

CHEM2610/OCSC Marine Chemistry/Introductory Chemical Oceanography

Winter 2023

A. CALENDAR DESCRIPTION

OCSC 2100 Introductory Chemical Oceanography (same as Chemistry 2610): This course will provide an introduction to the fundamental chemical properties of seawater and the processes governing the concentrations of elements and compounds in the oceans. It is an introduction to the sources, distribution, and transformations of chemical constituents of the ocean, and their relation to biological, chemical, geological, and physical processes. Topics include: controls on average concentration of chemicals in the ocean; vertical and horizontal distributions of ocean constituents; air-sea interactions; production, export, and remineralization of organic matter; the ocean carbon cycle; human-induced changes; stable isotopes; and trace elements.

CR: CHEM 2610 PR: CHEM 1011 OR CHEM 1051 which may be taken concurrently OR CHEM 1001

B. LEARNING GOALS

Upon successful completion of this course, the student should be able to

- know what are the fundamental properties and chemical composition of seawater
- identify what drives or limits ocean circulation and mixing, and how it redistributes chemical species throughout the ocean
- understand the processes that create and modify the chemical species in ocean waters and sediments
- understand how the ocean carbonate system works
- know the mechanism of ocean acidification and its effect on the ocean chemistry and biology, sediments and future climate
- understand biogeochemical cycling in the oceans
- understand global carbon cycle and the role the oceans play in it
- know fundamentals of Coastal Marine Chemistry
- understand the many way in which humans influence the chemistry of oceans, directly through marine pollution and indirectly through the emissions of greenhouse gases.

C. COURSE LECTURES AND CONTACTS

Lectures: Monday, Wednesday, Friday; 10:00–10:50 am; Room: A-1046

Attendance at lectures is critical to your success in this course. Ahead of the lecture, I will post on Brightspace **lecture notes**, so during the lectures you can concentrate on understanding the material. Note however that the lecture notes may have **blank areas and questions** – which we will fill-in and answer during the lectures. This is another reason not to miss the lectures – not only will you have material explained and give you **a chance to ask questions**, but also it will save you

time in the long term when preparing to the exams. During lectures, I will often indicate which issues are particularly important (and therefore more likely to show up on the exams ...)

Instructor: Dr. Piotr Trela. **Office:** CSF- 2231 (the new science bldg.); tel. 864-3063

Office hours (to be confirmed): **Mon. Wed. Fri. 11.10-11.50 am**, or by appointment.

E-mail: primary: the internal email inside Brightspace ptrela@online.mun.ca; in case of problems there: backup email: ptrela@mun.ca. In the latter case, PLEASE include in the subject line the number of the course. Every effort will be made to respond to emails within 24h, with the exceptions of evenings, weekends and holidays.

Teaching Assistant: TBA

For Brightspace technical issues: contact the tech support in CITL

For applying to drop the course after March 2, and/or to defer the final exam – you should contact and apply to Departmental Secretary of OCSC - Departmental Secretary Donna Inkpen dinkpen@mun.ca, (709) 864-2767

D. COURSE RESOURCES

TEXTBOOK:

Required text: 'Introduction to Marine Biogeochemistry' S.M. Libes, 2009. [GC116 L53 2009]

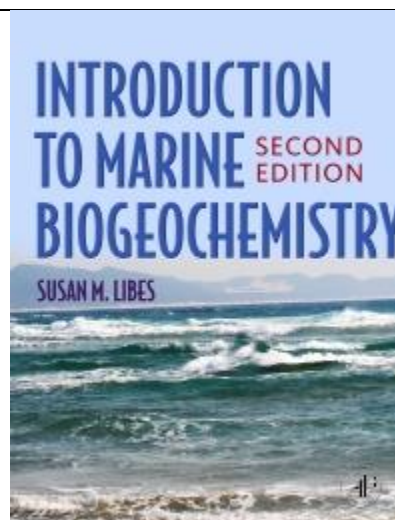
Supplementary Texts (I'll try to get on QEII reserve)

'An Introduction to the Chemistry of the Sea' Michael E. Q. Pilson 2013, 2nd Edition Cambridge University Press

