

ENVS 301
Tools for Sustainability
Spring 2017

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Class times: Monday and Wednesday: 10.30-11.50 am

Location: 209 David Kinley Hall

Office hours: By appointment by email

Course Overview: This course teaches students critical tools for sustainability science from multiple disciplines and to make connections between different disciplines to understand problems and trade-offs related to sustainability. Students will develop critical systems thinking skills and competence in tools such as cost-benefit analysis and life-cycle assessment, and learn about other elements of sustainability science and metrics while acquiring skills to communicate fluently about the integrated dimensions of sustainability in an interdisciplinary setting.

Prerequisites: None.

Web Site: All class materials (readings, handouts, assignments, announcements, etc.) will be maintained on the course web site. The site is found at <https://compass2g.illinois.edu>.

Disabilities: If you need accommodations for any sort of disability, please contact Professor Khanna. We need to know two weeks in advance if you need a disability-related accommodation for taking an exam, and you must arrange to have that exam proctored at DRES.

Assignments and Grading:

Homework: There will be a homework assignment for each of the sections on Life-cycle assessment, Cost-benefit analysis and Sustainability indicators. Students can work in groups on the homework but each student must submit their own assignment.

Paper/Project: Students will form teams of 4-5 students each and write a paper that uses the tools and concepts covered in class to a particular issue in sustainability (that issue may be chosen from the examples given in the introduction to the course, though a team may propose another topic if they have a strong interest in something else). Each team will present their work at the end of the class. Teams will be encouraged to pick a topic that involves assessing sustainability using tools and approaches covered in this course. The paper should describe the problem being studied, the aspects of sustainability (at least two from environmental, economic, and social dimensions) that will be analyzed, the tools/approaches to be used and how the

analysis will be carried out. Primary analysis using at least two of the tools covered in class can be conducted if data is available. Alternatively, the paper can also draw upon assessments conducted by other studies to make a persuasive case to support an assessment of sustainability on that issue. In this case, at least two to three other studies with differing conclusions should be researched to arrive at a summary assessment. Student teams will be responsible for identifying the problem, conducting literature searches and finding the evidence to support their point of view.

The deliverables for this project will include *a project proposal, a final presentation and a final paper*. **The paper will be due on May 12, 2017.** General guidelines for the paper are below:

- The paper should be a maximum of 20 pages double spaced with 1” margins and 12 point font (excluding figures, tables and references)
- All text, statements, and figures must be in your own words and properly cited. Plagiarism will not be tolerated. In addition to the Student Code (referenced above), students are also encouraged to visit the website of the Office of the Vice Chancellor for Research for resources related to understanding what constitutes plagiarism (<http://research.illinois.edu/ethics/plagiarism.asp#students>).
- Attendance will be taken during presentations. This will contribute to each student’s Class Participation and Conduct grade.
- It is understandable that team members may have different roles for the presentation vs. the paper (e.g., one person may be the coordinator of the paper and a separate person may be the coordinator of the presentation). However, all teammates must make substantive contributions to both the paper and the presentation. It is NOT acceptable for individuals to only work on one or the other.
- Your paper should be well-organized, well-written, and structured logically.
- Papers will be primarily evaluated for content, but will also be evaluated for writing effectiveness (e.g., organization, style, grammar, punctuation, spelling, and neatness).
- **Papers must be submitted electronically via the *Compass 2g* site.** The instructor reserves the right to evaluate reports with the SafeAssign™ plagiarism prevention service upon submittal.

An initial 1-page project proposal will be due on January 30, 2016. This will serve as the basis for your presentation and paper. It should consist of a description (2-3 paragraphs) of the topic you will study and include the following components: (a) the goal of your paper, (b) explain why it is important, (c) the aspects of the problem that you will conduct research on, and (d) the sources of information you will use (e) the tools you will use and (f) the conclusions you draw based on your own assessment or based on studies done in the literature. It should also provide a plan (1 paragraph) for how you will interact outside of class and coordinate activities related to the paper with your team mates and the roles that each of the team mates is expected to play. Clearly specify what the expectations are of the team mates: in terms of attendance, punctuality, and preparation prior to the meeting (e.g., can people miss 1-2 meetings? Do team members have to do anything in advance of the meeting, or can you just show up and do the work during the meeting?).

