

# The University Senate of Michigan Technological University

## Proposal 36-22

### Establishment of a new Master of Science in Sustainable Communities

Submitted by: Department of Social Sciences

Proposal Date: 11.18.2021 (Revised 2.7.2022)

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Interdisciplinary programs approval: This proposal involves an MS degree housed with the Department of Social Sciences. The structure of the program will likely involve a potential for increased enrollments across other units on campus, given the inclusion of a breadth of existing graduate certificates on campus.

Program Description:

- a. The goal of this MS degree is to prepare students to engage in sustainability-related professions in the public, private, and non-profit sectors that require 1) applied tools for research, investigation, and inquiry and 2) a holistic understanding of the root causes and potential pathways to address the most pressing sustainability problems in contemporary society. Students will be prepared to work in a wide range of job fields, including positions in public and private sustainability offices, planning, energy and waste companies, or for policy makers, governments, and regulatory agencies, marketing and communications, NGO or other nonprofits, insurance, consulting, standards organizations, and many more. The program is designed around four core areas (1) Social Science Foundations, 2) Applied Inquiry Skills, 3) Socio-Ecological and Socio- Technological Systems, and 4) Capstone Experience. The first core, Social Science Foundations, provides students a foundational understanding of the intersections of social, ecological, and technological systems. Students complete the second and third core areas by selecting courses from thematic lists, or by completing certificate programs from across campus. The final core (the Capstone Experience) gives students skills in partnering with diverse teams of stakeholders who are working toward sustainability goals. The degree can be completed as coursework only or report option.
- b. After completing this MS degree, graduates will be able to:
  - i. Describe the historical foundations and contemporary frameworks used in sustainability sciences
  - ii. Apply social research and inquiry skills to examine sustainability issues

- iii. Gather and analyze information from a diverse set of sources to understand a contemporary sustainability issue
- iv. Effectively partner with diverse teams of stakeholders to work towards enhancing sustainability based on goals identified in partnership

Program Title: Sustainable Communities

Rationale: Problems related to sustainability are the most pressing problems of contemporary society, and these problems are, at their foundation, social issues. The United Nations [Sustainable Development Goals](#), presented in the [2030 Agenda for Sustainable Development](#) (2015), presents an integrated vision for the conservation and development of diverse cultural and natural heritage as governments work toward goals in the eradication of poverty, social and economic development, and building a sustainable and just world. The proposed degree program prepares students to address these problems through holistic thinking and applied skill sets, creating professionals who contribute to a more sustainable future. Students who complete this degree will develop the skill sets and understandings necessary to work on sustainability issues in the public, private, and non-profit sectors. Students will use the skills of sustainability science and social science inquiry to assess and improve the sustainability of communities across multiple scales and domains. The Department of Social Sciences houses much of the necessary expertise but recognizes that these multidimensional problems require multidisciplinary collaboration across University units. Drawing on Department of Social Sciences expertise, students in the MS program Sustainable Communities will engage in community projects, policy and law, social data analysis, cultural heritage, and historical and comparative perspectives on sustainability.

*Job market:* Sustainability related jobs are found in some of the fastest growing fields in the 21st-century economy. Some of these positions involve technical skills in retrofitting buildings and installing renewable energy infrastructure. Many jobs in sustainability, especially at the management and leadership level where we expect to draw students for an advanced degree, require both applied tools for research, investigation, and inquiry and a holistic understanding of the root causes and potential pathways to address the most pressing sustainability problems in contemporary society using broad foundations in the social science skills that we will teach. Many organizations have begun reprioritizing departments and creating initiatives to develop environmentally friendly products and develop new green business practices. Figure 1 below shows key areas of sustainability and corporate social responsibility identified as urgent by leading employers in the field of sustainability. To impact these areas, there is a need for leaders who are skilled analysts, consultants, educators, planners, and policy makers. Many of these jobs did not exist several years ago and this sector of the economy is expected to continue to grow, according to the U.S Bureau of Labor Statistics<sup>1</sup>.

