)

Thursday, October 4

Readings

- McMahon and Cuffney 2000 – Quantifying urban intensity in drainage basins for assessing stream ecological conditions (Project Prep)
- Water Quality Tests
- Nacci et al 2009 – Evolution of tolerance to PCBs and susceptibility to a bacterial pathogen in Atlantic killifish from New Bedford Harbor

AM: **Scavenger Hunt Presentations & Discussion**

PM: **Seminar discussions on readings Led by:** _____

Lecture 05. Marine Urban Ecology Globally & Locally

Preliminary project ideas, question, hypotheses brainstorm

Friday, October 5

Readings

- <http://www.savebuzzardsbay.org/page.aspx?pid=279>
- <http://www.savebuzzardsbay.org/page.aspx?pid=304>
- <http://epa.gov/nbh/data.html>

ALL DAY Field trip: Buzzards Bay Coalition, with Robert Hancock (*bring wellies and waders!*)

Introduction, water sampling, lunch career discussion, visit 3 restoration sites

Class brainstorm: Cleaning up the Bay discussion

WEEK 2:

Monday, October 8

COLUMBUS DAY OBSERVED – NO CLASS

Tuesday, October 9

Readings

- Shapiro 2011 – Sustainable land design in urban runoff management
- Reifel et al 2009 – Impacts of stormwater runoff in the Southern California Bight
- Butler and Orians 2011 – Ecological Engineering Facilitation
- P. 1-32 EPA Green Infrastructure Case Studies: Municipal policies for managing stormwater with green infrastructure

AM: Movie: Reduce Runoff: slow it down, spread it out, soak it in

Lecture 06. Green Roofs and their relationship with water

Seminar Discussion: all readings Led by:

Class brainstorm: solving problems in your town with green infrastructure

PM: **Field trip to the Neponset (low tide = 12:32 pm)**

Wednesday, October 10

Readings

- Toward a healthy harbor
- Ricca and Cooney 1998 – Coliphages and indicator bacteria in birds around Boston Harbor
- Ryan, Lachmayr et al 2001 – Developmental effects of PCBs on the hard clam *Mercenaria mercenaria*
- Lachmayr et al 2009 – Quantifying nonspecific TEM B-Lactamase genes in a wastewater stream
- Excerpts from Political Waters: History of the Boston Harbor (Eric Jay Dolin) – pages TBD

AM: **Lecture 07.** Microbes and water quality in Boston Harbor

Seminar Discussion: all readings Led by:

PM: **Field trip to the Mystic**

Thursday, October 11

Readings

- A brief history of water in Boston
- Siegener and Chen 2002 – Caffeine in Boston Harbor seawater
- Hunt and Slone 2010 – Long-term monitoring using resident and caged mussels in Boston Harbor yield similar spatial and temporal trends in chemical contamination
- Lee et al 2004 - Ciliate populations as bio-indicators at Deer Island Treatment Plant
- Excerpts from Political Waters: History of the Boston Harbor (Eric Jay Dolin) – pages TBD

AM: **Lecture 08.** The history of the Boston Harbor

Seminar Discussion: all readings Led by:

PM: **Field trip to the Charles**

Friday, October 12

ALL DAY Field trip: Deer Island Sewage Treatment Plant

Class brainstorm: Boston Harbor - how clean is clean enough?

WEEK 3:

Monday, October 15

Readings

- ➔ Rowe and Hutchings 2003 – Mating systems and the conservation of commercially exploited marine fish
- ➔ NOAA Essential Fish Habitat Report on the Atlantic Cod (1999)

AM: **Lecture 09.** *Dan Ullucci, Rhodes College:* The history of cod decline in New England (*with Jess Pesce*)

Seminar Discussion: all readings Led by: _____

PM: Free – work on projects

Tuesday, October 16

ALL DAY Field trip: Gloucester Maritime

Class brainstorm: The Complexity of Cod discussion

Wednesday, October 17

AM: Project meetings

PM: Free – work on projects

Thursday, October 18

AM: Free – work on projects

PM: Free – work on projects

Friday, October 19

Readings

- ➔ 1-page Seabrook fact sheet
- ➔ Saila et al 1997 – Equivalent adult estimates for losses of fish eggs, larvae, and juveniles at Seabrook Station
- ➔ Burger et al 2011: Information needs for siting new, and evaluating current, nuclear facilities: ecology, fate and transport, and human health

ALL DAY Field trip: Seabrook Station Science & Nature Visitors' Center

Seminar discussion: all readings Led by: _____

WEEK 4:

Monday, October 22

Readings

- Pickett et al 2011 – Urban ecological systems – scientific foundations and a decade of progress
AM: **Lecture 10:** How to give an effective scientific presentation

Seminar Discussion: all readings Led by: _____

PM: Free- work on projects

Tuesday, October 23

Readings

- TBD

Seminar Discussion: all readings Led by: _____

NEAq Field Trip: Climate change, oceans, and CO2: what to do about it (W2O event) at NEAq IMAX

Wednesday, October 24

All day project analysis & preparation for final presentations

Thursday, October 25

Final presentations

Optional final exam



VII. Academic Conduct

It is each student's responsibility to know and understand the provisions of the Academic Conduct Code in the College of Arts and Sciences. The Code is available online at <http://www.cs.bu.edu/ugradprogram/conduct.html>. Cases of suspected misconduct will be referred to the Dean of the College. If the Dean's office comes to the conclusion that cheating or plagiarism have occurred, a grade of zero will be awarded for the assignment in question.

DRAFT October Calendar – MARINE URBAN ECOLOGY

~ October 2012 ~						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 COURSE STARTS	2 NAHANT TRIP	3 SCAVENGER HUNT	4	5 BUZZARDS BAY FIELD TRIP	6
7	8 NO CLASS	9 NEPONSET RIVER TRIP	10 MYSTIC RIVER TRIP	11 CHARLES RIVER TRIP PM: Dr. Andy Danylchuk	12 DEER ISLAND FIELD TRIP	13
14	15 COD – Dr. Dan Ullucci	16 GLOUCESTER FIELD TRIP	17	18	19 SEABROOK FIELD TRIP	20
21	22	23 W2O event at NEAq IMAX	24	25 RESEARCH PROJECT SYMPOSIUM	26	27
28	29	30	31	Notes: RED = scheduled field trips		

NOTE: This is a DRAFT – all trips are tentative until the start of the course (Oct 1).