

Title: Systems thinking for Sustainability

Lecturer: Dr. Christopher Doll

Course Description:

This course will explore systems and systems thinking in sustainable development. In particular, the course will present an approach based on low-order systems models that will be used to analyse systems interactions. These will then be developed into a method known as collaborative conceptual modelling, which aims to bridge different world views to create a common understanding of a problem. This method can therefore be used both individually, to help frame research questions, or collaboratively to determine common understandings.

The course will also present a range of themes in sustainability science to both illustrate the inherent complexity in sustainability science and as a means of applying these techniques to help understand them from broader, transdisciplinary perspectives with a view to building a greater understanding of the synergies and trade offs in the SDGs.

As such the course provides a useful methodology for diagnosing and understanding system interactions and their dynamics. It may be of particular interest for students interested in working with focus groups in their thesis as well as those seeking to gain a structured understanding of interactions within and between problem areas. The collaborative method is predicated on the assumption that no one person can fully understand the system and therefore students are expected to bring with them their own expertise and an open mind.

This course will run from late April-June.

Learning Outcomes:

By the end of the course, students are expected to have a practical and actionable understanding of systems theory and how it applies to sustainable development and specifically:

- An understanding of systems thinking, their merits and limitations
- The ability to construct and analyse influence diagrams for their chosen field of study as an aid to their thesis development
- A deeper appreciation of the inter-connectedness of sustainability issues

Assessment:

Class participation:	20%
Assignments:	50%
Report and final presentation	30%

Schedule:

Course Unit	Outline	Date	Time
1	Introduction and Overview	28 April	14:00-15:30
2	Systems Thinking and variables	28 April	16:00-17:30
3	Influence diagrams and feedbacks	1 May	14:00-15:30
4	Collaborative Conceptual Modelling	1 May	16:00-17:30
5	Human-ecological systems	9 May	11:00-12:30
6	Health and the SDGs	11 May	11:00-12:30
7	Urban systems	16 May	11:00-12:30
8	Food systems	16 May	16:00-17:30
9	Group Presentations	17 May	14:00-15:30
10	Energy, Technology and Societal transitions	23 May	11:00-12:30
11	Institutional Systems	23 May	14:00-15:30
12	Societal complexity and collapse	24 May	14:00-15:30
13	Group Presentations	30 May	11:00-12:30
14	Systems and their limitations	31 May	14:00-15:30
15	Individual Presentations	1 June	16:00-17:30

Readings:

Dyball, R and Newell, B. 2014. Understanding Human Ecology: A systems approach to sustainability. Earthscan

Newell, B and Siri, J. 2016. A role for low-order system dynamics models in urban health policy making. *Environment International* (95) 93-97

Nilsson M, Griggs D, Visbeck M. Policy: Map the interactions between Sustainable Development Goals. *Nature* 2016;534:320-22.

Tainter, J.A. 2014. Collapse and Sustainability: Rome, the Maya, and the Modern World. Archeological Papers of the American Archaeological Society. Volume 24, Issue 1. 201–214

Wilson, C and Grubler, A. 2011. Lessons from the history of technology and global change for the emerging clean technology cluster Background Paper World Economic and Social Survey 2011