'Marine Biogeochemical Cycles' The Open University (R. James), 2005. [GC111.2 M36 2005]

'Oceanography' M.G. Gross & E. Gross, 1996. [GC16 G7 1996]

'Seawater: Its composition, Properties and Behaviour' The Open University (E. Brown et al.) 1997. [GC101.2 S4 1997; - 2004 corrected edition is available online via MyMun)



BRIGHSPACE:

Main Page: News and updates, Calendar

Content: Lecture notes posted before the corresponding lecture. Also: information on exams, resource documents, and relevant links

The Brightspace-email is *the preferred way to email* me (my general MUN email listed above should be used only as a backup). E-mail is best for discussing private or very specific questions; for general questions use the **Communications => Discussions**, as the answer to your question may be of interest

to other students as well. You can post questions in the discussion area under your name or, if you prefer, anonymously.

Assessment: Assignments – a dropbox for your assignments, **Grades**– for your midterm grades.

E. IMPORTANT DATES AND COURSE SCHEDULE

JAN. 6, FRI.	1 ST LECTURE
FEB. 17	MIDTERM 1
FEB. 20-26	WINTER BREAK, NO CLASSES
MAR. 2, THUR.	<i>LAST DAY TO DROP COURSES WITHOUT ACADEMIC PREJUDICE</i>
MAR. 20, MON.	MIDTERM 2
APR. 6, THUR.	LECTURES END
APR. 12-21	FINAL EXAM SESSION

F. COURSE SECTIONS

- Fundamental properties of seawater and sediments and their composition
- Water masses, ocean circulation and mixing
- DOM, Air-Sea Exchanges, Speciation and Seawater Gases
- Redox
- Inorganic Carbon
- Marine Biogeochemistry
- Anthropogenic Influences
- Other topics

F. EVALUATION

- MIDTERMS (X 2) 20% EACH,
- ASSIGNMENTS (X 2) 7.5% EACH
- FINAL EXAM 45 %

Exam format: may contain all or some of the following: multiple choice, fill in the blanks, short answers, and/or map/graph questions. The final exam will be cumulative, with proportionally more weight given to the part not covered on the mid-terms.

IF you miss a midterm for a justified reason, the midterm grade will be added to the final, and, you might write a version of the exam that contains more questions from the missed part.

Assignment format: questions and/or problems to solve

G. COVID AND OTHER HEALTH ISSUES

- **General COVID-19 supports:** The Memorial COVID-19 website is an excellent source of information and support, with specific links for students, supports and services, and health and wellness.
- **If you feel unwell, stay at home.** Doctors' notes **are not required** for COVID-related absences. For other medical issues they needed only for absences longer than 5 days. Please contact me as soon as possible so we can figure out the alternatives. The only other times when doctor's note might be needed would be if you apply to drop the course after the last day to drop courses, or if you apply for a deferral of the final exam.
- **COVID contingencies:** if Memorial University operations change because of the COVID-19 situation, we may need to transit the course to a fully online delivery format. If this transition occurs, it will be **announced on Brightspace**, along with an update of the syllabus and revision of lecture schedule. Any necessary revisions to the evaluation methods will be made in consultation with the students registered in this course. If a student demonstrates that they would be disadvantaged by the change, then, as per 6.7.4 of the University Calendar, accommodations will be made.

- Typically, a transition would involve the exams changing to Brightspace online exams (Quizzes), the term project is already done via Brightspace Online Rooms.

H. HOW TO DO WELL IN THIS COURSE

Do not to fall behind - because this would make things more difficult as the new sections build on previous ones.

Combine lectures and the readings of the textbook – to do well in the course **you will need both.**

It's a chemistry course - so there will be chemical reactions. My emphasis is on understanding and connecting the dots, rather than simple memorization, so the less obvious reactions on exams would be given to you –in the test itself, in a formula sheet, or in the attached tables - but it will be up to you to recognize which is which, and use them to answer the questions. Therefore, when we encounter a reaction in class and lecture notes – ask yourself – do I understand what happens here, and how does it differ from other reactions discussed in a given section.