Discussion of Assigned Readings: One or more readings will be assigned for each class. Please visit the class page on compass to stay informed about the readings for the day and be prepared to discuss (a) the main argument of the paper (b) strengths and weaknesses of the paper (c) whether you agree/disagree with the main point of paper and (d) what is missing from the paper. Instructors may also pose specific questions related to a reading on the compass webpage.

Class Participation: This is an interactive class and your regular attendance and active participation in in-class activities and discussion are critical for your learning and that of your classmates. Attendance will be taken at the start of each class. Inclass activities will regularly include discussing topics and the assigned readings in small and large group settings.

Policies:

Late assignments: Homework and the paper will be accepted late but penalized by 25% up to 24 hours, and accepted but penalized by 50% between 24 and 48 hours; after 48 hours, the assignment will be given a score of zero in the absence of a note from an emergency dean.

Attendance: You are allowed 2 excused absences without any penalty provided you send Prof. Khanna and the instructor of the day an email before class if you are expecting to be absent from class that day.

Absence beyond that will be excused only if you have a medical emergency (supported by documentation) or have to be away on University business (supported by documentation). It is your responsibility to make up any missed activities/readings and to be prepared for upcoming activities.

Academic Honesty: We take academic integrity extremely seriously, and expect you to do the same. If you are uncertain as to what this means, please read Section 4 of the U of I Student Code. If we discover that anyone has engaged in dishonest conduct (such as cheating on a quiz or exam or plagiarizing a paper), we will not hesitate to impose strict sanctions on the student(s) involved. All cases of academic dishonesty will be reported to the appropriate University administrative offices.

Grade Assignment:

Your composite numeric grade will be calculated as follows:

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| Homework: | 25% |
| Participation | 10% |
| Midterm: | 25% |
| Paper: | 25% |
| Presentation: | 15% |

Grades for the paper will be based on the following criteria:

| Criterion | Weighting for Grade |
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| Clear articulation of the problem being studied, its significance from a sustainability perspective and key areas of controversy surrounding it | 10% |
| Review of the analysis of that topic using tools and concepts covered in class, including life-cycle analysis, cost-benefit analysis, trade-offs among different dimensions of sustainability | 30% |
| Clearly application of tools, logical tie between problem, goals of the and objective, approach and the conclusion, articulated position of your team on the topic and defense of that point of view using well-reasoned arguments supported by facts | 30% |
| Concluding statement that summarizes the main points of the paper and discusses policy implications of your analysis | 10% |
| Citations and use of peer reviewed literature | 10% |
| Writing style, grammar, spelling and punctuation | 10% |

Plan of Activity

| Instructor | Date | Topic | Readings | Exams/ Assignments/ Activities |
|-------------------|-------------|--|--|---|
| All | 1/18 | Overview of course | Eco Footprint Calculator http://www.footprintnetwork.org/en/index.php/GFN/page/calculators | Class Discussion on Concept of Sustainability |
| All | 1/23 | Discussion on Student Project Ideas and Teams | | |
| MW | 1/25 | Monitoring Dimensions of Sustainability: | Rockstrom et al. (2009). Safe Operating Space for Humanity. Nature, 461:472-475. Farrell et al. (2009). Ethanol Can Contribute to Energy and Environmental Goals. Science, 311: 506-508. | Homework 1 LCA spreadsheet based on Farrell due 2/7 In class discussion of Farrell |
| MW | 1/30 | Types of Footprints | Cucek et al. 2012. A Review of Footprint analysis tools for monitoring impacts on sustainability. Journal of Cleaner Production 34:9-20 | In class review of campus climate action plan and metrics - consider projects that might inform this. Project Proposals Due |
| MW | 2/1 | LCA: The Devil is in the Detail, Inventories & Assumptions | Meier et al. (2015). Environmental impacts of organic and conventional agricultural products: Are the differences captured by life cycle assessment? Journal of Environmental Management 149: 193-208. | In class discuss dining services performance metrics- introduce related project option: http://sustainability.illinois.edu/campus-sustainability/ica/p/ |
| MW | 2/6 | LCA: Devil is in the Details, Boundaries and Units | Heller et al. (2013). Toward a Life Cycle-Based, Diet-level Framework for Food Environmental Impact and Nutritional Quality Assessment: A Critical Review Environ. Sci. Technol. 47: 12632–12647 Not required! Resource that may help with project: | Continue discussion of campus dining services metrics, compare LCA with Real Food Challenge – |

