האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

Energy and the Environment - 82612

Last update 14-02-2022

HU Credits: 3

Degree/Cycle: 2nd degree (Master)

Responsible Department: Atmospheric Sciences

Academic year: 0

Semester: 2nd Semester

Teaching Languages: English

Campus: E. Safra

Course/Module Coordinator: Prof Carynelisa Haspel

Coordinator Email: carynelisa.haspel@mail.huji.ac.il

Coordinator Office Hours: By appointment

Teaching Staff:

Prof Carynelisa Haspel,
Prof Einat Aharonov

Course/Module description:

This course deals with the physical and chemical processes associated with fossil fuel and renewable/alternative energy sources and the influence of energy use on the environment, on health, and on the Earth's climate.

Course/Module aims:

1. To familiarize students with the complexities of fossil fuel and renewable/alternative energies.
2. To provide students with the knowledge they need to advise the public and policy makers regarding the use of energy.

Learning outcomes - On successful completion of this module, students should be able to:

1. To explain intelligently the processes connected with creating and using energy.

2. To explain to the public and policy makers how energy consumption impacts our environment, our health, and our climate.
3. To weigh if alternatives to conventional energies are practical and economical.

Attendance requirements(%):

No formal attendance requirement but strongly recommended to attend all lectures.

Teaching arrangement and method of instruction: Lectures and recommended reading.

Course/Module Content:

1. Introductory Concepts Part 1 – Preconceptions and Important Considerations
2. Introductory Concepts Part 2 – Concepts from Mechanics and Thermodynamics
3. The History of Energy Development
4. Fossil Fuels Part 1 – Formation, Reserves, Extraction, Refinement, Monetary Cost
5. Fossil Fuels Part 2 – Energy Content and Use
6. Energy Storage
7. Environmental Impact of Fossil Fuel Use Part 1 – Classifying Emissions and Their Chemistry
8. Environmental Impact of Fossil Fuel Use Part 2 – Oil Spills and Emissions from Gas and Oil Platforms

9. Health Impact Part 1 – Health Impact of Fossil Fuel Use
10. Climate Impact of Fossil Fuel Use Part 1 – The Basics
11. Climate Impact of Fossil Fuel Use Part 2 – Methane
12. Existing Means for Reducing Pollution Caused by Fossil Fuel Use
13. Nuclear Energy
14. Heath Impact Part 2 – Health Impact of Non-Ionizing and Ionization Radiation
15. Solar Energy
16. Geothermal Energy
17. Hydroelectric Energy
18. Wind Energy
19. Bio-Energy
20. Epilogue

Required Reading:
Presentations and other materials uploaded to moodle.

Additional Reading Material:
1. Energy and Civilization: A History by Vaclav Smil, 2018.
2. Environmental Science: Earth as a Living Planet by Daniel B. Botkin, 2013.
3. Fossil Fuels and Pollution: The Future of Air Quality (Global Warming) by Julie Kerr Casper, 2010.
4. Atmospheric Chemistry and Physics: From Air Pollution to Climate Change by John H. Seinfeld and Spyros N. Pandis, 2006.
5. Chemistry of the Upper and Lower Atmosphere: Theory, Experiments, and Applications by Barbara J. Finlayson-Pitts and James N. Pitts Jr., 1999.
6. World Atlas of Atmospheric Pollution by Ranjeet Sokhi, 2008.
7. Aerosol Technology: Properties, Behavior, and Measurement of Airborne Particles, 2nd edition, 1999.
8. 100% Clean, Renewable Energy and Storage for Everything by Mark Z. Jacobson, 2020.

Course/Module evaluation:
End of year written/oral examination 0 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 40 %
Reports 60 %
Research project 0 %
Quizzes 0 %
Other 0 %

Additional information:

There may be several guest lectures on selected topics. As the course progresses, we will update you as the on the schedule of these guest lectures.