University of Guelph
College of Biological Science

Department of Integrative Biology

COURSE OUTLINE

Marine Ecological Processes ZOO*4570 version 1

Winter Semester 2016

THE DETAILS OF THIS COURSE OUTLINE MAY CHANGE UNTIL THE FINAL VERSION IS PRESENTED IN THE FIRST WEEK OF CLASSES.

Course description

ZOO*4570 Marine Ecological Processes W (3-1) [0.50]

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. Topics to be discussed include production and energy transfer within pelagic food webs, export of energy to the benthos, and structure and dynamics of marine communities.

Prerequisites:
BIOL*2060, BIOL*3450, PHYS*1080

Teaching team

Faculty: Dr. Elizabeth G. Boulding.

E-mail: boulding@uoguelph.ca

Phone: extension: 54961

Office: 1464 New Science Complex.

College of Biological Science, Department of Integrative Biology

Office Hours: please make an appointment with Dr. Boulding by email

TA: TBA

Course schedule

Lectures Monday, Wednesday, Friday 10:30AM - 11:20AM in MCKN, Room 228

Lab/Tutorial is on Friday, 12:30-1:20, SSC 2314 and is a required part of the course.

Learning goals and rationale

The course goal is to provide an introduction to Oceanography and Marine Biology to graduating Marine and Freshwater Biology students.

Topic	**Expectations (input), students entering this class should be able to describe:**	**Learning Outcomes (output), students successfully finishing this class should be able to:**
Ocean geology	Factors affecting species distribution and abundance	1) Describe how plate tectonics affects the distribution of vent fauna
Ocean geography	The major oceans and continents	2) Explain spatial and depth variation in composition of ocean sediments.
Water movements	Major ocean currents	3) Understand factors affecting ocean basin circulation
Ocean stratification	Seasonal thermal stratification in lakes and perhaps oceans	4) Explain seasonal nutrient availability in euphotic zone
Upwelling	Seasonal nutrient regeneration in lakes and perhaps oceans	5) Predict where major upwelling regions are located
Seawater Composition	Freezing point depression, boiling point elevation with increasing salinity.	6) Understand constancy of composition of seawater and how halocline density gradients form
Nutrient limitation	Nitrogen and phosphorous cycles.	7) Use Redfield ratio to predict which nutrient is limiting.
Primary production	Understand reactions involved in photosynthesis	8) Predict which factors will limit primary production in a particular environment.
Phytoplankton diversity	Secondary pigments and metabolites in plants	9) Understand how the absorption spectrum of a water mass affects critical depth & how armour and chemical warfare affect herbivory.
Zooplankton diversity	Life at low Reynolds numbers	10) Understand feeding mechanisms of small copepods
Predator-prey	Functional responses to prey density	11) Describe feeding efficiency changes with relative predator-prey size
Pelagic ecosystems	Food chains and food webs	12) Understand how food chain length affects fish production.
Benthic ecosystems	Larval forms of marine invertebrates and fishes	13) Predict when benthic-pelagic coupling is important
Ecosystem engineers	Global distribution of Coral reefs, seagrass beds, mangroves, and kelp forests	14) Predict changes in species richness when ecosystem engineers are added to or removed from a section of coastline.
Marine communities	Disturbance, species diversity and succession	15) Describe factors affecting zonation and succession
Oceanographic Processes	Population and Community Ecology	16) Describe the effects of ocean circulation on community structure.

Course Resources

CourseLink: Please check the course D2L site under:

1) “Content”: postings of pdfs of selected (the more detailed) lecture slides, details of wet and computer laboratory assignments, Practice midterm and final exam questions.

2) “Discussions”: student-lead postings about current topics in oceanography

Strongly recommended textbooks:

“Oceanography: An Invitation to Marine Science and Introduction to Marine Biology, custom readings Zoology 4570 University of Guelph 2015 ed.". ISBN-13: 978-0-17-6670351 (created by Thompson/ Brooks/Cole). Includes:

Part I) Chapters 8, 9, 13, 14 in part from “Oceanography: An Invitation to Marine Science”, 9th Edition, Tom S. Garrison Orange Coast College ISBN-10: 1305105168 ISBN-13: 9781305105164

Part II) Chapters, 3, 4, 13 to 18 from “Introduction to Marine Biology” by George Karleskint , Richard Turner , James Small – April 26, 2012 ISBN-13: 978-1133364467 ISBN-10: 1133364462 Edition: 4th

Lecture Material Sources (most available on 2 hour reserve in McLaughlin Library):