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| | | | <p>Caffrey and Veal (2015). Conducting an Agricultural Life Cycle Assessment: Challenges and Perspectives. <i>The ScientificWorld Journal</i>. 2013: http://dx.doi.org/10.1155/2013/4724312013</p> <p>Poritosh et al. (2009). A review of life cycle assessment (LCA) on some food products. <i>Journal of Food Engineering</i> 9: 1–10</p> | <p>consider related project options</p> <p>Team Updates on Projects</p> |
| DM | 2/8 | Overview of Sustainable Development Goals and Indicator needs | <p>Adams, W. M., and S. Jeanrenaud. (2008). <i>Transition to sustainability: towards a humane and diverse world</i>. IUCN: Gland, Switzerland. pp. 7-32 [25 p.]</p> <p>Lu, Y., Nakicenovic, N., Visbeck, M., & Stevance, A. S. (2015). Policy: Five priorities for the UN Sustainable Development Goals-Comment. <i>Nature</i>, 520(7548), 432-433. [2 p.]</p> <p>2030 Sustainable Development Goals (read at least two, including SDG # 15 “Life on Land”) https://sustainabledevelopment.un.org/sdgs</p> | Brainstorming potential indicators for SDGs and considering local relevance of global sustainable development agenda. |
| DM | 2/13 | Why sustainability indicators & what makes for a good indicator? | Garrett, R. D. and A. E. Latawiec (2015). What are sustainability indicators for? <i>Sustainability Indicators in Practice</i> . A. E. Latawiec and D. Agol. Berlin, De Gruyter: 12-22 [11 p.] | Homework 2 assigned Due 2/20 Team Updates on Projects |
| MK | 2/15 | Private and Social Cost Benefit Analysis | <p>Kotchen, M. “Cost Benefit Analysis” Encyclopedia of Climate and Weather 2nd Edition, Stephen Schneider (ed.), New York: Oxford University Press, 2010.</p> <p>Loomis J and G. Helfand, 2001. Chapter7, Environmental Policy Analysis for Decision Making. Kluwer Academic Publishers, Dordrecht.</p> | Class discussion Dogs vs SUVs Paper posted on compass |
| MK | 2/20 | | | Class discussion: Kenkel, D., “A Guide To Cost-Benefit Analysis Of Drunk-Driving Policies,” <i>Journal Of Drug Issues</i> , 28 (3): 795-812 Summer, 1998 |
| MK | 2/22 | Discounting | Goulder, L. H. and R.N. Stavins, “An Eye on the Future,” <i>Nature</i> , 419, October: 673-674, 2002 | Discounting with Spreadsheets |

