ENVIRONMENT AND RESOURCE STUDIES 300

Fall 2020

Introduction to Systems Thinking

Instructor: Dr. Dan McCarthy
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Office hours: Rotating Online Office Hours – to be announced weekly

Teaching Team:

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Overview:

As human beings in an interconnected world, we face a number of complex and seemingly intractable problems including such things as climate change, food security, global poverty and pandemic diseases. Understanding how to address such problems is the first step to solving them. Ultimately we need to foster social and ecological resilience. Resilience is the ability of a linked social and ecological system to respond to stress and build the adaptive capacity of individuals and groups to respond to stress. The dynamics of social change and innovation are key to building such resilience.

This course provides an opportunity to learn and begin to apply systems-based tools in the context of a case-based study defined by the student in cooperation with the teaching-team. Students are provided with an introduction to the conceptual tools of systems thinking and resilience that help understand the dynamics of social change and social innovation. These conceptual tools will then be applied by students to develop a richer understanding of a case study of fostering social change and building adaptive capacity.

Course Objectives:

1) Through readings and weekly discussions, this course is intended to introduce undergraduate students to:

- **(i)** systems and complexity-based concepts, tools and capacities for effectively understanding and engaging in systems change;
- **(ii)** different approaches that have been taken to describe, analyze and intervene in complex systems, and;
- **(iii)** how these can be applied to issues of resilience and sustainability of linked social and ecological systems, including development of social innovations for adaptive management responses to these issues.

2) Apply these tools to better understand a case study that may be related to your proposed undergraduate thesis or other work or coop related experience.

Resources:

Course Texts:
Meadows, Donella, H., 2008. *Thinking in Systems: A Primer*. Vermont, U.S.A.: Chelsea Green.

NOTES:
- This useful text will be often supplemented by weekly readings posted to LEARN.

DESIRE 2 LEARN:
All course communications and course materials (lecture notes, weekly readings) will be provided through LEARN. Please sign in to LEARN as soon as possible and ensure you are on the course roster and that your e-mail address is correct.
Course schedule and **weekly readings** will be provided through **LEARN** under "Lessons".
Supplemental course readings are posted under "Readings", under weekly "Lessons", as links or specific references are provided and students are expected to find these using the University of Waterloo's E-Journals Collection available at: (http://sfx.scholarsportal.info/waterloo/az).
Please allow at least **24 hours** for responses to e-mail inquiries from the teaching team and do not expect e-mail responses from the teaching team over the weekend.

Course Requirements:

One-Page Systems Description Proposal: 5%
- Provide a no more than 1-page proposal – outlining your system of interest that you intend to describe in your final Systems Description assignment so that the teaching team can provide constructive feedback early on in your work
- The use of several peer-reviewed sources that you are tentatively basing the work on should be included
- **A grading guide is available on LEARN – Please refer to it!**
- **Due Date: September 25th, 2020 (submitted on LEARN by midnight)**

Quizzes (2): 20% (10% each)
- The quizzes are intended to test your knowledge of the subject matter of the course to ensure your comprehension of some of the key concepts and to encourage you to watch the lectures and do the readings.
- They will consist of approximately 15-20 questions – True/False, Multiple Choice and Short Answer
- **The Quizzes will take place after Lecture 5 (Week #5 – Week of October 5th) and Lecture 10 (Week #10 – Week of November 16th).**

Annotated Bibliography: 30%
- Review at least 10 topic-relevant articles / book chapters (mostly peer-reviewed) that will inform your systems description
- Approximately 10 double-spaced pages (excluding title page and references)
- **A detailed grading guide is available on LEARN – Please refer to it!**
- **Due Date: October 23rd, 2020 (submitted on LEARN by midnight)**

Systems Description: 45%

- Develop a systems description of the research problem to both refine your understanding of the case study and to describe how you propose to change the system to make it more resilient or sustainable.
- Approximately 12 double-spaced pages (excluding title page and references)
- **A detailed grading guide is available on LEARN – Please refer to it!**
- **Due Date: December 4th, 2020 (submitted on LEARN by midnight)**

Late Policy:

Late assignments will be accepted up to **one week after the due date** with a penalty of one full grade (i.e., 80% becomes 70%) except for unusual mitigating circumstances that should, of course, be communicated as soon as possible. Any requests for extension without penalty or for more than one week must be made in writing in advance of the assignment due date.

