SUSTAINABILITY SCIENCE
ESS 312: T, TH 11:00-12:15
Scott Bioengineering 229
Spring 2020, 3-Credits

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Ecosystem Science and Sustainability
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OVERVIEW:
As future sustainability practitioners and scientists, our students will be leading efforts to synthesize multifaceted information across a wide range of disciplines, with the goal to develop potential solutions to complex human-societal-environmental challenges at multiple scales.

Applying integrated knowledge of social-ecological systems, students will be able to implement mixed methods for understanding the intricacies of current issues, develop alternative scenarios to current practices and policies, and design scenarios to guide sustainable behaviors and practices in science and society.

In this class students will use the knowledge they have gained throughout the Ecosystem Science and Sustainability (ESS) curriculum and begin practicing some social science skills that they can utilize as sustainability practitioners and scientists. Sustainability Science (ESS 312) has been designed to align with Ecosystem Ecology (ESS 311). Each week we highlight a similar series of themes covered in ESS 311; however, this course will specifically focus on the social science aspects and interdisciplinary nature of each theme. Also similar to 312 we will focus on skills development and will participate in a series of in-class activities/labs. These activities are intended to prepare students for collaborating with community partners, where they may work in groups with a variety of stakeholders, institutions, and agencies to develop sustainable solutions to society's grand challenges (i.e. ESS 440, capstone course).

PREREQUISITES:
NR320 and/or at least one ecology class

LEARNING OBJECTIVES:
Upon completion of this course, successful students will be able to:

- Define and describe sustainability science and its foundational theories (knowledge)
- Diagnose the skills and tools necessary for developing and implementing sustainability initiatives (evaluation)
- Understand the ethics and rules regarding human subjects research (knowledge)
- Explain the differences among a multitude of sustainability accounting methodologies and highlight their positive and negative attributes (evaluation)

- Search and integrate multidimensional datasets and information to understand the complexity of interdisciplinary social-ecological challenges (analysis)
- Identify and evaluate potential scenarios for achieving sustainability (synthesis and application)

CLASS PHILOSOPHY

Students are expected to read/watch the required literature/media BEFORE class as these assignments will serve as an instrumental introduction to the relevant material. Classroom time will be predominately geared towards activities and discussions. ***Students cannot fully participate in these activities without having prepared for the class***.

WEEKLY TOPICS // READINGS // ASSIGNMENTS:

Tuesday	**Thursday**	**Assignments and Reading**
Week 1: January 21, 23 – The Science		
Defining Sustainability Sustainable Packaging Lab	The evolving field of sustainability science What makes a successful sustainability scientist?	**Required Reading:** Kates 2011 what kind of science; Haider 2018 the undisciplinary journey Optional - DuPuis 2013 how not what; Bettencourt and Kaur 2011
Week 2: January 28, 30 – The Science		
Intro to the Social Sciences	Discussion – Three perfect strangers **Project 1 – IRB Approval** **Computers in class will be helpful**	**Required Reading:** The Art and Science of Social Research: Chapters 1-3 **Required: Watch Movie** – Three Identical Strangers (The Importance of Human Subjects Approval)
Week 3: February 4, 6 – The Planet		
Anthropocene and the role of social science: Disciplinary, Interdisciplinary, and Transdisciplinary	Social Media and the Anthropocene Social Media Lab: Words matter Tools: 1. Wolframalpha.com 2. https://www.analyzewords.com 3. http://www.wordle.net/ **Computers needed in class**	**Required Reading:** Castree 2017 social science misconstrued; Maslin and Ellis 2013 Scientist still don't understand; Seidl 2013 Science with Society; Sklair 2018 Anthro Mass Media Optional – a better Anthropocene; dog eared social
Week 4: February 11, 13 – Hydrocycle		
Urban changes to the hydrological cycle Water consumption	Focus Groups, Surveys, Interviews Lab:	**Required Reading:** Steelman et al. 2015 Transdisciplinary water assessment Water footprint link – include here

