

## **Course Syllabus**

### **Course Title: Sustainability, Energy, and the Green Economy**

#### **Description:**

CHM 100 (BIO 100, PHY 100) introduces students to the foundations of the sustainability movement and connects them with real world applications. The course will explore the relationships between society, the environment, and the modern economy.

#### **Co-Requisites**

RDL 02, ENG 02, MTH 05

#### **Course Format**

3 Lec, 3hrs

#### **Textbook:**

Sustainability: A Comprehensive Foundation. Tom Theis and Justin Tomkin Editors

PDF Download Available FREE Online at:

<http://open.umn.edu/opentextbooks/BookDetail.aspx?bookId=96>

#### **Course Description**

This course entitled '*Sustainability, Energy, and the Green Economy*' will present the tenets of sustainability and why they have a growing influence in the world at large. The course will cover a brief history from the industrial revolution to the rise of the Neoliberal market to frame the beginning of environmental regulation and the rise of the sustainability movement. The curriculum will then cover the relationship of humans within their environment and the facts of climate change. This will be followed up with an analysis of the current global energy portfolio and burgeoning renewable energy sector. Limiting factors and inherent strengths will be highlighted. The course will then cover the connections between consumption and quality of life. Students will be lead through an estimation of their own carbon footprint. Emphasis will be made on the concept of 'Life Cycle Analysis' and how such analyses can be used to create market value. The course will then discuss major threats to ecosystems through the lens of global land use allocation. The remainder of the course will focus on how the principles of sustainability are building the green economy and how to build a successful career within it.

## Objectives

1. Students will develop a basic understanding of the principles of Sustainability and how the environment affects regional and global socio-economic trends.
2. Emphasis of this course is on the foundations of the Sustainability movement and its applications in the 21<sup>st</sup> century economy.
3. Students will integrate scientific data with their own lifestyle habits and larger societal trends in order to make better-informed personal life choices and broader market assessments.
4. Students who attend this course should gain insight as to how various BCC and CUNY degree options can be leveraged into careers with an impact on the sustainability of our economy.

## At the end of this course students should be able to:

1. Students will apply the critical lens of sustainability to all aspects of their personal lives as well as to the larger regional and global economy. They will understand the transition from developing, agricultural societies to industrial and post-industrial societies, and the connection to global trade, environmental justice, and human rights.
2. Students will be exposed to empirical data and asked to evaluate trends to ascertain the future energy and resource demands of a growing global population.
3. Students will be expected to understand the scientific principles of climate change, the underlying matters of environmental regulations, and the connection to global trade agreements.
4. Students will be expected to compare information from government, corporate, and non-government based organizations to form and express, in verbal and written forms, their own opinions on the state of the global environment and economy.
5. Students will be expected to gather information from class based resources, web-based sources, and personal experiences to formulate and articulate a hypothesis specifically related to the sustainability of societal and economic market trends.
6. Weekly writing exercises will require students to compose a thesis statement regarding the sustainability of a specific aspect of society. Students will be expected to write a final project for the course and to present a synopsis of their hypothesis and supporting information to the class for discussion.

## Approximate Grading

Homework/Class Participation	10%
Weekly Quizzes	35%
Writing Projects/Classroom Activities	20%
Final Exam	<u>35%</u>
Total	100%

## Sustainability, Energy, and the Green Economy

Week	Topic	Assignment
1	<b>Introduction</b> a) Humans and the environment, levels of life's organization (atom, molecule, cell, tissue, organ, organ systems, individual, population, community, ecosystem, biosphere) b) Ecological succession (primary and secondary) c) Energy flow in ecosystems; from producers to consumers (food chains, food webs, trophic levels, energy mass, ecological pyramid, chemical cycles: water, carbon, nitrogen, and phosphorus)	HW: Who are you and how do you connect to the rest of society and the world?
2	<b>History of Sustainability</b> a) 1800 – The Industrial Revolution b) 1945 – Bretton Woods and the rise of Neoliberalism c) 1972 – Declaration of the United Nations Conference on the Human Environment d) 1983 – The Brundtland Commission – <i>Our Common Future</i> e) 1987 – Sustainable Development f) 1992 – <i>The Earth Charter</i>	HW: What has led to the sustainability movement?
3	<b>Principles of Sustainability</b> a) Defining sustainability – How to quantify sustainability? b) Sustainable consumption c) Health and nutrition d) Sustainable population e) Development f) Economic growth and the environment	HW: List 3-5 examples of sustainability and write a paragraph explaining each example.
4	<b>Population and Migration</b> a) Global population growth: exponential growth and its effects, population density and the impact of AIDS b) Carrying capacity and ecological footprint c) Coastal population growth: Bangladesh d) Population growth and migration	HW: Where is your family from? How did they get here? Why did they leave where they were?
5	<b>Climate Change</b> a) Atmosphere composition b) Development of the current atmosphere c) Functions of the atmosphere d) Greenhouse gasses and climate change e) Global Warming: Not just warming... air and ocean currents, sea levels, and precipitation	
6	<b>Screening of Media (1/2 eg <i>An Inconvenient Truth</i> by Al Gore)</b>	Mid-term
7	<b>Energy</b> a) What do we do now: Oil, Coal, Natural Gas, and Nuclear b) Available resources, origins of fossil fuels, global distribution, transportation to refineries, peak oil, shale, natural gas c) Measuring impact: air/water pollution, nuclear waste, mining	HW: Define Energy, give 5 examples from your daily life. Find out what type of heating fuel your