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<sup>1</sup> <http://www.bls.gov/green/overview.htm>

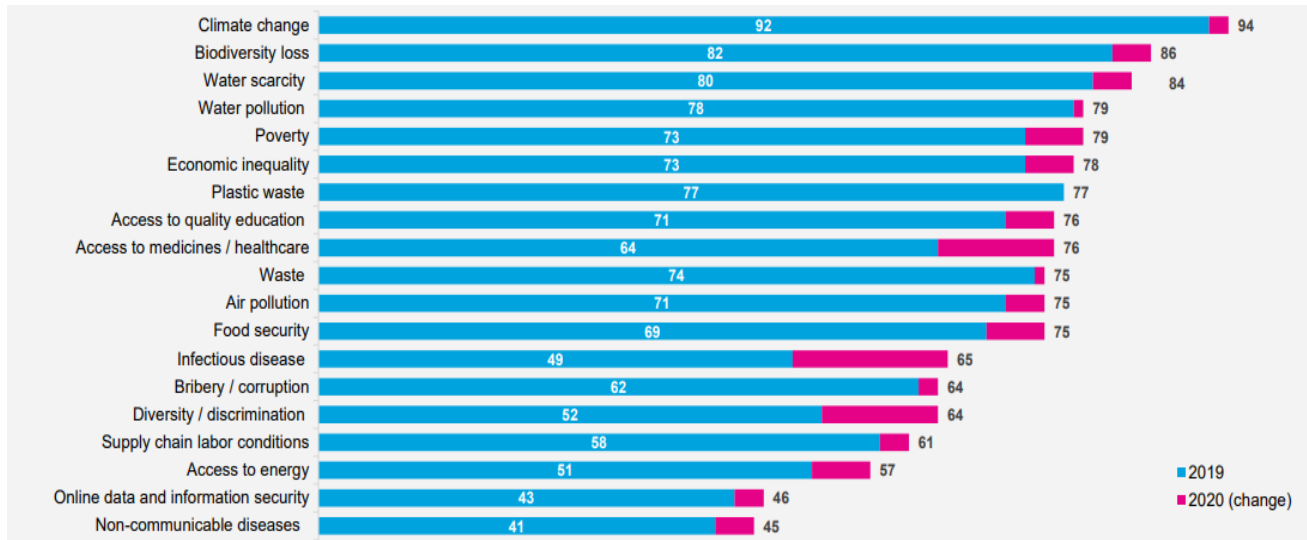


Figure 1. Source: The GlobeScan SustainAbility Survey 2020. Accessed Nov 2 2021 at <https://3ng5143rkkzc34ep72kj9as1-wpengine.netdna-ssl.com/wp-content/uploads/2020/08/GlobeScan-SustainAbility-Leaders-Survey-2020-Report-2.pdf>

Related programs: The Department of Social Sciences is home to a Sustainability Sciences and Society undergraduate degree. Michigan Tech offers an existing graduate certificate program in Engineering Sustainability & Resilience (which is included as options in this proposed MS degree). Michigan State University offers an MS degree in Community Sustainability (with both a coursework only and a research/thesis track); this degree is housed within a Department of Community Sustainability. The MS degrees at MSU are organized into topical focus area tracks selected by participating students. The proposed MS degree program in Sustainable Communities at MTU is unique in several ways. First, it integrates expertise from the Department of Social Sciences regarding historical and cultural heritage contexts for understanding sustainability as related to industrialization, infrastructure, and social well-being. Embedding sustainability in historical context is key for developing a holistic understanding. Second, this proposed MS leverages Michigan Tech’s unique strengths in applied learning and in multidisciplinary education grounded in technological and engineering expertise. Students will leave prepared to address sustainability challenges using research and inquiry skills for applied investigations as well as having grounded expertise in social, ecological, and technological domains.

Enrollment and Projections: The Department of Social Sciences aims to grow in the domain of sustainability social sciences, while also leveraging the growing expertise in sustainability and resilience across campus. The aim is to enroll ~5 students per year in years 1-3, increasing to 10 students per year by year 5. The program is grounded in currently available coursework and certificates, but will position the University to grow certificate offerings and faculty expertise in sustainability systems science, including in the social sciences. The Department intends to create an accelerated MS version of the degree after its creation, which is expected to further contribute to growth in enrollment.

Curriculum Design:

All courses are 3 credits unless otherwise noted. Given the Graduate School limit of 12 credits at the 4000 level for graduate students, students will be limited to no more than one 4000 level course in each of the categories a-d listed below. For reference, the example curriculum pathway below includes 9 credits at the 4000 level.

