EOSC 370 : Introduction to Physical and Chemical Oceanography, Fall 2008

Version: September 2, 2008

1. Calendar Description

History and development of oceanography; methods; ocean basin structure; properties of seawater; salinity, temperature and density distributions; circulation; waves and tides; acoustics, the oceans and climate. Three credits.

This will probably be the last year this course is given. If you wish to do the pair EOSC 370, 371 you should take both this year or wait and take the new pair next year.

2. Prerequisites

Either (a) one of PHYS 101, PHYS 107, PHYS 153 and one of CHEM 111, CHEM 121, CHEM 154 and one of MATH 101, MATH 103, MATH 105, MATH 121; or (b) SCIE 001.

3. Class Email

To ask questions, goes to Instructors and TA's only: eosc-370@eos.ubc.ca

4. Instructors

Dr. S. Allen, Associate Professor
253 Earth & Ocean Sci. South [1]
604-822-2828
email: sallen@eos.ubc.ca[2]
Office Hours: Tuesday 15:30-16:30, Wednesday 16:00-17:00[3]

. Dr. K. Orians, Associate Professor
1454 Biol. Sci. Bldg. [1]
604-822-6571
email: korians@eos.ubc.ca[2]
Office Hours: Wednesday 14:00-15:00footnotemark[3]

5. Teaching Assistants

Jason McAlister
email: jmcalister@eos.ubc.ca[2]

Mark Halverson
email: mhalverson@eos.ubc.ca[2]

. Olivier Riche
email: oriche@eos.ubc.ca[2]

Megan Wolfe
email: mwolfe@eos.ubc.ca[2]

Office Hour: Monday 15:00-16:00. Earth and Ocean Sciences East Room 134[1].

6. Meeting Times

Lectures will be held at 12:00 noon Monday, Wednesday and Friday in the Klinck Building Room 200.

7. Course Purpose

The students completing this course will be able to scientifically describe the physical and chemical structure of the world's oceans.

[1] Map of the various buildings is available on the website
[2] Send questions on course material, course structure, tests, exams *etc.* to eosc-370@eos.ubc.ca
[3] Also see webpage for extra office hours.

8. In General

This course is an broad introductory survey course intended for two groups of students: 1) those students with an interest in oceanography and 2) those students intending to major in oceanography. Those students majoring in physics or in physical oceanography will find the physical subsections of the course light in math and physics. Similarly those students majoring in chemistry or chemical oceanography will find the chemistry subsections light. Much more detailed treatments are given in EOSC 477 and EOSC 472, respectively.

If you cannot hear the lectures or see the slides please let us know.

9. Evaluation

The course will be evaluated in three ways. Tests and examinations will be on material covered in the lectures or specified in the assignments.

Final Exam

The final exam covers the whole course with the lectures after the last quiz having about twice as many marks associated with them as previous lectures. The final exam will take place during the official exam period and is scheduled by student services.

Quizzes

There are 4 in-class quizzes in total. You must attend 3: there are no other allowances for missed tests. (If you do miss two tests due to illness, you must produce medical evidence for both. In this case, your exam will be weighted more heavily.) Dates for the quizzes are in section 14. of this syllabus.

In-class Clicker Questions

There will be one or more i-clicker questions in most lecture periods. These questions will be used to give students a time to think about the material presented and to check student understanding of the material or to evaluate the reading/work done in the assignments. Upto 5 marks total of the final mark will be based on clicker questions: three on participation and two on percentage of correct answers. Some questions will be participation only (ie will not count toward the accuracy mark).

Mark Weighting

Your final mark will be calculated two ways and you will be given the higher mark.

Method 1 (with class participation marks)
51% Final Exam
45% Best three in-class quizzes
5% In-class clicker questions : 3% participation, 2% accuracy (second accuracy mark is a bonus mark)

Method 2 (without class participation marks)
55% Final Exam
45% Best three in-class quizzes

10. i-Clickers

Students are required to purchase an i-clicker unit, available from the bookstore. The same clicker can be used in multiple classes. Note that you need an i-clicker not a PRS clicker.

11. Text

There is no textbook for this course. Links to an online textbook and to supplementary reading materials will be on the website.

12. Web

A web page containing this syllabus and a printable version of the text of the slides we will show in class is available at http://www.eos.ubc.ca/courses/eosc370/eosc370.htm . The web page will also include answers to your questions on the course material. Please send questions to eosc-370@eos.ubc.ca. The id and password for the webpage will be provided in the first lecture or can be found by logging onto the VISTA webpage for this course.

We may also use the VISTA (webct) webpage for this course.

