

# Syllabus for ATOC 5051: Introduction to Physical Oceanography or, Notions for the Motions of the Oceans

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## 1 Contacts

The professor for this class is:

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## 2 Goals

In this class you will:

- Learn about many of the physical processes that occur in the ocean.
- Learn about how these physical processes are observed and quantified.
- Learn about where these processes occur in the ocean.
- Get practice writing and thinking scientifically by focused study on particular processes. You will have access to the most recent datasets and techniques available. You will also get a broader perspective and more practice by peer review of your colleagues' efforts.

## 3 CULearn and Websites

You should already have access (I hope!) through CUConnect to the CULearn webpages for the class. CULearn is where all of your assignments will be announced and uploaded, all of your grades will be available, and where you can post/read discussions and download resources (e.g., lecture notes, e-reserves, lecture slides, online textbooks) for the class.

## 4 Meetings and Places

We will meet Tuesdays and Thursdays from 11 to 12:15 in Duane E126. Office hours will be 1:30 to 4 Tuesdays and Thursdays at my office (Ekeley S250B). If you want to join me for lunch in between, that's good, too!

There is a computer room with all of the needed software already loaded in Ekeley W240. Handwritten on this syllabus should be a door access code to the South door of W240, as well as your username and password. This room is right around the corner from my office, so you can find me if there are problems.

All of the required readings will be posted on e-reserves and linked through CULearn. Textbooks are available in hard copy through the Math/Physics library in Duane near our classroom. There are a

number of other 'useful ocean books to know about' there, too. I recommend browsing a bit and seeing what there is.

## 5 Textbooks and Software

There is no official textbook for the class. There are a few online textbooks linked through CULearn, and there will be readings from a number of textbooks put on e-reserve so you can read them online. The hard copies of these books are also on reserve in the Math/Physics library. Gill's Ocean-Atmosphere book is available in the bookstore, and you might want it whatever else is going on.

The class will require use of Ocean Data View software and associated datasets. Both are available free for download online for PC, Mac, and Linux from <http://odv.awi.de>. Assignments are to be in pdf file format and created with American Geophysical Union templates. If you want to use LaTeX, the software is already loaded in the learning lab and I can help. If you want to use something else, you can download the AGU templates, but you're on your own if things go wrong!

We may be using matlab later in the course to do more detailed analysis of datasets or even simple modeling, but this will depend on your interests. There is a site license for matlab at CU, so you don't need to buy a copy, and I'll set up the computers in W240 to have matlab if needed.

## 6 Assignments and (lack of) Exams

There will be seven assignments for this class, and all of them will be in the form of short scientific reports. You will be working on two assignments at a time, reviewing the last one (a little work), and preparing the next one (more work). There will be no additional exams or midterms. The assignments will be equally weighted. The first assignment is a bit of a freebie, which just ensures that the system is up and running and everyone has access to all of the software, etc.

The scheduling of the assignments will be as follows.

- Paper assignment  $\#n$  will be due on a Friday at 5 PM. They will be submitted electronically through CULearn.
- On Monday, by noon, you will receive two of your colleagues'  $\#n$  papers to review through CULearn. Who is reviewing whom will be anonymous.
- On Tuesday, we will have class and office hours. You can discuss anything with me or the class about your paper or the papers you are reviewing ( $\#n$ ) or paper  $\#n + 1$  that you are thinking about. Be careful to preserve your reviewer anonymity!
- On Wednesday by noon, you should have your reviews of your colleagues' two papers ( $\#N$ ) done and submitted to me through CULearn.
- By Thursday at classtime, I will have your paper  $\#n$  back to you, with my reviews and your peer reviews. Discussion during class or office hours is encouraged of returned paper  $\#n$  or plans for paper  $\#n + 1$ .
- On Friday, I'd like a short summary of what you plan to do on paper  $\#n + 1$ .
- The following Friday, paper  $\#n + 1$  is due, and the process restarts.

All of this will be charted out on the calendar in CULearn.

Before you get worried about writing seven papers for one class, let me explain the goals of the paper writing. These are *not* supposed to be polished, ready to submit papers detailing years of research. Instead, they are supposed to be practice in writing drafts for your real research. The idea is to get used to pounding out a working draft in only a couple of hours, so that when the time comes for you to do it for real, that part will be easy.