- a. **Social Science Foundations: 9 credits**
  - i. SSXXXX Sustainability Science (currently a 3000-level course, will make 5000 version, students entering fall 2022 or spring 2023 can complete 3000-level version)
  - ii. Choose 2 courses:
    - SS 5530 Deindustrialization and the Urban Environment
    - SS 5900 Heritage Management
    - SS 5420 Memory and Heritage
    - SS 5720 Social Thought, Contemporary Issues

Undergraduate Level: maximum 1

  - SS/FW 3313 Sustainability Science
  - SS 4120 Sustainable Development and Communities (new name going in binder this fall)
  - SS 4700 Communities and Research
  
- b. **Applied Research and Inquiry Skills: 9 credits, either existing certificates or 9 credits of SS methods**
  - i. Existing Certificates:
    - Public Policy
    - Data Science Foundations
    - Geoinformatics
    - Geospatial Data Science & Technology
    - Engineering Sustainability and Resilience (BS in any discipline, with a background in quantitative analysis recommended)
  - ii. OR 9 credits from:
    - SS 4211 Ethnographic Methods
    - SS 5003 Survey Methods
    - SS 5004 Statistics for the Social Sciences
    - SS 5501 Industrial Communities
    - SS 6002 Research Design
    - SS 5700 Archaeological Field Methods
    - SS 5005 Introduction to Agent Based Modeling
    - SS 5800 Documentation of Historic Structures
    - SS 5001 Advanced Social Science Methods
    - SS 5049 GIS for Graduate Researchers
    - SS 5050 Advanced GIS Methods and Projects
    - PSY 5015 Cognitive Task Analysis
  
- c. **Socio-ecological and socio-technological systems: 9 credits, either existing certificates or 9 credits of courses listed below**

- i. Existing Certificates:
  - Natural Hazards and Disaster Risk Reduction
  - Natural Resource and Environmental Economics
  - Resilient Water Infrastructure (students must have a BS in civil, environmental or a related degree.)
  - WASH (students must have BS in any engineering field)
  
- ii. OR 9 credits from:
  - SS 5400 Sociology of the Environment
  - SS 5550 Global Environmental History
  - SS 5325 Water Policy, History & Governance
  - SS 5551 Global Industrial History
  - SS 5500 History of Technology
  - SS 5330 Advanced Topics in Energy Policy
  - SS 5300 Environmental and Natural Resources Policy
  - SS 5635 International Environmental Policy
  - SS 6100 Advanced Seminar in Energy and Climate Policy
  - BL 5421 Lake Superior Exploration
  - BL 5447 Stream Ecology
  - BL 5451 Advanced Ecology
  - CEE 5666 Water Resources Planning and Management (CEE 3620 and EC 3400)
  - EC 5650 - Market Failure & Environment (EC 2001 or EC 3002)
  - FW 5421 Climate Change and Management in Great Lakes Forested Systems
  - FW 5371 Snow Hydrology
  - FW 5115 Restoration Ecology
  - FW 5369 Hydrology and Watershed Management
  - GE 5150 Advanced Natural Hazards
  - GE 5660 Social Dimensions of Natural Hazards
  - UN 5400 Climate Science and Policy
  
- Undergraduate Level: maximum 1
  - SS 4200 Environmental Anthropology
  - SS 4390 Seminar in Sustainability
  - BL 4120 Environmental Remediation Toxicology (BL 1020 or BL 1040 or (BL 1200 and BL 1210) or (BL 1400 and BL 1410))
  - CEE 4410 Transportation Planning
  - CEE 4506 Sustainable Engineering
  - GE 4220 Mining Systems and The Environment
  - FW 4400 Urban Forestry
  
- d. Capstone Experience: 3 Credits to complete a professional development capstone or project, to be determined by faculty advisor. Course options:

- i. SS 5015 Cultural/Environmental Office of Surface Mining VISTA Field Service Internship
- ii. SS 5990 Graduate Research
- iii. SS 4920 Internship Experience
- iv. SS 4921 Washington Internship–Professional Practicum
- v. SS 5990: Graduate Research (for report option)

New Course Descriptions: The 5000-level Sustainability Science course is under development and will be proposed Fall 2022 as part of the annual curriculum update process.

