
ENVS 827.3

BREAKTHROUGHS IN WATER SECURITY RESEARCH (Water & Health)

School of Environment and Sustainability

Term 2 2019-2020



Course Coordinator	Dr. Charles Trick charles.trick@usask.ca
Course notes:	See course website http://bblearn.usask.ca Information on the seminars can be found at: http://www.usask.ca/water/news-and-events/dls/index.php
Assessment:	Reflection write-ups (3) 15% Classroom discussion and leadership 15% Case presentation and discussion participation 40% Case Study write-up (individual) 30%
Prerequisites:	None

Course Summary

BREAKTHROUGHS IN WATER SECURITY RESEARCH is a new seminar course for students in SENS and elsewhere across campus. The purpose of this course is to expose students to the latest research in water security, to connect students to the top researchers in the field internationally, to help students understand what constitutes world class research and to further develop awareness and understanding of major concepts in water security.

In this section of “BREAKTHROUGHS”, the focus will be on the relationship between the present and future supply of water (quality and quantity) and the health of communities. This itself is a giant task and we will add the concept of leadership and decision making to the cases you will be studying. It is important to recognize that when it comes to the health of communities the emphasis needs to focus on creating an improved outcome, not just describing a relationship.

The importance of water to the health of individuals, communities and nations cannot be overstated. The *Lancet* (Britain-based medical journal with the stated goal of “improving lives is the only end goal”) carried an editorial on World Water Day – 2019 titled “On the question of water: a matter of life and death.” This statement leads this set of lectures where we will recognize that no matter where your interests lay- geologist, hydrologist, ecologist, sustainability-ist - the global population needs your insight. And two billion inhabitants of the earth need it now.

There will be different stages in this course. We will start with understanding the endpoint of the 3-E model (Environment → Exposure → Effects); that is, how do we measure health or wellness of communities and, to a lesser extent, individuals? This section is followed by a series of case studies that consider enteric bacteria + water sanitation, ecological modification (water blooms), and consequences of the drought/floods on communities. By using the case study method, we will create a self-learning strategy that will enable you to approach any new environment-health challenge – and may be useful throughout other sections of the course. Ultimately you will become an active participant in water issues and human health through dialogue, systems thinking, and creative upstream decision making. Unsure about what “upstream decisions” means? Then this is the course for you.

Learning Outcomes

On completion of the course, students are expected to be able to:

1. Demonstrate an improved level of knowledge and understanding of the importance of water as a regulator of human health.
2. Apply an improved ability in creating a manageable understanding of the dynamics of problem-solving through a systems-learning approach.
3. Create a focused pattern of reading, assimilating, and evaluating current research literature (“Read like a Professor!”).
4. Produce a critical evaluation of how recent community-health approaches are linked to water research
5. Evaluate the central role of water quality, quantity, aesthetics, and spiritual value for health and the effect of a safe water supply on population health and community wellbeing
6. Explain why and how different types of waterborne diseases occur, how to treat them, and discuss social justice and policy issues concerning preventing such diseases through provision of safe clean water for drinking, recreation, cultural and sanitation purposes.
7. Apply the concept of scale (individual, community, national) to the decisions that will lead to better water-health relationships of individuals.

Keys to a Flipped-Class Preparation

There will be a considerable amount of work prior to the lecture. My expectations are that you have done the readings, you will be prepared to come to the board or to express to the class influence diagram or appropriate evidence of systems thinking, *you will be prepared with 5 questions that will be used to direct the discussion; and you will prepare 3-5 ways to realize change (I will ask for them during the class – or better yet, you will learn to offer them to the class).*

“The fact of knowing how to read is nothing, the whole point is knowing what to read.”

- Jacques Ellul

Readings are to be done prior to class. You will be expected to be able to share with the class the importance of the reading and a summary of the findings as it pertains to the case study or the topic at hand.

