

# **Sustainability Course Materials (Learning Objects)**

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## Syllabi/Lesson Plan

### Course Name: [Responding to Climate Change](#)

- **Authors:** [Patrick Callahan](#), Stephanie Pfirman, Juerg Matter, Peter Schlosser
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14, lower-division)
- **Time Required:** 2 Hours
- **Type:** Syllabus
- **Summary:** Analysis of climate change adaptations, responses, and mitigation options. Consideration of impacts of projected climate changes including global water, food and health complemented by regional case studies. Scientific, technologic, economic, political, and behavioral aspects of potential solutions.

### Course Name: [Climate Change Course at the University of Toledo](#)

- **Authors:** [Michael Weintraub](#), Michael Weintraub Patrick Lawrence
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 3 Months
- **Type:** Syllabus
- **Summary:** This is for a one-semester course with no pre-requisite. An overview of the scientific understanding of climate change and role of human activities, including atmospheric processes, greenhouse effect, carbon cycling, physical evidence, impacts, and proposed global actions in response.

### Course Name: [Lesson Plans: Global Climate Change: The Effects of Global Warming - CLEAN](#)

- **Authors:** [Ginny Brown](#), Teachers Domain
- **Publisher:** [CAMEL](#)
- **Education Level:** College
- **Type:** Syllabus
- **Summary:** Activity takes three to four class periods. Technology to show videos and additional materials are needed. The activity follows a progression that examines the CO2 content of various gases, explores the changes

### Course Name: [Food and Climate Change](#)

- **Authors:** [Michael Finewood](#), David Hassenzahl
- **Publisher:** [CAMEL](#)
- **Education Level:** Professional/Graduate
- **Type:** Syllabus
- **Summary:** This course considers the reciprocal relationship between Earth's changing climate and the human production and consumption of food. With attention to current

theories and case studies, students will develop a comprehensive understanding of food systems in relation to global

**Course Name: Syllabus : Making Choices about Energy Technologies: A Major Challenge for Climate Mitigation**

- **Authors:** Michael Berger, Simmons College, Boston, MA
- **Publisher:** [CAMEL](#)
- **Grade Level:** College-Graduate
- **Type:** Syllabus
- **Summary:** This is a very useful matrix that helps students systematically go through most of the major energy technologies and consider the most important criteria that will affect social, economic, and political choices made about the energy economy. GOALS Objectives: Students who

**Course Name: Syllabus: Responding to the Challenge of Climate Change**

- **Authors:** [Elizabeth Davey](#)
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 15 Weeks
- **Type:** Syllabus
- **Summary:** This course features guest lectures from faculty across the university, sharing the approaches their disciplines bring to understanding the challenge of global climate change. The course considers the impacts of climate change and the reports of the Intergovernmental Panel on

**Course Name: WORLD WITHOUT OIL Game**

- **Authors:** [Ginny Brown](#), Dan McDowell, Ken Eklund
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 1 Hours
- **Type:** Syllabus
- **Summary:** The game lesson plans are cross-disciplinary and relate to Climate Change, Energy, American History, World History, Geography, Current Events,

**Course Name: CLIMATE DISRUPTION Science, Sustainability, Solutions**

- **Authors:** [Monty Hempel](#)
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Type:**
- **Sumamry:** The science of climate change is rapidly evolving into a science of climate disruption. While most forecasts of the magnitude of climate forcing impacts have not changed dramatically in the past decade, the observed rate of change.

## Multimedia

### Video: PETM: Unearthing Ancient Climate Change - CLEAN

- **Authors:** [Ginny Brown](#), American Museum of Natural History
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 18 Minutes
- **Type:** Video
- **Summary:** In this video, a team of paleontologists, paleobotanists, soil scientists, and other researchers take to the field in Wyoming's Bighorn Basin to document how the climate, plants, and animals there changed during the [Paleocene-Eocene Thermal Maximum \(PETM\)](#) when a sudden, enormous influx of carbon flooded the ocean and atmosphere for reasons that are still unclear to scientists. The PETM is used as an analog to the current warming occurring. The scientists' research may help inform our understanding of current increases in carbon in the atmosphere and ocean and the resulting impact on ecosystems. Supporting materials include essay and interactive overview of animals that existed in the Basin after the [PETM](#) event.

### Video: Changing Planet: Adaptation of Species (Birds and Butterflies) - CLEAN

- **Authors:** [Anna Malinowski](#)
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 6 Minutes
- **Type:** Video
- **Summary:** This video addresses the impact of climate change on several butterfly populations. Warming temperatures lead to shifts in location of populations of butterflies or die-offs of populations unable to adapt to changing conditions or shift to new locations.

### Video: What Are the Greenhouse Emissions from Nuclear Power? - Climate Change

- **Authors:** [Julia Baker](#), Climate Central
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 1 Minutes
- **Type:** Video
- **Summary:** This short video discusses the environmental and monetary costs of nuclear power. It would be a great video to use in a lesson about alternative energy. The educator could show a video on several different energy sources (wind, solar, thermal, nuclear, etc.) and then ask students to discuss which energy source or combination of energy sources they think would be best for the future.

### Video: Changing Planet: Black Carbon - CLEAN

- **Authors:** [Anna Malinowski](#)
- **Publisher:** [CAMEL](#)

- **Education Level:** College (13-14)
- **Time Required:** 6 Minutes
- **Type:** Video
- **Summary:** This video addresses two ways in which black carbon contributes to global warming - when in the atmosphere, it absorbs sunlight and generates heat, warming the air; when deposited on snow and ice, it changes the albedo of the surface. The video is effective in communicating about a problem frequently underrepresented in discussions of climate change and also public health.