3. Biological Oceanography: an Introduction. 2nd Edition. C.M. Lalli and T.R. Parsons. 1997., Open University Set Book, 314 pages, about $73, Butterworth-Heinemann of Elsevier, ISBN: 0-7506-3384-0

4. Ocean circulation. 2nd edition. Open University 2001, Butterworth-Heinemann of Elsevier. 286 pages, about $50, ISBN: 0-7506-5278-0

5. Marine Biogeochemistry. July 2005 (formerly Ocean chemistry and deep sea sediments), Open University, Butterworth-Heinemann of Elsevier. About $68 ISBN:0-7506-6793-1

6. Dynamics of marine ecosystems: Biological-Physical Interactions in the Oceans. 3rd edition, Mann and Lazier, Blackwell. Summer 2005. about $87.

7. Seawater: its composition properties and behaviour. 2nd ed., Open University 1995, Butterworth-Heinemann of Elsevier. 166 pages. About $55, ISBN: 0-7506-3715-3

8. Waves, Tides and Shallow water processes. 2nd ed. Open University 2000, Butterworth-Heinemann of Elsevier 227 pages. about $47, ISBN: 0750642815.

9. Marine Ecological Processes. 2nd ed., Valiela 1995, Springer-Verlag, 686 pages. About $72, ISBN: 0-387-94321-8

10. Biological Oceanography. Miller 2004. Blackwell, 402 pages. About $85, ISBN: 0-632-05536-7

11. Essentials of Oceanography. 8th ed. Trujillo and Thurman. 2005. Pearson, Prentice Hall. 532 pages, ISBN: 0-13-144773-4

12. Introductory Oceanography. 10th ed. Thurman and Trujillo. 2004. Pearson, Prentice Hall. 608 pages, about $120, ISBN: 0-13-143888-3

13. Oceanography: an Introduction to the Planet Oceanus. Pinet 1992. West. 572 pp., ISBN: 0-314-77008-9

14. Marine Biology: Function, Biodiversity, Ecology with CD-ROM Second Edition Jeffrey S. Levinton 2007 Oxford Press ISBN13: 9780195141726

15. Laboratory Exercises in Oceanography 4th edition by Bernard W Pipkin et al. Paperback: 272 pages, Publisher: Worth Publishers; 4th edition (December 1, 2011) ISBN-10: 0716794926, ISBN-13: 978-0716794929.

Course Content

Week	Topics Covered in Lecture	Lab/Seminar Topic	Readings#
1	Seaweeds; then Ocean geology	Marine Macroalgae	G14. Multicellular Primary Producers
2	Ocean geology then Water movements	Sea floor spreading and plate tectonics	K3. Geology of the Ocean
3	Ocean stratification	Temperature and salinity	K4. Water, Wind and Tides
4	Upwelling	Water masses	G8. Circulation of the Atmosphere.
5	Seawater Composition	Surface currents	G9. Circulation of the Ocean.
6	Nutrient limitation	Ocean Sediments	G7. Ocean Chemistry
7	Primary production	Oceanography from Space- remote sensing	G14. Primary Producers
8	Phytoplankton diversity	Plankton	K17 The Open Sea
9	Zooplankton diversity	Littoral Ecosystems and Environment Impacts	K13. Intertidal Communities
10	Pelagic ecosystems	Tides	K14. Estuaries
11	Benthic ecosystems	The VENUS Observatory	K16. Neritic Communities
12	Benthic ecosystem	Neptune Observatory	K18. Deep Sea

13	Ecosystem engineers	Review Session	K15. Coral Reefs

* Pipkin et al. textbook.

Chapters from G = Garrison 2016, K = Karleskint et al. 2012. Page numbers will change with edition.

Methods of Assessment and due dates

Assessment				
Form of Assessment	Weight of Assessment	Due Date of Assessment	Course Content /Activity	Learning Outcome Addressed
Tutorial/ wet Laboratory**	15%	**Weekly assignment due at end of each tutorial**	Laboratory and computer oceanography activities	1-16
Midterm*	25%	Wednesday 24th February 2016 in lecture	Lecture, Assigned Readings	1 to 8
Complete Draft of Essay	3%	Monday, 7th March, 2016 (posted on PEAR before 23:59)	Term Essay	16
Peer review of essay	2%	Monday 14th March 2016 (posted on PEAR before 23:59)	Term Essay	16
Final version of essay	20%	28th March 2016 (double posted on PEAR and D2L before 23:59).	Term essay	16
Final exam*	35%	TBA	Lecture Reading	9-15
Bonus Marks***	+1%	April 8st 2016 (posted on	Lecture questions and comments/ D2L graded	1-16

		D2L Discussions before 23:59).	Discussion topics	

**Multiple choice and written short answers – the final exam will cover all lectures and assigned readings, including the ones before the midterm but the emphasis will be on topics from after the midterm.

