

Lafayette College

Course Syllabus (Tentative)

VAST 203.01/02 Sustainability of Built Systems

Spring 2013

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X5413 <http://lafayette.parameterid.com/>

Lectures: Section 01: Tuesdays/Thursday 8:00 – 9:15 am in AEC 325
Section 02: Tuesdays/Thursday 11:00 – 12:15 pm in AEC 325

Office Hours: To Be Announced or by Appointment

WA: Section 01: Shannon Noll (nolls@lafayette.edu)
Section 02: Matthew Warrenner (warrenem@lafayette.edu)

Texts: No required texts; readings provided as needed and include excerpts from books, articles, and other sources. Access to many of these readings will be through links on the course website.
This is a seminar/discussion-based class – thus you are encouraged to bring additional news articles, observations, commentary to class that relates to sustainability of built systems.

Learning Objectives:

In this course we take a cross-disciplinary approach to explore the concept of sustainability and its application to built or engineered systems - e.g., a transportation network, a water supply and distribution system, an energy production and delivery system, etc. By the end of this course, we will be able to do the following:

- Define sustainability as a systems approach and explain its historical origin;
- Describe sustainability criteria and indicators and use these to identify the sustainable (or unsustainable) components of large-scale built systems;
- Apply fundamental scientific principles (biological, physical, chemical) to assess interactions with natural systems;
- Describe some of the major ecological issues related to sustainable development, including management of resources, growth of cities, developing human capital, and sustaining ecosystems.
- Discuss how technical and non-technical issues are considered by engineers during design;
- Demonstrate based on a basic understanding of life-cycle environmental assessment and life-cycle costing how these tools are used assess and quantify interactions that occur between built and/or natural systems;
- Apply assessment tools to help in the comparison of the sustainability of different products and systems;
- Identify moral problems and dilemmas in engineering projects and sustainable development projects
- Demonstrate knowledge of several ethical principles/theories and their application in decision making
- Demonstrate familiarity with the code of ethics of their future profession
- Apply fundamental humanistic and moral reasoning principles to explore interactions with ethics and public perception;
- Describe the sustainable (and/or unsustainable) components of several large-scale examples (water systems, energy systems, food systems, etc).

Academic Integrity Statement: “Students are expected to be honorable, ethical, and mature in every regard” No form of scholastic misconduct will be tolerated. Academic dishonesty includes cheating, fabrication, falsification, plagiarism, complicity, and copying homework. It is the student’s responsibility to comply with the *Lafayette College Student Handbook* (www.lafayette.edu/student_life/) and to be familiar with the *Principles of Intellectual Honesty* (www.lafayette.edu/academics/honesty.pdf). Violations will be handled in accordance with the Procedural Standards in Disciplinary Proceedings stated in the *Student Handbook*.

Course Topics:

The course is organized for flexibility. The topics listed below are tentative and may be modified by the instructor during the semester, which will allow us to adjust the amount of time spent on each topic based on class interest and to choose alternate routes in the process of exploring the course topics and building community. Students will be advised in a timely manner of assignments, due dates, and required readings. If you have any questions at any time during the semester, please stop by my office and/or email me (pervizpm@lafayette.edu).

Introduction:

Overview, Easter Island, History of Sustainability, Brundtland Report, Dimensions of sustainability, Challenges to Sustainability, Developed vs. Developing, UN Millennium Development Goals, Utopias & Dystopias, Global Risk 2013

Sustainability and the Systems Approach:

Systems & their boundaries – stages, decision makers, boundaries, spatial aspects (gate-to-gate, cradle-to-grave), Supply chains & webs as systems, Product design, Built systems: Water, Sewer, Roads, Buildings

Exploring the Interaction between Natural and Built Systems:

Measurement of impacts and sustainability, Material and energy balances, Fate and transport of pollutants, Ecosystems, carrying capacity, and the tragedy of the commons, Example Footprint calculations, Toxicology and risk assessment, Mitigation, Development of Sustainability Assessment Criteria and Indicators.

Large-scale Built System Examples:

Water, Energy, and Food (Colorado River Basin, Ogallala Aquifer, Transportation Systems, Green Building Systems)

Role of Technology, Government, Corporations & Society:

Role of technical and non-technical issues in shaping engineering decisions, Impact of Technological Advances, Government Policies and Initiatives, Corporate responsibilities and policies, Global 100, Public perception, Public policy development.

Life Cycle Assessment:

Life Cycle Assessment of impacts from cradle to grave, Matrix rating, Inventory, Impact, Improvement analysis, LCA calculators and tools,

Life Cycle Costing:

Time value of money, equivalence, interest and inflation, Value of human life, Comparative economies of systems/products using life cycle costing, Cost-Benefit analysis, Transportation and Building systems

Exploring the Interaction between Built Systems and the Economy:

Indirect costs, intangibles, & equity, Market initiatives for polluters, Carbon offsets, Natural capitalism & full accounting.

