

**VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY**  
**COLLEGE OF NATURAL RESOURCES**  
*NATIONAL CAPITAL REGION*

*Course Syllabus*

**SUSTAINABILITY SCIENCE**

**NR 5864, CNR 17158**

**Spring Semester 2009**

**Meeting Times**

Every Thursday, 7:00 to 9:45 PM. First class is January 22.

**Course Location**

Virginia Tech, Alexandria Center, 1021 Prince Street, Alexandria, Virginia

**Course Credits**

3 Semester Credits

**Course Instructor**

Mansi Grover Vyas, Ph.D.

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**Office Hours**

By appointment; please call or e-mail for mutually convenient time.

**Course Description**

Sustainability science is a new transdisciplinary approach that recognizes the limitations of traditional scientific inquiry in dealing with the complex reality of social institutions interacting with natural phenomena. This course will examine the “Core Questions of Sustainability Science” in a holistic and systemic manner, emphasizing critical thinking, synthesis, and integration. Students will explore how are long-term trends in environment and development, including consumption and population, reshaping nature-society interactions in ways relevant to sustainability. The international community has made limited progress in evaluating and mitigating the environmental costs of economic growth and sustainable development worldwide. New challenges and roles for scientists, however, are emerging in the formation of principles and practices of sustainability. This course examines both the role and limits of natural resources and the environment in relation to human political, social, and economic goals and aspirations. We will explore global environmental concerns related to “progress” and “development.” A central issue

will be can scientifically meaningful “limits” or “boundaries” be defined that would provide effective warning of conditions beyond which the nature-society systems incur a significantly increased risk of serious degradation? Throughout the course, we will provide readings, films, and guest lectures on scientific and societal issues.

### **Course Prerequisites**

Baccalaureate degree and professional experience.

### **Course Objectives**

- To examine critically the core questions of sustainability science.
- To understand the biogeophysical laws governing human activities and institutions.
- To explore uses and limits of major categories of natural resources supporting human enterprise.
- To understand the scope and trends of key environmental problems on a global scale.
- To apply concepts of carrying capacity and ecological footprints to determining the potential for long-term sustainability of natural systems and human societies.
- To examine the implications of various social, economic, and political dimensions of sustainability.
- To understand the role of scientific information in shaping institutional frameworks to address sustainability issues.
- To evaluate the differences, linkages, and conflicts in sustainable development, economic development, and sustainability.
- To assess potential options, strategies, and outcomes for achieving sustainability.

### ***Required Texts:***

National Research Council. 1999. *Our Common Journey: A Transition Toward Sustainability*. National Academy Press. Washington, DC. 363 pp.

Brown, Lester R. 2006. *Plan B 2.0: Rescuing a Planet under Stress and a Civilization in Trouble*. W. W. Norton and Company. New York, NY. 365 pp.

### ***Supplemental Readings***

There will be articles from scientific and professional journals and other sources, including excerpts from books and newspaper clippings that will be added to the readings described in this version of the syllabus.

### ***Additional requirements***

Internet access and an e-mail address are required for this class. Internet access is available at the NVC Library and enrolled students will be assigned an e-mail account.

## **COURSE CALENDAR**

- January 22: Introduction to Sustainability Science
- January 29: Sustainability: What is it?
- February 5: Sustainability and Sustainable Development
- February 12: Livable Communities and Sustainability  
Sustainability Science
- February 19: Core Questions of Sustainability  
Human Dimensions of Sustainability
- February 26: Sustainability Goals, Principles, and Indicators  
Global Environmental Problems, Indicators, and Trends
- March 5: Population and Resources  
Consumption: Patterns and Implications
- March 12: *Spring Break*
- March 19: Ecological Footprints and Carrying Capacity
- March 26: Biodiversity, Ecosystem Services, and the State of the Planet
- April 3: Biogeophysical and Ecological Laws
- April 10: Political Economy and Ecological Economics
- April 17: Precautionary Principle and Adaptive Management
- April 24: Class Presentations - Sustainability: Sustainable Development  
or Economic Development
- May 1: Class Presentations – Implications for Civil Society and Global Security  
International Cooperation, Institutions, and Programs
- May 8: Class Presentations - The Future: Options and Outcomes
- May 15: Course Evaluations

## **EVALUATION POLICIES**

*Classroom participation (30%)* Each student will be expected to contribute to the learning environment by participating in classroom discussions based on readings assigned for that week. Arrangements can be worked out for a limited number of absences due to conflicts in work schedules.

*Short Papers (30%)* Each student will write two 5-6 page papers reviewing and summarizing information gleaned from book chapters, journal articles, and other sources on sustainability topics selected by the student. First paper: The student will read source documents concerning sustainability related to a selected environmental or natural resources topic, summarize the key issues in the status and trends, and critique the adequacy and limitations of the information. This paper will be due on March 13. Second paper: The student will read source documents concerning sustainability related to social, economic, and political issues, summarize the key issues of these cross-cutting topics, and critique the relationships with natural resource and environmental realities. This paper will be due on April 17.

*Oral presentation (10%)* Students will be responsible for choosing and presenting a case study for class discussion on one of the five sustainability topics listed in the syllabus during the last three class periods.

*Final paper (30%)* Summarize and analyze results of your Ecological Footprint data. Discuss the ecological implications of your Ecological Footprint in relation to **Sustainability**. Your grade will be determined on the basis of the critical thinking that you demonstrate in relation to the impacts, relationships, and consequences of your lifestyle and use of Earth's biosphere. Extra credit will be awarded for your analysis of the ways and degrees that your Ecological Footprint can be reduced. The final paper should be no longer than 10 double spaced pages and is due at the class meeting on May 1.

### **HONOR POLICY**

The tenets of the Virginia Tech Graduate Honor Code will be strictly enforced in this course, and all assignments shall be subject to the stipulations of the Graduate Honor Code as outlined in the Graduate Catalog. For more information on the Graduate Honor Code, please refer to the GHS Constitution, located online at <http://fbox.vt.edu/studentinfo/gradhonor/> Please contact the instructor immediately if you have questions.

### **SPECIAL ACCOMMODATIONS**

Students with special needs or circumstances are encouraged to meet with the instructor after the first class. If you need adaptations or accommodations because of a disability (learning disability, attention deficit disorder, psychological, physical, etc), if you have emergency medical information to share with the instructor, or if you need special arrangements in case the building must be evacuated, please make an appointment with the instructor as soon as possible (See contact information above). If you need captioning for videos, please let me know no later than two weeks in advance of date for viewing.

### **COURSE EVALUATIONS**

In the spirit of continuous improvement, the instructor seeks ways to improve this course and values your input. To that end, you will be asked to complete an

evaluation on May 8. At any point during the course, your suggestions and comments are most welcome.

### **INCLEMENT WEATHER**

Decisions about canceling classes during periods of inclement weather are made by the Northern Virginia Center Director in consultation with others. Students should listen to local media for information, but weather-related advisories affecting classes are posted at [www.ncr.vt.edu](http://www.ncr.vt.edu) and announced on the Weather Alert Line 703-538-8325.

**NOTE:** The course syllabus is a work in progress. Changes and updates will be made to accommodate the needs and interests of the students.