This class will examine key cross-cutting themes of sustainability and development through the framework of sustainability science. With its focus on use-inspired, basic, interdisciplinary research, the field of sustainability science has emerged as a foundational means to think through human-environmental relationships and social-ecological systems. Key thrusts in sustainability science – to bridge the gap between science and practice and across social, ecological, and professional sciences – are central to understanding and changing the trajectories of unsustainable development in many regions and countries, societies and communities, sectors, and markets. Students taking the course will (1) learn about the core principles of sustainability science and its antecedents, and (2) focus on four cross-cutting themes relevant to sustainability: Equity and justice, adaption to shocks, and transformational change, knowledge-action relationships, and governance of complex systems.

We will review the findings from early work in sustainability science and its relationship to the emergence and the foundations of sustainability science. This review over the first three weeks of the semester will set the stage for examining the listed core themes during the next four weeks of the semester. During each week, we will focus on how sustainability science examines these issues – both conceptually and with the help of specific case studies from different parts of the world. In the process, we will see how sustainability science can serve as an overarching framework for thinking about and acting for sustainability and development. We will also identify how sustainability science inspires solutions to the most pressing contemporary challenges. Coursework will involve class participation and writing to complete a sustainability science case-writing assignment by the end of the course.

Learning goals and outcomes
- Develop an understanding of key concepts in sustainability science, the ability to use them, and the capacity to understand their relationships
- Identify how empirical writings apply these key concepts and the major theoretical underpinnings of sustainability science and assess and critique their use in the literature
- Analyze political and institutional dimensions of sustainability
- Apply concepts and framings of interest to you in creating an independent empirical case study related to one of four issues in sustainability science: 1. Equity/Justice in sustainability; 2. Knowledge to Action; 3. Adaptation, 4. Governance of social-ecological systems

Expectations
Class attendance: I would like you to attend all class sessions. But if you are ill, or not feeling well, or experiencing any COVID-19 symptoms, please take care of yourself and do not force yourself to come to class to be counted for class participation. Just send me a note, and I will understand. I will also consider multiple forms of participation so that you don’t have to think about being in class to get credit for participation.
Active class participation: This class emphasizes participatory learning and relies on your ability to understand the assigned readings and engagement in classroom discussion. This means you are expected to attend the class ready to actively engage in class discussion with the readings fully digested and have put real thought into their comments and questions. But I understand participation can take many forms. I have outlined some below, but you should feel free to let me know of others that you would like me to incorporate in the course.

Completion of readings and assignments on time: Please complete your readings and submit your assignments on time. While all readings assigned in the syllabus are required readings, you will serve as a discussant in one reading per week. This role involves sharing your thoughts/questions on the assigned reading to stir the class conversation. All readings will be available on the Canvas course site.

Approach to readings: Everyone has their own unique reading style. One approach that I have learned from Dr. Arun Agrawal is to ask if the reading offers something interesting and important. After completing the reading, do you feel it was worth your time because you learned something useful or interesting? Or, whether the reading offered you something new that you did not know and how its findings/arguments are added to your existing knowledge. Another helpful resource is “How to Read a Book” by Dr. Paul N. Edwards. https://pne.people.si.umich.edu/PDF/howtoread.pdf

Links for some Useful Resources at Michigan
- Academic integrity: https://lsa.umich.edu/lsa/academics/academic-integrity.html
- Career services: https://seas.umich.edu/student-services/career-services
- International student resources: https://internationalcenter.umich.edu/
- Rackham Graduate School services for current students: https://rackham.umich.edu/current-students/

Requirements and grades
There are three components for your grade for the course. One is based on participation and the two others are based on assignments/quizzes.

Participation (20%); Answering questions (30%); Case study (50%)

1. Course participation (20%): You can opt to participate in a variety of ways. These include the following.
   i. the usual form of speaking up and talking about readings for the week including leading discussion on the assigned paper of the week OR
   ii. send the instructor your notes on reading other than the ones assigned to you (pick one from each week of class – pick any 3 or 4) OR
   iii. write up your impressions/synthesis of class discussions and share them with the instructor (pick any 3 or 4) OR
iv. put together responses to guest lectures or class videos and share them with the instructor (pick any 3 or 4), OR
v. select some central concepts identified in the syllabus from different weeks of the class (perhaps one from each listed week – pick any 3 or 4), search for and list their multiple definitions in the literature and see if you can propose your own definition for the concept.

I will welcome participation in multiple ways. The course participation will be graded in two parts (Weeks 1-4 and Weeks 5-7).

2. Responses to questions about readings (30%): All required readings for the course come with a set of guided reading questions. You need to select any three readings (other than those assigned to you as a discussant) and answer the questions associated with the readings. As this assignment is spread out across the weeks of the course, you can select a single article from Weeks 1-3, 4-5, and 6-7 for the first, second, and third reading responses respectively.