Detailed course subject description

Course outline:

Date	Topic/Activities	Case and Required Readings
March 23, 2020		
<p><i>Prior to the Day:</i> WE WILL USE THE FOLLOWING ARTICLE ROUTINELY IN THIS SECTION. CONSIDER PRINTING UP A COPY. The Rockefeller Foundation–Lancet Commission on planetary health. Safeguarding human health in the Anthropocene epoch: Sarah Whitmee, et al. Lancet. 2015. http://dx.doi.org/10.1016/S0140-6736(15)60901-1</p> <p>READ: the assigned case (Case #1 – contaminated carrots)</p> <p>READ: Parrish RG. Measuring population health outcomes. <i>Prev Chronic Dis</i> 2010;7(4):A71. http://www.cdc.gov/pcd/issues/2010/jul/10_0005.htm</p>		
Morning	Introduction to Water and Health Description of Assignments Approval of Syllabus Lecture: What does it mean to be healthy or well? How to scale up to communities?	
Afternoon	Explanation of Case Study #1. Constructive exercises to “brainstorm” events and team-building Outline the concept of cases and how to read them. Detail enteric bacteria details.	
March 24, 2020		
<p><i>Prior to the Day:</i> READ: Tools for Systems Thinkers: The 6 Fundamental Concepts of Systems Thinking. https://medium.com/disruptive-design/tools-for-systems-thinkers-the-6-fundamental-concepts-of-systems-thinking-379cdac3dc6a</p> <p>READ: Case Study #2 -Cholera outbreaks</p> <p>READ: Global cholera epidemiology: opportunities to reduce the burden of Cholera by 2030; D. Legros. <i>The Journal of Infectious Diseases</i>, jiy486, https://doi.org/10.1093/infdis/jiy486.</p>		
Morning	Review Influence Diagram for Case Study #1 Review Influence Diagram for Case Study #2	
Afternoon	Explanation of Assignment 1 Go over the use of datasets (GapMinder, etc.) Review Influence Diagram for Case Study #2 Review sanitation plans.	

March 25, 2020	
<p><i>Prior to the Day:</i> READ: Case Study #3. Dengue fever and the movement of mosquitoes.</p> <p>READ: Schmidt WP, Suzuki M, Thiem VD, et al. Population density, water supply, and the risk of dengue fever in Vietnam: cohort study and spatial analysis. PLoS Med. 2011;8(8):e1001082. doi:10.1371/journal.pmed.1001082</p>	
Morning	Review Case Study #3 – Dengue fever and mosquito-borne diseases
Afternoon	Creative decision-making: VW design. Mathematical Vision: “Are they killing us with lipstick?” Testing the 3-E model. Group work time for Assignment 2. Develop Groups and group topics
March 26, 2020	
<p><i>Prior to the Day:</i> READ: Wayne W. Carmichael (2001) Health Effects of Toxin-Producing Cyanobacteria: “The CyanoHABs”, Human and Ecological Risk Assessment: An International Journal, 7:5, 1393-1407, DOI: 10.1080/20018091095087</p>	
Morning	Lecture: Water, Health and Algal blooms – Global problems.
Afternoon	Create RUBRIC for presentations Importance of narrative and story-telling. Rules for graphs, graphics, tables, etc. Review
March 27, 2020	
<p><i>Prior to the Day:</i> READ: Case Study #5. <i>Cryptosporidium</i></p> <p>READ: Bhalchandra S, Cardenas D, Ward HD. Recent Breakthroughs and Ongoing Limitations in Cryptosporidium Research. F1000Res. 2018;7:F1000 Faculty Rev-1380. Published 2018 Sep 3. doi:10.12688/f1000research.15333.1</p>	
Morning	Lecture: Water, Health and <i>Cryptosporidium</i> outbreaks.
Afternoon	Structured group work time for Final Case Presentation (feedback on influence diagram)
March 30, 2020	
<p><i>Prior to the Day:</i> READ: Case Study #6 – “Meeting the last fisher on Earth” – Global aquatic resources and community research</p>	

