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Course Description & Objectives:
The objective of this 500-level course is to provide students with introductory knowledge of the broad and relatively young field of Oceans and Human Health. The focus is the present, future, and potential effects of oceanic processes and marine organisms on human health and wellbeing. These diverse factors reflect the physical, chemical, biotic and social processes which require an integration of information and knowledge from the medical, marine, and social sciences. Of growing concern in this rapidly-developing area of study is the human health effects from exposure to substances that occur widely in marine ecosystems including synthetic organic chemicals, polycyclic aromatic hydrocarbons (PAHs), metals (both introduced and anthropogenic), marine toxins, and pathogens. In addition, increasing consensus exists concerning the human health impacts of global warming and extreme events, such as natural disasters, associated with the changing coasts and oceans. Conversely, marine organisms, especially marine microbes, are a largely unexplored source of pharmaceuticals and products for the treatment of human diseases and dietary deficiencies. It is also becoming increasingly recognized that fish and shellfish are important sources of high quality protein and omega-3 polyunsaturated fatty acids in the human diet.

The introduction to the field is through a series of coordinated lectures for each topic that provide background information on human health, the physical environment, and oceanographic processes and case studies. This is followed by student presentations that will focus on potential term projects. The course covers harmful algal blooms, other marine microbes, and the impact of global climate change. An overview of coastal impacts and remedies (drugs from the sea and use of marine models in assessing health impacts) rounds out the introduction. The last two weeks are devoted to student presentation of term projects. A Review session will be held before the final exam.

Course Requirements & Evaluation:
This is a 3 credit course with entrance based on permission of instructors. Of note, it is a 500 graduate level course, but will be open to high level undergraduates on an individual case-by-case basis.

Course evaluation will be made by a letter grade. It will be determined using the summation of 4 different grades in the following manner:
1. Panel Discussion (15%)
2. Comprehensive Mid Term Examination (20%)
3. Final Presentation (20%)
4. Final Written Report (10 pages) (20%)
5. Written Final Examination (20%)
6. Class participation, including reading other students’ reports and bringing oceans and human health issues to class for discussion (5%)

Classes may only be missed with prior permission of instructor.

Requirements:
1. Panel Discussion with presentation; subjects (enclosed), position and group assignments will be
made on 1/20/09. and the Panel Presentations will be given on 3/3/09 and 3/10/09. Students will work in small groups (2-3 persons) to research and then present on an assigned Environmental subject with an assigned political agenda to the Course Instructors, their colleagues representing opposing view points and to their colleagues in general. Each small group (2-3 people) will be responsible for a position statement which should briefly outline the problem and their position; each member of the small group must present during this time (5 minutes/person). Each small group will present a 5 minute Rebuttal by one member of the small group. Then, the members of the small group will be responsible for answering questions from the Course instructors and their colleagues (including those representing opposing view points). Brief handouts of summarized information as "Press Releases" must be provided and use of visual materials by each small group is highly encouraged. Class participation in the discussions by non-presenters will be expected. A coin toss will decide which Agenda group presents first for each subject.

2. Final Written Report (10 pages) and Presentation, the title will be selected by the student on the first day of class. The Final Report is due on 11/24/08 with oral presentations on 11/24/08 and 11/26/08. Each student will be responsible for the preparation and submission of one investigative report directed specifically at an environmental health problem. The topics will be selected from a List of Topics included in this packet; these topics were chosen to supplement the broad topics discussed during the class period. Where relevant to the selected Topic, the report should consist of a concise discussion of the problem, relevant historical background, and some sort of recommended, practical plan for prevention and remediation, including education. It should be 10 pages, typed and double-spaced with at least 1 separate page of relevant references. It is recommended that each paper should be proof-read by at least one other colleague prior to submission, since accuracy of both spelling and grammar will be taken into account in the grading. All reports will be distributed via email and read by all of the students. Finally, a 10 minute oral presentation of each investigative report is expected; use of visual aids during these presentations is highly encouraged.

3. Written Mid Term Examination, will be a 1 hour In Class Open Book Mid Term Examination on 10/22/08 consisting of a mixture of short answer and essay questions reviewing the entire course (lectures and readings).

4. Written Final Examination, will be a 1 hour In Class Open Book Final Examination on 12/3/08 consisting of a mixture of short answer and essay questions reviewing the entire course (lectures, readings, and student presentations).

5. Class Participation, including reading other students' reports, will be important in terms of involvement in class discussions and interest shown. In addition, students are encouraged to bring in newspaper articles and other sources of information on current oceans and human health problems.