	<ul style="list-style-type: none"> <li>d) Sustainable Energy: Solar, Wind, Hydro, Geothermal, Biomass</li> <li>e) Enabling Technologies: Hydrofracking, Energy Storage, and Transmission</li> <li>f) Energy density comparisons: Liquid fuels vs batteries</li> <li>g) Sunk costs and industrial inertia</li> </ul>	building uses. How much does the building by at a time and how often do they refill the tank?
8	<p><b>Consumption and the Quality of Life</b></p> <ul style="list-style-type: none"> <li>a) Global water supplies, the hydrologic cycle, worth of water, global distribution, control, and the impact of contamination</li> <li>b) Motor Vehicles: driving trends, emissions, fuel economy, and regulation</li> <li>c) Turf grass: Land use changes in North America, the lawn care industry, allergies, gas powered leaf blowers</li> <li>d) Mountains of Trash: Types of waste, transport, landfills</li> <li>e) The demand for mineral resources - Mining: methods and impacts</li> <li>f) Recycling: from waste to resources</li> <li>g) The power of lifestyle choices: What is your footprint?</li> </ul>	HW: Estimate how much water you use each week and how much garbage you produce.
9	<b>Screening of Media (2/2)</b>	Introduce Final Project
10	<p><b>Threats on Ecosystems</b></p> <ul style="list-style-type: none"> <li>a) Global grain production and the origin of agriculture</li> <li>b) Pound for pound the cost of what we eat: a case for vegetarianism</li> <li>c) Soil and sustainable societies: the nature of soil, urbanization and soil loss, erosion, desertification and salt build up</li> <li>d) Roots and the American Dust Bowl – an agricultural disaster</li> <li>e) The state of global forests: types of forests, industrial value vs. ecological value</li> <li>f) Catch of the day: the state of global fisheries</li> <li>g) Invasive species, hatching schedules, and the food web</li> </ul>	HW: Keep a food log for the week.
11	<p><b>Practicing Sustainability</b></p> <ul style="list-style-type: none"> <li>a) Sustainable Community Planning: Sprawl vs. Smart growth</li> <li>b) Resiliency – building in the face of tropical storms and earthquakes</li> <li>c) Sustainable building: LEED, and the Passive Haüs – an Ideal</li> <li>d) Urban Retrofits – working with what we have: energy audits, ConEd and the Green team</li> </ul>	HW: Perform home energy audit
12	<p><b>Jobs and the Green Economy</b></p> <ul style="list-style-type: none"> <li>a) Renewable Energy – Solar, wind, geothermal, marine, biomass</li> <li>b) Transportation – Automotive, aviation, public transit, alternative fuels</li> <li>c) Buildings – LEED, Energy auditor, green/white roofs</li> </ul>	

	<ul style="list-style-type: none"> <li>d) Resource and Environmental management – DEP, public utilities, waste management, forestry, agriculture, Fish and Wildlife</li> <li>e) NGOs</li> </ul>	
13	<p><b>The Road to Sustainability</b></p> <ul style="list-style-type: none"> <li>a) Greening of the marketplace – The power of eco-marketing</li> <li>b) Life cycle assessment</li> <li>c) Sustainable Business practices</li> <li>d) Reducing the corporate energy footprint</li> <li>e) Green Manufacturing</li> <li>f) Green Chemistry</li> </ul>	
14	<b>Student Presentations</b>	
15	<b>Final Exams</b>	