#### **Video: Drilling Back to the Future: Climate Clues from Ancient Ice on Greenland - Climate Central**

- **Authors:** [Julia Baker](#), Climate Central
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 6 Minutes
- **Type:** Video
- **Summary:** This is an excellent video about how scientists use ice cores to study past climates. It could be integrated into a course about climate research.

#### **Video: Georgia: Coal and Carbon - Climate Central**

- **Authors:** [Julia Baker](#), Climate Central
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 10 Minutes
- **Type:** Video
- **Summary:** This video is long enough to give a comprehensive explanation of the use of coal for energy and its environmental effect, but still short enough to fit into a class lesson.

#### **From Mud to Molecules: What Deep Sea Sediments Can Tell Us about Past Climates - CLEAN**

- **Authors:** [Anna Malinowski](#)
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 5 Minutes
- **Type:** Video
- **Summary:** This video documents how scientists, using marine algae, can study climate change in the past to help understand potential effects of climate change in the future.

#### **Changing Planet: Fresh Water in the Arctic - CLEAN**

- **Authors:** [Anna Malinowski](#)
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)

- **Time Required:** 5 Minutes
- **Type:** Video
- **Summary:** This Changing Planet video documents scientists' concerns regarding how melting Arctic sea ice will increase the amount of fresh water in the Beaufort Gyre, which could spill out into the Atlantic and cause major climate shifts in North America and Western Europe. The video includes interviews with scientists and a look at the basics of how scientists measure salinity in the ocean and how ocean circulation works in the Arctic.

#### **Video: Earth as a System - WGBH - CLEAN**

- **Authors:** WGBH/Boston, Posted by Julia Baker
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 6 Minutes
- **Type:** Video
- **Summary:** This short video uses animated imagery from satellite remote sensing systems to illustrate that Earth is a complex, evolving body characterized by ceaseless change. Adapted from NASA, this visualization helps explain why understanding Earth as an integrated system of components and processes is essential to science education.

#### **Video: What We Known For Sure - Climate Central**

- **Authors:** [Julia Baker](#), Climate Central
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Time Required:** 2 Minutes
- **Type:** Resource
- **Summary:** This is a short video that gives a convincing case for human-caused carbon increase and, therefore, climate change.

#### **Simulation: The Global Carbon Budget 1960-2100 - CLEAN**

- **Authors:** [Julia Baker](#), Galen McKinley - University of Wisconsin - Madison
- **Publisher:** [CAMEL](#)
- **Education Level:** College (13-14)
- **Type:** Simulation
- **Summary:** This simulation allows the user to project CO<sub>2</sub> sources and sinks by adjusting the points on a graph and then running the simulation to see projections for the impact on atmospheric CO<sub>2</sub> and global temperatures.

#### **Simulation: Five-Year Average Global Temperature Anomalies 1880-2010 - CLEAN**

- **Authors:** [Julia Baker](#), Robert B. Schmunk, J Hansen, R Ruedy, Mki Sato, K Lo, NASA/Goddard Space Flight Center Visualization Studio
- **Publisher:** [CAMEL](#)



- **Education Level:** College (13-14)
- **Type:** Simulation
- **Summary:** This color-coded map displays a progression of changing five-year average global surface temperatures anomalies from 1880 through 2010. The final frame represents global temperature anomalies averaged from 2006 to 2010. The temperature anomalies are computed relative to the base period 1951-1980.

### **Simulation: CleanStart-Simulating a Clean Energy Startup**

- **Developer:** John Sterman, David Miller and Joe Hsueh
- **Publisher:** [LearningEdge](#)
- **Education Level:** College
- **Type:** Simulation
- **Summary:** In this live, web-based simulation, participants play the role of the founder of a new startup company in the exciting and competitive clean tech sector. Can you develop your technology into a successful company? Each quarter you must set prices, decide how many engineers and sales people to hire, and set compensation, including salary, stock, options and profit sharing. Will you pitch your firm to venture capitalists or bootstrap and remain 100% employee owned? Will you win customers and become cash flow positive before you run out of funds? Will you succeed and take your firm public?
- **Note:** request registration to use. User may use “Sunspot” or “SolarFlare” as screen ID to browse the simulation.

### **Eclipsing the Competition: The Solar PV Industry Simulation**

- **Developer:** [John Sterman](#)
- **Publisher:** [LearningEdge](#)
- **Education Level:** College
- **Type:** Simulation
- **Summary:** In this live web-based simulation, participants play the role of senior management at SunPower, a leading firm in the solar photovoltaic industry. The game simulates the solar PV industry as described in the SunPower case study. Users compete against other firms, simulated by the computer, and set the industry conditions so as to learn about strategy under different conditions relating to learning, knowledge spillovers, and competitor behavior.
- **Note:** request registration to use. User may use “Sunspot” or “SolarFlare” as screen ID to browse the simulation.

### **Fishbanks: A Renewable Resource Management Simulation**

- **Developers:** Dennis Meadows and John Sterman
- **Publisher:** [LearningEdge](#)
- **Education Level:** College
- **Type:** Simulation

- **Summary:** Fishbanks is a multiplayer web-based simulation in which participants play the role of fishers and seek to maximize their net worth as they compete against other players and deal with variations in fish stocks and their catch. Participants buy, sell, and build ships; decide where to fish; and negotiate with one another. Policy options available to instructors include auctions of new boats, permits, and quotas.
- **Note:** request registration to use. User may use “Sunspot” or “SolarFlare” as screen ID to browse the simulation.