READ: Mark, G. T., & Lyons, A. C. (2010). Maori healers' views on wellbeing: The importance of mind, body, spirit, family and lands. <i>Social Science & Medicine</i> , 70(11), 1756-1764.	
Morning	Lecture: Water, Ecosystem services, and community research.
Afternoon	Designing a Community Participatory Research Program.
March 31, 2020	
<i>Prior to class:</i>	
READ: https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health	
Morning	Lecture: Water, Health and Wellbeing: lead in drinking water
Afternoon	Activity: Write a letter to a government agency as a water and health predictive modeler noting your concerns for future water and health related threats.
April 1, 2020	
<i>Prior to class:</i>	
READ: Case Study #7. Lake Naivasha Sustainability Project	
Morning	Evaluate the Case. Design the research program. Consider the measurements of outcomes.
Afternoon	Small group creation of presentation to the stakeholders.
April 2, 2020	
Morning	Small group presentations and exercises.
Afternoon	
April 3, 2020	
Morning	Small group presentations and exercises.
Afternoon	

- **Readings**

There is no required textbook for this course.

Required readings, Case Studies, and course information will be posted online using BBLearn.

- **Course Responsibilities**

This is a non-traditional course.

1. In general, it will be taught as a case-based, reverse classroom.
2. Students will be expected to read the material PRIOR to entering the classroom. Students should come prepared with questions, ideas, and intellectual enthusiasm. Being mentally prepared for an enthusiastic discussion will bring the best out of everyone.
3. While facts are important in empirically-driven decisions, we aim to create knowledge and action. Be prepared to be involved. If you cannot be active in deriving answers to the complex decisions leading to improved environments and

health, then you have not accepted the purpose of the program.

4. The course instructor will serve as the overall coordinator and facilitator of interactions among students in the class.
5. The instructor will also work to arrange small-group and individual meetings between students in the class and some instructors who may overlap directly their research area.
6. The instructor will also grade all material and provide synthesis at the end of the course in terms of how to use what was learned in the course to aid and further individual research goals of enrolled students.
7. No recordings will be provided or allowed during this course.

- **Assessment criteria**

Students will be expected to attend all discussion sessions and seminars, lead at least one of the discussion sessions, and participate actively in all others.

Attendance at all seminars and discussion sessions is mandatory for passing the course (Reflections).

- **Assessment:**

Reflection write-ups (2)	10%
Classroom discussion and leadership	20%
Case presentation and discussion participation	30%
Case Study write-up (individual)	40%

- **Detailed assessment of students:**

Reflection Write-ups 1:

Reflection Papers

When assigned a reflection paper it is due at the start of the morning class. Print out your reflection and hand it in to me. The objectives of these papers are to help guide class discussion, develop the student's writing and analysis skills, and ensure good preparedness for class. In the reflection papers, you can synthesize the readings, state your reactions to the readings, raise issues and questions, or just be provocative. It is up to you as to what you write. You will be evaluated on issues of clarity, concern of thought, & ability to create a narrative that adds to the course content.

The reflection paper **cannot exceed** 1 page, 1.5-spaced, 11 point, Times New Roman, 1 inch margins. In some cases, you may want to provide a reference but in general you should view this as an **Op-Ed piece or a personal essay**. The structure is yours. The content is yours. Make it

thoughtful. Make it clear. I should know more about you and the topic by reading it ... and you should know more about you and the topic as you write it.

You will earn a grade between 0 and 3 for each reflection paper, with the mode, median and mean being 2. Only exceptional papers will earn a 3. No part marks (2.5). Marking is based on the following criteria:

- a. **3** shows **exceptional** insights into the readings; raises issues that are unique and thoughtful that go beyond a summary of the readings; demonstrates excellent writing skills
- b. **2** meets expectations (i.e. the expected mark)
1 does not demonstrate basic knowledge of the readings; does not demonstrate any
- c. reflections and merely repeats the main points of each reading, as opposed to synthesis;
- d. commits numerous writing mistakes **0** is late or missing

(Please bear with me: This marking scheme takes some maturity on your part. We are used to “meeting the requirements” to give top mark. But here you get “2” – this allows for a small number of the top papers to achieve a special denotation – a “3”. Some individuals will ask, “Does this mean $3 = 100\%$, $0 = 0\%$ - and by extension, $2 = 67\%$ and $1 = 33\%$?” No. And a common question is “I got a 2, why not a 3? General answer is that it was not a remarkable

Reflection 1: The Interview – 5% of final mark. Due before the March 24th class.