Sustainability Legislation, Voluntary Codes and Rating Systems:

U.S. Green Building Council LEED (Leadership in Energy and Environmental Design) green building rating system. Energy Star program, ASCE Prime Standard, Green Architecture

Exploring the Interaction between Moral Reasoning, Society & Built Systems:

The role of morality and ethics (utilitarianism, respect for persons). Responsibility vs. Obligation of Individuals and Societies, Ethical decision making processes, Inter – and Intra-generational equity, NSPE code of ethics.

Social Justice Framework/Large Scale Built System Examples:

Environmental and social justice, Environmental racism, Asian Carp, Three Gorges Dam, Peru Mining

Student Presentations and Discussion

Grading:

Class Attendance, participation, and leadership:	20%
Homework and in-class assignments:	20%
Writing Assignments:	30%
Semester Project (paper 20%, Presentation 10%):	30%

Class Participation and Leadership: Your learning will take place both during and outside of formal class times, including field trips. Reading and response writing assignments must be completed prior to the class during which they will be discussed. You are expected to participate during class discussions in addition to asking and answering questions and to work effectively with your colleagues on any in-class activities.

Out of Class Required Work:

In compliance with the federal definition of a four credit hour course we will have weekly scheduled activities as a part of this course. These activities include viewing and discussion of material in multi-media form, course related trips, presentations by visitors, and scheduled instructional session for use of tools and methodology. All scheduled activities are connected to a particular set of assignments and exercises. Attendance is mandatory.

Homework/Assignments: Homework and in-class assignments require a mix of reading, writing, and calculations. All assignments should be completed in a professional manner and are due at the beginning of class on the due date. Unless previous arrangements are made, late homework will receive a grade of zero.

Semester Project: In addition to several writing assignments throughout the semester, the course will include a major term project consisting of several stages. The semester project will focus in more detail on sustainability as it applies to a particular built system(s). Each student will prepare a report of approximately 10-14 pages that includes a) background, b) discussion of the extent of the sustainability focus, c) discusses quality of data sources referenced, d) describes of each aspect of sustainability assessed, including the criteria and indicators used and methods applied, e) summarizes the results of the sustainability assessment performed, f) discusses applicable codes, laws and policies, g) summarizes the broader context for this built system, and h) presents the conclusions of the system assessment. Each student will meet with the VAST Writing Associate twice for this assignment – once early in the process with a draft report (during Week 8) to discuss the approach and organization, and subsequently to review a complete draft of the document (during Week 12). The paper will provide a chance for you to strengthen your general thinking, organizational and written communications skills. More information will be provided later in the semester.

Required Writing Associate Meetings: To help integrate the study of writing in courses throughout the curriculum, Lafayette established a College Writing Program (CWP). CWP provides individualized instruction to help you identify potential writing problems before your professor reads a paper. You will meet with a Writing Associate (WA) four times this semester. The WA assigned for section 01 is Shannon Noll, and for section 02 is Matthew Warrenner. Your WA will meet with each of you in conferences to discuss drafts of your written work and engage you in conversation about your writing so that you can revise it effectively. Each of you will meet with your WA out-side-of class four times this semester, with each conference typically lasting about 30 minutes. The weeks that the meetings will take place will be announced in advance (usually a week before the assignment is due). All students, regardless of their writing abilities, should benefit from working with the WA, and therefore you are required to participate. Your WA is obligated to inform me of any late or missed meetings. If you miss a meeting your assignment grade will be reduced by 10 points. WA Drop-in hours for any Lafayette Students (No appointment is necessary) are held Sun.–Thurs., 6–9 pm, Watt Writing Room, Pardee 319. For more information look at <http://cwp.lafayette.edu/>

Standards of Academic Honesty in Written Work:

Whether you are in class, completing written assignments, or working on homework, you are expected to display the **utmost academic integrity**. This means that all written assignments must be solely your own work, the work of others must be cited correctly, and that you avoid misrepresenting the truth at all times. The issue of plagiarism and how to avoid it is important in all your classes that involve writing, including this one. Cases of plagiarism or unauthorized collaboration with others will constitute an act of academic dishonesty, as outlined in the Lafayette College *Student Handbook*, and will be dealt with according to College policy. Students are sometimes found guilty of academic dishonesty even when the act was committed unintentionally. Please understand these policies.

Because all intellectual work builds on the ideas of others, it is essential to **provide appropriate citations to the sources you consult, whether they are paraphrased or quoted directly**. Since scientific, fact-based papers are strengthened by the use of expert sources of information, you should seek out sources that strengthen your arguments or that argue other ideas or positions in your work. Every source needs to be cited in the paper in the

text itself wherever information from that source is paraphrased or quoted. See *The St. Martin's Handbook* for proper MLA citation format. As you perform research and track down sources be sure that you collect enough information about the source (author, title, publication, date, etc.) so that it is easy to cite the source in your draft and final papers. If you are not sure of what is expected concerning citations, or what constitutes academic dishonesty, please ask me before proceeding.

Students with Disabilities:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation or require assistance with academic concerns/accommodations, please contact the Office of the Dean of the College (610-330-5080) at Lafayette.

Course Communication:

E-mail will be used to communicate information about the course and any course cancellations. Also, there is a web site set up for this course <http://lafayette.parameterid.com/> that will provide additional information on assignments and readings.