

## **Sustainable Sites**

Instructor: Carolyn Gaidis

Course Time: Assume 3 consecutive hours each week

RM: GIVENS

*Spring 2011*

### **COURSE OUTLINE**

#### **Synopsis:**

Using the guidelines from the "Sustainable Sites Initiative" as a base idea, this elective course will provide interdisciplinary methodologies related to recent technologies involving landscape ecology, green infrastructure, habitat and wetland restoration, green roof design systems, soil structure and remediation, urban agriculture, storm water remediation through topographical manipulation, bioswale and rain garden sizing and design, arboriculture and other systems that assist in creating and maintaining micro and macro balanced ecosystems. The course is divided into topics promoting landscape, urban design and architecture as systems not in isolation from each other. The class will focus on applying the technology to sites of varying typologies.

#### **Objectives:**

The weekly elective class will combine technological/scientific knowledge, research, and practical applications. The goal is for the students to take the technology learned from lectures and research/readings and apply it in innovative ways. To apply the technology to design solutions that not only function but are also meaningful and thoughtful designs. The methods and systems learned will be applied to a chosen areas in the Saint Louis region. The sites may correspond to studio sites if located within the St. Louis region.

#### **Class Structure:**

Each class will have an informational lecture component that will present the latest in technologies of sustainable systems. The class readings will correspond with the lecture topics and a subsequent discussion will follow or be intertwined into the lecture presentation itself. The application of the information will be in a clear, concise weekly exercise based on at least 2 different site typologies at one time. For example: the student will be expected to calculate the area and depth required for a bioswale on an urban lot site and/or a suburban site.

**NOTE:** Copies of the readings will be scanned into the elective's folder on the courses drive and technical data will be available on 2-HR reserve at the library. Some information may be in handout format for students.

#### **Participation:**

Class attendance and participation is mandatory. Three excused absences are allowed without penalty. Any additional absence will result in a 10% drop in the total course grade per absence. Work in the course is subject to all university rules on academic misconduct. Plagiarism, the use of ideas or words of another person as if they were one's own or without crediting the source, is strictly forbidden. Arrangements for late submission of work must be made in advance and will be at the discretion of the instructor.

## Grading:

Participation in lectures & discussions	20%
Weekly applications of technologies	60%
Final sustainable innovations for chosen site	20%

## Schedule and Required Assignments

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### 01.19.11-Introduction. Sustainable Sites Initiative and overview of course.

**01.26.11-Global climate regulation** -Maintaining balance of atmospheric gases at historic levels, creating breathable air, and sequestering greenhouse gases

**02.02.11-Local climate regulation** -Regulating local temperature, precipitation, and humidity through shading, evapotranspiration, and windbreaks

### 02.09.11- Food and renewable non-food products

**LECTURE:** Urban Agriculture, composting...

**READINGS:** *Urban Farm-Sustainable City Living*. Volumes 1(Fall 2009)-Spring of 2011

**ASSIGNMENT:**

### 02.16.11- Waste decomposition and treatment

### 02.23.11-Erosion and sediment control-

**LECTURE: Preserving and/or restoring vegetative cover**

Removing existing vegetation disturbs soils and has other consequences as well. Without vegetation, a site loses its natural capacity for stormwater management, filtration, and groundwater recharge. Reduced vegetative cover also affects soil health, because vegetation maintains soil structure, contributes to soil organic matter, and prevents erosion.

**Use of Grading techniques to thwart erosion and sedimentation issues.** Excess sedimentation: Removing vegetation increases the likelihood of erosion, which contributes to increased sediment runoff.

**READINGS:** *Site Engineering for Landscape Architects.Chapters:xxxx*

Handouts from Professor.

**ASSIGNMENT:** Controlling erosion and excessive sedimentation through the re- grading and re-planting of your site. Assume a disturbed area occurs on your site due to construction.

### 03.02.11-Pollination

### 03.09.11-Brownfield mitigation-

**LECTURE:** Remediation processes. including Bioremediation, phytoremediation...

**READINGS:**

**ASSIGNMENT:** Each one of you will be given a different brownfield pollutant issue. Using the given information devise a plan to clean it up.

