**Department of Ocean Sciences, MUN Fall Semester 2023**

**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 on Mon, Tues, Thurs, Fri at noon until class time.

Please use jwroblew@mun.ca, rather than Brightspace course shell “Communications” for making an appointment.

Should classes be disrupted during the Fall 2023 Semester, the course will transition to remote delivery. Students will be notified of changes to this syllabus through student’s MUN emails sent by the instructor.

**Course Syllabus**

**Course description:**

**3 hours of lecture (Mon, Tues, Fri) and 3 hours of laboratory (Thurs) per week**

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

The courseexplores the effects of air-sea interaction on large-scale marine ecosystem domains, with a special focus on assessing the impact of anthropogenic global warming 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 Earth Systems 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 Thursday 5 October 20% of final grade

Second Quiz Tuesday 14 November 20%

Class presentation 30%

Computer Lab Assignments 30%

(There is no Final Exam)

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

Should the course be disrupted, some assignments may be cancelled and evaluation methods modified. Students will be notified of changes through student’s MUN email sent by the instructor.

All computer laboratories will be posted with examples in the Brightspace course shell, and explained on Thursdays 2-5 pm by the instructor in person in room C4011 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 which 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. 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)**

**Thursday 14 September Lab #1 - Using Microsoft Excel to solve equations**

**Thursday 21 September Lab #2 - Simple marine ecosystem models with analytical solutions**

***Lab 1 Report due***

**Thursday 28 September Lab #3 - Analytical sensitivity analyses of simple plankton models**

***Lab 2 Report due***

**Thursday 5 October NO LAB**

**Thursday 12 October (***one hour, as lectures follow Monday schedule***) Lab #4 – Empirical sensitivity analyses of the Schaefer model**

***Lab 3 Report due***

**Thursday 19 October NO LAB**

**Thursday 26 October Lab #5 – Fishing fleet dynamics model**

***Lab 4 Report due***

**Thursday 2 November NO LAB**

**Thursday 9 November Lab #6 – Earth systems models**

***Lab 5 Report due***

**Thursday 16 November NO LAB**

**Thursday 23 November (Labs have ended, *Lab 6 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**? (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 s**ufficient 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. If MUN returns to remote learning during the fall semester, lectures will be Microsoft Power Point slides posted on the Brightspace course shell. These slides will be posted under Course Content, Lecture Topics.

Each Lecture Topic will take several scheduled lecture periods.

**Lecture Topic 1 Large-scale marine ecosystem domains and fisheries resources**

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

*(Monday 2 October – National Truth and Reconciliation observed – NO CLASSES)*

**FIRST QUIZ Thursday 5 October – in classroom C4011 in the Physics Chemistry Building**

*(Monday 9 October - Tuesday 10 October – FALL SEMESTER BREAK – NO CLASSES)*

**Lecture Topic 2 Present state of the world fisheries and anthropogenic global warming**

**Lecture Topic 3 Natural climate fluctuations cause marine ecosystem regime shifts**

 **ENSO, PDO, NAO and AO oscillations**

 **Implications of natural climate fluctuations for fisheries management**

**Lecture Topic 4**  **Anthropogenic climate change**

 **Climate change legislation and geo-engineering**

**Lecture Topic 5**  **Rapid warming and cooling of regional marine areas**

 **Tipping Points**

**Lecture Topic 6**  **Predicted effect of ocean acidification on fish and shellfish production**

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

*(Monday 13 November - Remembrance observed - NO CLASSES)*

**SECOND QUIZ Tuesday 14 November – in classroom C4011**

**CLASS PRESENTATION**

The student will chose a marine biogeographical province of personal interest. The student will present in classroom C4011 during the last three weeks of the Fall 2023 Semester. The oral presentation should be about 20 minutes, followed by Q and A.

**In your presentation, you must address the question:**

**“How will *anthropogenic global warming* affect fisheries (and/or aquaculture) in the marine biogeographical province I have chosen?”**

**Describe the physical and biological oceanographic factors in your region that are affected by anthropogenic global warming.**

 **Changes in regional ocean currents?**

 **Changes in regional ocean near-surface temperature?**

 **Changes in mixed layer depth seasonal cycle and regional nutrient availability?**

 **Regional ocean acidification?**

 **Changes in regional primary production and secondary production?**

 If MUN returns to remote learning, the class presentation will not be available. A written term paper must then be submitted. The term paper should be about 5 pages, double spaced with Times New Roman 12 point font. Due no later than Friday 1 December, when the Fall 2023 Semester ends.

***Classroom etiquette and Memorial University Policies relevant to this course****:*

*Lectures by PowerPoint slides and Computer Laboratories are copyright of the instructor. Student must not record, publish, send, post on an internet site, sell, rent or otherwise distribute these works without the expressed permission of the instructor.*

*Memorial University 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*](http://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 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.*