Model Schedule demonstrating completion sequence:

Fall 2023:

SS 5xxx - Sustainability Science (core)

SU 5601 - R for Geosciences in Applied and Fundamental Tasks and Research (applied skills GIS cert)

SS 5420 - Memory and Heritage (core)

Spring 2024

SU 5012 - Geospatial Data Mining and Crowdsourcing (applied skills GIS cert)

SS 5050 - Advanced GIS Methods and Projects (applied skills GIS cert)

SS 5530 - Deindustrialization and the Urban Environment (Core)

Fall 2024

CEE 4410 -Transportation Planning (socio eco and tech systems)

SS 5551- Global Industrial History (socio eco and tech systems)

SS 4200 - Environmental Anthropology (socio eco and tech systems)

Spring 2025

SS 4920 Internship Experience or SS 5990 Graduate Research

Library and other learning resources: The students in this program will have access to the MTU library, computer laboratories, and all other learning resources on campus.

Description of available/needed equipment: Students will have access to computers on campus and there is no other equipment or laboratory space needed for program success. The Department of Social Sciences currently provides space for all funded graduate students. Increased enrollments may result in increased needs for office spaces, particularly if there is an institutional interest in providing space for unfunded graduate students.

Program costs and Impact on Resources within Social Sciences: The MS program in Sustainable Communities will require 30 credits of graduate coursework. The courses in the proposed MS degree program are already offered on campus and no additional support for faculty is required for the initial forecasted enrollment. To ensure viability of both this program, and our existing undergraduate BS program in Sustainability Science and Society, we anticipate program growth that will result in additional needs to increase teaching and advising capacity over the next two years. This includes additional staff support for the coordination of internships/applied work experiences (in both programs) and general program support. This need for additional instructional and advising personnel will grow in alignment with projected program growth across undergraduate and graduate programming in sustainability and community development within the Department of Social Sciences. For example, the Sustainability Science and Society degree is new and has quickly growing enrollments. This support need is also identified within a new BS degree proposal being developed in Social Sciences.

Accreditation requirements: Michigan Technological University is accredited by the Higher Learning Commission. No additional accreditations will be sought.

Planned implementation date: Fall 2022

New Degree Program sections:

1. Program specific policies: The SS Department graduate handbook will be updated to include this degree program, including specifically the coursework pathways and the expectations for the capstone experience. Information regarding expectations for students to succeed in graduate programs and regarding resources available to MTU graduate students is already provided in the existing handbook.
2. Scheduling plans: The courses included in this proposed MS degree program will be taught on the schedule provided in the registrar's course listings, though will be adjusted in the Fall 2022 Curriculum Update process to ensure core courses are taught annually as reflected in the model schedule.. Admissions currently occur on a rolling basis, but the Department is moving to have two consistent admission deadlines per year (January 15 and September 15); students can enter the program in any semester after Fall 2022 (September 15 2022 deadline for spring 2023 entry)
3. Space: There are no additional space needs required for this program at this time. The Department of Social Sciences currently provides space for all funded graduate students. Increased enrollments may result in increased needs for office spaces, particularly if there is an institutional interest in providing space for unfunded graduate students.
4. Faculty Resumes: See <http://www.mtu.edu/social-sciences/department/faculty-staff/>
5. Financial Review information See Appendix A

## Appendix A Financial Documentation for MS in Sustainable Communities

### 1. Relationship to University Strategic Plan:

- a. *Educational and Research Goals:* This new Master's program in Sustainable Communities aligns very well with several of the university's educational and research goals including the goals to focus on community, transformative education, encouraging the understanding of public policy issues, to promote social and civic responsibility as well as ethical conduct. Sustainability and resilience is one of the focus areas of the institution today and through our [Portrait 2045](#) vision for the institution.
- b. *Consistency with University's resource allocation criteria:* The proposed program is intended to attract new graduate students to the university and support broad interdisciplinary instruction and research in the sustainability sciences. This type of innovative, multi and interdisciplinary program is inline with recent guidance for allocating new faculty and staff resources. While the program can begin without new resources in 2022, to reach our projected growth and ensure program retention, additional resources will be needed in both faculty and support staff.

