

This interdisciplinary course examines the human ecology of the global human overpopulation problem. Pollution, resource depletion, extinctions and carrying capacity are explored, as well as political, psychological, cultural and technological adaptations. Feedback mechanisms will be proposed and discussed. Students will engage in debate and systems dynamics model building. This course is communication intensive.

4 credits

Spring 2018

Location: Troy Bldg 2015

Time: Tu F 4:00-5:50

Instructor: Prof. C. Bystroff (Biology)

Office location: J-Rowl 3C07

Office telephone number: x3185

Office hours: F 10-12

e-mail address: bystrc@rpi.edu

Teaching Assistant name: none

TA office location: n/a

TA e-mail: n/a

Class meeting	Lecture, date			Lecture(L), Debates (D), Presentations (P), Modeling (M), Videos(V), Group discussion (G)	Readings from <i>Limits to Growth, The 30-year Update</i> , unless otherwise specified. Read and submit questions. Homework due dates.
1	My worldview.	1/16	LG		
2	Overshoot. InsightMaker.	1/19	LM		pp. 1-16
3	Growth.	1/23	LM		pp. 16-36 HW1
4	Demographics.	1/26	LG		pp 37-50
5	Critical thinking. Moral philosophy.	1/30	LMG		Van Heuveln, Tessman
6	Debate 1.	2/2	DV		
7	Biosphere 1.	2/6	LM		pp. 51-86 HW2
8	Non-renewable resources.	2/9	MP		pp. 87-107
9	Climate change.	2/13	LG		pp. 108-127
10	Debate 2.	2/16	DV		
11	World 3.	2/23	LM		pp. 129-136 HW3
12	Carrying capacity.	2/27	PM		pp. 136-147
13	The Land.	3/2	MG		pp. 147-162
14	Debate 3.	3/6	DV		
15	Collapse.	3/9	ML		pp. 163-179 HW4
16	Ethical dilemmas.	3/20	PL		Hardin1,2, vonFoerster
17	Unexpected resilience.	3/23	LG		pp. 181-202
18	Debate 4.	3/27	DV		
19	Technology.	3/30	LM		pp. 203-234 HW5
20	Transitions.	4/3	PL		pp. 235-264
21	Guest lecture: Dave Gardner.	4/6	LG		pp. 265-284
22	Female empowerment.	4/10	LG		Uzochukwu
23	Disavowal. Messaging.	4/13	LG		Coole *
24	Family planning.	4/17	PL		PamelaHerd
25	Current events	4/20	PG		news
26	Current events	4/24	MG		news
27	Term Projects	4/27	P		
28	Term Projects	5/1	P		

Books

Meadows D, Randers J, Meadows D. (2004) "The Limits to Growth. The 30-year update"

Supplementary readings

Van Heuveln, B. <http://www.cogsci.rpi.edu/~heuveb/Teaching/CriticalWisdom/Fallacies.htm>

Diamond J. (2005). Collapse: How societies choose to fail or succeed.

Hardin, G. (1968). The tragedy of the commons. *Science*, 162(3859), 1243-1248.

Hardin, G. (1974). Commentary: Living on a Lifeboat. *BioScience*, 24(10), 561-568.

Hopfenberg, R., & Pimentel, D. (2001). Human population numbers as a function of food supply. *Environment, Development and Sustainability*, 3(1), 1-15.

Attenborough D. (2011) "How Many People Can Live on Planet Earth" BBC Documentary (47 min) <https://www.youtube.com/watch?v=1oi9z1aZXBQ>

Von Foerster, H., Mora, P. M., & Amiot, L. W. (1960). Doomsday: Friday, 13 november, AD 2026. *Science*, 132(3436), 1291-1295.

Herd, P., Higgins, J., Sicinski, K., & Merkurieva, I. (2016). The implications of unintended pregnancies for mental health in later life. *American journal of public health*, 106(3), 421-429.

Moon, Ban-Ki. The Millenium Goals Report 2015. ISBN 978-92-1-101320-7.

<http://www.footprintnetwork.org/> (Ecological footprint analysis)

<https://kumu.io/stw/swim> (Simulation with InsightMaker)

Course web page

www.bioinfo.rpi.edu/bystrc/courses/biol4961

Grading

Essay/talk : 20%

Homework : 20%

Debates : 20%

Bring a question to class: 20%

Term project : 20%

Communication intensive course

Human Population is a communication intensive course. Students are expected to critically read, write, to engage in debate, to do presentations in front of the class and handle questions afterward, and to write essays.

