MINOR IN ENVIRONMENT AND SUSTAINABILITY

Open to all MIT undergraduates in any major, the Environment and Sustainability Minor (E&S Minor) offers students the opportunity to apply their STEM and major-course knowledge to some of the most critical and challenging problems facing humanity. The minor equips students with interdisciplinary knowledge and real-world experience needed to understand, diagnose, and develop solutions to complex problems faced by society as it strives for social and environmental sustainability. Students tailor their MIT education to their professional goals, preparing to apply the principles of sustainability in diverse workplace contexts, including business/industry, government, civil society, and academia.

The E&S Minor combines a wide range of fields of inquiry to directly engage environmental and climate challenges facing ecosystems and populations around the globe. Fundamentally, these challenges affect both human systems and the earth systems on which we depend. Planetary challenges include climate change, risks to oceans and forests, degradation to both biodiversity and material resources, and fundamental transformations of biogeochemical cycles. Challenges facing society include widespread and intransigent environmental injustice, expanding urban and agricultural pollution, technological and economic lock-in of infrastructure and all manner of production and consumption systems, and a global dependence on carbon intensive energy.

The minor prioritizes integrative, interdisciplinary learning that is critical for effectively understanding and addressing the complexities of environmental issues today and in the future, and is structured on four pillars: Earth Systems and Climate Science, Environmental Governance, Environmental Histories and Cultures, and Engineering for Sustainability. Upon completion of the minor, students will have achieved learning outcomes in seven categories: Systems Thinking; Sustainable Design Skills; Applied Sustainable Solutions; Know Your Planet; Social Context; Ethical Decision-making; and Impactful Communication.

The E&S Minor is comprised of five to six subjects, for a minimum of 57 units:

- One foundational subject (12.387[J] People and the Planet: Environmental Governance and Science)
- Subjects in two core required areas of study: 1) Context and Perspective and 2) Sustainable Solutions
- 24 units of elective subjects, reflecting the student’s particular interests.

Environment and Sustainability Foundation

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.387[J] People and the Planet: Environmental Governance and Science</td>
<td>9</td>
</tr>
</tbody>
</table>

Context and Perspective

Select one of the following: 1,2,3 12

- 11.169 Global Climate Policy and Sustainability
- 21A.312 Planetary Change and Human Health
- 21A.410 Environmental Struggles
- 21H.185[J] Environment and History
- 21H.186 Nature and Environment in China
- 21H.187 US Environmental Governance: from National Parks to the Green New Deal

Sustainable Solutions

Select one of the following: 1,2,3 12

- 1.006 Tools for Sustainable Design
- 2.722[J] D-Lab: Design
- 11.025[J] D-Lab: Development
- EC.715 D-Lab: Water, Sanitation and Hygiene
- EC.719 D-Lab: Water, Climate Change, and Health

Electives

Select a minimum of 24 units from the categories below: 1,2,3 24

Discovery

- 1.008 Engineering for a Sustainable World
- 1.009 Climate Change
- 1.091 Traveling Research Environmental eXperience (TREX): Fieldwork

- 2.00C[J] Design for Complex Environmental Issues: Building Solutions and Communicating Ideas

- 2.981 New England Coastal Ecology

- 3.002 Materials for Energy

- 12.000 Solving Complex Problems

- 12.12 Nature’s Sandbox: The History of Ancient Environments, Climate, and Life

- SP.310 Engagement and Discovery Through the Terrascope Field Experience

- SP.360 Terrascope Radio

- SP.361 Majors and Careers Through a Terrascope Lens

Applied Problem Solving

- 1.004 Startup Sustainable Tech

- 1.013 Senior Civil and Environmental Engineering Design

- 1.020 Engineering Sustainability: Analysis and Design

- 1.102 Introduction to Civil and Environmental Engineering Design II

- 1.107 Environmental Chemistry Laboratory
2.00A Fundamentals of Engineering Design: Explore Space, Sea and Earth
2.651[J] Introduction to Energy in Global Development
4.218 Disaster Resilient Design
4.411[J] D-Lab Schools: Building Technology Laboratory
10.496[J] Design of Sustainable Polymer Systems
11.007 Urban and Environmental Technology Implementation Lab
11.173[J] Infrastructure Design for Climate Change
12.307 Weather and Climate Laboratory
12.335 Experimental Atmospheric Chemistry
15.772[J] D-Lab: Supply Chains
22.033 Nuclear Systems Design Project

**Economic and Global Systems**

14.42 Environmental Policy and Economics
14.43[J] Economics of Energy, Innovation, and Sustainability
21H.383 Technology and the Global Economy, 1000-2000
IDS.437[J] Technology, Globalization, and Sustainable Development

**Energy x Sustainability**

3.18 Materials Science and Engineering of Clean Energy
5.371 Continuous Flow Chemistry: Sustainable Conversion of Reclaimed Vegetable Oil into Biodiesel
8.21 Physics of Energy
10.04 A Philosophical History of Energy
10.05 Foundational Analyses of Problems in Energy and the Environment
22.081[J] Introduction to Sustainable Energy
IDS.521[J] Energy Systems for Climate Change Mitigation

**Ethics and Just Futures**

6.9320 Ethics for Engineers
11.148 Environmental Justice: Law and Policy
21A.155 Food, Culture, and Politics
22.04[J] Social Problems of Nuclear Energy
24.03 Good Food: The Ethics and Politics of Food
24.07 The Ethics of Climate Change
24.191 Being, Thinking, Doing (or Not): Ethics in Your Life
STS.032 Energy, Environment, and Society
WGS.160[J] Science Activism: Gender, Race, and Power
WGS.275[J] Gender, Race, and Environmental Justice

