**Oceanography 320: Aquatic Pollution**  
**Fall 2015**  
Tu-Th 09:00-10:15  
MSB 315

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<tr>
<th>Course Instructor:</th>
<th>Dr. Eric Heinen De Carlo</th>
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<tr>
<td>Office:</td>
<td>MSB 523</td>
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<th>Teaching Assistant:</th>
<th>Ms. Danielle Hull</th>
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<th>Date</th>
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<td>Aug 25</td>
<td>Introduction, Course objectives</td>
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<td><strong>First in class writing assignment</strong></td>
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<td>27</td>
<td>Food chain theory</td>
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<td>Sep 1</td>
<td>Primary production</td>
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<td>Sep 8</td>
<td>Physical factors affecting production</td>
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<td>10</td>
<td>Cultural eutrophication</td>
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<td><strong>Outline of 1st term paper due</strong></td>
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<td>17</td>
<td>Cultural eutrophication and Recent research in Kaneohe Bay</td>
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<td>Sep 22</td>
<td>Sewage treatment – primary, secondary</td>
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<td>24</td>
<td>Sewage treatment – tertiary and alternatives</td>
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<td>Sep 29</td>
<td>Video: Waters of Ayole</td>
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<td>Oct 1</td>
<td>Pathogens</td>
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<td>Oct 6</td>
<td>Class Discussion: Water and health</td>
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<td>Pathogens in water supplies</td>
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<td>Non-Point source pollution,(NPS), urban runoff</td>
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<td>Oct 13</td>
<td>NPS-Urban runoff</td>
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<td>Dec 17</td>
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TEXT BOOK

Library card catalog number: TD420.L38 2000

GENERAL COURSE COMMENTS

This course is not particularly difficult if you have some basic background in chemistry and biology (i.e., introductory courses) as well as the formal course prerequisite (OCN 201). Students with no chemistry or biology background will be at a potential disadvantage, because class presentations and discussions will often invoke basic concepts from these subjects. If you have no background in chemistry or biology, you will likely need to spend additional time outside of class on your own to obtain a basic understanding of some fundamental principles. You are welcome to seek assistance from the course instructor and TA, as needed, but not much time will be spent covering basic biology or chemistry in class so as not to slow down the pace of the class or inconvenience the students who already have this background.

Students are responsible for knowing and adhering to due dates for textbook readings and writing assignments unless notified otherwise by the course instructor. The schedule of lecture topics is tentative and current events and/or a keen interest by the class in material related to a given class topic may lead to changes in the lecture schedule. Significant schedule changes will be announced during class time and, once announced, become the responsibility of the students. Extreme deviations from the lecture schedule will be provided in the form of an updated syllabus on the web site or handed out in class, or by email to the students.

Limited information about this course, including some old exams from the professor who wrote our textbook, is available on the OCN 320 website: http://www.soest.hawaii.edu/oceanography/courses.html

Important class postings including any course changes, new reading assignments, selected (but not all) lecture notes, etc. will be available on the Laulima site for this class.

GRADING

Your grade in this course will be based on the total points you achieved in the course, curved relative to the rest of the class. The commonly used scheme of most US secondary schools and colleges of 90-100 = A, 80-89 = B, 70-79 = C, etc., will not be particularly useful as a guideline in this course. I design the tasks (quizzes, exams, papers, etc.) in this course so that the numerical scores re more broadly distributed, thereby facilitating the ranges of final numerical scores into letter grade groups. You are encouraged to check how you are doing in the course throughout the semester by asking the course instructor to giv
you an estimate of a letter grade based on points earned up to the time of your request. Please do keep in mind that “estimated” letter grades on individual components are not averaged to yield a final letter grade. So just to summarize again:

**Final letter grades will be based on numerical scores and the class curve.**

The fraction of total points achievable in the various course categories is shown below:

- a) Periodic quizzes (15%)
- b) Midterm exam (20%)
- c) Final exam (20%)
- d) Short essays/writing assignments worth 10% total and two term papers worth 10% each, for a total possible score for all writing assignments of 30%
- e) One classroom presentation (10%)
- f) Classroom participation (5%)

Quizzes will be unannounced and based partly on material previously covered in classroom lectures and partly on the assigned readings (i.e., the material that has not yet been covered in class). There will be NO MAKEUP of any missed quizzes. Excused absences, however, will be factored into the total quiz score.

