

MARS 8030 Physical Oceanography

General course information & course syllabus

Instructor: Dr. Daniela Di Iorio
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Office Hours: open door policy

Lectures: Spring 2014, 9:30 to 10:45 am
Tuesday, Thursday
Marine Sciences Building, Room 239

Primary Textbooks as guidance:

Introduction to Physical Oceanography, 2nd edition, by John A. Knauss.
Descriptive Physical Oceanography, An Introduction, 6th edition, by L.D. Talley, G.L. Pickard, W.J. Emery and J.H. Swift

Textbooks available in the library:

Introductory Dynamical Oceanography, 2nd edition, by Stephen Pond and George Pickard,
Ocean Circulation, Open University Press Team.
Waves, Tides and Shallow water Processes, Open University Press Team.

Textbooks available online:

Introduction to Physical Oceanography (2008), Robert H Stewart,
http://oceanworld.tamu.edu/home/course_book.htm
Regional Oceanography: an Introduction (2003), Matthias Tomczak and J. Stuart Godfrey
<http://www.es.flinders.edu.au/~mattom/regoc/pdfversion.html>

Course Description/Objectives: In this course you will learn the fundamental laws of physics and use mathematical relations to describe ocean processes ranging from coastal to global scales. You will learn the physical forces on Earth that cause ocean motion and you will be able to carry out mathematical calculations, understanding the limitations, and giving a physical interpretation of the solutions obtained along with a drawing of the processes involved. We will examine the ocean and atmosphere as a coupled system with the energy to drive this system coming from the Sun and the motion altered by the Earth's rotation. In general, atmospheric circulation creates the global ocean wind-driven surface currents known as thermocline circulation. Coupled atmosphere ocean processes create anomalies like El Nino. Deep ocean currents driven by density differences is known as the meridional overturning circulation that together with the surface currents regulate climate on Earth. We will then discover how waves are a means of propagating energy from its generation region to another point on Earth and how the Earth/Moon/Sun system causes large bodies of water to rise and fall as tidal waves. Finally we will examine coastal and estuarine circulation and the resulting mixing that takes place as a result of the many forcing mechanisms that include river, tide and wind. At the end of the course you will be able to present a review of a research paper of your choice to the class on any topic of physical oceanography.

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Grade Distribution:

Assignments (10 total, plus in class work)	40%
Midterm Exam	25%
Paper Presentation	5%
Final Exam (Cumulative)	30%

A(90-100%,4), A-(85-90%,3.7), B+(80-85%,3.3), B(75-80%,3), B-(70-75%,2.7), C+(65-70%,2.3), C(60-65%,2.0), C-(55-60%,1.7), D(50-55%,1), F(0-50%,0)
no adjustments will be made to the final grade distribution.

Incompletes: The grade of Incomplete (I) is given to students who, for reason of accident or illness, were unable to complete a segment of the course. In no case will an Incomplete be given as a means of avoiding a failing grade.

WF: The grade of Withdrawal with Failure (WF) will be given to students who fail to come to class and hand in course material when expected and who withdraw from the course prior to the Midpoint Withdrawal Deadline of Mar 21, 2012.

Assignments: You may use any word processor (LaTex, Word, OpenOffice, Pages, etc) or computational software (MATLAB, Excel, Numbers, etc) to help with your assignments. Hand written, plotted **and drawn** is just fine provided it is neat and legible. You must show your work, outlining any assumptions made and discuss your result for full credit. You may work together to solve homework problems (please acknowledge who you work with on your assignment) but what you hand in must be your own work. You may NOT use any unauthorized material to complete the assignment (past or present students' solutions). Corrected class work is a major part of learning and can be resubmitted provided a clear understanding of the problem is shown and the work is submitted with greater detail. The last day of class is the due date for handing in all class work.

Paper presentation guidelines: Choose a physical oceanographic article from any one of the following journals: *Journal of Geophysical Research (Oceans), Journal of Physical Oceanography, Estuarine Coastal Shelf Science, Continental Shelf Research, Estuaries and Coasts, Deep-Sea Research, Journal of Atmospheric and Oceanic Technology, Atmosphere-Ocean, Journal of Marine Systems, Limnology and Oceanography*. An article from *Nature, Science, EOS* or equivalent will NOT be accepted nor will a paper on biological and chemical oceanography be accepted unless you can show how physical processes affect them. Part of Assignment #7 will include turning in a copy of your chosen paper with a detailed summary - so start scanning the journals early to find a paper that interests you.