The first step in learning what to say is to learn to listen. For this reflection I would like you to interview another student in the class and to create a 1-page reflection of what you learned during the interview. The topic should be on “Why they are taking a water & sustainability course?”

Reflection 2: The Future – 5% of final mark. Due before the April 30th class.

What will **YOUR** future look like? In a one-page reflection, I would like you to provide a narrative of “what will **your daily world** look like in 25 years?”

- **Classroom discussion and leadership:**

Reverse classroom teaching requires the full attention and participate of each member of the class. Without active participation the learning experience is minimized. Thus, it is logical to expect that each student will contribute each class. Participation requires thoughtful questions and comments that progress the classroom conversation – not comments that simply restate what has been said. Each class you will be evaluated for your level of contribution. This will translate to 20% of your final mark. Depending on the class size we may employ peer-evaluators to assist in the evaluation.

- **Case presentation and discussion (group):** Working alone or in small groups (depending on class size) you will choose one topic and present it in a 30-minute session to the class. You will lead in the discussion and board presentation.
- **Case Study write-up (individual):** You will be provided details in the class but the final product for the course will be a policy brief for the water/health project you chose to present to this class. This policy brief is an independent (i.e., not group) activity. Policy briefs are designed to provide intellectual clarity and leadership to a senior administrator. In general, policy briefs will be composed as follows:
 - Define the problem. (1 paragraph).
 - Example or statement that broadens the problem statement. (1 paragraph). This
 - usually covers the situation of the problem or condition of the community.
 - Example of what happens if there is no action. (1 paragraph).
 - Intervention #1. (1 paragraph).
 - Intervention #2. (1 paragraph).

School and University policy statements

1. Grading System Description

SENS uses the following grading system as adopted by the College of Graduate Studies and Research:

90-100 Exceptional

A superior performance with consistent strong evidence of

- a comprehensive, incisive grasp of subject matter;
- an ability to make insightful, critical evaluation of information;
- an exceptional capacity for original, creative and/or logical thinking;
- an exceptional ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently;
- an exceptional ability to analyze and solve difficult problems related to subject matter.

80-89 Very Good to Excellent

A very good to excellent performance with strong evidence of

- a comprehensive grasp of subject matter;
- an ability to make sound critical evaluation of information;
- a very good to excellent capacity for original, creative and/or logical thinking;
- a very good to excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently;
- a very good to excellent ability to analyze and solve difficult problems related to subject matter.

70-79 Satisfactory to Good

A satisfactory to good performance with evidence of

- a substantial knowledge of subject matter;
- a satisfactory to good understanding of the relevant issues and satisfactory to good familiarity with the relevant literature and technology;
- a satisfactory to good capacity for logical thinking;

- some capacity for original and creative thinking;
- a satisfactory to good ability to organize, to analyze, and to examine the subject matter in a critical and constructive manner;
- a satisfactory to good ability to analyze and solve moderately difficult problems.

60-69 Poor

A generally weak performance, but with some evidence of

- a basic grasp of the subject matter;
- some understanding of the basic issues;
- some familiarity with the relevant literature and techniques;
- some ability to develop solutions to moderately difficult problems related to the subject matter;
- some ability to examine the material in a critical and analytical manner.

<60 Failure

An unacceptable performance.

2. Midterm and Final Examination Scheduling

Midterm and final examinations must be written on the date scheduled.

Final examinations may be scheduled at any time during the examination period; students should therefore avoid making prior travel, employment, or other commitments for this period. If a student is unable to write an exam through no fault of his or her own for medical or other valid reasons, documentation must be provided and an opportunity to write the missed exam may be given. Students are encouraged to review all examination policies and procedures:

<http://students.usask.ca/academics/exams.php>

3. Assessment Issues and Grade Disputes

A student shall be permitted to see any examination unless otherwise stated at the beginning of the course. Students dissatisfied with the assessment of their work in any aspect of course work, including midterm or final examination should consult the University policy ‘*Student Appeals or Evaluation, Grading and Academic Standing*’ found at the Office of the University Secretary:

<http://policies.usask.ca/policies/student-affairs-and-activities/student-appeals.php>

4. Examinations with Disability Services for Students (DSS)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Disability Services for Students (DSS) if they have not already done so. Students who suspect they may have disabilities should contact DSS for advice and referrals. In order to access DSS programs and supports, students must follow DSS policy and procedures. For more information, check <http://www.students.usask.ca/disability/>, or contact DSS at 966-7273 or dss@usask.ca.