**Required Reading:**


There will be individual lecture readings provided by each lecturer and recommended bibliography at his/her discretion. In addition, students are encouraged to investigate journals and other sources of information.
Course Schedule & Readings

**Week August 27, 2008**
- Introduction to the course (All)
  Readings: Preface (Walsh); Commentary & Intro (Oceanography pg 14-23)

**Week September 3**
- Oceans & Human health and Policy (SS) (????)
  Readings: Chapter 5 (Walsh); Coastal (Oceanography pg 62-71); Oristano Declaration (Bowen)

**Week September 8**
- Case study on human health – Cholera (LEF/SS)
  Readings: Chapter 11 (Walsh); Laws Case Study (Oceanography pg 81-83)

  **September 10**
  - The Physical Basis of Oceans and Human Health (GH)
  Readings: Chapter 1 (Walsh);

**Week September 15**
- Oceans and Human Health: Atmosphere-Ocean-Climate (GH)
  Readings: Chapter 2 (Walsh)

  **September 17**
  - Oceans and Human Health: Vulnerabilities and Hazards (SS)
  Readings: Chapter 3 (Walsh)

**Week September 22**
- Epidemiology Case Study (LEF)
  Readings: Chapter 11 (Walsh)

  **September 24**
  - Case study: The limits to the Earth’s nutritional capacity (GH)
  Readings: Chapter 1-3 (Walsh)

**Week September 29**
- Student Environmental Panel (All)

  **October 1**
  - Student Environmental Panel (All)

**Week October 6**
- Marine microbes: Harmful Algal Blooms (HABs) (GH)
  Readings: Chapters 11-16 (Walsh); HAB (Oceanography pg 94-109); HABs (NRC pg 59-70)

  **October 8**
  - Marine microbes: HABs – Florida red tide (Brand)
  Readings: Chapters 11-16 (Walsh)

**Week October 13**
- Marine microbes: HAB and Florida Red Tide Research & Epidemiology (LEF)
  Readings: Chapters 11-16 (Walsh)

  **October 15**
  - Marine microbes: Pathogens and other microbes (LEF) (Solo Gabriele)

  **Lora Fleming 12/19/09 10:28 PM**
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Week October 20
- Marine microbes: Florida Healthy Beaches Program and Human Shedding (LEF) (Samir/Plano)
  Readings: Chapters 17-20 (Walsh)

October 22
- Marine microbes: Recreational Microbes (LEF)
  Readings: Chapters 17-20 (Walsh)

Week October 27
- Mid Term Examination (All)

October 29
- Climate, Weather and the Challenge of Risk Communication (Broad)
  Readings: Chapter 1, 2 (Walsh)

Week November 3
- Climate, Weather and the Challenge of Risk Communication (Broad)
  Readings: Chapter 1, 2 (Walsh)

November 5
- Coastal Impacts- Ocean Effects of Rising Sea Level on Coastal Environments (DM) (Wanless)
  Readings: Chapter 4 (Walsh); Hurricanes, Cyclones, Tsunamis (Oceanography pg 24-51)

Week November 10
- Coastal impacts- Pollution and Health aspects of fisheries and food supply (DM)
  Readings: Chapters 6-10 (Walsh); Coastal, Food (Oceanography pg 62-71; pg 84-93);

November 12
- Coastal impacts- Marine Mammals: Indicators of Bioavailable Contaminants and other OHH research (DM) (Litz)
  Readings: Chapters 6-10 (Walsh); Case Study (Oceanography pg 134-137)

Week November 17
- Remedies- Marine Natural Products Drug Discovery (DM)
  Readings: Chapters 21-26 (Walsh); Marine Pharmaceuticals (Oceanography 110-125); Marine Pharmaceuticals (NRC pg 73-82)

November 19
- Remedies- Marine Animal Models of Human Health (DM) (Berry)
  Readings: Chapters 27-33 (Walsh); Sentinel Species (Oceanography pg 126-137); Marine Models (NRC pg 83-96)

Week November 24
- Student presentation: class projects (All) – Final Written Report Due!

November 26
- Student presentation: class projects (All)

Week December 1
- Student presentation: class projects (All)
December 3
- Final Exam (All)
List of Oceans & Human Health Report | Topics

1. How does the coupling between the global ocean and atmosphere potentially affect human health?
2. How do oceanic currents influence the distribution of organisms that adversely affect human health?
3. How do the life cycles of harmful algae regulate their occurrence in coastal waters?
4. How have historians shed insight into the linkage between oceanic processes and the fall of civilizations?
5. How could a weakening, or cessation of flow, of the Gulf Stream alter the climate in Europe?
6. Locate the original literature on *Vibrio cholerae* and describe what human health interventions you would implement to control spread of this disease via the ocean.
7. Locate data on the toxin-producing organisms in the ocean waters of South Florida. What toxins do they produce? What dangers do they pose to humans living near the coastal ocean?
8. Locate data on freshwater organisms that produce toxins in Southern Florida. What toxins do they produce? What dangers do they pose to humans living near the body of freshwater?
9. There is a sewage treatment plant on Virginia Key where the Rosenstiel School of Marine and Atmospheric Sciences is located. Locate data about the operation of this plant and describe the diseases that would most likely arise from a spill from this plant into the ocean. What parts of Miami-Dade County would be impacted? How would a spill be mitigated?
10. The Black Point area has “Mt. Trashmore” located on the edge of Biscayne Bay. Locate data about Biscayne Bay's biological communities and its circulation. Describe the likely effects Mt. Trashmore is having on Biscayne Bay and on humans living nearby. Are coastal landfills a good way to deal with trash? What do other coastal states do? What dangers might arise from this practice?
11. What are the known economic impacts of microbial pollution of marine waters and possible future directions to estimate this burden?
12. What are the known economic impacts of harmful algal blooms on human health and the environment, and possible future directions to estimate this burden?
13. Describe the known human health effects from microbial pollution?
14. What are the known economic impacts of harmful algal blooms on human health and the environment, and possible future directions to estimate this burden?
15. How do marine mammals serve as sentinel species for oceans and human health? Describe at least one specific case scenario.
16. How do contaminants move up the food chain? Why do some organisms accumulate certain contaminants while others do not?
17. Of the many existing pharmaceuticals and personal care products, discuss which you predict may have the most detrimental effect on the future health humans and our environment.
18. How would demographics assist in predicting the potential areas of influence for different contaminants in the environment? In what regions of the United States might certain types of compounds be more prevalent? Less prevalent? Expand the discussion to different regions of the world.
19. Discuss the traits of aquatic organisms that make them inherently good models for biomedical research.
20. Go to the Nobel Prize website (http://nobelprize.org/nobel_prizes/medicine) and obtain information on at least five aquatic animal models that have been useful for biomedical research.
21. Read one of the following books (or find your own book with approval of Instructor) and after a brief synopsis of its content, discuss the importance of this book for the present and/or future of Oceans & Human Health and why:
   - *Collapse: How Societies Chose to Fail or Succeed* by Jared Diamond (2005)
12/19/09

- *Silent Spring* by Rachel Carson (1964)
- *Field Notes from a Catastrophe: man, nature and climate change* by Elizabeth Kolbert (2006)
Environmental Panel Presentation

Panel Discussion with presentation: subject, position and group assignments will be made on 1/20/09, and the Panel Presentations will be given on 3/3/09 and 3/10/09. Students will work in small groups to research and then present on an assigned Environmental subject with an assigned political agenda to the Course Instructor, their colleagues representing opposing view points, and to their colleagues in general. Each small group (2-3 people) will be responsible for a position statement which should briefly outline the problem and their position; each member of the small group must present during this time (5 minutes/person). Each small group will present a 5 minute Rebuttal by one member of the small group. Then, the members of the small group will be responsible for answering questions from the Course instructors and their colleagues (including those representing opposing view points). Then, the members of the small group will be responsible for answering questions from the Course instructors and their colleagues (including those representing opposing view points). Brief handouts of summarized information as "Press Releases" must be provided and use of visual materials by each small group are highly encouraged. Class participation in the discussions by non-presenters will be expected. A coin toss will decide which Agenda group presents first for each subject.

1) Increasingly the world’s seafood supply for human consumption is derived from Aquaculture both within and outside the US. Should aquaculture be allowed to increase in the US?

Political Agendas: 1) Aquaculturalists, 2) Environmentalists

Moderators Position: The Course Instructors and Colleagues will represent the United States, both Legislature and Citizens

2) As a small island developing nation, you realize global warming and sea level rise may already or will soon be impacting your traditional way of life. What can you do about this and what is the responsibility of the rest of the world for this situation?

Political Agendas: 1) island nationals, 2) International Environmental Experts

Moderators Position: The Course Instructors and Colleagues will represent the Citizens of the world

3) As the need for oil increases, increasingly we are turning towards the oceans as a source of oil exploration. Does society’s moral imperative lie in developing these oil reserves or preserving the marine environment for future generations?

Political Agenda: 1) Oil Companies, 2) Environmentalists

Moderators Position: The Course Instructors and Colleagues will represent the Citizens of the World.

4) As human populations continue to grow, the efforts to feed and provide for these people will accelerate pollution and exhaust environmental resources. Does society's moral imperative lie in feeding the increasing population or preserving the environment for future generations?

Political Agenda: 1)"Developed" Nations, 2)"Developing" Nations

Moderators Position: The Course Instructors and Colleagues will represent the Citizens of the World.