Water footprints Water as an indicator Social-ecological water challenges in SA	SA water data collection and analysis	
Week 5: February 18, 20 – Biodiversity, Diversity, and Cultural Diversity		
Cultural Diversity, Diversity and Equity **Carrie Chennault**, Post-doctoral fellow, feminist and social theorist	Interviews and Photovoice Lab **Carrie Chennault** Post-doctoral fellow, feminist and social theorist	**Required Reading:** Negi 2010 (Traditional Culture and Biodiversity Conservation: Examples From Uttarakhand, Central Himalaya) Kayapo Indians https://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/photovoice/main Embracing biological and cultural diversity – an interview with jerome https://www.synchronicityearth.org/embracing-biological-and-cultural-diversity-an-interview-with-dr-jerome-lewis/ **Project 1 – Due Friday 21st**
Week 6: February 25, 27 – The Social-Ecological Study of Neighborhoods		
Project 2 – Neighborhood Analysis Fort Collins land cover and sociodemographics **Shaunie Rassmussen and Rae Nickerson** - Graduate Students, The Urban Ecology Lab at CSU <<McHale away>>	**Project 2** – Neighborhood Analysis In class workday – **Computers needed in class**	**Required Reading:** **Extra Credit Opp this week:** Attend at least two hours of the International Symposium and submit a reflection. The Symposium runs from 25-27th at the Lory Student Center
Week 7: March 3,5 – Biodiversity and Ecosystem Processes		
Changing Conceptions of Biodiversity and Value **David Bunn** – Professor of interdisciplinary human and social sciences, Anthropology	Participatory mapping and oral history lab **David Bunn** – Professor of interdisciplinary human and social sciences, Anthropology	**Required Reading:**
Week 8: March 10, 12 - Climate		

Climate Education and Communication	Climate Communication Lab	**Required Reading:** https://www.socialsciencespace.com/2018/04/five-principles-of-science-communication/ Extra Reading: IPCC Climate Outreach guide
Week 9: Spring Break		
Week 10: March 24, 26 – Sustainability and Consumption		
Clothing and Consumption – The Crisis in Your Closet - Sonali Didi	**Project 3 – Creative Implementation** (Proposals due April 9)	**Project 2 Due – Neighborhood Analysis**
Week 11: March 31, April 2 – Carbon Cycling		
Metabolism and Life Cycle https://metabolismofcities.org/stakeholders/interviews Lab – household metabolism	Network Analysis Lab **Rachal Skyving** – Graduate Student Urban Ecology Lab **Computers needed in class**	**Required Reading:**
Week 12: April 7, 9 – Implementing Sustainability Science Methods		
Project 3 – Creative Implementation **In Class Workday**	**Project 3 – Creative Implementation** **In Class Workday**	**Project 3 Proposals Due April 9th**
Week 13: April 14, 16 – Nutrient Cycles // Equity and Environmental Justice		
Social Cost of Nitrogen Metabolic Rift, Nitrogen Budget P Budget Landscape Preferences	**Stephanie Malin** – Associate Professor of Environmental Sociology	**Required Reading:** Nitrogen Budget UK, Metson et al 2002 Phosphorus for Phoenix; Nassauer et al.
Week 14: April 21, 23 – Metals and Other Elements		
Technology and Sustainability - Coltan	Field Trip – Walking neighborhoods from our neighborhood analysis	**Required Reading:**
Week 15: April 28, 30 – Political Science and Civic Engagement		
Sam Houghteling – Straayer Center	**Josie Plaut** - Institute for the Built Environment	**Required Reading:**
Week 16: May 5, 7 – Food Webs // Conclusions and Reviews		
Food Inc Lab	Conclusions // Reviews	**Required Movie: Watch Food Inc.**
Week 17: Finals Week		
Project 3 Presentations – 12 presentations in 3 hours		**Project 3 Due on Day of Finals**

ASSESSMENT COMPONENTS:

Preparation and Participation – Quizzes, Discussions, Labs, and Activities: 10%
Active learning requires that all students show up prepared for the class and ready to participate; therefore, reading in advance is required for this course. Random quizzes on reading assignments will be given throughout the semester. I will drop the one lowest quiz grade from the final grade calculations at the end of the semester.