### World Climate: Negotiating a Global Climate Change Agreement

- **Developers:** John Sterman, Thomas Fiddaman, Travis Franck, Andrew Jones, Stephanie McCauley, Philip Rice, Juliette N. Rooney-Varga, Elizabeth Sawin and Lori Siegel
- **Publisher:** [LearningEdge](#)
- **Education Level:** College
- **Type:** Simulation
- **Summary:** World Climate provides an interactive role-play environment through which participants explore the risks of climate change and the challenges of negotiating international agreements to reduce greenhouse gas (GHG) emissions. Participants play the roles of major GHG emitting nations and negotiate proposals to reduce emissions in a live, face-to-face setting.
- **Note:** request registration to use. User may use “Sunspot” or “SolarFlare” as screen ID to browse the simulation.

### Story of Stuff with Annie Leonard

- **Authors:** Annie Leonard, Tides Foundation & Funders Workgroup for Sustainable Production and Consumption
- **Publisher:** [The Story of Stuff Project](#)
- **Education Level:** High School, College General Ed, College Lower Division Mobile
- **Type:** Animation (Shockwave)
- **Summary:** “From its extraction through sale, use and disposal, all the stuff in our lives affects communities at home and abroad, yet most of this is hidden from view. The Story of Stuff is a 20-minute, fast-paced, fact-filled look at the underside of our production and consumption patterns. The Story of Stuff exposes the connections between a huge number of environmental and social issues, and calls us together to create a more sustainable and just world. It'll teach you something, it'll make you laugh, and it just may change the way you look at all the stuff in your life forever.”

## **Case Study**

### Environmental Management at IBM (A): Making Sustainability Sustainable through Passion and Process

- **Authors:** Rebecca M. Henderson and Paulina Ponce de León Baridó

- **Publisher:** [LearningEdge](#)
- **Education Level:** College Upper Division
- **Type:** Case Study (PDF)
- **Summary:** Environmental management had been an important facet at IBM dating back to the 1970s. The case describes the company's efforts in creating and managing sustainable practices.

### Materials Pooling (A): Opportunity and Potential of the Sustainability Consortium

- **Authors:** John Carroll, Art Kleiner, Joe Lauer, Benyamin Lichtenstein and Chris Page
- **Publisher:** [LearningEdge](#)
- **Education Level:** College Upper Division
- **Type:** Case Study (PDF)
- **Summary:** This case series describes the concept of materials pooling as a sustainability strategy for businesses and the challenges that such collaborations encounter.

### SunPower: Focused on the Future of Solar Power

- **Authors:** Joel Conkling, Rebecca M. Henderson and Scott Roberts
- **Publisher:** [LearningEdge](#)
- **Education Level:** College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Case Study (PDF)
- **Summary:** In late 2006, SunPower designed, manufactured, and delivered the most efficient solar cells in the world. At a time when many experts believed solar technology would grow quickly, SunPower needed to decide whether to maintain market share through a strategy of differentiated technology or pricing.

### Vermont City Electric

- **Authors:** Robert M. Freund and Jonathan Potter
- **Publisher:** [LearningEdge](#)
- **Education Level:** College Upper Division
- **Type:** Case Study (PDF)
- **Summary:** In late 2008, Vermont City Electric (VCE), a municipal electric utility company, needed to determine which investments in demand-side management (DSM) programs to undertake in the context of the budget restrictions it faced. Based on the information contained in the case, students must construct and solve a mixed-integer optimization model of VCE's operations over a six-year planning period in order to determine which DSM programs to implement and what the cost and carbon impact of these programs will be.

### Materials Pooling A, B, C

- **Authors:** Benyamin Lichtenstein, MIT Sloan School of Management
- **Publisher:** [LearningEdge](#)
- **Education Level:** College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Case Study (PDF)
- **Summary:** "This case series describes the concept of materials pooling as a sustainability strategy for businesses and the challenges that such collaborations encounter."

### [NASA AND TEACHERS GO GREEN: Second Nature](#)

- **Authors:** Megan Begley
- **Publisher:** [Second Nature: Education for Sustainability](#)
- **Education Level:** College General Ed
- **Type:** Case Study
- **Summary:** This is a resource for teachers in higher-ed. Second Nature was founded in Boston in 1993 by a small group of forward-thinking leaders that included Dr. Anthony D. Cortese, Senator John F. Kerry (D-MA), Teresa Heinz Kerry, Bruce Droste, and others. This group sought to establish an organization dedicated to bringing about the change in society that is vital to the success and livelihood of every current and future living being: a change for a just and sustainable future. We began with a multimillion dollar, ten year outreach and advocacy effort to catalyze such transformative change, change that would have universities produce students prepared for character and citizenship as well as commerce and career in the 21st century.