Final Exam: Thu May 1, 8-11am, Marine Sciences Building, Room 239. Exam will be cumulative with emphasis on the second half of the course.

Academic Honesty: All students are responsible for maintaining the highest standards of honesty and integrity in every phase of their academic careers. The penalties of academic dishonesties are severe and ignorance is not an acceptable defense. Documents for academic honesty and standards, like "A Culture of Honesty", may be found at the web site for the University of Georgia Office of Vice President for Instruction
http://www.uga.edu/honesty/ahpd/culture_honesty.htm.

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Plagiarism (“take ideas, writings, etc. from another and pass them off as one’s own”, Webster’s New World Dictionary) will not be tolerated. There are several forms of plagiarism, ranging from outsourcing your work to somebody else, to slight rewording of a published text or summarizing a text without citing it. If you are in doubt consult with the instructor **before** you hand something in.

eLC-New: All lecture notes, assignments, reading materials and data sets will be posted on the E-Learning Commons *New* web site <https://uga.view.usg.edu> (the secure website). You must have a UGA-myid account. For complete information on the use of eLC-New, go to the Student Support link on this homepage. Once you log into eLC-New you will find all the courses you are authorized to use. If you do not see MARS8030 - GEN PHYS OCEAN then you must make sure you are registered for the course. In the Content Browser you will see a link for the Syllabus, Assignments and Class Notes. All files will be in PDF format and you will need to have the Adobe Acrobat Reader installed on your computer. If you have problems please let me know.

Lecture Schedule: This outline is a general plan for the course; deviations may be necessary.

Wk 1	T Jan 7	Class introduction / Solar input	
	Th Jan 9	Heat Fluxes	
Wk 2	T Jan 14	Heat Balance / Earth’s rotation	
	Th Jan 16	Coriolis Force	Assign 1 due
Wk 3	T Jan 21	Atmospheric processes / Global wind field	
	Th Jan 23	Ekman Transport	
Wk 4	T Jan 28	Wind driven surface currents – subtropic/subpolar region	Assign 2 due
	Th Jan 30	Wind driven surface currents – The Gulf Stream (conservation of potential vorticity)	
Wk 5	T Feb 4	Equatorial currents	
	Th Feb 6	El Nino	Assign 3 due
Wk 6	T Feb 11	Water masses / TS diagrams	
	Th Feb 13	Deep water formation – Greenland Sea convection	
Wk 7	T Feb 18	Meridional Overturning circulation	Assign 4 due
	Th Feb 20	Special topic: Hydrothermal circulation	
Wk 8	T Feb 25	Review	

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	Th Feb 27	Midterm Exam	Assign 5 due
Wk 9	T Mar 4	Dynamical Oceanography – equations of motion	
	Th Mar 6	Dynamical oceanography – conservation of momentum	
Wk 10	Mar 11/13	Spring Break	
Wk 11	T Mar 18	Dynamical Oceanography – conservation of mass and continuity	Assign 6 due
	Th Mar 20	Dynamical Oceanography – potential temperature and salinity	Withdrawal deadline
Wk 12	T Mar 25	Dimensional analysis and scaling	Assign 7 due, submit paper presentation summary
	Th Mar 27	Wind generated waves	
Wk 13	T Apr 1	Inertial and Internal waves	
	Th Apr 3	Kelvin and Rossby waves	Assign 8 due
Wk 14	T Apr 8	Tides – Equilibrium model: Tide producing force	
	Th Apr 10	Tides – Dynamical model	
Wk 15	T Apr 15	Coastal Processes	Assign 9 due
	Th Apr 17	Estuarine Dynamics	
Wk 16	T Apr 22	Paper presentations	
	Th Apr 24	Review	Assign 10 due. Last day to submit all class material
	Th May 1 8:00-11:00 am	Final Exam, Rm 239	