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| | | | Boardman, A.E W.L. Mallery, A.R. Vining, "Learning from Ex-ante/Ex-Post Cost-Benefit Comparisons: The Coquihalla Highway Example," <i>Socio-Economic Planning Sciences</i> , Volume 28, Issue 2, 1994, Pages 69-84 | In Class Discussion of Boardman et al. Homework 3 assigned Due 3/1 |
| MK | 2/27 | Cost Benefit Analysis of Biofuels | Dwivedi, P., W. Wang, T. Hudiburg, D. Jaiswal, W. Parton, S. Long, E. DeLucia, and M. Khanna, "Cost of Abating Greenhouse Gas Emissions with Cellulosic Ethanol. <i>Environmental Science and Technology</i> ," 49(4): 2512-2522, 2015. | CBA with spreadsheets Team updates on application of CBA to student projects |
| LR | 3/1 | The public's perception of—and support for—sustainability | Pew Research Center. (2015.) How Americans are—and aren't—making eco-friendly lifestyle changes. Retrieved from http://www.pewresearch.org/fact-tank/2015/11/17/how-americans-are-and-arent-making-eco-friendly-lifestyle-changes/ Cone Communications. <i>Three-quarters of Americans say sustainability is a priority in making food purchasing decisions</i> . Boston, MA: Cone Communications Food Trend Tracker. | Who says what is or what is not sustainable? An interactive quiz |
| LR | 3/6 | Why journalists report on sustainability issues the way they do | Lockie, S. (2006). Capturing the sustainability agenda: Organic foods and media discourses on food scares, environment, genetic engineering, and health. <i>Agriculture and Human Values</i> , 23, 313-323. | Analyzing news reports about sustainability topics |
| All | 3/8 | | Project Status Report and Next Steps | |
| MK/ MW | 3/13 | Review for Midterm | | |
| MK/ MW | 3/15 | Midterm | | |
| | | Spring Break | | |
| MW | 3/24 | Socio-technical Standards, Certifications, and Product Claims | Daviron and Vagneron (2011) From commoditisation to de-commoditisation and back again: Discussing the role of sustainability standards for agricultural products. <i>Development Policy Review</i> , 29: 91-113 | Discussion of who sets the standards |

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| MW | 3/29 | Integration and Interpretation of Metrics at Various Scales- U of I's role as an 'Anchor Institution' | Dieleman. (2016) Urban agriculture in Mexico City; balancing between ecological, economic, social and symbolic value. <i>Journal of Cleaner Production</i> (2016) * Resources to inform discussion, not required. Bregendahl and Chase (2014) Evaluation and the local foods data void. <i>Journal of Agriculture, Food Systems, and Community Development</i> , 5: 5–9. http://dx.doi.org/10.5304/jafscd.2014.051.007 Taylor and Luter (2013) Anchor Institutions. Suggest you skim sections 3 and 4. Anchor Institutions Task Force, Marga Inc. University of Buffalo. | Discussion of Campus Action Plan Food Purchasing Goals. We will draft a class recommendation |
| All | 4/3 | Discussion of student projects | | |
| MK | 4/5 | Societal Cost Benefit Analysis | Clotfelter, C.T. and J.C. Hahn, "Assessing the National 55 MPH Speed Limit," <i>Policy Sciences</i> 9: 281-294, 1978 | CBA Activity with spreadsheets |
| MK | 4/10 | Environmental Valuation | Loomis, J., "Economic Values without Prices: The Importance of Non-market Values and Valuation for Informing Public Policy Debates," <i>Choices</i> , 20(3), 3 rd Quarter, 2005: 179-182. | Is Some Number Better than No Number? Class Discussion |
| MK | 4/12 | Benefit Transfer Approaches | Ready, R. and S. Navrud, "Benefit Transfer – The Quick, the Dirty, and the Ugly?" <i>Choices</i> 20(3), 3 rd Quarter, 2005:195-199. | Project updates |
| DM | 4/17 | Measuring Success (1): The challenge of trade-offs | McShane, Thomas O., et al. "Hard choices: making trade-offs between biodiversity conservation and human well-being." <i>Biological Conservation</i> 144.3 (2011): 966-972. [6 p.] | Discussion of reading and reflection on trade-offs and synergies in group projects. |
| DM | 4/19 | Measuring Success (2): Predictive Proxy Indicators | Miller, D.C. and C.B. Wahlén, 2015. Understanding Long-Term Impacts in the Forest Sector: Predictive Proxy Indicators. Washington, DC: Program on Forests (PROFOR). pp. 10-19; 26-28 & 32-33(on Indicators clusters 1 and 3); and 52-55. [19 p.] | Project Updates |
| LR | 4/24 | | Topic: Telling "stories" of sustainability—Making presentations that stick | |
| LR | 4/26 | Preparing for presentations | | |
| All | 5/1 | Student Presentations | | |
| All | 5/3 | Student Presentations | | |