### [To Build a \(Better\) Fire](#)

- **Authors:** Burkhard Bliger, Conservation Magazine
- **Publisher:** [Conservation Magazine](#)
- **Education Level:** High School, College General Ed
- **Type:** Case Study
- **Summary:** Article and brief lesson plans from Conservation Magazine article on the benefits of improving basic fuel burning stove technology to combat climate change

## **Open Textbook**

### [Principles of Marketing](#)

- **Authors:** John K. (Jeff) Tanner (Baylor University); Mary Anne Raymond (Clemson University)
- **Publisher:** [MERLOT](#)
- **Education Level:** College Lower Division, College Upper Division
- **Type:** Open Textbook (can be customized by the instructor), PDF
- **Summary:** This is a free online textbook that can be read directly from the site. It can also be customized by the instructor. "Principles of Marketing by Tanner, Raymond and Schuster teaches the experience and process of actually doing marketing - not just the

vocabulary. It carries five dominant themes throughout in order to expose students to marketing in today's environment: Service dominant logic – This textbook employs the term “offering” instead of the more traditional First “P” – product. That is because consumers don’t sacrifice value when alternating between a product and a service. They are evaluating the entire experience, whether they interact with a product, a service, or a combination. So the fundamental focus is providing value throughout the value chain, whether that value chain encompasses a product, service, or both. Sustainability – Increasingly, companies are interested in the impact they are having on their local community as well as the overall environment. This is often referred to as the “triple bottom line” of financial, social, and environment performance. Ethics and social responsibility – Following on the sustainability notion is the broader importance of ethics and social responsibility in creating successful organizations. The authors make consistent references to ethical situations throughout chapter coverage, and end of chapter material in most chapters will encompass ethical situations.

### **Sustainability: A Comprehensive Foundation**

- **Authors:** Tom Theis, University of Illinois; Jonathan Tomkin, University of Illinois
- **Publisher:** [Connexions](#)
- **Education Level:** College General Ed, College Lower Division
- **Type:** Open Textbook (reusable)
- **Summary:** A free, open-source textbook available for viewing online or as a download for use on e-readers or printing. First and second-year college students are introduced to this expanding new field, comprehensively exploring the essential concepts from every branch of knowledge – including engineering and the applied arts, natural and social sciences, and the humanities. As sustainability is a multi-disciplinary area of study, the text is the product of multiple authors drawn from the diverse faculty of the University of Illinois: each chapter is written by a recognized expert in the field. Designed for the new generation of e-readers, the book can also be viewed in a browser, saved as a pdf, or printed.

### **Sustainability, Innovation, and Entrepreneurship**

- **Authors:** Andrea Larson, The Darden School of Business at the University of Virginia
- **Publisher:** [Saylor Foundation](#)
- **Education Level:** College General Ed, College Lower Division
- **Type:** Open Textbook (reusable)
- **Summary:** This is a free textbook offered by Saylor Foundation. This book is suited for the Entrepreneurship or Innovation course with an emphasis on Sustainability or for a course devoted entirely to Sustainability.

**The Sustainable Business Case Book** (if it does work, please copy and paste the link: [http://www.saylor.org/site/textbooks/Sustainable Business Case Book - Attributed 2.pdf](http://www.saylor.org/site/textbooks/Sustainable_Business_Case_Book_-_Attributed_2.pdf))

- **Authors:** Matt Magnusson, Michael Merenda, Ross Gittel
- **Publisher:** [Saylor Foundation](#)
- **Education Level:** College Upper Division, Graduate School
- **Type:** Open Textbook (reusable)
- **Summary:** 'The issue of sustainability and specifically sustainable business is of increasing interest and importance to students of business and also students in the sciences, government, public policy, planning and other fields. There can be significant benefits from students learning about sustainable business from the rich experiences of business practice.'

### **Sustainable Energy**

- **Authors:** David MacKay
- **Publisher:** [UIT Cambridge Ltd](#)
- **Education Level:** College General Ed, College Lower Division, College Upper Division, Professional
- **Type:** Open Textbook
- **Summary:** 'The issue of sustainability and specifically sustainable business is of increasing interest and importance to students of business and also students in the sciences, government, public policy, planning and other fields. There can be significant benefits from students learning about sustainable business from the rich experiences of business practice.'

### **Managing the New Frontiers**

- **Authors:** Jonathan T. Scott, Kozminski University
- **Publisher:** Management Education Services
- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School
- **Type:** Open Textbook (PDF)
- **Summary:** The author of this textbook states that, "efficiency, sustainability, and waste reduction practices are producing eye-opening results in businesses around the world.." He produced this online textbook to "(1) to show that efficiency, sustainability, and waste reduction are business issues, (2) to promote business as a whole, and, (3) to help stop environmental degradation." This is a fresh view of business through "The Seven P's of Business Efficiency Part I: Building the Application Foundation • Preparation (creating awareness and examining needs) • People (getting employees involved and keeping them motivated) Processes (efficiency-related work philosophies and cultures) • Preservation (measuring progress, staying on track, and going further) Part II: Taking Action (Practical Application Suggestions) • Place (improving the buildings in which business is conducted) • Product (increasing the efficiency of goods and services) • Production (cutting waste and costs in manufacturing processes)."

## The Sustainable Business

- **Authors:** Jonathan T. Scott
- **Publisher:** [EFMD](#)
- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School
- **Type:** Open Textbook (PDF)
- **Summary:** This is a free, online textbook offered by the Global Text Project at University of Georgia. "As a teacher, it is fascinating to watch student reactions when sustainable business practices are introduced in the classroom. Most are dumbfounded by the cost-savings and profits involved and want to know more. A smaller number, however, respond differently. With their lips pursed and their arms folded across their chests, they refuse to believe in what British business consultant John Elkington referred to in 1994 as the 'triple bottom line' - the financial, environmental, and human costs of doing business (wealth creation, resource efficiency, and job creation) as well as the significance and importance of each of these 'pillars', and how they influence one another. Interestingly, although most of the people who disregard sustainability readily admit that the world is facing profound problems – and that these problems are not going away anytime soon - their lack of experience, knowledge, and comfort with long-term thinking often forces them to place sustainability under the label of 'environmentalism'"

## **Online Course**

### Principles of Sustainability

- **Author:** Greg Möller
- **Publisher:** [University of Idaho](#)
- **Education Level:** College General Ed, College Upper Division, Graduate School
- **Type:** Online Course
- **Technical Requirements:** Flash or HTML5 compatible browser
- **Summary:** This open courseware online course is a digital walkabout on the primary concepts, principles, and issues of sustainability. The course features almost 50 "doculectures" filmed in a cinematic style, crowd sourced by over 100 filmmakers and scholars across the globe.

