Cape Cod Green Infrastructure – Alternative Approaches to Ecosystem & Water Quality 2015

Syllabus

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Schedule: Fridays 12:30 - 2:30 PM

Practicum Description

This Practicum will examine a broad range of emerging technologies that are designed to restore water quality and ecosystem health using natural (green) processes that incorporate recycling of nutrients and provide attractive alternatives to conventional technologies. It is designed to produce a guidance document for the purpose of informing stakeholders about these technologies with the goal of advancing their implementation.

Examples of green infrastructure that will be explored in the course include constructed wetlands, rain gardens, bioretention systems, green roofs, phytoremediation, permeable reactive barriers, shellfish bed restoration, aquaculture, fertigation systems, and ecotoilets. These technologies show significant promise for water quality and ecosystem restoration, with many co-benefits including resiliency to climate change, low energy costs, low maintenance, and local job creation.

The Practicum is designed to give students an understanding of green infrastructure, the challenges associated with the development and implementation of emerging technologies. It will include a field trip to Cape Cod, Massachusetts to visit sites where these technologies are being pilot tested and to meet with organizations and individuals who are engaged in watershed planning and permitting as part of the Cape Cod 208 Water Quality Plan – an innovative regional planning process conducted by the Cape Cod Commission and authorized by the U.S. Environmental Protection Agency (USEPA) and the Massachusetts Department of Environmental Protection (MADEP).

The Practicum provides an opportunity to learn about green infrastructure – the principles of designing emerging technologies, what the technologies are, how they are being utilized, barriers and hurdles for their adoption, and an adaptive management process that
can enable the integration of these technologies into our society by managing risks and optimizing benefits.

**Class Schedule**

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<tr>
<th>Date</th>
<th>Activity</th>
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<tr>
<td>January 16</td>
<td>Introduction to Practicum, discuss goals and opportunities, background on Cape Cod 208 project</td>
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<td>January 23</td>
<td>Discuss various options for outreach document (web, app, flyer, etc), 208 progress update</td>
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<td>January 30</td>
<td>Assignments of technologies, organize into four groups of two students (two technologies each), 208 progress update</td>
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<td>February 6</td>
<td>Updates on readings, reports from each group, discussion of video and web technology options</td>
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<td>February 20</td>
<td>Conference Call with Sia Karplus (Green Infrastructure Coordinator, Town of Falmouth, MA)</td>
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<td>February 27</td>
<td>Discuss format for technology descriptions, updates on technology options</td>
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<td>March 6</td>
<td>Share sample technology descriptions, develop pilot project map</td>
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<td>March 13/20</td>
<td>No Meeting - Spring Break</td>
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<td>March 27</td>
<td>Plan details for field trip and meeting with Cape Cod Commission</td>
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<td>April 3</td>
<td>Plan details for field trip and meeting with Cape Cod Commission</td>
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<tr>
<td>April 10</td>
<td>Field Trip to Cape Cod, visit technology pilot projects and meeting with Cape Cod Commission</td>
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<tr>
<td>April 17</td>
<td>Review videos and finalize web site format, review and edit pilot project map and descriptions</td>
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<td>April 24</td>
<td>Final Presentations by students</td>
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**Required Readings for All Students:**
Introduction to TMDLs [http://www.epa.gov/owow/tmdl/intro.html]

Reference Materials for Individual Technologies:

*Eco-Toilets:*


Phytoremediation:

Fort Worth, T. X. “Phytoremediation at Naval Air Station–Joint Reserve Base Fort Worth.” Technology (2005).


Permeable Reactive Barriers:


**Constructed Wetlands:**


Matamoros, Víctor, Carlos Arias, Hans Brix, and Josep M. Bayona. “Removal of
pharmaceuticals and personal care products (PPCPs) from urban wastewater in a pilot vertical flow constructed wetland and a sand filter.” Environmental science & technology 41, no. 23 (2007): 8171-8177.


Wallace, Scott D., and Robert Lee Knight. Small-scale constructed wetland treatment systems: feasibility, design criteria, and O&M requirements. WERF, 2006.


Oysters and Aquaculture Restoration:


Maryland Interagency Oyster Restoration Workgroup “Harris Creek Oyster Restoration Tributary Plan: A Blueprint to restore the oyster population in Harris Creek” Report prepared by participants from Oyster Recovery Partnership, US Army Corps of Engineers, Maryland Dept. of Natural Resources and NOAA (2013)


Oyster Metrics Workgroup “Restoration Goals, Quantitative Metrics and Assessment Protocols for Evaluating Success on Restored Oyster Reef Sanctuaries.” Report prepared for the Sustainable Fisheries Goal Implementation Team of the Chesapeake Bay Program (2011)


