

Sustainability Graduate Certificate Program Course Requirements

The Sustainability Certificate program consists of 12 credit hours.

Below is a list of pre-approved courses designated by the category of Sustainability Knowledge Fundamentals or Skill Set Development. Students must identify a proposed suite of courses related by some focus area in their application to the certificate. Alternate courses may be approved given adequate justification.

SUSTAINABILITY KNOWLEDGE FUNDAMENTALS (6 CREDITS REQUIRED)

This set of courses allows students to acquire fundamental knowledge in sustainability principles. Courses that fulfill this requirement focus on foundational theory and background within a specific topic, providing context and in-depth analysis of that topic. Included are courses that cover principles of sustainability, ethics, behavior, education, biodiversity conservation, policy, law, or other sustainability-themed courses that investigate a particular topical area through case studies. Choose 6 credits from the following:

- NRE 596/AAS 596: History of Environmental Thought and Activism (3 credits)
- ANTHRCUL 539: Consumption (3 credits)
- ANTHRCUL 625: Anthropological Approaches to Property and Property Rights (3 credits)
- POLSCI 650: Political Economy of Development (3 credits)
- EHS 588: Environmental Law (3 credits)
- EHS 574/CHEM 574: Environmental Chemistry (3 credits)
- EPID 666: Health and Socioeconomic Development (3 credits)
- HBEHED 516: Global Health: Anthropological Perspectives (3 credits)
- LAW 771: How to Save the Planet (3 credits)
- NRE 537: Urban Sustainability (3 credits)
- NRE 501.038: Foundations of Sustainable Food Systems (1-4 credits)
- NRE 501.055: Poverty, Environment, and Inequality (1-4 credits)
- NRE 501.089: Justice Issues in Conservation and Sustainability (3 credits)
- NRE 577: Political Ecology, Environmental Security and Conflict (3 credits)
- NRE 509: Ecology: Science of Context and Interaction (4 credits)
- NRE 510: The Science and Practice of Social Change (3 credits)
- NRE 512/BL 536: Ethics of Corporate Management (2.25 credits)
- NRE 517: Conservation Biology (3 credits)
- NRE 548: Land Use and Global Change (3 credits)
- NRE 555: Climate and Development (3 credits)
- NRE 557/CEE 586: Industrial Ecology (3-4 credits)
- NRE 560/URP 543/SW 710: Behavior and Environment (3 credits)
- NRE 563: Localization (3 credits)
- NRE 565a: Principles of Transition (1.5 credits)

- NRE 565b: Power-over and Power-with (1.5 credits)
- NRE 566: Public Opinion and the Environment (3 credits)
- NRE 574/PUBPOL 519: Sustainable Energy Systems (3 credits)
- NRE 593: Environmental Justice (3 credits)
- NRE 592/URP 542: Environmental Planning: Issues and Concepts (3 credits)
- URP 553: Sustainable Urbanism and Architecture (3 credits)

SKILL SET DEVELOPMENT (SIX CREDITS REQUIRED)

This set of courses allows students to acquire specific tools and methods that can be applied to the practice of sustainability. Courses fulfilling this requirement focus on developing techniques and tools of analysis, intervention or design principles, and generally have associated problem sets, laboratory or field-based components, design projects, mock negotiations, or other experiences directly related to skill development. Included are courses related to modeling, mapping, design, policy-making, behavior change, analytical problem solving, and otherwise acquiring experience applying different tools or techniques. Choose 6 credits from the following:

- NRE605/BE 605/ARCH 507: Green Development (3 credits)
- ARCH 575: Building Ecology (3 credits)
- CEE 460: Design of Environmental Engineering Systems (3 credits)
- CEE 582: Environmental Microbiology (3 credits)
- CEE 686/CHE 686: Case Studies in Environmental Sustainability (2-3 credits)
- COMPLEXSYS 501: An Introduction to Complex Systems (3 credits)
- EEB 556: Field Botany of Northern Michigan (UMBS)
- EEB 585: Ecology of Streams and Rivers (UMBS)
- ECON 662: Environmental Economics (3 credits)
- EHS 570: Water Quality Management (3 credits)
- EHS 672: Life Cycle Assessment: Human Health and Environmental Impacts (3 credits)
- ENGR 521: CleanTech Entrepreneurship (3 credits)
- FIN 583: Energy Project Finance (1.5 credits)
- FIN 637: Finance and Sustainable Enterprises (2.25 credits)
- MECHENG 589: Sustainable Design of Technology Systems (3 credits)
- NRE 549: Analysis and Modeling of Ecological Data (3 credits)
- NRE 554: Urban Agriculture (1-4 credits)
- NRE 573: Environmental Footprinting and Input-Output Analysis (3 credits)
- NRE 578: Urban Storm water: Science, Design, and Management (3 credits)
- NRE 501.046: Science and Management of the Great Lakes (1-4 credits)
- NRE 552: Ecosystem Services (3 credits)
- NRE 545: Applied Ecosystem and Development (2 credits)
- NRE 610: Advanced LCA Methods and Software Tools (1.5 credits)
- NRE 508: Wetland Ecology (3 credits)
- NRE 513/STRAT 564/STRAT 565: Strategies for Sustainable Development (3 credits)
- NRE 514/EHS 572: Environmental Impact Assessment (2 credits)
- NRE 520: Fluvial Ecosystems (3 credits)
- NRE 521: Fluvial Ecosystems Lab (1 credit)
- NRE 523: Environmental Risk Assessment (2 credits)
- NRE 527/BE 527: Energy Markets and Energy Politics (3 credits)

