



Faculty of Science Course Syllabus (Section A) (revised April 2022)

**Department of Chemistry
Chemistry 3305 / Physics 3303
Materials Science
Fall 2022/23**

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

We acknowledge the histories, contributions, and legacies of the African Nova Scotian people and communities who have been here for over 400 years.

Note: The only difference between Chemistry 3305 and Physics 3303 is that Chemistry 3305 has a lab (20 hours per term) and Physics 3303 has a term paper.

Instructor(s):

Lecturer: Dr. Mark Obrovac
Office: Chemistry Building, Room 230
Telephone: 902-494-4060
E-Mail: Mark.Obrovac@dal.ca
Office Hours: Office Hours are held on Tuesdays and Thursdays, 11:30 am - 12:30 pm in the Chemistry Building, Room 540. Help outside of office hours by appointment only.

Lab Instructor: Dr. Gianna Aleman
Office: Chemistry Building, Room 1051
Telephone: 902-494-3827
E-mail: gianna.aleman@dal.ca

Course delivery: In person

Lectures: MWF 1035-1125 LSC-COMMON AREA C332

Laboratories (CHEM3305 only): T 1305-1655 CHEMISTRY PODIUM 115

The **laboratory will start on September 6, 1:05 pm Room 115P** with an Intro Session of approximately 1 h. Attendance to the Intro Lab is mandatory.

Schedule: After the Intro Lab, the laboratory will run every second week, or as scheduled. Each student will complete 5 experiments over the course of the term.

All aspects related to the laboratory format, expectations, policies, help sessions, and more, can be found in the **'Intro Module: Lab Syllabus'**, **available in the lab Brightspace website**. All students are required to complete the 'Intro Module: Lab Syllabus' during the first week of term.

Course Description

This course emphasizes the principles involved in understanding physical properties of materials, such as thermal and mechanical stability, and electrical and optical properties. All phases of matter are examined: gases, liquids, films, liquid crystals, perfect crystals, defective solids, glasses. Important processes such as photography and Xerography are explained.

Course Prerequisites

CHEM 3305

CHEM 1012.03, and (CHEM 2301.03 and CHEM 2304.03) or PHYC 3200.03 (can be a corequisite) or (ERTH 2001.03 and ERTH 2002.03)

PHYC 3303

CHEM 1012.03, and PHYC 3200.03 (can be co-requisite) or (CHEM 2301.03 and CHEM 2304.03) or (ERTH 2001.03 and ERTH 2002.03)

Course Exclusion

CHEM 3305: PHYC 3303.03, CHEM 3303.03

PHYC 3303: CHEM 3305.03

Learning Objectives

The objective of this course is to provide students with a solid introduction to materials science. Students will gain knowledge in materials at their bulk, and, where applicable, particle, subparticle and atomic level and will learn how each relates to overall physical properties: including optical, thermal, electronic, magnetic, and mechanical properties. Using this knowledge, students will learn how materials scientists, design, make, analyse, and describe new materials for various applications.

Course Materials

Required textbooks:

Solid State Chemistry and its Applications, 2nd Ed./Student Edition by Anthony R. West.

Online resources and answers to all problems at:

<http://bcs.wiley.com/he-bcs/Books?action=index&itemId=1119942942&bcsId=8612>

Physical Properties of Materials by Mary Anne White.

Online resources and answers to all problems at:

<http://www.physicalpropertiesofmaterials.com>

Lecture slides, homework and other materials will be provided on the course Brightspace website.

Laboratory Requirements:

- Laboratory manual: CHEM3305 Laboratory Manual is required (University bookstore).
- Safety glasses (CSA Z94-3 or Z87.1) are mandatory in the laboratory.
- Lab coats are mandatory in the laboratory.
- A hard cover notebook is required.
- A USB flash drive is required to store data.

All required materials can be purchased from the Dalhousie bookstore.

Course Assessment

| <i>Component</i> | <i>Weight (% of final grade)</i> | <i>Date</i> |
|---|--------------------------------------|---|
| Term Paper Topic Submission (PHYS 3303) | 5% of term paper grade | due 10:35 am, Friday, Oct. 7 |
| Midterm Examination | 25% | 10:35 am - 11:25 pm, Friday, Oct. 21 |
| Final Examination | 40% | (scheduled by the Registrar) |
| Homework Assignments | 15% | assigned regularly |
| Lab (CHEM 3305) | 20% | details to be provided during the intro lab, September 6, 1:05 pm Room 115P |
| Term Paper (PHYS 3303) | 20% | due 10:35 am, Wednesday, Dec. 7 th |

Other course requirements

Chemistry 3305: You must pass the lab (>50%) to pass the course.