### Comparative Security and Sustainability

- **Author:** Prof. Nazli Choucri
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Undergraduate / Graduate
- **Type:** Online Course



- **Summary:** This course focuses on the complexities associated with security and sustainability of states in international relations. Covering aspects of theory, methods and empirical analysis, the course is in three parts, and each consists of seminar sessions focusing on specific topics.

### Design for Sustainability

- **Author:** Dr. Eric Adams Prof. Jerome Connor Prof. John Ochsendorf Rossella Nicolin(Teaching Assistant)
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Graduate
- **Type:** Online Course
- **Summary:** The course considers the growing popularity of sustainability and its implications for the practice of engineering, particularly for the built environment. Two particular methodologies are featured: life cycle assessment (LCA) and Leadership in Energy and Environmental Design (LEED). The LCA methodology is a rigorous, quantitative approach to environmental impact evaluation that tallies the impacts of products throughout their lifetimes; it has been used successfully in a number of industries (particularly packaging and manufacturing) but less frequently in the built environment. The LEED rating system awards points to projects for achieving specific goals considered relevant to sustainable design, and rates built projects according to the total number of points achieved. The fundamentals of each approach will be presented. Specific topics covered include water and wastewater management, energy use, material selection, and construction.

### Ecology II: Engineering for Sustainability

- **Author:** Prof. Dennis McLaughlin Nicolin(Teaching Assistant)
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Undergraduate
- **Type:** Online Course
- **Summary:** This course provides a review of physical, chemical, ecological, and economic principles used to examine interactions between humans and the natural environment. Mass balance concepts are applied to ecology, chemical kinetics, hydrology, and transportation; energy balance concepts are applied to building design, ecology, and climate change; and economic and life cycle concepts are applied to resource evaluation and engineering design. Numerical models are used to integrate concepts and to assess environmental impacts of human activities. Problem sets involve development of MATLAB® models for particular engineering applications. Some experience with computer programming is helpful but not essential.

### Implementing the Disaster Act of 2000 at the Federal Level; Sustainability and Resilient Communities (PowerPoint and [PDF](#) Syllabi)



- **Author:** David Godschalk University of South Carolina-Chapel Hill
- **Publisher:** [MERLOT](#)
- **Education Level:** College Upper Division
- **Type:** Course Session
- **Summary:** This class reviews the assumptions and actions underlying the implementation of the Disaster Mitigation Act of 2000 at the federal level. The Act's provisions and FEMA's implementation rule are summarized. Their potential impacts on state and local mitigation capacity and commitment are discussed. The concepts of sustainability and the resilient community are described and explored.

### [Sustainable Development: Theory and Policy](#)

- **Author:** Prof. Nazli Choucri
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Undergraduate / Graduate
- **Type:** Online Course
- **Summary:** This course provides a review of physical, chemical, ecological, and economic principles used to examine interactions between humans and the natural environment. Mass balance concepts are applied to ecology, chemical kinetics, hydrology, and transportation; energy balance concepts are applied to building design, ecology, and climate change; and economic and life cycle concepts are applied to resource evaluation and engineering design. Numerical models are used to integrate concepts and to assess environmental impacts of human activities. Problem sets involve development of MATLAB® models for particular engineering applications. Some experience with computer programming is helpful but not essential.

### [Planning for Sustainable Development](#)

- **Author:** Prof. David Laws Prof. Martin Rein
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Graduate
- **Type:** Online Course
- **Summary:** This course explores policy and planning for sustainable development. It critically examines concept of sustainability as a process of social, organizational, and political development drawing on cases from the U.S. and Europe. It also explores pathways to sustainability through debates on ecological modernization; sustainable technology development, international and intergenerational fairness, and democratic governance.

### [S-Lab: Laboratory for Sustainable Business](#)

- **Author:** Prof. David Laws Prof. Martin Rein
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)

- **Education Level:** Graduate
- **Type:** Online Course
- **Summary:** How can we translate real-world challenges into future business opportunities? How can individuals, organizations, and society learn and undergo change at the pace needed to stave off worsening problems? Today, organizations of all kinds—traditional manufacturing firms, those that extract resources, a huge variety of new start-ups, services, non-profits, and governmental organizations of all types, among many others—are tackling these very questions. For some, the massive challenges of moving towards sustainability offer real opportunities for new products and services, for reinventing old ones, or for solving problems in new ways. The course aims to provide participants with access and in-depth exposure to firms that are actively grappling with the sustainability-related issues through cases, readings and guest speakers.

### Sustainable Design and Technology Research Workshop

- **Author:** Prof. Leon Glicksman; Prof. Andrew Scott
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Graduate
- **Type:** Online Course
- **Summary:** This workshop investigates the current state of sustainability in regards to architecture, from the level of the tectonic detail to the urban environment. Current research and case studies will be investigated, and students will propose their own solutions as part of the final project.