Exams will test student knowledge of the material covered in classroom lectures and the assigned textbook readings (note that not all textbook materials and other assigned readings can be discussed comprehensively in class but said material does remain the responsibility of the student).

The first exam will include material covered from the beginning of the course to immediately prior to the first exam. The second (final) exam will principally cover material presented after the first exam. Although exams are not specifically designed to be cumulative, knowledge is cumulative, and comprehension of concepts learned in the first half of the semester will be important in mastering the subject matter presented in the latter part of the course.

Exams will include a combination of multiple-choice, true/false and fill in the blank questions, short (quantitative) problems and short essay questions. Exams will be sufficiently challenging that only the well-prepared student will be able to complete the entire exam.

**WRITING ASSIGNMENTS:**

The University of Hawaii “writing intensive” designation for a course is defined as a minimum of 16 pages of original writing during the semester. In this class the writing intensive requirement is met through several short in-class and outside of class essays of and two research/term papers. The page total is for writing only (double spaced 12pt Times new Roman font with one inch margins) and excludes any figures, tables, and reference lists in the term papers.
The student group classroom presentations will be on the topic of specific interest to your group (the group membership will be assigned a few weeks before the presentations). More details on the format of the presentations are provided below.

Information presented in your research papers and the classroom presentation must be based on material derived from a minimum of three peer-reviewed publications from the scientific literature; other material you wish to use can be included as long as you have met the three peer-reviewed paper criterion. The course textbook, web sites, magazines, newspapers, etc. are meant to supplement the minimum required peer reviewed articles. When using non-peer reviewed resources, it will also be necessary for you to clearly delineate how objective, credible, or biased the opinions presented in the particular resources may be. A portion of your grade on the papers will depend on the appropriate use and citations of references.

Students must turn in complete extended outlines of the papers by dates specified in the syllabus for preliminary review by the course TA and to ensure the paper will be of sufficient scope to meet the class requirements. If you do not provide the first draft for review, you will be missing an important opportunity to obtain assistance that will ultimately lead to a better grade on the assignment. All drafts and final papers turned in late will be penalized 5% points per day late. There will be NO EXCEPTIONS to this policy.

The term paper extended outline/rough draft will be handed in and reviewed by the course TA, who will provide an assessment of the writing plan and make recommendations for improvement. After review by the TA and return of the outline, students will prepare and turn in their papers to the course instructor. The course TA and instructor will then provide further comments on style, grammar and scientific content as necessary and the grading will reflect the level of adherence to pre-set norms for these elements. Students are expected to pay careful attention to the nature and type of editorial comments (from the TA and instructor suggestions) so that they can improve their writing skills. Remember the papers will be evaluated in terms of their adherence to common norms of scientific (objective, expository) writing, rather than lay prose or journalistic style reporting.

The structure of your term papers should include the following:

1) The title of your paper and your name (on the top of the first page)
2) An introduction. This should be one to two well written paragraphs, depending on the overall length of the paper. Its purpose is to introduce the topic of the essay. This/these paragraph(s) should inform the reader about what you will be writing and provide the rationale for the paper as well as a brief layout of the rest of the paper. It is in your introduction that you must explain why the subject matter is important and worth the time that one would spend reading it.
3) The body of your paper. In the body of your paper you will develop several individual paragraphs that flow logically; i.e., the material in each paragraph follows from the previous paragraph and carries the reader from start to finish. Please be concise and avoid repetition. Each paragraph must stand alone and cover a topic that is specifically called out and described in the introductory sentence of
said paragraph. The final sentence in a paragraph leads into the topic of the subsequent paragraph.