Course Schedule:

NOTE: Please refer to **LEARN 300 site** regularly for changes to this **Schedule** and for **Weekly Readings**

Week #1 – Week of September 8th – Introduction to the Course
Week #2 – Week of September 14th – Introduction to Systems Thinking
Readings: Meadows, Thinking in Systems, Chapter 1 and 2 and additional readings posted on LEARN
Week #3 – Week of September 21st – Basics of Systems Thinking / Describing Systems
Readings: Meadows, Thinking in Systems, Chapters 3 and 4 and additional readings posted on LEARN

ONE-PAGE PROPOSAL FOR SYSTEMS DESCRIPTION DUE: September 25th, 2020

Week #4 – Week of September 28th – System Archetypes and Leverage Points
Readings: Readings posted on LEARN
Week #5 – Week of October 5th – Systems Thinking and Interdisciplinary, Environmental Research
Readings: Meadows, Thinking in Systems, Chapter 7 and additional readings posted on LEARN

QUIZ #1 (10%) – based on readings and lectures Weeks 1-5

Fall Reading Break – Week of October 12th – NO CLASS

Week #6 – Week of October 19th – Systems Thinking, an Ecosystem Approach and Decision-Making
Readings: Meadows, Thinking in Systems, Chapters 5 and 6 and additional readings posted on LEARN

ANNOTATED BIBLIOGRAPHY ASSIGNMENT DUE: October 23rd, 2020

Week #7 – Week of October 26th – Resilience Thinking
Readings: Readings posted on LEARN
Week #8 – Week of November 2nd – Social Innovation and Transition Management
Readings: Readings posted on LEARN

Week #9 – Week of November 9th – Systems Transformation and Three-Horizons
Readings: Readings posted on LEARN
Week #10 – Week of November 16th – Guest Speakers – BIPOC Perspectives on Systems and Systems Thinking
Readings: Readings posted on LEARN

QUIZ #2 (10%) – based on readings and lectures Weeks 6-10

Week #11 – Week of November 23rd – Critical Systems Thinking
Readings: Readings posted on LEARN
Week #12 – Week of November 30th – Synthesis Lecture
Readings: Readings posted on LEARN

SYSTEMS DESCRIPTION ASSIGNMENT DUE: December 4th, 2020

Academic Integrity:

In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility. See the Office of Academic Integrity webpage for more information.

Discipline
A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. Check the Office of Academic Integrity for more information. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline. For typical penalties check Guidelines for the Assessment of Penalties.

Grievance
A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4. When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Appeals
A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 - Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 - Student Appeals.

Note for Students with Disabilities
The AccessAbility Services office, located on the first floor of the Needles Hall extension (NH 1401), collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.

University Policies: Plagiarism

Please familiarize yourself with the University of Waterloo's policy dealing with plagiarism. Be especially careful when using materials from the internet and be aware that software available to instructors can be used to check student submissions for plagiarism. Plagiarism offences are normally treated quite seriously by the University and can result in significant penalties being assessed (e.g. failing grade on an assignment, repeating a course, suspension or expulsion).

Definition of Plagiarism:

"The act of presenting the ideas, words or other intellectual property of another as one's own." Source: University of Waterloo, Policy 71.

Turnitin: Plagiarism detection software (Turnitin) may be used to screen assignments in this course. This may be done to verify that use of all materials and sources in assignments is documented. Students will be given an option if they do not want to have their assignment screened by Turnitin. In the first week of the term, details will be provided about arrangements and alternatives for the use of Turnitin in this course.

To Avoid Plagiarism

The use of other people's work ***must be properly acknowledged and referenced*** in all written material such as assignments, take-home examinations, essays, research papers, laboratory reports, work-term reports, design projects, statistical data, computer programs and research results. The properly acknowledged use of sources is an accepted and important part of scholarship. However, use of such material without complete and unambiguous acknowledgement is an offence under UW Policy 71.

Quoting, paraphrasing, and summarizing (source: http://owl.english.purdue.edu/owl/resource/563/1/)

These three ways of incorporating other writers' work into your own writing differ according to the closeness of your writing to the source writing.

- **Quotations** must be identical to the original, using a narrow segment of the source. They must match the source document word for word and must be attributed to the original author with page number.
- **Paraphrasing** involves putting a passage from source material into your own words. A paraphrase must also be attributed to the original source. Paraphrased material is usually shorter than the original passage, taking a somewhat broader segment of the source and condensing it slightly.
- **Summarizing** involves putting the main idea(s) into your own words, including only the main point(s). Once again, it is necessary to attribute summarized ideas to the original source. Summaries are significantly shorter than the original and take a broad overview of the source material.

Unclaimed Assignments

Unclaimed assignments will be retained until one month after term grades become official in Quest. After that time, they will be destroyed in compliance with UW's confidential shredding procedures.