### Global Problems of Population Growth

- **Author:** Dr. Robert Wyman
- **Publisher:** [Open Yale Courses](#)
- **Education Level:** College General Ed, College Lower Division, College Upper Division
- **Type:** Online Course
- **Summary:** This survey course introduces students to the important and basic material on human fertility, population growth, the demographic transition and population policy. Topics include: the human and environmental dimensions of population pressure, demographic history, economic and cultural causes of demographic change, environmental carrying capacity and sustainability. Political, religious and ethical issues surrounding fertility are also addressed. The lectures and readings attempt to balance theoretical and demographic scale analyzes with studies of individual humans and communities. The perspective is global with both developed and developing countries included.

### Introduction to Environmental Policy and Planning

- **Author:** Prof. Lawrence Susskind
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Graduate
- **Type:** Online Course
- **Summary:** This course is the first subject in the Environmental Policy and Planning sequence. It reviews philosophical debates including growth vs. deep ecology, "command-and-control" vs. market-oriented approaches to regulation, and the importance of expertise vs. indigenous knowledge. Its emphasis is placed on environmental planning techniques and strategies. Related topics include the management of sustainability, the politics of ecosystem management, environmental governance and the changing role of civil society, ecological economics, integrated assessment (combining environmental impact assessment (EIA) and risk assessment), joint fact finding in science-intensive policy disputes, environmental justice in poor communities of color, and environmental dispute resolution.

### [Introduction to Civil and Environmental Engineering Design I](#)

- **Author:** Prof. Harold Hemond; Prof. Heidi Nepf; Prof. Louis Bucciarelli, Sheila Frankel
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Undergraduate
- **Type:** Online Course
- **Summary:** This sophomore-level course is a project-oriented introduction to the principles and practice of engineering design. Design projects and exercises are chosen that relate to the built and natural environments. Emphasis is placed on achieving function and sustainability through choice of materials and processes, compatibility with natural cycles, and the use of active or adaptive systems. The course also encourages development of hands-on skills, teamwork, and communication; exercises and projects engage students in the building, implementation, and testing of their designs.

### [Transportation Policy and Environmental Limits](#)

- **Author:** Prof. Frederick Salvucci; Prof. Joseph Coughlin
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Graduate
- **Type:** Online Course
- **Summary:** Through a combination of lectures, cases, and class discussions this subject examines the economic and political conflict between transportation and the environment. It investigates the role of government regulation, green business and transportation policy as facilitators of economic development and environmental sustainability. It analyzes a variety of international policy problems including government-business relations; the role of interest groups, non-governmental organizations, and the public and media in the regulation of the automobile; sustainable

development; global warming; the politics of risk and siting of transport facilities; environmental justice; equity; and transportation and public health in the urban metropolis. It provides students with an opportunity to apply transportation and planning methods to developing policy alternatives in the context of environmental politics.

### **Urban Transportation, Land Use, and the Environment**

- **Author:** Prof. Pericles (Chris) Zegras
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Graduate
- **Type:** Online Course
- **Summary:** This course is aimed at the aspiring planning practitioner, policy-maker, or industry decision-maker with an interest in urban transportation and environmental issues in Latin America. The course will focus on current transport-related themes confronting many cities in the region, including: rapid motorization and suburbanization and subsequent impacts on transportation infrastructure and quality of life; public sector management and improvement of privately-owned and operated transit systems; and, transportation air pollution problems and potential solutions. The course will be geared towards interactive problem-solving, taking advantage of students' skills and experiences in: institutional analysis, policy analysis, and project and program evaluation and implementation.

### **Environment and Society**

- **Author:** Prof. Dara O'Rourke
- **Publisher:** [MIT Open Course Ware, Massachusetts Institute of Technology](#)
- **Education Level:** Undergraduate
- **Type:** Online Course
- **Summary:** Modern industrial activities - which MIT engineers and scientists play a major role in - have significant environmental and social impacts. Trends towards further industrialization and globalization portend major challenges for society to manage the adverse impacts of our urban and industrial activities. How serious are current environmental and social problems? Why should we care about them? How are governments, corporations, activists, and ordinary citizens responding to these problems. This course examines environmental and social impacts of industrial society and policy responses. We will explore current trends in industrialization, urbanization, and globalization, analyze the impacts these trends have on human health, environmental sustainability, and equity, and then examine a range of policy options available for responding to current problems. The course will present key trends in both domestic and international contexts.

### **Presentation/Lecture**

### Ethics and Sustainability

- **Author:** Unknown
- **Publisher:** [Open Course Ware](#), University of California-Irvine
- **Education Level:** College Lower Division, College Upper Division
- **Type:** Vedio
- **Summary:** Ethics and Sustainability, recorded video lecture with Professor Richard Matthew on February 16, 2010.

### The Psychology of Sustainability

- **Author:** Beth Karlin
- **Publisher:** [Open Course Ware](#), University of California-Irvine
- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Vedio
- **Summary:** Sustainability Seminar delivered on February 9, 2011 by UC Irvine Ph.D. student Beth Karlin, "The Psychology of Sustainability." There is growing consensus that environmental, social, and economic sustainability are not possible given current trends and that understanding human interactions with the environment is a key aspect of ameliorating many of these issues. Psychology, as the science of human behavior, is in a prime position to assist with this task.