There will be at least one lab, activity, or discussion each week. Activities are designed to enhance our learning experience, provide opportunities to apply knowledge, and/or practice some social science methodologies. Most activities will be in-class exercises. If you miss these classes, you will not be able to "make-up" or receive "points" for the associated assignments. I will drop the one lowest assignment grade, so if you miss class once you will not be affected. Since attendance and actively engaging in class is extremely important however, no more than one assignment will be excused per student.

Project 1 IRB Approval: 25%
Human subjects' researchers must follow Common Rule Regulations established in 1991. Essentially these rules were established to protect people that are participating in research projects on humans. Institutional Review Boards have been established at Universities to protect the rights and welfare of human subjects. (1) First review CSU's IRB website https://vpr.colostate.edu/ricro/irb/ CSU requires that anyone participating in human subjects research must first participate in training. Each student will complete this training online through the CITI program: https://about.citiprogram.org/en/homepage/ Specifically you will complete the Human Subjects Research Training, Social-Behavioral-Educational: https://about.citiprogram.org/en/series/human-subjects-research-hsr/ The training is free and is an excellent addition to your CV. There are 15 required modules and each one could take 15-30 minutes to complete. Each module consists of a short reading assignment and a 3-5 question online quiz. You may use this certification and training in other classes or research opportunities at CSU.

Project 2 Neighborhood Analysis: 25%
We will assign small groups of students (6-8 students per group) two neighborhoods (Census Tracks) to study in Fort Collins.

As a team you will first do an online analysis of your neighborhoods. Utilizing census data and other information you can gather online, you will research the basic characteristics of both neighborhoods. Then you will write a 1-2 page report on your neighborhoods (Arial 11 or 12 font, 1.5 spaced). Your report will include images and maps you make utilizing internet-based resources.

When your internet analysis and report is complete your teams will make a 2-hour visit to each of your neighborhoods. Teams will spend timely simply walking around each neighborhood, but also designate some time observing social-environmental dynamics in 1-2 different public spaces (streets, parks, open-spaces, ditches, commercial areas, store fronts, etc.). Each person will take field notes and be attentive to both the environmental and human aspects of each place. Try to be objective and not include value judgements. Sketches, samples, relevant site-specific information, and pictures are all valuable. Your field notes, sketches, data must be written up and included in your final report as an appendix.

Although the internet analysis and field work will be conducted in teams and collaborative, a short final report is going to be submitted by each and every student in class. That means that the writing is

done on your own and students should submit separate reports with their own writing. The final document will be a 2-3-page written report: (1) write a narrative describing the physical and social characteristics you saw in each neighborhood; (2) Compare and contrast the neighborhood's statistical profile and your observations. Do your observations accord with the data? Why or why not? (3) Compare the neighborhoods – What was different, why? (4) Finally write a reflection on this experience.

We will discuss this project in greater detail in class.

Project 4 Creative Implementation: 30%

Pick a method we learned about this semester (e.g. interviews, surveys, focus groups, theatrical intervention, media analysis, photovoice, network analysis, metabolism, nutrient budget, etc.) and a topic/focal area of interest and implement it. First you must provide a one-two paragraph proposal for review. The proposal must outline your goal, the audience, and a basic plan for how you will implement your "study". We will discuss the details for this assignment in class and I will provide a grading rubric for your review. You can work in small teams (2-3 people) or alone, but the final product must be sufficient for all people involved to fully participate. You will produce a 5-17-minute power point presentation (depending on the size of your team – about 5-7 mins per person). The power-point presentation must be submitted online AND printed and handed in on the day of your presentation. Each printed slide must include all of the presentation notes for review. Presentation notes must be written in complete sentences, with proper paragraphs and grammar.

STUDENT EXPERIENCES AND PEDAGOGICAL TECHNIQUES:

Students will -

- Critically evaluate sustainability principles through discussing complex concepts with their peers, engaging with experts in the field, and reflecting on their interactions and what they learned.
- Practice techniques for communicating science to a broad audience
- Use and evaluate, a number of tools used in sustainability science to assess social and ecological systems.
- Integrate and analyze social and ecological datasets for an interdisciplinary understanding of sustainability challenges and interventions.

TEXTBOOKS AND COURSE MATERIAL:

Scientific Papers will be assigned throughout the semester – their pdfs will be shared online using canvas. There will also be links to webpages and other media.