ENVIRONMENT AND RESOURCE STUDIES 300

Fall 2017

Introduction to Systems Thinking

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Office hours: Wednesday 11am-12pm

Meeting Time/Location: Fridays, 11:30-2:20pm, EV2 2002

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) different approaches that have been taken to describe, analyze and intervene in complex systems, and;

    (ii) 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.

Course Structure:

Lectures

Lecture sessions will generally be an hour and a half to two hours long. Any of the official lecture time that is not used, the course instructor will be available to provide advice on assignments.

The last 50 minutes of the session will be used to supplement and support the lectures with small group discussion. The teaching team will provide advice on assignment topic choice and on-going support for systems description in the tutorial sessions.

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:

Quizzes: 15%
- These brief quizzes, held **<u>randomly</u>** at the beginnings of class meetings, will test student's knowledge of the weekly readings and previous lecture material
- There will be a total of **4 quizzes** throughout the term and the **top 3 quizzes** will be counted in your final mark – therefore each quiz is worth 5% of your final mark, 3 quizzes = 15%
- **Random: please come to class every week**

Annotated Bibliography: 30%
- Review at least 10 topic-relevant articles / book chapters (mostly peer-reviewed) that will inform your systems description
- No more than 10 double-spaced pages (excluding title page and references)
- A **Grading Guide** has been posted on LEARN, please refer to it for details as the teaching team will be utilizing this to grade the submissions
- **<u>Due Date</u>: October 20th, 2016 (submitted on LEARN by midnight)**

Systems Portfolio and Participation: 15%
- Each week students will participate in a facilitated, small-group discussion that is intended to aid in the development of their Systems Study (see below) through the weekly, incremental development of a systems portfolio.
- Each week students will submit a brief assignment (approximately 1-page) resulting from the facilitated session. These hard-copy submissions will be reviewed by the teaching team to track students' comprehension of the class material and as to the development of the students' systems study.
- Marks will be allocated based on weekly submissions (evidence of attendance and participation) and content

Systems Study and Theory of Systems Change: 40%
- 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. The system description is to be comprised of the following:
  - A description of the components and structure of the system
  - A description of the dynamics that underlie the system
  - Your conceptual/theoretical and personal perspective, biases, assumptions
- Develop a Theory of Systems Change – what change are you proposing is necessary and document how you think this change can be enacted
- No more than 12 double-spaced pages (excluding title page and references)
- A **Grading Guide** has been posted on LEARN, please refer to it for details as the teaching team will be utilizing this to grade the submissions
- **<u>Due Date</u>: November 17th, 2017 (submitted on LEARN by midnight)**

<u>Late Policy:</u>
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 311 site** regularly for changes to this tentative **Schedule** and for **Weekly Readings**

Week #1 – September 8th – Introduction to the course

Week #2 – September 15th – Introduction to Systems Thinking
      Readings: Readings posted on LEARN

Week #3 – September 22nd – Basics of Systems Thinking / Describing Systems
      Readings: Meadows – Meadows, Thinking in Systems, Chapter 1 and 2 and additional readings posted on LEARN

Week #4 – September 29th – Basics of Systems Thinking / Theories of Systems Change
      Readings: Meadows, Thinking in Systems, Chapters 3 and 4

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

October 13th – **NO CLASS DUE TO READING BREAK**

Week #6 – October 20th – Systems Thinking and Interdisciplinary, Environmental Research
      Readings: Meadows, Thinking in Systems, Chapter 7 and additional readings posted on LEARN

Week #7 – October 27th – Resilience Thinking
      Readings: Readings posted on LEARN

ANNOTATED BIBLIOGRAPHY ASSIGNMENT DUE: October 20th, 2017

Week #8 – November 3rd – Social Innovation and Transition Management
      Readings: Readings posted on LEARN

Week #9 – November 10th – Critical Systems Thinking
      Readings: Readings posted on LEARN

Week #10 – November 17th – Guest Lecture by Katie Kish – Applying Systems Thinking and Complexity in Research: a conceptual framework for problem-solving
      Readings: Readings posted on LEARN

SYSTEMS DESCRIPTION ASSIGNMENT DUE: November 17th, 2017

Week #11 – November 24th – Guest Lecture by Melanie Goodchild, PhD Candidate – Indigenous Innovation and System Change
      Readings: Readings posted on LEARN

Week #12 – December 1st – Guest Lecture by Prof. Stephen Quilley – Big History, Systems and Limits to Growth
      Readings: Readings posted on LEARN

Academic Integrity:

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. www.uwaterloo.ca/academicintegrity/. Students who are unsure what constitutes an academic offence are requested to visit the on-line tutorial at: http://www.lib.uwaterloo.ca/ait/

Research Ethics: Please also note that the University of Waterloo requires all research conducted by its students, staff, and faculty which involves humans as participants to undergo prior ethics review and clearance through the Director, Office of Human Research and Animal Care (Office). The ethics review and clearance processes are intended to ensure that projects comply with the Office's Guidelines for Research with Human Participants (Guidelines) as well as those of provincial and federal agencies, and that the safety, rights and welfare of participants are adequately protected. The Guidelines inform researchers about ethical issues and procedures which are of concern when conducting research with humans (e.g. confidentiality, risks and benefits, informed consent process, etc.).
If the development of your research proposal consists of research that involves humans as participants, the please contact the course instructor for guidance and see:
www.research.uwaterloo.ca/ethics/human/

Note for students with disabilities: The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, 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 OPD at the beginning of each academic term.

Religious Observances: Please inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

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, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt, please contact your Undergraduate Advisor for details.

Discipline*:* A student is expected to know what constitutes academic integrity, to avoid committing academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (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. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties, check Guidelines for Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm

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). See: www.adm.uwaterloo.ca/infosec/Policies/policy72.htm

Consequences of Academic Offences:
ENV students are strongly encouraged to review the material provided by the university's Academic Integrity office (see: http://uwaterloo.ca/academicintegrity/Students/index.html).

Turnitin:
Plagiarism detection software (Turnitin) will be used to screen assignments on this course. This is being done to verify use of all material and sources in assignments is documented. In the first lecture of the Term, details will be provided about the arrangements for the use of Turnitin. **NOTE:** Students may request an alternative to Turnitin, which is to prepare an annotated bibliography for each assignment. For advice on how to prepare an annotated bibliography, see: http://www.lib.sfu.ca/help/writing/annotated-bibliography