3. Sustainability science case (50%): I will share guidance for writing a sustainability case study at the beginning of the class. It aims to help you proceed at your own pace for completing a written case study. We will schedule multiple group meetings to go over the guidance. The goal is to complete a rough draft of the case before the end of the semester. I will continue to work with those who would like to prepare a complete draft of the case for publication. Your grade for the case study will be based on this rough draft. It will follow the rubric for the case study. Again, this assignment has three parts, developing a case study overview paragraph and presentation (30%) by Week 4 and the submission of the case draft by Week 7 (20%)

Overview of due dates for assignments
Week 3: Nov. 9, Responses to questions part 1
Week 4: Nov. 14, Case study overview paragraph and presentation
Week 4: Nov. 14, Participation 1
Week 6: Nov. 21, Responses to questions part 2
Week 7: Dec. 8, Case draft
Week 7: Dec. 8, Responses to questions part 3
Week 7: Dec. 8, Participation 2

Course overview and readings
Week 1: Oct. 24 and 26: Introduction, core principles, history
Major issues and questions: What is Anthropocene? What are its challenges? What is sustainability science? What are its key emphases (core principles)? What are their roots in disciplinary and interdisciplinary environmental frameworks (history)? What is the promise of sustainability science? What do we need to achieve this promise (and sustainability)? How concepts of human rights, entitlements, capacity, and capabilities are related to sustainability science?

Key concepts: Anthropocene, sustainability, sustainable development, capacity and capability, entitlements

Required readings

**Week 2: Oct. 31 and Nov. 3: Empirical cases**

*Major issues and questions:* How do empirical writings apply concepts and major theoretical underpinnings of sustainability science? What are some practical, political, and institutional dimensions of sustainability?

*Key concepts:* Common property, political ecology, coupled systems, ecosystem services

**Required readings**
5. [https://www.learngala.com/cases/c4347834-77c1-47fe-900f-b55b091df528](https://www.learngala.com/cases/c4347834-77c1-47fe-900f-b55b091df528)

**Week 3: Nov. 7 and 9: Tradeoffs and cobenefits in sustainability**

*Major issues and questions:* What are the three pillars of sustainability? What is sustainable development? What are some empirical examples of tradeoffs and cobenefits in sustainability? What are some methods to analyze tradeoffs and cobenefits?

*Key concepts:* Tradeoffs, cobenefits, multi-criteria analysis

**Assignment:** Responses to questions part 1 (Nov 9)

**Required readings**

**Week 4: Nov. 14 and 16: Equity and justice in sustainability science**

*Major issues and questions:* How are sustainability and equity related? What are the major concepts related to equity that affect sustainability? What is the responsibility of humans to the natural world?
**Key concepts:** Equity, justice, diversity, inclusion, equality, redress/reparation, recognition, procedural equity, redistribution, power, planetary boundaries, and stakeholders.

**Assignment:** Case study overview paragraph and presentation; Participation 1 (Nov 14)

**Required readings**


**Recommended:** Watch and review the National Academy of Sciences Workshop recording on equity and justice: [https://www.nationalacademies.org/event/11-30-2020/progress-challenges-and-opportunities-for-sustainability-science-a-workshop](https://www.nationalacademies.org/event/11-30-2020/progress-challenges-and-opportunities-for-sustainability-science-a-workshop)

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**Week 5: Nov. 21: Adapting to shocks and managing transformational change**

**Major issues and questions:** On what contemporary trajectories of change are we moving (ecosystems and biodiversity, wellbeing, climate change, systems such as forests and water, soils and erosion, fisheries, human footprint, 30X30 and half earth)? What are the different approaches for managing change – coping vs adaptation vs promise of transformation? What are the different forms of adaptation? What are different transition processes and frameworks?

**Key concepts:** Coping, adaptation, transformation, mitigation, transition (demographic, forest, energy, nutrition, social assistance), Half Earth, 30X30, wellbeing, natural capital

**Assignment:** Responses to questions part 2 (Nov 21)

**Required readings:**


**Recommended:** Watch and review the National Academy of Sciences Workshop recordings on adaptation and transformational change: [https://www.nationalacademies.org/event/11-30-2020/progress-challenges-and-opportunities-for-sustainability-science-a-workshop](https://www.nationalacademies.org/event/11-30-2020/progress-challenges-and-opportunities-for-sustainability-science-a-workshop)
Week 6: Nov. 28 and 30: Knowledge-Action relationships

Major issues and questions: Understanding the mutual relationship of knowledge production and action; Knowledge for action, knowledge to action, and coproduction;

Key concepts: Knowledge/power, participation, ladder of participation, coproduction, useable knowledge, hidden transcripts, domination and resistance, action research, participatory research, participatory action research, indigenous knowledge, coproduction.

Required readings:

Recommended: Watch and review National Academy of Sciences Workshop recordings on Knowledge and Action relationships: https://www.nationalacademies.org/event/11-30-2020/progress-challenges-and-opportunities-for-sustainability-science-a-workshop

Week 7: Dec. 5 and 7: Governing complex systems, conclusion

Major issues and questions: What is governance? What do we know about the effective governance of natural systems? What are coupled systems, complex adaptive systems, and social-ecological systems? What are some methods for understanding complex systems (causes of effects vs effects of causes)? What are some complexities in synthesizing knowledge about sustainability?

Key concepts: Governance, institutions, property rights, complexity, complex systems, adaptive systems, social-ecological systems, resilience, synthesis science.

Assignment: Rough draft of the case study; Responses to questions part 3; Participation 3 (Dec 8)

Guest Lecturer: Dr. Thaddeus Miller, University of Massachusetts

Required readings: