ZOO*4570 Marine Ecological Processes - Winter 2014

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PREREQUISITES: BIOL*3450, PHYS*1080, ECOLOGY COURSE.
Recommended: BIOL*3120
F (3-1) Credit weight: 0.5.

CALENDAR DESCRIPTION

This course provides an advanced analysis of the physical and biogeochemical processes in the world's oceans and the dependence of biological processes on physical and chemical processes from micro- to macro-scales.

METHOD OF EVALUATION

Seminar oral and written presentations: 20% - details TBA
First midterm examination: 30%. 26 February 2014. In lecture period.
Final examination: 50% Time and place TBA

COURSE CONTENTS

Lectures will cover the following topics (subject to modification):

1. INTRODUCTION AND IMPORTANCE OF THE OCEANS – plate tectonics, ocean basin geography
2. OCEAN PHYSICAL CHARACTERISTICS: areas and depths, temperature, salinity, pressure, oxygen, pH.
3. OCEAN CHEMICAL CHARACTERISTICS: constancy of composition, residence times.
4. WATER MOVEMENTS.
a) Major ocean currents, Forces causing water motions and mixing.
b) Physical processes at the macro-scale. Surface ocean circulation, deep ocean circulation, "ocean conveyor belts", biogeochemical cycles, ENSO and Atlantic systems, aging and tracing of water masses.
c) Physical processes at the meso-scale. Effects of winds; gyres, Langmuir cells, tidal influences, patchiness, planetary frontal systems, shelf break fronts, river plume fronts.
d) Physical processes at the micro-scale. Molecular versus eddy diffusion., life at low Reynolds numbers, relationships among viscosity, momentum and diffusion.
5. BIOGEOCHEMICAL CYCLES.
a) The global carbon cycle: dissolved gases and pH, inorganic carbon and calcium, dissolved and particulate organic carbon.
b) The nitrogen cycle: chemical compounds, budgets, processes, nutrient regeneration and primary production.
c) The phosphorus cycle: Chemical compounds, phosphate limitation, seasonal effects.
d) The silicon cycle: Chemical compounds, effects on plankton
e) The sulfur cycle: anoxic and aerobic factors, atmospheric components
f) Iron limitation
6. COMMUNITY STRUCTURE.
A. Coral reefs
a) Biodiversity
b) Primary production
c) Symbiosis

B. Intertidal Communities
a) Mangrove communities
b) Rocky intertidal communities
c) Beach intertidal communities
d) Salt marsh communities
e) Sea grass communities
C. Benthic subtidal.
a) Phytobenthos: macrophytic algae and seagrasses, kelp forests.
b) Zoobenthos: herbivores, filter feeders, deposit feeders, predators
c) Benthic pelagic coupling
D. Pelagic communities
a) Primary production – phytoplankton groups, measuring primary production, photosynthesis rates, irradiance, nutrient limitation.
b) Secondary production – zooplankton groups, collection methods, vertical migration.
c) Nekton including whales
d) Sea birds
e) Fish
E. Deep-sea communities
a) Biotic provinces of the ocean floor
b) Biodiversity animals
c) Deep sea ecology
d) Chemo-autotrophs. Hydrothermal vent communities, cold seep communities.
F. Estuaries
G. Polar communities
7. HUMAN IMPACTS ON MARINE ECOSYSTEMS
a) Mariculture
b) Fisheries
c) Marine pollution
d) Exotic species and ship ballast water
e) Global warming

LEARNING OUTCOMES:
By the end of the course students should be able to

1. Understand the dependence of marine ecosystems on physical and chemical parameters, and hydrodynamic and biogeochemical processes
2. Understand the principles of biogeochemical processes.
3. Understand the processes involved in primary production and energy transfer within food webs and the import, export and exchange of energy and nutrients between communities.
4. Understand the structure and dynamics of marine communities

ATTENDANCE AND PARTICIPATION.
Each student must attend and participate in each seminar.

COURSELINK
This course will make use of the University of Guelph's course website on D2L (via Courselink). Lecture outlines will be posted the night before a lecture. They should not be treated as a substitute for the lectures; instead, they should be used to help you prepare for lectures and should be augmented with careful lecture notes.

UNDERGRADUATE CALENDAR
The Undergraduate Calendar is the source of information about the University of Guelph's procedures, policies and regulations, which apply to undergraduate programs. It can be found at:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/

ABSENCE AND ILLNESS
If you are absent from classes during the semester, you will be expected to make up missed lecture material on your own.
When an assignment or exam is missed, you must notify the instructor in writing, with your name, id#, and e-mail contact as soon as possible. If requesting academic consideration on medical or compassionate grounds, be prepared to provide supporting documentation. Dates of incapacitation stated on the note must, of course, cover the date of the missed assignment or exam. The original paper copy of the note must be delivered to the course instructor (for missed midterm) within 5 days of the missed assignment (weekends included), or a mark of 0% will be assigned. Notes will not be returned. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-_ac.shtml

E:MAIL COMMUNICATION
Students are required to check their <uoguelph.ca> e:mail account regularly: e:mail is the official route of communication between the University and its students.

DROP DATE
The last date to drop one semester Winter 2014 courses, without academic penalty, is **Friday, March 7th**. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-_drop.shtml

ACCESSIBILITY
The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.
For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.csd.uoguelph.ca/csd/

ACADEMIC MISCONDUCT
The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need

to remain aware that instructors have access to and the right to use electronic and other means of detection.
Please note: Whether or not a student **intended** to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

RECORDING OF MATERIALS
Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

Course Evaluation information
CCS now provides the U of G Online Course Evaluation System in a secure, online environment. End of semester course and instructor evaluations provide students the opportunity make constructive comments and to have their comments and opinions form part of the information used by Promotion and Tenure Committees in evaluating the faculty member's contributions in the area of teaching.
Course evaluations are now conducted through this web site. Login with your central email account login ID and password:
https://courseeval.uoguelph.ca/CEVAL_LOGIN.php
Please Note: Instructors do **NOT** receive evaluations until the end of exam period. Furthermore, evaluations are anonymous, unless you specifically indicate you want to acknowledge your comments.