

Sustainability and Energy Undergraduate Certificate Requirements

The Sustainability and Energy Undergraduate Certificate provides a means for Northwestern students to pursue instruction that contextualizes the relevance and importance of climate, sustainability, and energy across a broad spectrum of disciplines. Certificate students will develop a sustainability literacy that allows them to make informed and effective decisions towards building a more equitable, sustainable future, no matter what they pursue professionally post-graduation.

Undergraduate Certificate Requirements

ISEN 200-level core sequence (3.0 credits)

ISEN 210	Introduction to Sustainability
ISEN 220	Introduction to Energy Systems for the 21st Century
ISEN 230	Climate Change and Sustainability: Ethical Dimensions

Note: these courses are non-sequential and can be taken in whatever order best fits the student's schedule)

Electives (4.0 additional credits)

- At least three (3) at the 300+ level; none at the 100-level
- At most two (2) from any department or program (for classes that are cross-listed, the department the shows on your transcript will be the one we use to evaluate this rule)
- Only one (1) approved study abroad course can be counted
- Relevant "Special Topics" courses may be counted more than once, with a change in topic

GPA Requirements

- 3.0 average or better within the ISEN 200-level sequence
- 3.0 average or better across all seven requisite courses
- All classes submitted towards completion of the Certificate must receive a merit (letter) grade

Double-Counting Rules

- Certificate requires academic course work of at least four (4) units that are not applied to a major or minor; you can double-count up to three (3) courses cumulatively (across all other majors/minor, not per additional major/minor)
- Double-counted classes can be from the core sequence, the electives, or a mixture thereof

Pre-Approved Electives

Approved Electives are noted on the following pages. Because new courses are being introduced/retired all the time, and/or course numbers change from time-to-time, it's possible that you may not see a course below that you believe should be included, or may see a course that is not offered in a given year (particularly Special Topics courses). Please contact trienens-ed@northwestern.edu to inquire under such a circumstance.

Courses should have a primary/majority focus on topic(s) pertinent to climate, sustainability and/or energy.

NATURAL SCIENCES

Biological Sciences

BIOL_SCI 335	Critical Topics in Ecology and Conservation
BIOL_SCI 337/ PBC 435	Biostatistics (formerly Quantitative Methods for Ecology and Conservation)
BIOL_SCI 347	Conservation Biology

Chemistry

CHEM 306/406	Environmental Chemistry
CHEM 393	Green Chemistry
CHEM 435/445	Advanced Inorganic / Advanced Physical Chemistry: Chemistry of Alternative Energy

Earth and Planetary Sciences

EARTH 314/ CIV_ENV 314	Organic Geochemistry
EARTH 341	Quaternary Climate Change: From the Ice Age to the Age of Oil
EARTH 342/ ISEN 410	Contemporary Energy & Climate Change
EARTH 343	Earth System Modeling
EARTH 390	Special Topics (when relevant, e.g. GIS Applications for Earth and Environmental Sciences)
EARTH 450	Advanced Topics (when relevant, e.g. Communicating Science Beyond Academia, in Paleoclimate)

Environmental Sciences

ENVR_SCI 201	Earth: A Habitable Planet
ENVR_SCI 202	The Health of the Biosphere
ENVR_SCI 203	Humans and the Environment
ENVR_SCI 390	Special Topics (when relevant, e.g. GIS Applications for Earth and Environmental Sciences, Global Change Ecology, etc.)

Physics

PHYSICS 333-2 Advanced Electricity and Magnetism

PHYSICS 359 Electronics Laboratory

ENGINEERING

Chemical and Biological Engineering

CHEM_ENG 345 Process Optimization for Energy and Sustainability

CHEM_ENG 364 Chemical Processing and the Environment

CHEM_ENG 365 Sustainability, Technology and Society

CHEM_ENG 367 Quantitative Methods in LCA

Civil and Environmental Engineering

CIV_ENV 201 Engineering Possibilities: Decision Science in the Age of Smart Technologies

CIV_ENV 202 Biological and Ecological Principles

CIV_ENV 203 Earth in the Anthropocene

CIV_ENV 260 Environmental Systems and Processes

CIV_ENV 295 Climate Change and Adaptation

CIV_ENV 303/ENVR_POL 390 Environmental Law and Policy

CIV_ENV 304 Civil & Environmental Engineering Systems Analysis

CIV_ENV 314/EARTH 314 Organic Geochemistry

CIV_ENV 346 Ecohydrology

CIV_ENV 361-1 Environmental Microbiology

CIV_ENV 361-2 Public and Environmental Health

CIV_ENV 364 Sustainable Water Systems

CIV_ENV 368 Sustainability: The City

CIV_ENV 387 Design of Sustainable Urban Developments

CIV_ENV 395 Special Topics (when relevant, e.g. Energy Law and Policy, Water in Israel and the Middle East, Energy Geosystems and Geosystems, etc)