For computer access to the web see the Faculty of Science's Links at:
http://www.science.ubc.ca/students/resources/spaces

13. Other References

- Open University Oceanography Series These books are intended for third year students whereas most texts introduce Oceanography at the first year level. Unfortunately our full course is scattered among 4 of these books.
    - Vol 1. The Ocean Basins: their structure and evolution, First Edition. QE39.O23 1989. Woodward Library.
    - Vol 2: Seawater: its composition, properties and behaviour, Second Edition. GC 101.2.S4 1997, on reserve in Woodward Library
    - Vol 3: Ocean Circulation. GC 228.5.O25 1989,on reserve in Woodward Library.
    - Vol 4: Waves, tides and shallow-water processes, GC 211.2.W38 1989, on reserve in Woodward Library.
    - Vol 5: Ocean chemistry and deep-sea sediments, GC111.2.O34 1989. Barber Learning Centre.
    - Biological oceanography : an introduction. Lalli and Parsons. QH91.L35 1997, on reserve in Woodward Library.
- Physical Oceanography of BC Coast, 1981. Although slightly dated this book is an excellent introduction to the physical oceanography of our area. GC854.T46 1981, on reserve in Woodward Library and Barber Learning Centre.
- Essentials of meteorology : an invitation to the atmosphere, Ahrens. A good introduction to atmospheric science. QC861.2.A3 1994, on reserve in Barber Learning Centre..
- Introductory dynamical oceanography, Pond and Pickard. A higher level book on physical oceanography. GC 201.2.P66 1983. Koerner Library and Barber Learning Centre.
- Introductory Oceanography, Eighth Edition, Harold V. Thurman. A first year level text. A good read and lovely pictures. GC16.T45 1997, Woodward Library.
- An introduction to the world's oceans, Sixth Edition. Duxbury, Duxbury and Sverdrup. Another first year text. It has a particularly good section on history. GC11.2.D89 2000, on reserve in Woodward Library.

14. Important Dates

- First class : Sep 3
- Last day to withdraw from course without a 'W' appearing on transcript : Sep 16
- Quiz 1 : Sep 22
- Quiz 2 : Oct 10
- Last day to withdraw from course : Oct 10
- Thanksgiving, no class: Oct 13
- Quiz 3 : Oct 31
- Quiz 4 : Nov 19
- Last class : Nov 28
- Final Examination, within the official examination period : Dec 3 to Dec 17. This examination period is set out in the Calendar and no work or vacation arrangements should be made for this period. Note, examination period includes Saturdays.

15. Contents

Section /Lecture	Approx. Date	Instructor	TA
I Introduction			
1. Introduction	Sep 3	SEA, KJO	-
II Preliminaries			
2. Water	Sep 5	SEA	JM
3. Chemical Oceanography	Sep 8	KJO	JM
4. Density & Pressure	Sep 10	SEA	OR
5. Coriolis and Other Forces	Sep 12	SEA	OR
6. Geostrophy	Sep 15	SEA	OR
III Tides			
7. Stratification 1	Sep 17	SEA	OR
8. Tides	Sep 19	SEA	OR
9. Tides in BC	Sep 24	SEA	OR
10. Mixing	Sep 26	SEA	OR
IV Water Masses			
11. Heat and Salt Budgets	Sep 29	SEA	MH
12. Water Masses	Oct 1	SEA	MH
13. TS and Thermohaline Circulation	Oct 3	SEA	MH
V Chemical Oceanography			
14. Marine Biogeochemical Cycles	Oct 6	KJO	JM
15. Dissolved Oxygen	Oct 8	KJO	JM
16. Carbon Dioxide	Oct 15	KJO	JM
17. Plant Nutrients	Oct 17	KJO	JM
18. Chemical Cycles	Oct 20	KJO	JM
VI Ekman Dynamics and Upwelling			
19. Forcing the Ocean	Oct 22	Guest Lecturer	MW
20. Ekman Dynamics	Oct 24	SEA	MW
21. Ekman Convergence/Divergence	Oct 27	SEA	MW
22. Coastal Upwelling and Circulation	Oct 29	SEA	MW
VII World Currents			
23. Equatorial Upwelling and Currents	Nov 3	SEA	MW
24. World Currents	Nov 5	SEA	MW
25. High Latitude Currents	Nov 7	SEA	MW
VIII Western Boundary Currents			
26. Vorticity & Stretching	Nov 10	SEA	MH
27. Sverdrup Circulation	Nov 12	SEA	MH
28. Stommel Circulation	Nov 14	SEA	MH
IX Ocean Waves			
29. Stratification 2	Nov 17	SEA	MH
30. Surface Waves	Nov 21	SEA	MH
31. Kelvin Waves	Nov 24	SEA	MH
32. Rossby Waves	Nov 26	SEA	MH
X Summary			
33. Review	Nov 28	SEA, KJO	-