- NRE 531: Principles of GIS (4 credits)
- NRE 533: Negotiation Skills in Environmental Dispute Resolution (3 credits)
- NRE 534: GIS and Landscape Modeling (3 credits)
- NRE 540: GIS for Natural Resource Applications (2 credits)
- NRE 541: Remote Sensing (4 credits)
- NRE 543: Environmental Spatial Data Analysis (3 credits)
- NRE 547: Forest Ecology in a Changing World (4 credits)
- NRE 550/STRAT 566: Systems Thinking for Sustainable Development (3 credits)
- NRE 556/EEB 477: Field Ecology (5 credits)
- NRE 561: Psychology of Environmental Stewardship (3 credits)
- NRE 562: Environmental Policy, Politics, and Organizations (3 credits)
- NRE 563: International Environmental Policy (3 credits)
- NRE 568: Re-Connecting and Re-Vitalizing (1.5 credits)
- NRE 570: Environmental Economics: Quantitative Methods and Tools (3 credits)
- NRE 581: Advanced Environmental Education (3 credits)
- NRE 589: Ecological Restoration (4 credits)
- NRE 592/URP 542: Environmental Planning: Issues and Concepts (3 credits)
- NRE 597: Environmental Systems Analysis (3 credits)
- NRE 605/BA 605: Green Development (3 credits)
- NRE 639.075: Food Sovereignty (1-3 credits)
- NRE 639.108: Conservation Biology and Ecosystem Health (1-3 credits)
- NRE 639.114: Future Scenarios for Global Food Security (1-3 credits)
- NRE 664: Food and Fuel: Research Questions at the Base of the Economy (1.5-2 credits)
- NRE 668/ECON 661: Advanced Natural Resources Economics (3 credits)
- NRE 669/ECON 662: Environmental Economics (3 credits)
- NRE 687: Landscape Planning (4 credits)
- UP 524: Land use and Development Management Planning
- UP 525: Food Systems Planning
- UP 532: Sustainable Development

EXPERIENTIAL LEARNING CAPSTONE EXPERIENCE (THREE CREDITS REQUIRED)

The capstone experience is an activity or combination of activities that represent the effort associated with a 3-credit course. The capstone experience may be in the form of an approved 3-credit elective course, or an approved activity not associated with an official course. Current non-credit opportunities include participation in:

- the Dow Sustainability Fellows Program
- Sustainability Without Borders
- Blue Lab

- Planet Blue
- the Campus Farm
- Sustainability related internships
- Other approved experiential activity

For example, experiential activities could take the form of an intensive international project trip, volunteering at a community organization over the course of a semester, or helping to design and implement a Planet Blue campaign. Given the range of possible activities, experiential activities that are not taken for course credit are evaluated on a case-by-case basis. The suitability of experiences that also fulfill requirements for a graduate degree, such as a required project, departmental capstone course, or research project, are evaluated on a case-by-case basis. Capstone experiences must have a distinct sustainability-related focus and should be approved in advance of the activity.

Advising: each student must obtain a faculty advisor for the certificate program who is knowledgeable in the student's proposed focus area. The role of the advisor will be to assist the student in selecting appropriate coursework relevant to the proposed focus area.