### The Politics of Sustainability

- **Author:** Richard Matthew
- **Publisher:** [Open Course Ware](#), University of California-Irvine
- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Vedio (1.5 hrs.)
- **Summary:** Recorded Sustainability Seminar Lecture on Wednesday, March 9, 2011 delivered by UCI Professor Richard Matthew. Families and health, businesses and educational systems, fresh water and clean air- there are a lot of things in our world that we would like to last. They are the material underpinnings of freedom, dignity, comfort and stability. We have come to realize over the last few decades, however, that some of the things we value and depend upon are moving along trajectories that are not sustainable. The costs are mounting and we can imagine a point in the not too distant future when some of these things run out of gas, falter, perhaps collapse.

### State Capacity, Economic Crisis and Economic Reform: Implications for Sustainability

- **Author:** George Shambaugh, Georgetown University
- **Publisher:** [Open Course Ware](#), University of California-Irvine

- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Video (1hr.)
- **Summary:** Like the economic crises in Korea in 1997 and Argentina in 2001, U.S. and European responses to the 2008-2011 financial crises are less about what particular strategy is most likely to succeed or who specifically will be bailed out, than they are about the capacity of national governments to overhaul their economies and restore confidence in the global markets...

### Organic Becomes Big Business

- **Author:** Mindgate Media
- **Publisher:** [Mindgate Media](#)
- **Education Level:** College General Ed, College Lower Division, College Upper Division
- **Type:** Video
- **Summary:** Gary Hirschberg, CEO of Stonyfield Farms, believes that agriculture can achieve environmental sustainability through "the power of business." In this 2007 interview with Fortune, he says that Stonyfield's principal contribution to the green movement is the huge market it provides for suppliers of the organic materials used in making its dairy products. He also tries to extend the company's green philosophy to everything it does, from slimming its packaging to burning biowaste as fuel in its factories

### Who Controls Water? Conflict, Cooperation, and "Soft" Power

- **Author:** David Feldman
- **Publisher:** [Open Course Ware](#), University of California-Irvine
- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Video (1hr.)
- **Summary:** Sustainability Seminar delivered on February 23, 2011 by UC Irvine Professor David Feldman, "Who Controls Water? Conflict, Cooperation, and "Soft" Power". Water is our planet's most precious resource. It is required by every living thing, yet a huge proportion of the world's population struggles to access it. Agriculture, aquaculture, industry, and energy depend on it - yet its adequacy and safety engender conflict. This conflict is likely to intensify as threats to freshwater abundance and quality, including climate change, urbanization, new forms of pollution, and privatization of control, continue to grow.

### Implementing Mitigation at the State Level; Sustainable Hazard Mitigation Criteria

- **Author:** David Feldman
- **Publisher:** [Open Course Ware](#), University of California-Irvine

- **Education Level:** College General Ed, College Upper Division
- **Type:** PDF and [PowerPoint](#)
- **Summary:** The first part of the class is a lecture on the public policy and political contexts in which state hazard mitigation plans are prepared and implemented. It draws on Birkland's concept of natural disasters as focusing events that place mitigation on the public agenda. It reviews the quality of state hazard mitigation plans prepared in the U.S. under the Stafford Act, in terms of "good" planning criteria and in terms of achieving long-term sustainability, including the challenges and obstacles faced by state hazard mitigation planners. The second part of the class is an exercise in which teams of students develop and propose a checklist of sustainability criteria to assess state hazard mitigation plans. Each team discusses and presents its assessment criteria in a Power Point presentation to the class, including the rationale for each criterion and the way that it might be measured.

### [Transboundary Environmental Policy and Institutions along International Borders](#)

- **Author:** Lisa Fernandez
- **Publisher:** [Open Course Ware](#), University of California-Irvine
- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Video (1hr. 18 mins.)
- **Summary:** Sustainability Seminar delivered on February 16, 2011 by UC Riverside Professor Linda Fernandez "Transboundary Environmental Policy and Institutions along International Borders."

### [Water in the Balance: The Human Fingerprint on Global Freshwater Availability as Seen from Space](#)

- **Author:** Jay Famiglietti
- **Publisher:** [Open Course Ware](#), University of California-Irvine
- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Video (1hr.)
- **Summary:** A CUSA Sustainability Seminar delivered by Jay Famiglietti, PhD, Professor, Earth System Science and Civil & Environmental Engineering, and Director, UC Center for Hydrologic Modeling. Recorded on April 6, 2011. Over the last decade, satellite observations of Earth's water cycle, in particular, those from NASA's GRACE (Gravity Recovery and Climate Experiment) mission, have provided an unprecedented view of recent changes in freshwater availability.

### [Knowledge and Environmental Policy](#)



- **Author:** William Ascher
- **Publisher:** [Open Course Ware](#), University of California-Irvine
- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Video (1hr.)
- **Summary:** Environmental policymakers rely on a prodigious amount of knowledge from a wide variety of sources. Sometimes available knowledge is technically appropriate and covers the broad range of considerations that policymakers ought to take into account, yet it is easy to identify serious limitations in the generation, transmission, and use of relevant knowledge.

### **Climate Change: Science and Impacts - Will Steger Foundation**

- **Author:** [Julia Baker](#), Daniel Enderton - MIT, PhD Student
- **Publisher:** [CAMEL](#)
- **Education Level:** College Lower Division
- **Type:** PowerPoint
- **Summary:** 58 slides This presentation was featured at the Will Steger Foundation's 2007 Summer Institute. This PowerPoint was presented by Daniel Enderton, a PhD student at Massachusetts Institute of Technology. This presentation is a very detailed one about the scientific processes contributing to climate change and its consequences, specifically surrounding the arctic region. GOALS The goals of the 2007 Summer Institute were: to provide background knowledge on global warming science...