**Regular attendance and successful completion of Tutorial/ wet Laboratory assignments is required to obtain credit for course. Not all lecture slides will be posted on D2L and some important points are made orally by the instructors therefore it is important to take notes during class and tutorial lectures.

*** Oral contributions to class discussion/answering questions in lecture (Your answer does not have to be correct to get bonus marks) or written postings to Graded Discussion topics on D2L.

Important Dates

Event		
Reading week	February 15-20th 2016	No Classes /Labs scheduled this week
40th Class day Drop Date	Friday, March 11th, 2016	Last day to drop course without penalty.
Good Friday Holiday	Friday, March 25, 2016	No Classes

Please see the assessment table above for a list of the due dates for all course assignments.

Grading

TERM ESSAY REQUIREMENTS AND POLICY

INSTRUCTIONS.

1. Must be double-spaced in font size of 12 with one inch margins all around.
2. Figures and Tables should be placed after List of References.
3. Maximum length is 6 pages excluding Title page, List of References, figures, and tables. Minimum length is 5 pages. Penalties for too long or too short.
4. Citation of references in text and List of References in style of the journal “Marine Biology”.
5. Possible topics include: 1) Effect of a Physical Oceanographic (or a Biogeochemical) Process on Populations of a Marine Species, 2) Effect of a Physical Oceanographic (or a Biogeochemical) Process on a Marine Community, 3) Effect of a Physical Oceanographic or (a Biogeochemical) Process on a Marine Ecosystem, 4) How changes in Physical Oceanographic (or Biogeochemical) Processes caused

by human activities are Impacting Marine Ecosystems. Please check with professor before doing other topics.

6. Minimum 10 references from the primary literature in peer-reviewed scientific journals with at least five being from the past three years. Can also include websites and recent review articles.
7. Draft essay must be peer-reviewed electronically by your essay partner assigned by PEAR before we will grade your revised final copy.
8. Submit final version twice: post one final electronic pdf copy on PEAR for your instructors to read and one pdf copy on D2L for your classmates to read.

LATE SUBMISSION POLICY OF DRAFT OR OF FINAL COPY OF ESSAY.

Penalty is 5% per day unless valid compassionate or medical exemptions apply (Please see "When You Cannot Meet a Course Requirement" section below).

EVALUATION OF ESSAY

Final draft of Essay is graded out of 100% but is worth 25% of final course grade (5% of which is from electronic peer reviewing exercise). The same grading rubric will be used by the peer reviewer to grade your first version and by your instructors to grade your final version.

English/grammar, Punctuation 10%

Logical Organization and Writing Style 20%

Creativity and Synthesis of ideas 20%

Scientific Content 50 %

Course and University Policies

When You Cannot Meet a Course Requirement
When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or teaching assistant) in writing in an email, with your name, id#, and e-mail contact, and be prepared to provide supporting documentation. 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

Where possible laboratories missed because of illness or compassionate reasons will be completed in subsequent laboratory periods.

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 advisort.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

E-mail Communication

As per university regulations, all 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 courses, without academic penalty, is the 40th class day. To confirm the actual date please see the schedule of dates in the Undergraduate Calendar. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Grading

Indicate all course policies regarding in-semester tests and assignment submissions, including time and place for submission of assignments and explicit penalties for late submissions.

Students who do not complete 80% of the laboratory/tutorial sessions and who do not hand in both drafts of the term essay will be given an incomplete as their final grade.

Campus Resources

The Academic Calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: http://www.uoguelph.ca/registrar/calendars/index.cfm?index

If you are concerned about any aspect of your academic program:

- make an appointment with a program counsellor in your degree program. http://www.bsc.uoguelph.ca/index.shtml or https://www.uoguelph.ca/uaic/programcounsellors

If you are struggling to succeed academically:

- There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. http://www.learningcommons.uoguelph.ca/

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. https://www.uoguelph.ca/counselling/
- Student Health Services is located on campus and is available to provide medical attention. https://www.uoguelph.ca/studenthealthservices/clinic
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. http://www.uoguelph.ca/~ksomers/

If you have a documented disability or think you may have a disability:

- The Centre for Students with Disabilities (CSD) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see: https://www.uoguelph.ca/csd/