4) **The final summary paragraph.** This paragraph provides the reader with a brief summary of the most important conclusions of your paper. It should also point out what information might be missing and what additional work should/needs to be done on this topic. This is also where you may express your own opinions as to whether bias and/or lack of information may have led to the topic not being treated completely or accurately picture.

5) **The reference list.** All sources of materials used in your paper, including peer reviewed journal articles, books, newspaper articles, magazine articles and web-sources, must be cited. The reference list must follow the format used for scientific literature, rather than that used in social sciences or non-science majors.

Some Hints to Help you Write

An old saying about oral presentation and papers goes as follows: 1) you tell them what you are going to tell them, 2) you then tell them what you are telling them, and 3) you finish by telling them what you just told them… This seems pretty simple, but you will be surprised how many presentations and papers fail to adhere to this simple format. Its value comes from reinforcing ideas in the mind of the reader by reminding the reader what the subject is. Avoiding frequent use of this, these, those, etc. but rather stating exactly to what “this, these or those” refers to helps imprint on the reader’s mind what the topic is.

The writing assignments in this course have two primary objectives. The first is to help reinforce some concepts that are introduced during the lectures as well as to allow you to acquire a more in-depth understanding of the material than is possible from simply listening to the instructor in lecture and/or reading the textbook. The second objective is to help you improve your critical thinking and writing skills. It is well-known that one of the better ways to learn material is to write about it. Good communication skills are also very important in most professional occupations. I cannot overemphasize how many times I have been asked by prospective employers, who were recruiting to fill job openings, how well an applicant wrote because they needed a person with “good communications skills”.

Unfortunately, as is the case with many things, the only way to get better at writing is to do it frequently… Practice makes perfect, as the old adage goes… The more you write, the better your writing will become and the easier it will become for you to write. Many of us may not initially like to write, but developing effective writing skills is a very important part of your professional training.

*How to construct your papers:*

Try to make the content of your papers follow a logical sequence. First introduce a problem and describe why it is of interest. Then present some known fact(s) (and/or data). Subsequently, present (one or more) hypotheses that have been advanced by those who have worked on the subject matter and try to present and evaluate, as much as possible, alternative hypotheses or arguments. In all cases, ensure that material in the early sentences and paragraphs leads into the subsequent discussion. Conversely ensure that material fits in and follows from what was previously stated/written (i.e., the paragraphs should not be a
“brain dump” of random thoughts). Verify that the material in each paragraph relates to the introductory sentence of that paragraph. Also material in the next paragraph should follow logically from the last (transitory) sentence in the previous paragraph. Make sure that you let the reader know when you transition from one point to another or when you are explaining an opposing hypothesis/argument. Words such as “however”, “in contrast”, and “nonetheless” help the reader realize that you are changing topics or presenting a differing opinion.

The development of extended outlines, while seemingly simple yet unexciting, will prove to be very helpful to organize your thoughts. This is why I am requiring you to prepare and turn in detailed outlines for evaluation before you turn in your written assignments. Detailed outlines are like lists of brief synopses of the multiple lines of evidence you will use to support the main point of the paper. As you begin to fill in an outline with increasingly more detail, you will find that its utility increases and that it can serve as a roadmap to the structure of your paper. If you take it to the extreme, the outline can become your first draft.

Your writing assignments should be concise and articulate. This is easier said than done and, to achieve this goal, you will likely have to edit your paper carefully and repeatedly! The writing assignments of this course, however, should not represent an onerous time commitment on your part. Try to begin your writing assignments early (i.e., do not procrastinate) and do not worry too much about how well you write your first draft. Your first draft can be as simple as what I refer to as an “idea train”, where you just put down the ideas as they develop in your head and then build upon them. Once you have looked over your reference materials and jotted down relevant information, you begin to write thoughts that come to your head about the topic, without paying great attention to grammar, structure or whether the ideas follow logically or not. Use word processor software to develop both your outlines and the subsequent paper. This will make it easier for you to edit and fill in material later, as well as re-arrange things that are not in a logical order.

