Kilachand Honors Course Description
Course #: KHC ES/BI 101
Title: Bigfoot: Nitrogen, the Ocean, and You
Instructor: Robinson W. Fulweiler
www.fulweilerlab.com

Description:
Without nitrogen there would be no life - no me, no you, no blue whale, no Atlantic cod, no Antarctic krill. But like anything - too much nitrogen leads to a series of negative consequences. Since the beginning of the 20th century, human activities have doubled the amount of nitrogen cycling through the biosphere and in doing so we have introduced large amounts of nitrogen into coastal waters. This excess nitrogen has led to eutrophication, loss of submerged aquatic vegetation, harmful algal blooms, increased low oxygen conditions and dead zones, fish kills, and loss of biodiversity. But this nitrogen has also allowed human population to rise to 7 billion – in fact, about 50% of us are alive because of human fixed nitrogen through the production of fertilizer. We are currently faced with a grand challenge: how do we feed an increasing population while protecting and even restoring our environment? The goal of this course is to take on this grand challenge. We will explore the history of the nitrogen cycle and the role of social contracts, religion, and politics in shaping its current status. We will examine where our nitrogen comes from, where it goes, and what happens when it gets there. We will discuss the ethics of what we eat and how we live. Ultimately we will design a campaign that communicates to a wider audience what our nitrogen footprint (or our Bigfoot) is and how it shapes the world around us.

Responsibilities:
It is your job to participate and communicate. I encourage you to ask questions during class – there are NO dumb questions. Do not wait for the end of the semester to express your feelings about any aspect of the course – I will enthusiastically listen to constructive comments and suggestions, and will respond where possible. Of course, I can only do this if I am aware of your comments, concerns, suggestions, etc. So please feel free to contact me outside of class. This does not just apply to course material – if you are interested in a particular subject and would like more information on current topics, something you saw on the news, read in the paper; if you are interested in careers in science or becoming a science major or minor – I am happy to help and point you in the right direction.

For everyone, I stress the importance of your familiarity with, and adherence to, Boston University's College of Arts and Sciences Academic Conduct Code, in particular those portions dealing with cheating and plagiarism (http://www.bu.edu/cas/academics/programs/conductcode.html). Cases of academic misconduct will be promptly referred to the Dean’s Office.

Course Grading:
Your grade will be based on participation, weekly assignments, and a final project. Class participation is VITAL! And attendance is mandatory if you have more than one unexcused absence your grade will be lowered (e.g., if you have an A but miss >1 class you will earn an A-). I like and will encourage an interactive, dynamic class. So please - don’t be afraid to ask questions and speak up when you don’t understand something.

Weekly Assignments: 40%  Twitter journaling: 10%
Final Project: 50% (This will be broken down into manageable parts along the way. (e.g., initial outline: 5%, refined outline: 5%, final presentation: 15%, etc.).
Reading List (Preliminary List)

Books
1. Enriching the Earth: Fritz Haber, Carl Bosch, and the Transformation of World Food Production. Author: Vaclav Smil
2. The Alchemy of Air: A Jewish Genius, a Doomed Tycoon, and the Scientific Discovery That Fed the World but Fueled the Rise of Hitler Author: Thomas Hager
3. The Omnivore's Dilemma: A Natural History of Four Meals Author: Michael Pollan

Selected Primary Literature and Websites:

Nitrogen Cycle:

Social Contracts/Policy:

Waste Treatment:
How does MWRA work: http://www.mwra.com/03sewer/html/sewhow.htm
How sewer and septic systems work: http://home.howstuffworks.com/home-improvement/plumbing/sewer3.htm

Aquatic Environmental Consequences of too much nitrogen:


**Possible Solutions:**


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<th>Date</th>
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<td>Jan. 20</td>
<td>Introductions, Class Overview, Goals</td>
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<td>22</td>
<td>What is N and why does it Matter?</td>
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<td>The Nitrogen Cycle - Terrestrial Overview</td>
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<td>The Nitrogen Cycle - Marine Overview</td>
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<td>Feb. 3</td>
<td>Earth’s Ecological Carrying Capacity - and You</td>
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<td>The History of Nitrogen - Part I</td>
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<td>Fritz Haber: The Good, The Bad, The Ugly</td>
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<td>Too much of a good thing - Impacts to the Land Part I</td>
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<td>Sewage and You</td>
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<td>What’s your N footprint?</td>
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<td>How do we fix our Nitrogen Problem?</td>
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<td>Fertilizer - Organic vs. Inorganic</td>
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<td>Feeding the World - Tomorrow</td>
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<td>Politics, Politicians, and Nitrogen?</td>
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<td>Nitrogen and Transportation</td>
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<td>A Call to Action</td>
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<td>Solving the Problem - Innovative Solutions I</td>
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<td>Solving the Problem - Innovative Solutions II</td>
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<td>101 ways to decrease our N footprint</td>
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<td>Final Presentations</td>
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