Physical Oceanography ATMS373002

Fall, 2006
T & R 9:25 – 10:40
Robinson Hall 238

Dr. Paula Hennon
phennon@unca.edu
http://facstaff.unca.edu/phennon/atms373/
Messages: 251-6149

Text: *Introduction to Physical Oceanography*, R. Stewart, 2005.
The text is a .pdf to be downloaded from the course webpage. DO NOT print the 350 page text in the Atmospheric Sciences lab! Take the file to Kinkos or Office Max to print for approximately $18.

Course Description: This course is designed to provide an introduction to various topics in Physical Oceanography. As atmospheric scientists, our study of the physics of the ocean will focus on the interactions between the ocean and the atmosphere and how these dynamics affect weather and climate. Some important phenomenon we will study include:

- The heat budget of the oceans.
- The exchange of heat with the atmosphere and the role of the ocean in climate.
- The surface mixed layer.
- The dynamics of ocean currents, including geostrophic currents and the role of vorticity.
- The wind-driven circulation including the Ekman circulation, Ekman pumping of the deeper circulation, and upwelling.
- The formation of water types and masses.
- The thermohaline circulation of the ocean.
- The equatorial circulation and El Niño in the Pacific.
- The observed circulation of the ocean plus the Gulf of Mexico.
- Numerical models of the general circulation.
- Waves in the ocean, including i) surface waves; ii) inertial oscillations, iii) tides, and iv) tsunamis.
- Waves in shallow water, coastal processes, and tide predictions.

You should expect the class sessions to be quite interactive. Each class meeting is based on the premise that you are prepared to participate having completed an activity (reading, writing, thinking assignment) assigned in the previous class session. If you come to class unprepared the class session will probably not help you learn much more than you already know! (And what's the point of that?) Only a small portion of the class sessions will be lectures. The majority of the class meetings will consist of discussions, group activities, problem solving, and experiments.

Assessments: Your level of learning in this course will be assessed in a variety of ways, some more traditional than others. Your grade in the course will depend on the cumulative number of points you achieve on these assessments during the semester. Here is an approximate breakdown (by points) of the assessment activities:

		A	920 – 1,000
		A-	900 – 919
8-minute answers	100	B+	880 – 899
Exercises	400	B	820 – 879
Journal Pages	150	B-	800 – 819
Class Project	300	C+	780 – 799
	1,000 points total	C	720 – 779
		C-	700 – 719
		D	600 – 699
		F	<600

8-minute Answers: Occasionally you will be asked to compose an answer to a "thinking question" for the first eight minutes of a class session. Your answer will show your ability to integrate the appropriate vocabulary and concepts encountered in your preparation for class sessions and during class exercises.

Exercises: In-class exercises, homework, discussion preparation outlines, topic research, presentations, and informal writing will constitute the majority of the work of this course. Some of these activities will involve group work. Modern science discoveries are typically products of collaboration between individuals and organizations with various strengths and weaknesses. Learning to produce meaningful work as a result of collaboration is one of the goals of this course. Whenever group work is assigned, the final assessment of learning will be a combination of group grade and peer evaluation. The group grading process will be more fully explained before the first group project.

Journal Pages: Self-directed active learning requires thoughtful reflection on the concepts being studied as well as the formulation of questions and opinions on the topics of interest. You are to keep a journal for this course. You should make at least one entry in your journal each week. At the beginning of Tuesday's class you are to submit the entries you have made during the preceding week; late submissions are not acceptable. Journal entries should be submitted on ordinary 8 1/2 by 11 paper, which is (or can be) punched for placement in a notebook.

A complete entry for a week will contain:

1. A summary, written in your own words, of the material we dealt with during the week for which you are making the entry. This summary need not be more than a few paragraphs long.

2. A "log" recording the individual work you have done for the class (questions that surfaced--whether you solved them or not; reading you did--whether from the text, the handouts, or outside sources; participation in discussions--in the classroom or out; work you did on your project or any other thing you may have done that you think relevant to the course). This discussion may be from one to several pages in length.

3. An analysis of the week's work and the understanding you have gained (or failed to gain) during the week. You may include: difficulties you may have experienced, extensions you may have thought of, questions you may still have, and successes you have enjoyed. Your analysis of your week's work is the heart of your journal.