The first draft you write will likely not be much fun or interesting for anyone else to read, but that is fine, at least at this stage of writing. Put the first draft away for at least one day, then come back and re-read it and evaluate what is missing as well as what material is there that does not relate to the subject at hand. An important part of your editing of the first draft will be to eliminate material that “hangs there” and/or is inconsistent with what you are trying to express. Unsupported thoughts and arguments should also be eliminated at this stage.

Once you have a second draft, have someone else read it and provide you with feedback. Room-mates, friends, significant others, instructors from other courses, etc. can help you significantly improve your writing because they are looking at your paper with fresh (and unbiased) eyes.

Use of references in your writing assignments:

Your writing assignments must be supported by a list of bibliographic references that describe the sources of material that you consulted. The use of relevant published references gives proper credit to the original authors whom you quote, and provides a
historical timeline for the reader to examine at greater length if he or she desires. Keep in mind that peer-reviewed literature articles are much better references than popular literature or the internet/web because **they have already been vetted as relevant and sound by other experts in the field**. These references are less likely to be subjective and/or biased or contain unsupported opinions than what you may find in newspaper or magazine articles and web materials such as blogs, etc.

A good example of what **not to use** is an article that says: “Plaxo has been proven to be 60% more efficient in enhancing digestive function”… I ask: 60% more efficient than what? Who determined this and how? What is the source of this information and how do I know that it is reliable? **Remember, you must document any argument you make.**

**Citations in your text and reference lists must follow the style used in scientific publications**, not liberal arts, history, English, etc. Each citation in the text should state the name of the author (or authors) followed by the year of publication. For example a text citation should read as follows: A study of school children showed that using Plaxo as a food additive helped digestion (Smith and Tanaka, 2007). Alternatively you could say: A study conducted by Smith and Tanaka (2007) demonstrated that using Plaxo as a food additive helped digestion. If there are more than two authors the citation should be: Smith et al. (2007) or (Smith et al., 2007).

The references should be listed in alphabetical order with multiple entries by a given author listed in chronological order. Again, please use the scientific literature style. Here are some examples:


In the case of two papers by the same author(s) in a given year, please cite them in the text as, for example, Kawahara (1998a) and Kawahara (1998b) so as to differentiate them.

For non-peer reviewed citations, please select a format and then use it consistently. You should, however, still cite by last name first, followed by first initial(s), YEAR, and then the rest of the info such as title, followed by the source of the info.

The following are the topics of your writing assignment:

Each of your two term papers should be between 5 and 6 pages long, double spaced, excluding references, graphs and tables. Please use Times Roman 12 pt font with your margins set at no more than 1 inch from each side as well as the top and bottom of the page. All papers must be paginated. All papers must be turned in both electronically (MS Word) and in hard copy. If you do not adhere to the above criteria you will lose points.

1) Eutrophication of coastal waters: Hypoxic and anoxic zones

The focus of this paper is to be on cause and effect relationships between land-derived (natural or anthropogenic) inputs of freshwater, suspended sediment and their associated nutrient loads on the coastal waters and, ultimately, how the ensuing primary productivity leads to (over) consumption of oxygen. It is strongly suggested that you use quantitative data to substantiate any arguments presented in your paper.

Some starting points/reference papers are given below.


Hoover, D.J. and Mackenzie, F.T. 2009. Fluvial fluxes of water, suspended particulate matter and nutrients and potential impacts on tropical coastal water


2) For the second paper, you have three choices. They are:

a) Water Quality in Urban Environments

b) Water quality issues following natural disasters (e.g., Hurricane Katrina in New Orleans, Horizon deep water well disaster in the Gulf of Mexico), the 2011 Tohoku earthquake and tsunami, water issues in conflict/war zones or in under-developed nations.

c) Water rights and conflicts, from local to global (e.g., Waiahole ditch-tunnel controversy, Western US water use rights, international water conflicts)

Keep in mind that there is a large body of peer-reviewed literature available for the first topic and most aspects of the second topic.

It may be more difficult to write a term paper on the third topic, because there is likely less peer-reviewed literature available. Because the third topic has both political and
scientific interest, you may make more extensive use of newspaper, magazine and web resources. You must, however, still utilize at least two peer reviewed reference papers.