Understand your diagrams – graphs in the textbook and lecture notes organize and summarize the chemical oceanography data. So if you take the time to understand them – it will go a long way to help you with understanding of the material and preparing for the tests and exams.

Be active –when something is confusing, unclear, or seems contradictory – ask question in the class or post questions in Brightspace Discussion.

I. POLICIES

Grading system follows that described in the Memorial University Undergraduate Calendar: <https://www.mun.ca/regoff/calendar/sectionNo=REGS-0661> 6.9 Letter Grades, Numeric Grades and Points Per Credit Hour.

Academic Integrity: 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. Students found guilty of an academic offence may be subject to a number of penalties commensurate with the offence including reprimand, reduction of grade, probation, suspension or expulsion from the University. For more information regarding this policy, students should refer to the University Regulations for Academic Misconduct (Section 6.12) in the University Calendar.

For guidance on proper scholarly behaviour the student should seek advice from their instructors and faculty advisors. <http://www.mun.ca/regoff/calendar/sectionNo=REGS-0748>). You may also check the Memorial University Library's Academic Integrity webpage, specifically, the "Fast facts about academic misconduct", which provides information on writing tests and exams, and using "homework help" sites: <https://www.library.mun.ca/researchtools/guides/integrity/>

Among issues most relevant for this course:

- during exams, your **cell phone** should be switched off and stored with the rest of your belongings at the front of the class
- your assignment has to be your own work

Medical Notes:

When is a medical note required?

1. After missing the final exam for health reasons, when requesting a deferred examination (at the moment - you don't need this note in case of suspect COVID illness, but double-check if there are any changes to this policy by the time we get to April)
- 2 Requests to drop the course after the last day to do so.
3. If more than one evaluation was missed during the term due to an extended illness.

When is a medical note NOT required?

1. COVID-related absence of less than 14 calendar days' duration, during the term, including illness, isolation or quarantine requirements, or caregiving requirements. For deferral of the final exam, see the note in point 1 of the previous section.

Non-COVID related illness of less than 5 calendar days - during the term.

J. FEEDBACK

I value your feedback, both on the content and format of lectures and labs – your feedback lets me know what works and what does not, and adjust it to make the course better for you, and for future students. If you have any specific questions about the content – ask in class, if not via Brightspace: Communications -> Discussion section by posting a question about the material or upcoming exams. You can also provide anonymous feedback in the Feedback subsection.

K. INCLUSION AND EQUITY

Students with Disabilities

• I am committed to working with students with pre-existing medical and mental health needs, as well as new needs that may arise within the semester. If you need academic accommodation, I encourage you to reach out to the [Glen Roy Blundon Centre](#).

Equity

We welcome all learners from various disciplines and differing ethnic and cultural backgrounds from within the University, as this provides opportunity for the sharing of a diversity of experiences, world-views, values, problem-solving approaches, and enlightening and enriching course perspectives. It is an expectation that course discourse be collegial and respectful across disciplinary, ethnic, cultural, and personal boundaries.

Memorial Support Services

Support Services offered to students at Memorial include:

- The Counselling Center <http://www.mun.ca/counselling/home/>
- The Glen Roy Blunden Center <http://www.mun.ca/blundon/about/index.php>
- The Writing Center <http://www.mun.ca/writingcentre/about/>
- Student Affairs and Services <http://www.mun.ca/student/home/>
- The International Student Advising Office <http://www.mun.ca/isa/main/>

For Additional Supports see: www.mun.ca/currentstudents/student/ and <http://munsu.ca/studentlife/centres/>, among them: Memorial University Libraries, The Commons (QEII Library), Center for Innovation in Teaching and Learning Support Centre, Information Technology Services, Academic Advising, and specific departmental help centres.

• Available student life supports including, but not limited to: Student Wellness and Counselling Centre, Student Support and Crisis Management, MUN Chaplaincy, Sexual Harassment Office, The Circle: First Nations, Inuit & Métis Students Resource Centre, Disability Information Support Centre, International Students Resource Centre, Sexuality and Gender Advocacy, Student Parent Assistance & Resource Centre, Students Older Than Average, Intersections – A Resource Centre for Marginalized Genders, and specific departmental societies.