

Spring 2019

# EVSC 325-002: Energy and Environment

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## EVSC 325 Energy and Environment *Spring 2019 Course Syllabus*

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Office: Tiernan 365

Office Hours: T / F 2:00-3:30 and by appt

**NJIT Academic Integrity Code:** All Students should be aware that the Department of Chemistry & Environmental Science takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

### COURSE INFORMATION

#### I. Course Description and Objectives Summary:

An introductory course to the interdisciplinary study of the complex interactions that occur among and within environmental systems: air, water, and terrestrial environs. The course includes an emphasis on anthropocentric effects on these environmental systems. It is provided as a part of a curriculum in applied environmental science and as such emphasizes problem identification and engineered solutions. The course serves as an introduction to further advanced study specializing in environmental science and engineering.

**Number of Credits:** 3 Cr

**Prerequisites:** None

#### Course-Section and Instructors

Course-Section	Instructor
EVSC 325; WF 10-11:20 FMH 319	MP Bonchonsky

**Office Hours for All Chemistry & Environmental Science Instructors:** [Spring 2019 Office Hours and Emails](#)  
**Required Textbook:**

<b>Title</b>	<b>Textbook:</b> Energy: Its Use and the Environment, 5th Edition
<b>Author</b>	Roger A. Hinrichs, Merlin H. Kleinbach
<b>Edition</b>	5 <sup>th</sup> edition, 2013
<b>Publisher</b>	Brooks/Cole
<b>ISBN #</b>	ISBN-10: 1111990832 ISBN-13: 9781111990831

**University-wide Withdrawal Date:** The last day to withdraw is as shown on the NJIT academic calendar currently listed as Monday, April 8, 2019 (always check academic calendar). It will be strictly enforced.

**II. Learning Outcomes:** Student learners will:

- Trace the historical and current contributions of energy systems to human progress
- Recognize principal patterns of energy transformations in the natural environment and anthro built environment
- Calculate the technical performance of energy systems: efficiencies, physical transport of heat
- Evaluate environmental implications of various forms of energy production including major contaminants and modes of mitigation
- Recognize and identify the technical fundamentals of fossil fuels in energy production
- Explain the technical fundamentals of the production of electricity from wind turbines, photovoltaic cells and solar thermal energy systems
- Identify and differentiate the technical formats of nuclear power systems and the environmental implications
- Analyze the New Jersey Energy Master Plan in the context of national energy policy development
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Develop and incorporate standards of professional behavior that include rules of ethics and etiquette.

**POLICIES**

All EVSC students must familiarize themselves with, and adhere to, all official university-wide student policies. EVSC takes these policies very seriously and enforces them strictly.

**Grading Policy:** The final score in this course will be determined as follows:

Essays	15
Quizzes	20
Participation	5
Midterm Exam	30
Final Exam	30

Extra Credit – environmental-energy news bonus work (up to 5 pts): Submit one piece of environmental news pertinent to energy/environment course material and write down your comments in a page. You must submit 3-7 items (attaching your news) spread throughout the semester – recommend: one item every other week.

The final course grade will be determined as follows:

Final Grade	Overall Academic Performance (100%)
A	Above 90
B+	85-89
B	80-84
C+	75-79
C	70-74
D	60-69
F	Below 60

**Attendance Policy:** Attendance at classes will be recorded and is mandatory. Each class is a learning experience that cannot be replicated through simply “getting the notes.”

**Homework Policy:** Homework is an expectation of the course. The homework assignments set by the instructor are used in class discussions which comprise in part the determination of the score for “participation”.

**Exams:** There will be a quizzes, a midterm exam held in class during the semester and one final exam. The following exam periods are tentative and therefore possibly subject to change (see moodle for any updates):

Midterm Exam	March 15
Quizzes	TBD on moodle
Final Exam Period	May

**Makeup Exam Policy:** There will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event that a student has a legitimate reason for missing a quiz or exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor’s note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the CES Department Office/Instructor that the exam will be missed so that appropriate steps can be taken to make up the grade.

**Cellular Phones:** All cellular phones and other electronic devices must be switched off during all class times. Such devices must be stowed in bags during exams or quizzes.