### 03.16.11-spring break-no class

**03.23.11-Habitat functions** Providing refuge and reproduction habitat to plants and animals, thereby contributing to conservation of biological and genetic diversity and evolutionary processes. Along with habitat loss, exotic invasive species are a major cause of loss of biodiversity and species. Increasing the use of native plants in landscape design reduces the risk from invasive species.

**03.30.11- Water supply and regulation**

**LECTURE:** Bioswale and raingarden sizing, design and construction.

**READINGS:** *Residential Bioretention Area Maintenance Plan*-MSD

*Rain Gardens: Managing water sustainably in the garden and designed landscape.*

**ASSIGNMENT:** Calculate the area of runoff on your site's surfaces. Roof/vegetative areas/impervious surfaces such as driveways, patios or parking areas using MSD formulas. Create a bioswale or raingarden to stop the water runoff from leaving your site. 90% of runoff detained is MSD's requirement.

**02.19.11- Saturday** Trip to Habitat for Humanity single -family homes in North St. Louis. Bioswale/raingarden construction.

**04.06.11-Human health and well being benefits**

**LECTURE:** Healthy ecosystems are the source of the many intangible—but no less real and measurable—benefits that humans derive from a relationship with nature. For one thing, access to nature encourages physical activity, which can result in weight loss and overall improvements in health. Physiological benefits of viewing and interacting with nature.

**READINGS:**

**04.13.11-Air and water cleaning**

**LECTURE:** Green roof design solutions. Methods, design and construction.

**READINGS:** Peck, Steven. *Green Roof infrastructure: Design and installation 201*. Green Roofs for Healthy Cities. 2006. Van Valkenberg book.

**ASSIGNMENT:** **Chose the most efficient green roof system for your structure's roof. Design the green roof with appropriate plantings and provide both plan and section.**

**04.16.11-Saturday** trip to either the Centene Tower green roof in Clayton or to Bowood gardens to tour the green roof on site. Time to be coordinated by Ms. Gaidis.

**04.20.11-Cultural benefits**

**04.27.11-Presentations**

**05.04.11-Presentations**

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**Reserved Bibliography and Readings-2 hour reserve in Architecture Library-unless noted**

**Books:**

- Barnes, Peter. ***Climate Solutions: What Works, What Doesn't and Why***. 2008. Chelsea Green Publishing Company. Simplistic but hits all of the points.
- Benyus, Janine M. ***Biomimicry: innovation Inspired by Nature***. 1997. Harper Collins Publishers. the bible for those who believe in this approach.
- Dinep, Claudia. ***Sustainable Site Design: Criteria, Process, and Case Studies for Integrating Site and Region in Landscape Design"***
- Dunne, Thomas & Leopold, Luna. 1978. ***Water in Environmental Planning***. W.H. Freeman and Company. WEST C#TD160.D85. A Mathematical read so a bit painful but sift through it.
- Dunnett, Nigel & Hitchmough, James. 2004. ***The Dynamic landscape: design, ecology and management of naturalistic urban planting***. London; New York: Spon Press. C# SB473 .D95
- Dunnett, Nigel & Clayden, Andy.2007. ***Rain Gardens: Managing water sustainably in the garden and designed landscape***. Portland, Oregon; Timber Press. Beautifully done and great case studies.
- Edwards, Andres R. ***Thriving Beyond Sustainability: Pathways to a Resilient Society***
- Farr, Douglas. ***Sustainable Urbanism: Urban Design With Nature***
- Forman, Richard T. T. 1995. ***Land Mosaics : The Ecology of landscapes and regions***. Cambridge ; New York: Cambridge University Press. C# : GE170 F57
- Girling, Cynthia & Kellett, Ronald. 2005. ***Skinny Streets & Green Neighborhoods: Design for Environment & Community***. Island Press. C#HT167.G57. Amazing book. Talks about Green infrastructure and can be referenced back to several essays in the ***Landscape Urbanism Reader*** edited by Charles Waldheim.
- Gore, Al. 2009. ***Our Choice: A Plan to Solve the Climate Crisis***. Rodale Publishing. While sophmoric-and a bit outdated already, still a good basic read.
- Kormondy, Edward J. 1984. ***Concepts of Ecology. Third edition***. Prentice Hall. New Jersey. WEST C# QH541 K59.
- Johnson, Bart, and Kristina Hill. 2002. ***Ecology and Design : Frameworks for learning***. Washington, DC: Island Press. C# : SB472.45 .E39
- McHarg, Ian L., and American Museum of Natural History. 1969. ***Design with Nature***. 1st ed. Garden City, N.Y.: Published for the American Museum of Natural History (by) the Natural History Press. HC110 E5 M33. The Bible for Landscape Ecologists and Planners. The basis we built from and are still building ideas from.
- Peck, Steven. ***Green Roof infrastructure: Design and installation 201***. Green Roofs for Healthy Cities. 2006. Document source from the course Ms. Gaidis received her green roof design certification. Will be supplemented by handouts more up to date and possible class visit from a local green roof installer.

