

Faculty of Science Course Syllabus**Department of Chemistry**

CHEM 6361

Sustainable Materials Issues

Winter 2021/2022

Instructor: Dr. Mark Obrovac email: Mark.Obrovac@dal.ca office: Chemistry 230**Lectures:** TR 1335-1425 CHEMISTRY 540

Lectures will be delivered in person whenever possible or as synchronous online lectures otherwise.

Laboratories: none**Tutorials:** none**Course Description**

This course will provide a quantitative coverage of matters concerning eco-informed choices of materials for applications, with an emphasis on energy and sustainability.

Course Prerequisites

CHEM 3303.03 or CHEM 3305.03 or CHEM 5303.03 or PHYC 4230.03 or MATL 3500.03 or permission of the instructor.

Learning Objectives

This class offers an introduction to the sustainable use of materials. Topics include an overview of resource consumption, environmental impacts, Indigenous perspectives, life cycle analysis, mineral resources, recycling, and profiles of selected materials. Students will obtain an understanding of the impacts of the materials cycle on the environment and learn tools to make eco-informed materials selection.

Course Materials

Required textbook:

Materials and the Environment: Eco-informed Material Choice, 3rd Ed. by Michael F. Ashby

Recommended (but not required) textbooks:

Minerals, Metals and Sustainability: Meeting Future Material Needs by William John Rankin

Elements of a Sustainable World by John Evans

Materials for a Sustainable Future, Trevor M Letcher, Janet L Scott (eds.)

Course Delivery (online):

This course will have an accompanying Brightspace page. Links to online lectures, lecture slides, homework and other materials will be provided on the course Brightspace website. Synchronous online lectures will take place during the regular class time via MS Teams (link provided via Brightspace). Note that class attendance and participation in both in person and online lectures are required and make up a major component of the course grade. It is each student's responsibility to read their Dalhousie email and keep current with the course Brightspace website.

Course Assessment

<i>Component</i>	<i>Weight (% of final grade)</i>	<i>Date</i>
Class Attendance / Participation	30%	
Homework	40%	assigned regularly
Final Exam	30%	(Scheduled exam period)

Other course requirements

A minimum grade of 75% in the Class Attendance / Participation component is required in order to pass the course. A minimum grade of 50% on the written Final Exam component is required in order to pass the course. There is no supplemental examination in this course. Independent work is expected on all graded course components.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

Course Policies on Missed or Late Academic Requirements

Attendance

Attendance and class participation are key aspects of this course. Therefore 75% of the lectures must be attended to pass the course. If you are unable attend a lecture because you are ill, experiencing an emergency or otherwise, please submit a Student Declaration of Absence (SDA) form, as per the regulations in the University Calendar. If possible, a make-up lecture time can be arranged. If it is not possible to schedule a make-up lecture, missed lectures for which an SDA form was submitted may be excused without penalty. Note that there is a maximum of 2 uses of the SDA form (total) for this course.

Assignments

All assignments must be handed in on time. Late work will not be accepted and will receive zero marks except for reasons of illness or emergency. There are no supplemental or make-up assignments in this class. If you are unable complete an assignment on time because you are ill, experiencing an emergency or otherwise, please submit a Student Declaration of Absence (SDA) form, as per the regulations in the University Calendar and the assignment deadline may be extended without penalty. Note that there is a maximum of 2 uses of the SDA form (total) for this course.

Final Exam

Students that miss the final exam for reasons of an illness or emergency should contact the instructor prior to the final exam time by email. In case of a missed exam due to illness or emergency a make-up exam will be offered at a later date.

Course Content

- Basic concepts and definitions: natural resources, renewable resources, non-renewable resources, materials, material groups, commodities, sustainability.
- Major materials usage.
- The Earth: the crust, biosphere, hydrosphere, atmosphere, and biogeochemical cycles.



DALHOUSIE UNIVERSITY

- Environmental impacts of human activity: global warming, acidification, eutrophication, smog formation, ozone depletion, ecotoxicity, human toxicity, resource depletion.
- Indigenous perspectives on materials use and sustainability.
- The materials cycle: materials and energy balances, embodied energy, exergy, CO₂ footprint, eco-indicators, life cycle assessment.
- Mineral resources: elemental distribution and abundance, resources and reserves, ore grade, enrichment ratio, co-products, market price, Sherwood plot.
- Commercial production of the elements and some important structural materials.
- Polymers and composite materials.
- Materials recyclability.
- Selection strategies for sustainable materials.

Faculty of Science Course Syllabus (Section B)
Winter 2021

Chemistry 6361
Sustainable Materials Issues

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Missed or Late Academic Requirements due to Student Absence

As per Senate decision instructors may not require medical notes of students who must miss an academic requirement, **including the final exam**, for courses offered during fall or winter 2020-21 (until April 30, 2021). Information on regular policy, including the use of the Student Declaration of Absence can be found here:

https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html.

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

Statement: <http://www.dal.ca/cultureofrespect.html>

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)

https://www.dal.ca/academics/important_dates.html

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Student Resources and Support

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: <https://libraries.dal.ca/>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Fair Dealing Guidelines <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html

Student Advocacy: <https://dsu.ca/dsas>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

Biosafety: <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>