## **ADDITIONAL RESOURCES**

**Accommodation of Disabilities:** Office of Accessibility Resources and Services (*formerly known as Disability Support Services*) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at **973-596-5417** or via email at [lyles@njit.edu](mailto:lyles@njit.edu). The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <http://www5.njit.edu/studentuccess/disability-support-services/>

**Important Dates** (See: always check [Spring 2019 Academic Calendar, Registrar](#))

<b>Date</b>	<b>Day</b>	<b>Event</b>
January 23	W	First Day of this Class
February 1	F	Last Day to Add/Drop Classes
April 8	M	Last Day to Withdraw
April 10	F	No Friday Classes. Good Friday
March 17-24	week	Spring Break
May 7	T	Last Day of Classes
May 8-9	W, Tr	Reading Day
May 10-16	week	Final Exam Period

# Course Outline

(please see Moodle course website for any changes and updates during the semester)

## Lecture topics, dates:

Week 1, WF Jan 23-25, Introduction...review of syllabus, assignments, selected readings; Introduction to energy, natural energy and the environmental implications of its production and distribution

Week 2, WF Jan 30 Feb 1 Energy Fundamentals

- Energy basics
  - Forms of energy
  - Power
  - Units of energy
- Transformation of Energy among useful forms

Week-3, WF Feb 6, 8 Energy in the Bio Environment

Week-4, WF Feb 13, 15 Energy Use in Industrial Societies

- Energy Consumption in the United States
- Comparative Energy Use Internationally
- Nonrenewable Energy Sources
- Renewable Energy Sources

Week-5, WF Feb 20, 22 Fossil Fuels...

Debate, For and Against: "Considering the abundance of coal, should we develop our coal fueled power plants to the maximum extent possible?"

(Conventional sources)

- Petroleum
  - Petroleum Resources
    - World production
    - Petroleum resources in the United States
  - Petroleum Refining
- Natural Gas
  - History of use of Natural Gas
  - Natural Gas resource in the World
  - Natural Gas resource in the United States

Coal

(and non-conventional sources)

Shale Oil Tar Sands tight geo formations

CO<sub>2</sub> Capture and Storage (CCS) Technologies

Week-6, WF Feb 27, March 1 Heat Engines and Energy Efficiency.... Debate, For and Against: "The Development of Nuclear Energy systems is critical to meeting our future energy needs"

- Mechanical Equivalent of Heat
- Thermodynamics of Heat engines
- Common Heat Engines and efficiencies
  - Steam Engines
  - Gasoline Engines
  - Diesel engines
  - Gas Turbines
- Heat Pumps
- Cogeneration

Week-7 WF March 6, 8 Renewable Energy Sources I ...Wind turbines and other...

Debate, For and Against: "Alternative Energy source development is progressing adequately in the world"

Hydropower

Dynamic

Tidal

Wave

Windpower

Geothermal Energy

Ocean Thermal energy conversion

Biomass as energy Feedstock

Types of Biomass Derived Fuels

Municipal solid waste as feedstock

Week WF March 13, 15 Review and Midterm on Fri 3.15

Week-8 Spring Break March 17-24

Week-9, WF March 27, 29 Renewable Energy Sources II ...Solar....Mr. Michael Hornsby, Community Solar Program

Debate, For and Against: Proposition: "Solar Energy systems should be the dominant global alternative energy source for the future"

Week-10 WF April 3, 5: Nuclear power

Issues of Nuclear Energy Production

Summary of nuclear energy history

Radioactivity

Nuclear Reactors

The boiling water reactor

The Fuel Cycle, Uranium

Environmental and safety aspects of nuclear energy

Chernobyl Incident

Nuclear weaponry

Storage of Radioactive Waste

Nuclear Fusion as a Potential Energy source

Week-11, WF April 10, 12 Energy Conservation...to include presentation and discussion of the New Jersey energy plan (debate topic and participants, to be confirmed)

Week 12, WF April 17, 19

Electricity and Transmission Issues, the National Grid... Debate: For and Against: "The use of energy resources for transportation should be restricted"

Automobiles

Mass transit

Week13, WF April 24, 26 Cogeneration Systems. Discussion re: Linden Cogeneration Plant

Debate "The Environmental Impact of Energy Sources can be Controlled through Engineering"

Week 14, WF May 1, 3 current energy issues and summary, complete student presentations

Week 15 Last class F May 3 review, problem calculations

Final Exam period begins May 8 see registrar exam schedule