### **Climate Change Impacts of Waste - Will Steger Foundation**

- **Author:** [Julia Baker](#), Alex Danovitch - Eureka Recycling
- **Publisher:** [CAMEL](#)
- **Education Level:** College Lower Division
- **Type:** PowerPoint
- **Summary:** 27 slides This presentation was featured at the Will Steger Foundation's 2007 Summer Institute in St. Paul, Minnesota. This PowerPoint was presented by Alex Danovitch with Eureka Recycling. It explains how environmentally destructive production is and how difficult it is to harvest energy from waste. It concludes by showing how recycling is the best solution for reducing the environmental impacts of production.

### **Bioenergy as a Core Midwestern Climate Change Solution - Will Steger Foundation**

- **Author:** [Julia Baker](#), Sarah Wash - Great Plains Institute
- **Publisher:** [CAMEL](#)
- **Education Level:** College Lower Division
- **Type:** PowerPoint
- **Summary:** 11 slides This presentation was featured at the Will Steger Foundation's 2008 Summer Institute in St. Paul, Minnesota. This PowerPoint was presented by Sarah Wash,



Program Associate for the Great Plains Institute. Focusing specifically on the Midwestern region of the United States, this presentation explains what biofuels are, how they are used, and whether they are a viable alternative fuel source.

### **The Psychology of Sustainable Behavior - Will Steger Foundation**

- **Author:** [ulia Baker](#), Christie Manning
- **Publisher:** [CAMEL](#)
- **Education Level:** College Lower Division
- **Type:** PowerPoint
- **Summary:** 38 slides This presentation was featured at the Will Steger Foundation's 2008 Summer Institute. This PowerPoint was presented by psychologist Christie Manning. This short presentation explains the social barriers to sustainable behavior and how to overcome these obstacles.

### **Cap and Auction 101 - Will Steger Foundation**

- **Author:** [ulia Baker](#), J Drake Hamilton - Fresh Energy
- **Publisher:** [CAMEL](#)
- **Education Level:** College Lower Division
- **Type:** PowerPoint
- **Summary:** 36 slides This presentation was featured at the Will Steger Foundation's 2008 Summer Institute. This PowerPoint was presented by J. Drake Hamilton, Science Policy Director at Fresh Energy. It explains the benefit of market-based regulation of greenhouse gas emissions and how the policy would work on a large scale. It also talks a little about regional solutions near Minnesota.

### **Global Warming: Emissions Sources and Solutions - Will Steger Foundation**

- **Author:** [ulia Baker](#), Fresh Energy - J Drake Hamilton
- **Publisher:** [CAMEL](#)
- **Education Level:** College Lower Division
- **Type:** PowerPoint
- **Summary:** 19 slides This presentation was featured at the Will Steger Foundation's 2007 Summer Institute. This PowerPoint was presented by J Drake Hamilton, Science Policy Director at Fresh Energy. It focuses on increasing energy requirements and the need for cleaner energy sources. It offers strategies to reducing emissions including suggestions for the transportation and power industries as well as strategies for carbon sequestration.

## **Database/Collection**

### **Campus Sustainability Case Studies**

- **Author:** National Wildlife Federation
- **Publisher:** [National Wildlife Federation](#)

- **Education Level:** College General Ed, College Lower Division, College Upper Division, Graduate School, Professional
- **Type:** Collection, Database
- **Summary:** This is a database of what college and university students are doing to make their campuses more sustainable. Searchable by campus, topic and academic year.

### [UC Irvine OpenCourseWare Collections](#)

- **Author:** University of California - Irvine
- **Publisher:** [Open Course Ware](#), University of California-Irvine
- **Education Level:** College General Ed, College Lower Division, College Upper Division
- **Type:** Collection, Course materials
- **Summary:** The University of California at Irvine provides courses, materials, lectures, and collections on various topics through their open educational resources project. The "sustainability" link on this page leads to a series of lectures on sustainability and related topics such as climate change. It includes the following courses objects:

[Planning, Policy and Design 132: Sustainability II](#)  
[Planning, Policy and Design 139: Water Resource Policy](#)  
[The Plug-In Electric Vehicle Revolution: Are We Ready?](#)  
[How Predictable is the Climate System: Droughts, Floods, and Extreme Events](#)  
[Business and Sustainability](#)  
[Sustainability, Food Security and World Food Problems](#)  
[Political Rhetoric or Policy Reality? Tracking Trends in Environment, Peace, and Security](#)  
[Ethics and Sustainability](#)  
[Greening Aid? Understanding the Environmental Impact of Development Assistance](#)  
[Knowledge and Environmental Policy](#)  
[State Capacity, Economic Crisis and Economic Reform: Implications for Sustainability](#)  
[The Politics of Sustainability](#)  
[The Psychology of Sustainability](#)

### [Open Teaching Resource--Sustainability](#)

- **Authors:** Mike Ashby
- **Publisher:** [Materials Education Community](#),
- **Education Level:** Undergraduate
- **Type:** Open Resources
- **Summary:** Granta's Teaching Resource Website contains 200+ resources to support materials related courses across engineering, science and design disciplines at the undergraduate level. They have been created by Professor Mike Ashby, Granta Design and the users of CES EduPack. Some of the resources, like those on this page, are open access. Others are only available to instructors at the 800+ institutions that use CES EduPack worldwide.