### 2. Impact on University Enrollment:

- a. *Projected number of students in the program:* The aim is to enroll ~5 students per year in years 1-3, increasing to 10 students per year by year 5. The program is grounded in currently available coursework and certificates, but will position the University to grow certificate offerings and faculty expertise in sustainability systems science, including in the social sciences.
- b. *Source of new students (existing students vs. newly matriculating):* Both. We anticipate primarily new matriculating students, but this program will also attract MTU undergraduates interested in continuing in their sustainability studies at the MS level.
- c. *Likely correlation between demand for the new program and existing enrollment patterns at MTU:* This proposed MS degree provides a post-baccalaureate degree pathway for the growing undergraduate enrollments in sustainability-focused programs.
- d. *What is the current enrollment in the unit:* As of Fall 2021: 37 graduate students

### 3. Impact on Resources Required by Department in Which the Program is housed:

- a. *Faculty lines:* The new program can begin using existing faculty lines; however, to reach our projected growth and ensure program retention, 2 additional faculty lines will be needed in the next 2-3 years.



- b. *Faculty and student labs, including ongoing maintenance:* Existing labs are adequate to support this program.
- c. *Advising:* Advising is completed by individual faculty advisors. Additional faculty lines (noted above) will be necessary to support advising as enrollment increases in years 3-5. Additional staff support will be needed to coordinate capstone experiences such as internships and community partnerships. This role will be shared between this new MS program, our existing BS in Sustainability Sciences and Society, and a working proposal for a new BS in the Department.
- d. *Assessment:* The existing SS Graduate Affairs Committee will conduct all assessment activities as well as monitor and evaluate the overall enrollment and student performance for this new program on an annual basis.

4. Impact on Resources Required By other Units Within the University:

- a. *Other academic units with regard to faculty, labs, and assessment:* We do not expect significant impact to other units except for a modest increase in enrollments in existing courses. Because of the wide reach of this degree, the additional student seats in existing courses will be spread widely across other units on campus.
- b. *Information Tech, library, central administration and career planning (with respect to computing services, library resources, advising, record keeping, development of employer relations, etc.):* There should be no significant impact on other units.

5. Assessment of the ability to obtain the necessary resources assuming requested funds are obtained: There are many scholars who study and are trained in the sustainability sciences. We do not anticipate any challenges in recruiting world-class scholars to join the faculty to support this program and our related BS program.

6. Past proposals. Has the department initiated any other new degree programs in the last five years? No new graduate degree programs have been developed in the past 5 years.

7. Departmental Budget contribution

- a. *The department's general fund budget:* The general fund base budget in FY 22 is \$1.7 million.
- b. How much tuition does the department generate (credit hours taught by the department and number of credit hours taken by department majors):

All data based on 2019-20 enrollments, the latest year for which complete data is available.

Undergraduate SCH: Lower Division: 6,274 @ \$629 (in-state tuition) = \$3.9 million

Undergraduate SCH: Upper Division: 2,760 @ \$835 (in-state tuition) = \$2.3 million

Graduate SCH: 446 @ \$1182= \$527,000

8. How do the benefits from this program compare to other alternatives that are currently under consideration or development. Will approval and allocation of resources to this program preclude the development of other programs? There are no additional alternatives under consideration. This program will support both of our existing graduate programs in a number of ways:
- a. This proposed program takes advantage of the established and growing intersections of expertise in our two existing graduate programs in the Department of Social Sciences and areas of study that students are interested in pursuing.
  - b. This program leverages existing courses from our two existing programs and the increased enrollment will allow us to have class sizes that are more sustainable (current courses are very small- 2-4 students) and promote an enhanced learning experience, especially for project, lab, and community-based courses.
  - c. This program will allow us to offer our existing program courses (which include the core courses in this program) on a more regular basis allowing students to matriculate through their programs on time.

Appendix B: [Graduate Learning Outcomes](#) (GLOs)

- vi. Describe the historical foundations and contemporary frameworks used in sustainability sciences
- vii. Apply social research and inquiry skills to examine sustainability issues
- viii. Gather and analyze information from a diverse set of sources to understand a contemporary sustainability issue
- ix. Effectively partner with diverse teams of stakeholders to work towards enhancing sustainability based on goals identified in partnership