The Tasks of Science (DIPA)

The practice of science may be broken down to four tasks, each dependent on the one before it. Descriptive, which is data gathering and experimentation; Interpretive, which is model building; Predictive, which is hypothesis generation; and Active, which is experimental design or taking an ethical position. Students will be asked to follow DIPA in essays and in discussions and problem solving.

Homework assignments

There will be four homework assignments, all using InsightMaker. (insightmaker.com)

InsightMaker (IM)

We will use an online systems dynamic modeling tool to build models for population growth in the context of a finite world, with positive and negative feedbacks. Students will annotate their model using IM's StoryTelling feature. Time will be allotted in class to learn how to use IM.

Bring a question to class

Students will upload questions based on the reading. The instructor will select one or two questions for class discussion. Grades are based on how often you uploaded and how insightful your question was.

Debate

Students, in two groups of 3 (or 4), take opposing viewpoints, on a pre-defined topic. Before debate day they prepare 3 (or 4) logical arguments (descriptions, interpretations, predictions) supporting the desired position and provide them to the opposing team at least three days before debate day. On debate day, each argument is presented, and is followed by a cross-examination (question/answer). The remainder of the class (the Panel) asks questions of the debaters at the end of the debate. Each student signs up for two debates using Sign-up Genius (<http://www.signupgenius.com/>).

Seven-Minute Science

Each student will do two science essays read aloud to the class. No slides. Talks should be seven minutes with 2 to 5 minutes of questions/answers. Seven minutes equals approximately 840 words or about three pages of text. Topics can be anything relating to the science of human population. Please provide your topic to the instructor at least 1 week before your scheduled presentation. Present and attribute your data, construct an explanatory model, and predict future data, events or outcomes. Written essay must contain and cite references. Sign up for 7-minute science dates using Sign-up Genius (<http://www.signupgenius.com/>).

Essays will be graded on clarity and content. Clarity will be assessed by (1) correct word usage, (2) correct sentence structure, (3) correct paragraph structure, and (4) correct essay structure. Content will be assessed by the "DIPA" method of statement classification. Essays are text only with citations and bibliography, but no figures. Submit essays electronically in Word or Pages format. Students are encouraged to visit the Center for Communication Practices in the Folsom Library to hone their skills in writing.

Term Project:

Students in groups of two or three will propose a topic two weeks before term project presentation day, relating to some current outcome of population overshoot. Slide show presentations (10 minutes in length per presenter) will be given orally *from memory* using slides but *not using written notes*. Presenters will field questions afterward. Please turn in the slides of the presentation. Grades are based on the slide-show presentation, and the question/answer period.

Academic honesty

Confirmed plagiarism, defined as unattributed use of published material, whether egregious or unintentional, will result in penalties as follows: First time "F" on assignment, 2nd time "F" in course. *Dual submission*: Unattributed copying is a form of plagiarism. The first incidence of confirmed copying will result in a "F" on the assignment for both parties. A second incidence will result in an "F" in the course. *(Does not apply when working in groups and all authors names are on the paper.)*

Treatment of student ideology in the classroom:

This course deals with a sensitive subject for some religions and other ideologies. Students will not be graded on their religious views, political leanings or opinions in general. Religion and politics may be discussed where it is relevant to the course, but every attempt should be made to ensure that religious topics and political views are treated with respect, objectivity and non-judgement. Any student who uses this course as an opportunity to judge any religious doctrine or ideology will be warned and possibly graded down. Any student who uses non-falsifiable statements tied to ideology will be gently warned and may be graded down.

Unexcused absences:

This is a participatory course. Attendance is required. Each unexcused absence will result in a 3% grade reduction. Documentation for excused absences is processed by the Student Experience Office, 4th floor Academy Hall, x8022, se@rpi.edu.

Learning Outcomes

1. Students will be able to present and critique a logical argument for a forward prediction of variables relevant to human ecology.
2. Students will be able to build and run systems dynamics models for human ecology.
3. Students will be able to draw from biology, ecology, geochemistry, psychology and math in discussing human population dynamics.
4. Students will understand and practice objectivity and ordered process in science writing.