Department of Ocean Sciences, MUN Fall Semester 2021 (dated 11 July 2021)
OCSC 4300: Climate Change and Global Marine Fisheries Dynamics

Instructor: Dr. Joe Wroblewski; e-mail: jwroblew@mun.ca
Office room C-4047 in the Physics Chemistry Building on campus
Office hours by appointment. In person (or if MUN returns to remote learning, by using Webex or Zoom) on M, T, Th, F at noon to 1pm.
Please use jwroblew@mun.ca rather than D2L for making an appointment.

Course Syllabus

Course description:
3 hours of lecture (Mon, Tues, Fri) and 3 hours of laboratory (Thursday) per week
(held in room C4011 in the Physics Chemistry Building on campus)
The course explores the effects of air-sea interaction on large scale marine ecosystem domains, with a special focus on assessing the impact of climate change on global fisheries and aquaculture production. The course uses a blend of lectures and computer simulation laboratories to familiarize students with current research on climate and seafood production. Students will explore biogeochemical oceanographic models coupled to atmospheric circulation models that predict the effects of anthropogenic global warming on fisheries. Students will learn to code marine ecosystem models using Microsoft Excel software.

Evaluation
First quiz 20% of final grade
Second quiz 20%
Term paper 30%
Computer Lab Assignments 30%

Reference material supporting lectures will be available in the Brightspace course shell. There is no textbook for the course.

All computer laboratories will be posted with examples in the D2L Brightspace course shell, and explained on Thursdays 2-5 pm by the instructor in person (or if MUN returns to remote learning by synchronous Online Rooms Brightspace D2L session at scheduled lab times). Once posted, the laboratories will be continuously available to the student.

The six laboratory segments for the course will explore increasingly complex marine ecosystem models. The more complex laboratory segments will take two lab class periods. All labs are computer models run using Microsoft Excel software that is freely available to students at Memorial University. Students will learn to code and run the model on their personal laptop or a desktop computer at home. Each student will write a laboratory report, due at the time of the next laboratory segment. Alternatively, two (no more) students can work together and submit one report. Laboratory reports will be evaluated by the instructor. Each of the six laboratory reports will be worth 5%, for a total of 30% toward the final grade.
Computer Laboratory Schedule
(held in room C4011 in the Physics Chemistry Building on campus)

Lab #1 - Using Excel to solve equations

Lab #2 - Simple marine ecosystem models with analytical solutions
Lab 1 Report due

Lab #3 - Analytical sensitivity analyses of simple plankton models
Lab 2 Report due

Lab #4 – Empirical sensitivity analyses of Schaefer Model
Lab 3 Report due

Lab #5 – Fishing fleet dynamics model
Lab 4 Report due

Lab #6 – Earth systems models and their limitations in predicting fisheries production
Lab 5 Report due

Here are the seven criteria used for evaluating a student’s Lab Report (each lab report is worth 5% of the final grade):

1. Did the report follow the style of scientific writing (Title page with student’s name and date, Purpose of the lab, Methods, Results (the graphs), Discussion and References)? (0.5 point)
2. Was the report of adequate length? Use Times New Roman with 12-point font for the text. (0.5 point)
3. Was the report clearly written, free of grammatical errors and spelling mistakes? (0.5 point)
4. Was (Were) the model equation (equations) given? (0.5 point)
5. Was the purpose of the lab clearly stated? (1 point)
6. Were the axes and curves in the graphs properly labeled (showing which parameter values generated each curve)? (1 point)
7. Was there sufficient thought in the Discussion? Be careful not to plagiarize. (1 point)

LECTURES
(held in room C4011 in the Physics Chemistry Building on campus)

Lectures will be delivered by the instructor in person, unless there is a return to remote learning at MUN. In person lectures will always be supported with asynchronous lectures by narrated Power Point slides. If MUN returns to remote learning during the fall semester, lectures will only be the videos posted on the course Brightspace shell (D2L).

Asynchronous lectures will be posted at the lecture schedule times, Monday, Tuesday, and
Friday at 2 pm. These videos will be posted under Course Content, Lecture Topics. Once posted, the lecture videos are available to the student for viewing. Each Lecture Topic will take several scheduled lecture periods, hence a number of videos.

**Lecture Topic 1** Large-scale marine ecosystem domains and fisheries resources  
References available on D2L

Historical global distribution of demersal fish catches, coastal pelagic fish catches, catches of tuna-like fishes and crustacean catches

**Lecture Topic 2** Present state of the world fisheries and a changing climate  
References available on D2L

**FIRST QUIZ** – in classroom (or take-at-home if return to remote learning)

**Lecture Topic 3** Natural climate fluctuations cause marine ecosystem regime shifts  
ENSO, PDO, NAO and AO oscillations  
References available on D2L

Implications of natural climate fluctuations for fisheries management

**Lecture Topic 4** Anthropogenic climate change  
References available on D2L

Climate change legislation and geo-engineering

**Lecture Topic 5** Rapid warming and cooling of regional marine areas  
References available on D2L

Potential surprises: Tipping Points

**FALL SEMESTER BREAK** -- no classes

**Lecture Topic 6** Predicted effect of ocean acidification on fish and shellfish production  
References available on D2L
**SECOND QUIZ** – in classroom (or take-at-home if return to remote learning)

**Lecture Topic 7** Evaluating predictions of the impact of climate change on fisheries
References available on D2L

**TERM PAPER**
Reference source:
This UN FAO Technical Paper (available on D2L) has a chapter for each fisheries management region of the world.

The student will choose a chapter from this Technical Paper of personal interest, and critique that chapter based on the student’s knowledge from the course. The term paper must be no longer than 5 pages, double spaced with Times New Roman 12 point font.

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Classroom etiquette and Memorial University Policies relevant to this course:
Asynchronous lectures by narrated PowerPoint slides are copyright of the instructor. Student must not record, publish, send, post on an internet site, sell, rent or otherwise distribute this work without the expressed permission of the instructor.

This class provides a safe learning environment to all students, regardless of religious, linguistic and economic backgrounds, lifestyle choices, gender, nationality, physical ability or learning differences.

Memorial University is committed to supporting inclusive education based on the principles of equity, accessibility and collaboration. Accommodations are provided within the scope of the University Policies for the Accommodations for Students with Disabilities. Students who may need an academic accommodation are asked to initiate the request with the Glenn Roy Blundon Centre (www.mun.ca/blundon).

Students are expected to adhere to those principles which constitute proper academic conduct. A student has the responsibility to know which actions, as described under Academic Offences in the University Regulations, could be construed as dishonest or improper. For more information regarding this policy, students should refer to the University Regulations for Academic Misconduct (Section 6.12) in the University Calendar.

Land Acknowledgement, Memorial University
We acknowledge that the lands on which Memorial University’s campuses are situated are in the traditional territories of diverse Indigenous groups, and we acknowledge with respect the diverse histories and cultures of the Beothuk, Mi’kmaq, Innu, and Inuit of this province.