Fiedler, J., McManus, M., Tomlinson, M.S., De Carlo, E.H., and 7 others. Real-time Observations of the February 2010 Chile and March 2011 Japan Tsunamis in Honolulu, Hawai‘i, as recorded by the Pacific Islands Ocean Observing System Oceanography. 27(2)  http://dx.doi.org/10.5670/oceanog.2014.34


GROUP CLASSROOM PRESENTATION

This assignment is designed to provide students with the opportunity to develop their organizational, collaborative, and (oral) communications skills. As part of this assignment students will team up in small groups to develop a 10-12 minute power-point presentation on a topic of relevance to the class. All students in each group are expected to participate in all aspects of the assignment. Students will prepare a handout of the power-point slides as well as an extended text outline (lesson plan) that includes more in-depth or supplementary information not will not be covered during the classroom presentation. The extended text outline should be 2-3 pages in length and include a (peer-reviewed) reference list for supplemental reading. The final exam will include questions from all student classroom presentations.

Because of its “W” designation students must complete all writing assignments to pass this course, i.e., a letter grade of F for the ENTIRE COURSE will automatically be given to anyone who does not meet the writing and classroom presentation requirements, regardless of the number of points achieved on quizzes and exams.

STUDENT EXPECTATIONS

YOU (THE STUDENT) ARE RESPONSIBLE FOR YOUR GRADE

Because the syllabus is effectively the “contract” for this course, the successful student will read this document carefully and use it as a reference throughout the semester.

If you are like most of us who cannot remember everything we hear throughout our busy lives, it is important to write down information in a notebook dedicated to this class. This includes specific directions from the course instructor regarding assignments as well as the taking of notes during class. There is a positive correlation between note-taking in class and grades achieved in many courses, and it has long been demonstrated that note-taking is a valuable memory and learning aid.

In order to facilitate note taking in class a summary printout of the class powerpoint presentation slides for each chapter/topic will be posted on Laulima. You should print it and bring it to class with you. NOT ALL MATERIAL PRESENTED IN CLASS WILL BE ON THE HANDOUTS. The powerpoint slides are NOT, by any means, all you need to know to obtain high scores on the quizzes and exams. Additional note-taking is critical.

To get the most benefit from your note-taking, you should review your notes relatively soon after class (i.e., that day) and expand or clarify them. This process will help you assimilate the subject material.
When you have questions in class, do not hesitate to ask and, as necessary, follow up after class! If you have questions outside of class, please do your own research on the topic first so as to be prepared to ask informed questions and have a fruitful discussion.

Please plan your time carefully and appropriately. We are all busy and most of you are taking multiple courses, each of which likely requires work outside of class. **For this course, each class lecture session should generate 3-4 hours of outside work, depending on your preparation for the course and writing skills, for a total of 9-12 hours of time outside of class per week.** It is imperative that you keep up in this class. If you cannot devote the time outside of class that is indicated above, maybe you reconsider your participation in the class. It is highly unlikely that you will be able to cram successfully and catch up one or two nights before an exam and do well!

Each of us has a slightly different learning style (hence a different ability to succeed following a particular approach). If you know what works for you, by all means follow it. If your current approach for learning does not work you should try a different approach.

*Do not hesitate to consult the course instructor and/or TA for help and advice, and remember that this course is for you.*

**STUDENT LEARNING OUTCOMES**

Upon completion of this course students will:

1) Be able to understand and explain to lay and technically skilled persons the underlying principles of primary productivity and eutrophication and how natural events and human induced changes impact these processes in fresh and coastal water bodies.

2) Be able to understand how different human activities affect the composition of natural waters (fresh and marine) and how to evaluate “cause and effect” relationships” between pollution and the welfare of the “biology”.

3) Be able to understand how to make informed decisions regarding stewardship of natural waters and how to minimize the adverse impacts of human activities on natural water bodies.

4) Through writing formal scientific papers and group oral presentations, students will have developed organizational, collaborative, and presentation skills that lead to improved oral and written communication skills.