Entries will not be graded for grammar, spelling, or style. This informal writing is meant to bring questions to the surface and to help synthesize vocabulary, concepts, and class exercises. Just be sure to include all three portions -- the summary, log, and analysis.

By the end of the semester you will have completed quite a body of work that demonstrates your understanding and knowledge of Physical Oceanography. Your Journal notebook is a good place to keep exercises once they have been returned to you; discussion outlines; and completed reading guides.

Class Project: The heart of the course will be your group project. This project will be a simple experiment regarding a subject of your choice that can be undertaken during the beach study trip. The process or phenomenon in question should be augmented by remotely sensed data of your study site. Working groups will pair students going to perform fieldwork with students not going on the trip. More details and a timetable will be presented during class.

In short, each project will consist of:

1. A proposal
2. 2 progress reports
3. A poster explaining the experiment and the results
4. A short presentation explaining the poster
5. A short written summary describing the research question, the experiment undertaken, and the results.

Policies: Exercises and writing assignments are due at the beginning of class on the due date. Exercises may be turned in up to 24 hours late for a 50% penalty. You must be in class the entire activity to get credit for an in-class exercise. Attendance is extremely important for your personal success in this class as well as for your group participation. Please communicate with your group members and me if an absence is inevitable.

Student Affairs Creed: "The University of North Carolina at Asheville is a community of scholars dedicated to personal and academic excellence and growth. In joining this learning community, We commit to a code of civilized behavior.

- We will practice personal and academic integrity;
- We will respect the dignity of all persons, including ourselves;
- We will respect the rights of others;
- We will not condone bigotry;
- We will strive for the openness to learn from differences in people, ideas, and opinions;
- We will demonstrate concern for others, their feelings, and their need for conditions that support their work and development. Allegiance to these ideals requires us to refrain from behaviors that threaten the freedom and respect every individual deserves."

If you use any form of cheating, you will be subject to procedures outlined in Section 8.3 of the UNCA Faculty Handbook. Possible outcomes include receiving a zero for an assignment, dismissal from the course, and/or submission/dismissal from the university.

To respect the learning experience of others, please turn off all cell phones, pagers, beepers, etc....prior to class.

Class Schedule: Please be aware that the following schedule may and probably will change as the semester progresses. All changes to the schedule will be announced in class and on the course webpage.

Day	Date	Topic	Chapter
Tues.	8/22	Charting	
Thurs.	8/24	Physical Setting	2 (12 pp.)
Tues.	8/29	Physical Setting - Bathymetry	3 (16 pp.)
Thurs.	8/31	Satellite measurement of Ocean Winds	4 (10 pp.)
Tues.	9/5	Comparison of Ocean Wind Sources	
Thurs.	9/7	Heat budget and fluxes	5 (22 pp.)
Tues.	9/12	Ideal observing systems	
Thurs.	9/14	Temperature, salinity, and density	6 (27 pp.)
Tues.	9/19	Ocean Models	
Thurs.	9/21	Waves and wave forecasts	16 (20 pp. skim)
Tues.	9/26	Coastal Processes - Beaches & Barrier Islands	17 (p.295 - p.301)
Thurs.	9/28	Coastal Processes - Beach Nourishment	
Tues.	10/3	Tides	17 (12 pp.)
Thurs.	10/5	Estuaries	
Tues.	10/10	Pawleys Island Field Work - No meeting	
Thurs.	10/12	Pawleys Island Field Work - No meeting	
Tues.	10/17	Ocean Dynamics	7 (11 pp. skim)
Thurs.	10/19	Stability	8 (17 pp. skim)
Tues.	10/24	The Upper Ocean & Wind Stress	9 (14 pp.)
Thurs.	10/26	The Upper Ocean & Wind Stress	
Tues.	10/31	Geostrophic Currents	10 (30 pp.)
Thurs.	11/2	Ocean Currents	
Tues.	11/7	Wind-driven circulation - Sverdrup's Theory	11 (14 pp.)
Thurs.	11/9	Wind-driven circulation - Stommel & Munk	
Tues.	11/14	The Gulf Stream	
Thurs.	11/16	Deep Water Circulation	13 (21 pp.)
Tues.	11/21	Deep Water Circulation & Global Change	
Thurs.	11/23	Thanksgiving - No meeting	
Tues.	11/28	El Niño and La Niña	14 (19 pp.)
	11/30	The Southern Oscillations & ENSO Teleconnections	
Final		Project Poster Presentations	