Students registered with DSS may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through DSS by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by DSS.

5. Academic Honesty

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts

and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals (<http://www.usask.ca/secretariat/student-conduct-appeals/>)

For more information on what academic integrity means for students see the Academic Integrity Awareness site at: <http://www.usask.ca/integrity/index.php>

6. Recording

The syllabus must include a notice of whether the instructor intends to record lectures and whether students are permitted to record lectures.



Academic Integrity Checklist

Honesty and integrity are expected of every student at the University of Saskatchewan. There are many forms of academic misconduct; perhaps the most common is plagiarism. According to the University of Saskatchewan Guidelines for Academic Conduct:

“Plagiarism is the theft of the intellectual creation of another person without proper attribution. It is the use of someone else's words or ideas or data without proper documentation or acknowledgment. Quotations must be clearly marked, and sources of information, ideas, or opinions of others must be clearly indicated in all written work. This applies to paraphrased ideas as well as to direct quotations. A student must acknowledge and fairly recognize any contributions made to their personal research and scholarly work by others, including other students.”

There are many resources on campus to assist you with proper citation and paraphrasing.

- For guidance on when and how to quote from other documents and how to properly paraphrase information in other documents, see <http://library.usask.ca/howto/honesty.php>.
- To learn about different styles of citation and how to properly cite a variety of different sources including statistics, archival materials, maps, legal documents and government reports, see <http://libguides.usask.ca/citation>.

When in doubt about a citation requirement or your approach to paraphrasing, ask your librarian or your course instructor or your academic supervisor for assistance.

Before you submit any written work, review it against the following checklist:¹

- I have acknowledged the use of all ideas with accurate citations.
- I have used the words of another author, instructor, information source, etc., and I have properly acknowledged this and used proper citation.
- In paraphrasing the work of others, I have put the idea into my own words and did not just change some words or rearrange the sentence structure.
- I have checked my work against my notes to be sure that I have correctly referenced all quotes or ideas.
- When using direct quotations I have used quotation marks (or other means to clearly identify the quoted text) and provided full citations.
- Apart from material that is a direct quotation, everything else in the work is presented in my own words.
- When paraphrasing the work of others I have acknowledged the source or the central idea.
- I have checked all citations for accuracy (e.g. page numbers, journal volume, dates, web page addresses).

¹ Compiled based on York University (http://www.yorku.ca/tutorial/academic_integrity/acadintecheklist.html), Curtin University (<http://academicintegrity.curtin.edu.au/global/checklist.cfm>, University of Toronto (<http://www.utoronto.ca/academicintegrity/resourcesforstudents.html>), and Skidmore College (<http://cms.skidmore.edu/advising/integrity/checklist.cfm>) checklists for academic integrity.

- I have used a recognized reference style (i.e. APA, MLA, Chicago etc.) consistently throughout my work.
- My list of references/ bibliography includes all of the sources used to complete the work.
- I have accurately and completely described any data or evidence I have collected or used.
- I fully understand all of the content (e.g., terms, concepts, theories, data, equations, ideas) of the work that I am submitting.
- The content of the work has not been shared with another student, unless permitted by the instructor.
- The content of the work reflects wholly my own intellectual contribution or analysis and not that of another student(s), unless the instructor approved the submission of group or collaborative work.
- If another person proofread my work it was for the sole purpose of indicating areas of concern, which I then corrected myself.
- This work has not been submitted, whole or in part, for credit in another course or at another institution, without the permission of the current course instructor(s).
- I understand the University of Saskatchewan's policy and expectations concerning academic honesty and the consequences of plagiarism or other forms of academic misconduct.

DRAFT