Since you all have different preparation, you will all be able to take advantage of what you know. However, we are working to develop elements in all of the following:

- Quantitative Skills and Equations for the Ocean (Theory/Modeling Component)
- Descriptive Skills and Geography of Ocean Currents (Descriptive Oceanography)
- Understanding of Ocean Observations and Current Techniques (Observations/Engineering Component)

By the end of the semester, you should have addressed each element somewhat in some of your papers.

I hope you will get inspired along the way, and you can revise one of these little papers into a real paper or a comps project, but don't get upset because you have to hit the ground running. You'll have to do it sometime, and this will be in a friendly environment!

## 6.1 Why papers?

I think that this (admittedly experimental) approach will help to balance the class. Folks with a lot of quantitative experience will be able to use that to their advantage while folks with more substantial preparation in writing, argument, and logical structure will be able to use those abilities. We will be using the most up-to-date oceanographic datasets available, and so the work you are doing is potentially cutting edge research (but that's up to you!).

Also, in the future you will be expected to write much more complicated papers in a more tightly constrained time frame, you might as well get some practice now.

## 6.2 AGU formats and templates

We will be writing all of the papers according to the style, page length, and guidelines of the American Geophysical Union (AGU) journal: *Geophysical Research Letters* (GRL). GRL is geophysics' own version of *Nature* or *Science*, and it contains only very short focused articles (4 pages, usually 4 figures or fewer). I chose this journal because it has very clear guidelines for formatting and reviews, as well as an online article length checker that we can borrow! Regardless of your specialization, you will probably have an opportunity to write a GRL paper in the future, so this will be good practice.

## 6.3 Peer review

In addition to writing the papers, you will each be performing anonymous reviews of each others work. This will give you an opportunity to read closely about topics other than the one you chose, and hopefully you will be able to learn about science writing more quickly. Also, there are a lot of quandaries that arise in peer-reviewing (e.g., one reviewer loves it and one hates it, or a reviewer makes incorrect statements), so you'll get some experience with those issues in by practice in a friendly environment.

We will be using the AGU guidelines for review. Obviously, they will not apply directly to our papers, given that we will only have a couple of weeks per assignment. But, they are a useful guideline to go by, and when you do reviews of your fellow students, I'll expect to get a A1 or B2 or B1 score, etc. The instructions to reviewers are attached at the end.

## 6.4 What will we do with all these peer-reviewed papers?

As the semester continues, there will be some papers of yours that you like quite a bit, or that were very positively reviewed. Either you or me (with your permission, of course) can mark them as 'published' in CULearn, so that the whole class can see them. At the end of the semester, all of you will receive a bound copy of all of the published papers: 'Proceedings of ATOC 5051: Notions for the Motions of the Oceans, Fall 2007'. You can use this book for your future reference, and it will be available for future ATOC 5051 inductees.

At any time in the semester that you feel like it, you can do revisions of the papers that are already graded and reviewed. These revisions won't count much toward your grade, but they are nice to do for the papers you want published.

It is up to you which papers you want published (if any), and you will be listed as an associate editor of the volume whether or not you have a paper in it.

## 7 Policies

Because of the reviewing process, the scheduling of assignments is tight. Thus, I will have to insist that all papers be turned in on time. If they are late, they will drop a letter grade. If they are really late (so that they mess up the next step in the reviewing process) they will be counted as missed and can not be made up. If you foresee that there are big problems coming up (medical, family, etc.) let me know *before* an assignment is due and we can figure something out.

I encourage you to work together, and I do not mind at all if you have similar papers or share figures. However, in this case, I want you to list all of your study group as co-authors or put them in the acknowledgments section of your paper. You are all required to submit a version of each assignment as first author (that is, one that you wrote yourself). You need to be careful to cite your colleagues or the textbooks or papers you might be working from. You can use as much of these resources as is convenient in your version of the paper, but you need to properly cite the sources. We will discuss this topic more as the class (and the inevitable trouble) ensues. These issues of plagiarism and proper sourcing are a big part of what is to be learned in this method of assignments.

A few other items.

