

# ENVIRONMENT AND RESOURCE STUDIES 300

Fall 2018

## Introduction to Systems Thinking

**Instructor:** Dr. Dan McCarthy  
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Office: EV2-2027  
Office hours: Tuesday 1:00pm-2:00pm

**Meeting Time/Location:** Mondays, 2:30-4:20pm, EV2-2002

<b><u>Tutorials:</u></b>	TUT 101	1:30pm-2:20pm, Wednesdays	HH 124
	TUT 102	12:30pm-1:20pm, Wednesdays	HH 344
	TUT 103	10:30am-11:20am, Thursdays	AL 210
	TUT 104	1:30pm-2:20pm, Thursdays	HH 124

### **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 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.

## **Course Structure:**

### **Lectures**

Lecture sessions will generally be approximately 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:**

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:**

### **Annotated Bibliography: 35%**

- 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 19<sup>th</sup>, 2018 (submitted on LEARN by midnight)**

### **Tutorial Lead-off Discussion and Participation: 15%**

- 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.
- Attendance at the tutorial sessions is mandatory and attendance will be taken. This portion of the grade will be based on your attendance record at the tutorials as well as your contribution to discussions.
- **Given that presentations will take place throughout the term, grades will be based on progress-to-date**
- **A detailed grading guide is available on LEARN – Please refer to it!**
- **Sign-Up in First Tutorial**

### **Systems Study: 50%**

- 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: November 23<sup>rd</sup>, 2018 (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 – September 10<sup>th</sup>** – Introduction to the course (**No Tutorials** the first week – September 12<sup>th</sup> and 13<sup>th</sup>)

**Week #2 – September 17<sup>th</sup>** – Introduction to Systems Thinking  
Readings: Meadows, Thinking in Systems, Chapter 1 and 2 and additional readings posted on LEARN

Tutorials (September 19<sup>th</sup> and 20<sup>th</sup>): Introductory Session and Sign-up for Presentations

**Week #3 – September 24<sup>th</sup>** – Basics of Systems Thinking / Describing Systems

Readings: Meadows, Thinking in Systems, Chapters 3 and 4 and additional readings posted on LEARN

Tutorials (September 26<sup>th</sup> and 27<sup>th</sup>): Discussion about Systems Descriptions

**Week #4 – October 1<sup>st</sup>** – Complexity Capacities

Readings: Readings posted on LEARN

Tutorials (October 3<sup>rd</sup> and 4<sup>th</sup>): Topic Choice for Systems Description

**Fall Reading Break** – October 8<sup>th</sup> (Class) and 10<sup>th</sup>, 11<sup>th</sup> (Tutorials) – **NO CLASS, NO TUTORIALS**

**Week #5 – October 15<sup>th</sup>** – Systems Thinking and Interdisciplinary, Environmental Research

Readings: Meadows, Thinking in Systems, Chapter 7 and additional readings posted on LEARN

Tutorials (October 17<sup>th</sup> and 18<sup>th</sup>): Advice on Annotated Bibliography

### **ANNOTATED BIBLIOGRAPHY ASSIGNMENT DUE: October 19<sup>th</sup>, 2018**

**Week #6 – October 22<sup>nd</sup>** – Systems Thinking, an Ecosystem Approach and Decision-Making

Readings: Meadows, Thinking in Systems, Chapters 5 and 6 and additional readings posted on LEARN

Tutorials (October 24<sup>th</sup> and 25<sup>th</sup>): Discussion on Systems Description

**Week #7 – October 29<sup>th</sup>** – Resilience Thinking

Readings: Readings posted on LEARN

Tutorials (October 31<sup>st</sup> and November 1<sup>st</sup>): Student Presentations/Discussions

**Week #8 – November 5<sup>th</sup>** – Social Innovation and Systems Transformation

Readings: Readings posted on LEARN

Tutorials (November 7<sup>th</sup> and 8<sup>th</sup>): Student Presentations/Discussions

**Week #9 – November 12<sup>th</sup>** – Critical Systems Thinking

Readings: Readings posted on LEARN

Tutorials (November 14<sup>th</sup> and 15<sup>th</sup>): Student Presentations/Discussions

### **SYSTEMS DESCRIPTION ASSIGNMENT DUE: November 18<sup>th</sup>, 2016**

**Week #10 – November 19<sup>th</sup>** – Guest Lecture – Indigenous Innovation and System Change

Readings: Readings posted on LEARN

Tutorials (November 21<sup>st</sup> and 22<sup>nd</sup>): Student Presentations/Discussions

**Week #11 – November 26<sup>th</sup>** – Guest Lecture by Prof. Stephen Quilley – Big History, Systems and Limits to Growth

Readings: Readings posted on LEARN

Tutorials (November 28<sup>th</sup> and 29<sup>th</sup>): Tutorial Wrap-up Discussion

**Week #12 – December 3<sup>rd</sup>** – Synthesis Lecture

Readings: Readings posted on LEARN

## **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](#).