Vaclav, Smil. 1999. ***Energies: An Illustrated Guide to the Biosphere and Civilization***. MIT Press. It is from MIT, a beautifully written book explaining everything since hunters and gatherers.

Van Der Ryn, Sim & Cowan, Stuart. 1996. ***Ecological Design***. Island Press. C#GE170 .V36. Mixes theory with technology. Very well written.

Strom, Steven, Woland, Jake & Nathan, Kurt. 2009. ***Site Engineering for Landscape Architects***. John Wiley and Sons Publishing.

S Loizeaux-Bennet, "***Stormwater and Nonpoint-Source Runoff: A Primer on Stormwater Management***," *Erosion Control* 6, no. 7 (1999): pp. 56–69. handout and technical.

LEED-ND Core Committee, "***Understanding the Relationship between Public Health and the Built Environment***," May 2006, p. 69. Technical handout.

D Pimentel, L Lach, R Zuniga, and D Morrison, "***Environmental and Economic Costs of Nonindigenous Species in the United States***," *BioScience* 50, no. 1 (2000): pp. 53–65. technical handout.

McPherson, Nowak, and Rowntree, "***Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project***."

#### **Periodicals:**

Urban Farm-Sustainable City Living. Volumes 1(Fall 2009)-Spring of 2011

Urban Land-ULI's Magazine

Landscape Architecture Magazine-will site examples of some relevant (good and bad) projects in class lectures.

Harvard Design Magazine No. 31. ***Sustainability Pleasure: vol.11, Landscapes, Urbanism and Products***. Read the whole thing.

PennDesign: Mostly for James Corner and Anu Mathur projects.

#### **Websites/Resources:**

<http://www.sustainablesites.org/> (sustainable site initiative website)

<http://www.mobot.org/> (Missouri Botanical Garden)

<http://www.usgbc.org/> (United States Green Building Council)

<http://www.asla.org/ContentDetail.aspx?id=14444> (ASLA Resource Center)

<http://www.uli.org/> (Urban Land Institute)

<http://stlouis.missouri.org/slcdc/> (St. Louis Development Corporation)

<http://www.rhcda.com> (Regional Housing Community Development Alliance)

<http://www.ewgateway.org/> (East-West Gateway Council) ; includes link to the 2035 Legacy Transportation Vision Plan

<http://www.modot.org/StLouis/> (Missouri Department of Transportation St. Louis District)

<http://ded.mo.gov/> (Missouri Department of Economic Development)

Sustainable Sites

<http://www.co.st-louis.mo.us/plan/ocd.html> (St. Louis County Community Development)

<http://gis.stlouisco.com> (St. Louis County GIS interactive maps)

<http://www.greatrivers.info/> (Great Rivers Greenway organization)

<http://www.mostateparks.com/> (Missouri State Parks and Historic Sites)

<http://www.dnr.mo.gov/> (Missouri Department of Natural Resources)

<http://mdc.mo.gov/> (Missouri Department of Conservation)

<http://www.eslarp.uiuc.edu/ibex/archive/> (Illinois Bottomland Explorer IBEX; Database of East St. Louis historical documents, prepared by UIUC's ESLARP)

<http://www.eslarp.uiuc.edu/> (UIUC's ongoing East St. Louis Action Research Project)

<http://msdis.missouri.edu/> (Missouri Spatial Data Information Service; links to GIS data by city/county)

<http://www.shawnature.org/nativeland/MSD.aspx> (MSD plant lists for bioswale/raingarden/wetland/prairie plantings

native to Midwest)