Materials Science

MAT_SCI 381 Energy Materials

MAT_SCI 382 Electrochemical Energy Materials and Devices

Mechanical Engineering

MAT_SCI 380/ISEN 390 Thermal Energy Systems Design

MECH_ENG 395 Special Topics (when relevant, e.g. Combustion/ Energy Systems; Fundamentals of Nuclear Reactor Physics; Energy and Society, Bioinspired Surface Engineering)

Project Management

PROJ_MGMT 441 Sustainability in Construction

PROJ_MGMT 443 Sustainability Strategies in Organizations

PROJ_MGMT 445 Sustainability Policy and Regulatory Context

PROJ_MGMT 446 System Thinking for Sustainable Design

PROJ_MGMT 448 Metrics of Sustainability

PROJ_MGMT 449 Economics of Sustainability

Other Engineering Courses

ENTREP 474/ISEN 430 NUvention: Energy

SOCIAL SCIENCES/HUMANITIES

Economics

ECON 371 Economics of Energy

ECON 372 Environmental Economics

ECON 373 Natural Resource Economics

Environmental Policy and Culture

ENVR_POL 212/SOCIOL 212 Environment and Society

ENVR_POL 336/SOCIOL 336 The Climate Crisis, Policies and Society

ENVR_POL 340 Global Environments and World History

ENVR_POL 390 Special Topics in EPC (when relevant, e.g. US and/or International Environmental Politics, Political Ecology, Media, Earth and Making a Difference, Climate Change, Law and Policy, etc)

ENVR_POL 394 Professional Linkage Seminar (always relevant, e.g. International Environmental Organizations)

ENVR_POL 395 Special Topics Seminar (when relevant, e.g. Climate Change and Public Health)

English

ENGLISH 300 Seminar in Reading and Interpretation: Global Ecologies

ENGLISH 339 Special Topics in Shakespeare (when relevant, e.g. Green Worlds? Shakespeare's Environmental Questions (Pre 1830))

ENGLISH 378 Studies in American Literature (when relevant, e.g. Environmental Justice in Black and Indigenous Women's Literature)

History

HIST 251	The Politics of Disaster: A Global Environmental History
HIST 300	New Lectures in History (when relevant, e.g. American Environmental History)
HIST 309	American Environmental History
HIST 376	Global Environments and World History
HIST 392	Topics in History (when relevant, e.g. History of the Environment: Science, Technology and Culture, Environment and Energy in the Middle East, Energy in American History, etc.)

Political Science

POLI_SCI 329	US Environmental Politics
POLI_SCI 349/ ENVR_POL 390	International Environmental Politics
POLI_SCI 390	Special Topics (when relevant, e.g. Civic Participation and the Environment, Environmental Politics of the Middle East, Geopolitics of Energy)

Sociology

SOCIOL 212/ ENVR_POL 212	Environment and Society
SOCIOL 336/ ENVR_POL 336	The Climate Crisis, Policies and Society

Other Social Sciences and Humanities Courses

ANTHRO 390	Special Topics (when relevant, e.g. Political Ecology, Arch of Sustainability and Collapse)
COMM_ST 383	Media, Communications, Environment
COMP_LIT 302	Reading Across Disciplines (when relevant, e.g. Environmental Cultures in East Asia)
GEOG 240	Economic Geography
HUM 370	Special Topics (when relevant, e.g. Fire and Blood: Resources, Energy, and Society)
JOUR 390-O	Topics (when relevant, e.g. Native American Environmental Issues and the Media)
MENA 390	Advanced Topics (when relevant, e.g. Resources, Energy, and Power in the Middle East and North Africa)
PHIL 270	Climate Change and Sustainability: Ethical Dimensions (*This is a cross-list of ISEN 230, and therefore is NOT eligible for elective credit*)
RELIGION 369/ ENVR_POL 390	Media, Earth & Making a Difference

Other Trienens Institute (non-core) Courses

ISEN 390	Special Topics in Energy and Sustainability (always relevant)
ISEN 410/ EARTH 342	Contemporary Energy & Climate Change
ISEN 495	Special Topics in Energy and Sustainability (always relevant)

**There are several additional ISEN 400-level courses designed specifically for MS Energy & Sustainability (MSES) students that are not typically open to undergrad enrollment, and so are not listed here. Should you receive enrollment permission, all ISEN 400-level classes would be approved for Sustainability and Energy Undergraduate Certificate elective credit.*