**Life and Ecology**

1.089 Earth’s Microbiomes
12.007 Geobiology: History of Life on Earth
21A.303[J] The Anthropology of Biology

**Materials and Material Culture**

1.035 Mechanics of Materials
3.081 Industrial Ecology of Materials
3.094 Materials in Human Experience
3.19 Sustainable Chemical Metallurgy
3.982 The Ancient Andean World
3.983 Ancient Mesoamerican Civilization
4.657 Design: The History of Making Things

**Media, Communications, and Literature**

21L.449 The Wilds of Literature
21W.012 Writing and Rhetoric: Food for Thought
21W.036 Science Writing and New Media: Writing and the Environment
21W.775 Writing about Nature and Environmental Issues
CMS.374[J] Transmedia Art, Extraction, and Environmental Justice
CMS.375 Reading Climate Through Media
STS.034 Science Communication: A Practical Guide

**Negotiations, Politics, and Policy**

11.003[J] Methods of Policy Analysis
11.011 The Art and Science of Negotiation
12.385 Science, Politics, and Environmental Policy
17.181 Sustainability: Political Economy, Science, and Policy
17.30[J] Making Public Policy
17.309[J] Science, Technology, and Public Policy
MINOR IN ENVIRONMENT AND SUSTAINABILITY

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>IDS.060[J]</td>
<td>Environmental Law, Policy, and Economics: Pollution Prevention and Control</td>
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<tr>
<td>IDS.061[J]</td>
<td>Regulation of Chemicals, Radiation, and Biotechnology</td>
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<tr>
<td>IDS.062[J]</td>
<td>Global Environmental Negotiations</td>
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**Planet Earth and Climate Science**

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<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>1.061</td>
<td>Transport Processes in the Environment</td>
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<tr>
<td>1.061A</td>
<td>Transport Processes in the Environment I</td>
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<tr>
<td>1.071[J]</td>
<td>Global Change Science</td>
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<tr>
<td>1.080</td>
<td>Environmental Chemistry</td>
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<tr>
<td>1.085[J]</td>
<td>Air Pollution and Atmospheric Chemistry</td>
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<tr>
<td>12.001</td>
<td>Introduction to Geology</td>
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<td>12.002</td>
<td>Introduction to Geophysics and Planetary Science</td>
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<tr>
<td>12.003</td>
<td>Introduction to Atmosphere, Ocean, and Climate Dynamics</td>
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<tr>
<td>12.021</td>
<td>Earth Science, Energy, and the Environment</td>
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<td>12.086</td>
<td>Modeling Environmental Complexity</td>
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<td>12.104</td>
<td>Geochemistry of Natural Waters</td>
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<td>12.301</td>
<td>Climate Science</td>
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<td>12.306</td>
<td>Atmospheric Physics and Chemistry</td>
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<td>12.349</td>
<td>Mechanisms and Models of the Global Carbon Cycle</td>
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<td>12.372</td>
<td>Elements of Modern Oceanography</td>
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<td>12.377</td>
<td>The History of Earth’s Climate</td>
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<td>12.390</td>
<td>Fluid Dynamics of the Atmosphere and Ocean</td>
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<td>18.352[J]</td>
<td>Nonlinear Dynamics: The Natural Environment</td>
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**The Built Environment**

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<th>Subject Code</th>
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<tr>
<td>4.211[J]</td>
<td>The Once and Future City</td>
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<tr>
<td>4.401</td>
<td>Environmental Technologies in Buildings</td>
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<tr>
<td>4.432</td>
<td>Modeling Urban Energy Flows for Sustainable Cities and Neighborhoods</td>
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<tr>
<td>11.113</td>
<td>The Economic Approach to Cities and Environmental Sustainability</td>
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<tr>
<td>11.123</td>
<td>Big Plans and Mega-Urban Landscapes</td>
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<tr>
<td>11.149</td>
<td>Decarbonizing Urban Mobility</td>
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<td>11.158</td>
<td>Behavioral Science and Urban Mobility</td>
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**Urban Energy Systems and Policy**

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<tr>
<th>Subject Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>11.165</td>
<td>Urban Energy Systems and Policy</td>
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</table>

**Total Units**

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<tr>
<th>Subject Code</th>
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<tr>
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1. See the Environment & Sustainability Minor website (https://environmentalsolutions.mit.edu/environment-sustainability-minor) for potential elective and core subject substitutions or additions.

2. Not all subjects in the E&S Minor are offered every academic year, and some have prerequisites that are outside of the E&S Minor program. Please visit the MIT Subject Listing (http://student.mit.edu/catalog) for a current and comprehensive list of offered classes.

3. If a subject is counted towards a core area of study, it cannot also count as an elective.

4. Up to two Terrascope (https://terrascope.mit.edu) subjects may count towards the E&S Minor.

A minimum of four subjects (or 48 units) taken for the Environment and Sustainability minor cannot also count toward a student’s major or other minor. In other words, only one subject that counts toward a student’s major or other minor degree may also count toward the E&S Minor elective requirement.

There are no restrictions on the number of subjects that may count towards a student’s HASS Concentration and the E&S Minor. A student may petition to have a subject that is not listed on the electives listing count towards the E&S Minor.

For more information, contact Sarah Meyers (smeyers@mit.edu), Education Program Manager at the MIT Environmental Solutions Initiative (ESI) or visit the ESI education website (https://environmentalsolutions.mit.edu/environment-sustainability-minor).