- Assignment deadlines are firm, so that reviewing can function properly.
- Attendance is expected. If you will miss a class, please let me know when and why so I can be sure you'll get any announcements, etc.
- Clothing and behavior (e.g., cell phone use) should be appropriate for a learning environment.
- Discrimination and harassment will not be tolerated.
- Please contact me if you have any disabilities that require accommodation.

## 8 AGU Peer Review Instructions

Editorial Instructions to Reviewers (A reminder of current GRL Policy)

Geophysical Research Letters aims to provide rapid publication of forefront research that has an immediate impact on the science community. The journal features articles from a broad range of geophysical disciplines. We ask your help as a reviewer in evaluating both scientific content (Categories 1-4) and presentation quality (A-C) to determine if a submitted manuscript meets GRL standards.

We welcome and will pass on to authors any specific suggestions which would materially improve the quality of a manuscript. Your comments will be conveyed anonymously unless you specifically note in your review that you wish your identity to be passed on to the authors.

**Scientific Quality:** Scientific quality of the manuscript is fundamental to publication, and the following Categories 1-4 are meant to aid the reviewer and Editor.

**Science Category 1:** The manuscript meets one or more of the following criteria:

- Important new science at the forefront of an AGU discipline
- Innovative research with interdisciplinary/broad geophysical application
- Instrument or methods manuscript that introduces new techniques with important geophysical applications

If the manuscript falls in Category 1, please give sufficient detail as to which of these criteria and why.

**Science Category 2:** The manuscript is potentially Category 1 but significant clarification/revision is needed. For example, the manuscript presents:

- Some unclear or incomplete scientific reasoning
- Inadequate presentation of data
- An instrument/method where the geophysical application is not obvious

If possible, please specify the revisions that might allow this manuscript to meet Category 1 criteria.

**Science Category 3:** The paper is publishable in the refereed literature but is unlikely to become a Category 1 paper. For example:

- It is a scientifically correct paper but not obviously a significant advance in a geophysical field
- A solid paper with little immediate impact on the research of others (e.g., a routine application of a standard research technique, or a new measurement/laboratory method with limited geophysical application)
- A good but basically incremental improvement to existing data sets, models, or instruments

**Science Category 4:** This paper is basically unpublishable in an AGU journal:

- There are major scientific errors in the manuscript
- Essentially the same material has been published or is being considered for publication elsewhere
- The technique is not useful
- The research area is not representative of an AGU discipline

**Presentation Categories:** These categories measure the maturity of the submitted manuscript in terms of language, communication, and GRL criteria.

**Presentation A :** Manuscripts should meet ALL of the following:

- Abstract is succinct (< 150 words), accurate, and comprehensible to a non-specialist
- Manuscript is generally well-written, logically organized, and adequately illustrated
- Figures and tables are understandable and readable (when sized for GRL)
- English usage and grammar is adequate, with few spelling/typographical errors (please specify any minor fixes)
- Manuscript appears to fit GRL's 4-page limit

**Presentation B:** Manuscripts are potentially "A" manuscripts with suitable revision. Please give explicit direction as to which sections/features need revision, extension or reduction. For example:

- Abstract needs to be rewritten/shortened
- Manuscript is not well written, is not logically organized, or is inadequately illustrated
- Manuscript needs to be (and can be) shortened
- English usage, grammar, or spelling errors detract from the paper

**Presentation C:** Manuscripts cannot readily be revised by the authors into Presentation "A" without a major re-write. For example:

- Specific ideas cannot be adequately presented within the 4-page GRL limit
- Organization and illustration of the manuscript make it too difficult to review fairly
- English usage, grammar, and/or spelling errors are endemic and require substantial copy-editing before this manuscript can be reviewed adequately

**Highlights:** GRL is now highlighting several manuscripts in each issue. Science Category 1 manuscripts are potentially highlightable. If you feel that the manuscript you are reviewing is particularly exciting and deserves to be highlighted, please include in your review a short note as to its importance.

The Editors of GRL rely on the counsel and recommendations of reviewers in order to maintain the quality of the journal and meet GRL's specific criteria. Please recognize that the final decision on a manuscript is made solely by the Editor using the expertise of several reviewers and based on the above GRL criteria.

Michael J. Prather

Editor-in-Chief

15 March 1999