ENVIRONMENT AND RESOURCE STUDIES 311

Fall 2014

Introduction to Systems Thinking

Instructor: Dr. Dan McCarthy
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Office: EV2-2027
Office hours: Thursdays 10:00am-12:00pm

Meeting Time/Location: Fridays 8:30-10:20am AL 124

Tutorials:

TUT 101	Friday 10:30-11:20am	EV2 2006
TUT 102	Friday 10:30-11:20am	HH 124
TUT 103	Friday 12:30-1:20pm	PAS 2085
TUT 104	Friday 12:30-1:20pm	AL 209

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.

Tutorials

The 50-minute tutorials will be used to supplement and support the lectures. Teaching Assistants will provide advice on assignment topic choice and on-going support for systems description in the tutorial sessions. Students will lead-off brief discussions on their systems descriptions and proposals to get input from their peers.

Resources:

Course Texts:

David Waltner-Toews, James J. Kay, Nina-Marie E. Lister. 2008. *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability*
New York, U.S.A.: Columbia University Press.

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 inquires from the teaching team and do not expect e-mail responses from the teaching team over the weekend.

Course Requirements:

In-Class Midterm Exam (In-Class): 20%

- The in-class mid-term exam will test students' understanding of the concepts explored in the first half of the term to ensure that they can adequately utilize them in the context of the systems description (culminating assignment)
- **October 17th, 2014 (During regular class time)**

Annotated Bibliography: 20%

- Review at least 12 topic-relevant articles / book chapters (mostly peer-reviewed) that will inform your systems description
- No more than 10 double-spaced pages
- **Due Date: October 24th, 2014 (submitted on LEARN by midnight)**

Tutorial Lead-off Discussion: 10%

- Lead Tutorial Discussion on Systems Description – Provide a brief 5-minute lead-off presentation for discussion in a tutorial session. These discussions are intended to allow you to get feedback from fellow students on your systems description to date.
- **Given that presentations will take place throughout the term, grades will be based on progress-to-date**
- **Sign-Up in First Tutorial**

Systems Study/Description: 30%

- Develop a systems description of the research problem to refine your understanding of the case study. 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
- No more than 12 double-spaced pages
- **Due Date: November 28th, 2014 (submitted on LEARN by midnight)**

Take-Home Final Exam (In-Class): 20%

- The in-class final exam will test students' understanding of the concepts explored over the entire term to ensure that they can adequately utilize them in the context of the systems description (culminating assignment)
- **Due Date: December 5th, 2014 (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 311 site** regularly for changes to this tentative **Schedule** and for **Weekly Readings**

Week #1 – September 12th – Introduction to the course

NO TUTORIALS (September 12th)

Week #2 – September 19th – Introduction to Systems Thinking

Tutorials (September 19th): Introductory tutorial session – review of assignments and important dates

Week #3 – September 26th – Basics of Systems Thinking

Tutorials (September 26th): Discussion of weekly readings, sign up for tutorial presentations and initial discussion of systems description.

Week #4 – October 3rd – Describing Systems

Tutorials (October 3rd): Discussion of weekly readings and discussion of systems description topic choices.

Week #5 – October 10th – Systems Thinking, an Ecosystem Approach and Decision-Making

Tutorials (October 10th): Mid-term preparation

Week #6 – October 17th – **IN-CLASS MIDTERM**

Tutorials (October 17th): Student Presentations

ANNOTATED BIBLIOGRAPHY ASSIGNMENT DUE: October 24th, 2014

Week #7 – October 24th – Systems Thinking and Interdisciplinary, Environmental Resea**rch**

Tutorials (October 24th): Student Presentations

Week #8 – October 31st – Guest Lecture by Dr. Morgan Tait **–** Philosophy and Systems Thinking

Tutorials (October 31st): Student Presentations

Week #9 – November 7th – Resilience, Social Innovation and Transition Management

Tutorials (November 7th): Student Presentations

Week #10 – November 14th – Critical Systems Thinking and Course Wrap-up/Evaluations

Tutorials (November 14th): Student Presentations

Week #11 – November 21st – Guest Lecture by Prof. Stephen Quilley – "Big History" and a "Third Basin of Attraction"

Tutorials (November 21st): Exam preparation

Week #12 – November 28th – **PICK UP TAKE-HOME FINAL EXAM**

NO TUTORIALS (November 28th)

SYSTEMS DESCRIPTION ASSIGNMENT DUE: November 28th, 2014

TAKE-HOME FINAL EXAM DUE: December 5th, 2014

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