EXAMPLE CURRICULA FOR FOCUS AREAS

Students are free to design their own focus area, with approval from the certificate coordinator or committee member designated by the coordinator. To provide some structure, this pre-approved list of focus area coursework is given; however, students are not required to choose from the areas listed. Similar to the course lists, the pre-approved focus areas will undergo an annual review by the certificate committee. It is expected that the pre-approved focus areas will change over time. Example pre-approved focus areas include:

1. SUSTAINABLE FOOD SYSTEMS

A. Sustainability knowledge fundamentals (6 credits required)

- NRE 501 (038): Foundations of a sustainable food systems (3 credits)

Plus one of the following:

- EEB 498: Ecology of Agroecosystems (3 credits)
- NRE 501 (055): Food Systems: Implications of Unequal Access (4 credits)

B. Skill set development (6 credits required)

- UP 525: Food systems planning (3 credits)
- SPH 633: Evaluation of Global Nutrition Programs (3 credits)

C. Experiential learning capstone experience (3-credit equivalent)

Internship with any of the following:

- UM Sustainable Food Systems Campus Farm
- Washtenaw Food Policy Council
- Washtenaw Food Hub
- Growing Hope

2. TRANSITIONAL THINKING FOR A SUSTAINABLE SOCIETY

A. Sustainability knowledge fundamentals (6 credits required)

- NRE 564: Localization (1.5 credits)
- NRE 565a: Principles of transition (1.5 credits)
- NRE 565b : Power-over and power-with (1.5 credits)
- NRE 560: Behavior and environment (1.5 credits)

B. Skill set development (6 credits required)

- NRE 561: Psychology of environmental stewardship (1.5 credits)
- NRE 568: Re-connecting and re-vitalizing (1.5 credits)
- NRE 581: Advanced environmental education (3 credits)

C. Experiential learning capstone experience (3 credit equivalent)

Internship with any of the following:

- Sustainability Without Borders
- Washtenaw Food Policy Council
- Data-Driven Detroit

3. SUSTAINABLE CITIES

A. Sustainability knowledge fundamentals (6 credits required)

- URP 542: Environmental planning: Issues and concepts (3 credits)
- URP 553: Sustainable urbanism and architecture (3 credits)

B. Skill set development (6 credits required)

- UP 532: Sustainable development (3 credits)
- ARCH 507: Green development (3 credits)

C. Experiential learning capstone experience (3 credit equivalent)

Internship with any of the following in an environmental capacity:

- City of Ann Arbor
- Washtenaw County

4. SUSTAINABILITY POLICY

A. Sustainability knowledge fundamentals (6 credits required)

- NRE 510: The Science and Practice of Social Change (3 credits)
- NRE 566: Public opinion and the environment (3 credits)

B. Skill set development (6 credits required)

- NRE 562: Environmental policy, politics and organizations (3 credits)
- NRE 563: International environmental policy (3 credits)

C. Experiential learning capstone experience (3 credit equivalent)

Internship with:

- National or international environmental NGO focused on policy making

5. SUSTAINABLE ENERGY

A. Sustainability knowledge fundamentals (6 credits required)

- NRE 557, CEE 586: Industrial ecology (3 credits)

B. Skill set development (6 credits required)

- NRE 527, BE 527: Energy markets and energy politics (3 credits)

C. Experiential learning capstone experience (3 credit equivalent)

Internship with one of the following:

- National or international environmental NGO focused on energy issues

- Energy-related enterprise
- Local, regional or national agency focused on energy issues

6. SUSTAINABLE MANAGEMENT OF BIOLOGICAL RESOURCES

A. Sustainability knowledge fundamentals (6 credits required)

- NRE 517: Conservation Biology (3 credits)
- NRE 589: Ecological Restoration (3 credits)

B. Skill set development (6 credits required)

- NRE 556: Field Ecology (3 credits)

Plus one ecosystem or organismal class, such as:

- NRE 508: Wetland Ecology (3 credits)
- NRE 547: Forest Ecology (3 credits)

C. Experiential learning capstone experience (3 credit equivalent) Internship

with one of the following:

- SNRE Affiliated Research Center
- Local, national or international NGO focused on biodiversity and conservation (e.g., The Nature Conservancy, The Sierra Club, World Wildlife Federation)
- Local, regional, or national agency focused on conservation (e.g., Michigan Department of Natural Resources, U.S. Fish & Wildlife Service)

7. SUSTAINABLE WATER SYSTEMS

A. Sustainability knowledge fundamentals (6 credits required)

- NRE 520: Fluvial Ecosystems (3 credits)
- CEE 520: Land-Surface Hydrology (3 credits)

B. Skill set development (6 credits required)

- EHS 570: Water Quality Management (3 credits)

C. Experiential learning capstone experience (3 credit equivalent) Internship

with one of the following:

- SNRE Affiliated Research Center focused on water-related issues
- (e.g., Cooperative Institute for Limnology & Ecosystems Research – CILER; Michigan Sea Grant, or Great Lakes Environmental Research Lab - GLERL).
- Local, national or international NGO focused on water quality and management
- (e.g., Huron River Watershed Council, Michigan Clean Water Action)
- Local, regional or national agency focused on water quality and management (e.g., Michigan DEQ, U.S. Geological Survey)