



Yale Energy Studies

SOCIETY • TECHNOLOGY • ENVIRONMENT

Energy Studies is a multidisciplinary academic program (MAP) in Yale College.



The curriculum is designed to provide selected undergraduates with the knowledge and skills needed for advanced studies, leadership, and success in energy-related fields. Energy Studies scholars must also complete the requirements of a Yale College major, as Yale does not offer a major in Energy Studies.

Study of the world of energy can take many forms. Think about your home. Where does the energy come from to turn on the lights and to charge your mobile phone, or to heat the space or cool it? Answers to these questions involve **energy science and technology**. Today, despite all the progress of the last twenty years in renewable energy sources, such as wind and solar, about 80% of the world's primary energy still comes from fossil fuels—coal, oil, and natural gas. That number, which comes as a surprise to many, highlights the challenge of a rapid transition to renewable energy. What new technologies, new breakthroughs, can speed up the move away from fossil fuels?

Many students will be interested in the **environmental impacts** of modern energy use, especially air and water pollution and climate change. We now know that the world needs to reduce man-made greenhouse gas emissions from fossil fuels to zero within the next three decades. Are there realistic pathways to a “Net Zero” energy economy by the year 2050? Can geoengineering help to avoid excessive warming?

Other students will be interested in energy's **social and economic impacts**. Moving away from fossil fuels will be hard enough on its own, but more difficult still is making this transition while providing modern energy services to the hundreds of millions of people around the world who now lack them. Can sustainable global investment help assure a just energy transition?

Students normally apply to Energy Studies in the fall term of sophomore year. The program's requirements are completion of six courses from a list approved by the faculty advisory committee (see reverse side for sample courses) plus a senior capstone project. The six courses must be distributed (two each) across the program's three tracks:

Track 1 Energy Science and Technology | Track 2 Energy and Environment | Track 3 Energy and Society

Only two of the six courses can be required courses in the student's major. One of the six can be taken Pass/Fall; the others must be taken for full letter grade. Other program activities include field trips, special guest lectures, bi-weekly program dinners, and participation in the Yale Alumni in Energy Conference.

The capstone of the program is a senior project, which can take the form of a traditional senior essay (with permission, the student's senior essay in the major may fulfill this requirement), a credited or uncredited independent study project, or a written report on an internship in an energy-related field. A **Yale Energy Studies group on LinkedIn** helps students find internships.



COURSES IN ENERGY STUDIES

*Below are some of the courses accepted for Energy Studies credit.
These lists are not exhaustive, and some courses are not offered every year.
See the website for further information.*

*ENRG 300, Topics in World Energy, is offered as a seminar for
junior Energy Studies Scholars in the Fall Term.*

ENRG 400 is the Senior Capstone Seminar in the Spring Term.

Track 1 – Energy Science and Technology

APHY 100, Energy Technology and Society
CENG 300, Chemical Engineering Thermodynamics
CENG 315, Transport Phenomena
CHEM 430, Statistical Mechanics and Thermodynamics
EENG 406, Photovoltaic Energy
EPS 274, Fossil Fuels and World Energy
EPS 275, Renewable Energy
MENG 211, Thermodynamics for Mechanical Engineers
MENG 389, Mechanical Engineering IV: Fluid Thermal Energy Science
PHYS 180, University Physics
PHYS 420, Thermodynamics and Statistical Mechanics

One general science course below can normally count in Track 1.

CHEM 161/165, General Chemistry I and II
CHEM 163/167, Comprehensive University Chemistry I and II
CHEM 332/333, Physical Chemistry I and II
PHYS 180/181, University Physics
PHYS 200/201, Fundamentals of Physics
PHYS 260/261, Intensive Introductory Physics
PHYS 401/402, Advanced Classical Physics from Newton to Einstein

Track 2 – Energy and Environment

ENVE 120, Introduction to Environmental Engineering
ENAS 360, Green Engineering and Sustainable Design
ENVE 373, Air Pollution Control
ENVE 377, Water Quality Control
ENVE 416, Chemical Engineering and Process Design
ENVE 448, Environmental Transport Processes
ENVE 473, Air Quality and Energy
EPS 101, Climate Change
EPS 140, Atmosphere, Ocean, and Climate Change
EPS 232, Earth Surface Processes
EVST 431, The Physical Science of Climate Change

Track 3 – Energy and Society

AMST 236, American Energy History
ANTH 409, Climate and Society from Past to Present
ANTH 473, Abrupt Climate Change and Societal Collapse
ECON 330, The Economics of Natural Resources
ECON 432, Economics of Social Catastrophes
EVST 224, Writing About the Environment
EVST 247, Politics of the Environment
GMAN 167, Green Germany, History and Culture of Sustainability
GLBL 253, Globalization Space
GLBL 394, Climate and Society from Past to Present
LITR 345, Climate Change and the Humanities
PHYS 330, Science and Public Policy
PLSC 212, Democracy and Sustainability

SAMPLE COURSES OF STUDY

Energy Science & Technology Focus

PHYS 180 · EPS 140 · ECON 330
EPS 274 · EENG 406 · EVST 431
PHYS 200 · EPS 275 · GLBL 384
EPS 140 · ENVE 473 · MENG 389



Energy & Sustainability Focus

APHY 100 · EPS 232 · GLBL 217
ECON 330 · EPS 275 · PLSC 212
APHY 100 · ECON 330 · PLSC 212
EPS 140 · ENAS 360 · ANTH 409



Energy & Environment Focus

CHEM 161 · ENVE 120 · EPS 140
ENVE 473 · EPS 274 · ECON 330
APHY 100 · EPS 140 · PLSC 212
EPS 275 · AMST 236 · ECON 432



Energy Policy & Climate Focus

PHYS 260 · EPS 140 · EPS 101
ECON 330 · ANTH 409 · EVST 431
CHEM 163 · EPS 101 · EPS 275
ANTH 473 · ECON 432 · PHYS 320