Physics 3303: You must pass the term paper (>50%) to pass the course.

For both Chemistry 3305 and Physics 3303: A minimum grade of 50% on the final exam component is required in order to pass the course.

Chemistry 3305: As a student in the Department of Chemistry at Dalhousie, and as part of your chemistry laboratory class requirement, you are REQUIRED to complete the following training:

1. WHMIS (Workplace Hazardous Materials Information System) course
2. Laboratory Safety Course
3. Lab map (in-lab activity with the Instructor)

For deadline and further details about the mandatory safety training consult the laboratory manual and the lab Brightspace website.

Chemistry 3305: Laboratory exemptions for this course may only be granted to students who have previously passed the laboratory (final laboratory mark \geq 50%) after having done all the experiments, and who are repeating the course within one (1) year following that in which the laboratory credit was initially granted. Students who have reason to believe that they may be exempted from the laboratory must verify this with the lab instructor, Dr. Aleman, within the first week of the laboratory program. If an exemption is granted, the previous laboratory mark will be carried forward. Whether or not you receive an exemption is Dr. Aleman's decision. A student who is denied a laboratory exemption must repeat the laboratory program. Partial exemptions for specific experiments and/or reports will not be granted.

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

All assignments must be handed in on time. Answers to assignments are posted/discussed in class immediately after assignments are submitted, therefore late work will not be accepted and will receive zero marks. There are no supplemental or make-up assignments, examinations or quizzes in this class. If you are too ill to write a quiz or examination or complete an assignment in this class, please provide a Student Declaration of Absence form, as per the regulations in the University Calendar. A student who is well enough to write a test will not be allowed a re-write. However, if you are ill or experiencing an extreme personal emergency at the time of a test or an assignment, call me (lab phone: 902 494 4060 or call the main office and leave a message) or email me to inform me of the situation. In the case of an excused quiz or assignment, the others will be weighted more heavily. For an excused midterm examination, the marks for the relevant sections of the final exam will be used in place of the missed test mark. Worked solutions and marking schemes for assigned problems and for the term tests will be posted in a glassed-in bulletin board in the hallway of the third floor of the Chemistry Building. Solutions will not be made available electronically. Due to space limitations, each solution set may only be available for a limited time. It is the student's responsibility to check their work against the posted solutions as soon as work is returned to you.

It is each student's responsibility to read her/his Dalhousie email and the Brightspace website.

In the case of a weather-related closure of the University, notification will be provided on Dal Alert, the Dalhousie website and on local radio stations. If a class needs to be cancelled in another emergency, every attempt will be made to contact students via email and/or Brightspace.

No cell phone use (including no texting) in class, please.

Course Policies related to Academic Integrity

Independent work is expected on all homework assignments. Except where indicated, all homework assignments are to be handwritten on paper (i.e. not electronically). Hardcopy homework assignments are to be submitted by uploading scanned copies to the lecture Brightspace web page as a single pdf file.

Course Content

Part I: Introduction to Materials Science

- atomic structure of materials
- x-ray diffraction
- defects in solids
- bonding in solids
- phase behaviour

Part II: Physical Properties of Materials (topics included as time permits)

- colour and other optical properties of materials
- thermal properties of materials
- electrical properties of materials
- magnetic properties of materials
- mechanical properties of materials
- physical adsorption of gases
- ion diffusion and intercalation in solids
- materials synthesis
- materials characterization methods

Faculty of Science Course Syllabus (Section B) (revised April-2022)**Fall/Winter 2022-23***Course name & number*

Please ensure that the following information on [University Policies](#) is available to all students in your course. This document should be sent to students in your course along with your Course Syllabus, Section A, or may be copied into your [Course Syllabus \(Section A\)](#).

University Policies and Statements

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

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://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&chapterid=1&topicgroupid=31821&loaduseredits=False>

University Grading Practices

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

Faculty of Science Course Syllabus (Section C) (revised April-2022)**Fall/Winter 2022-23***Course name & number*

Please ensure that the following information on Student Resources is available to all students in your course. This document should be made available to students on the course Brightspace page, or elements may be copied into your **Course Syllabus**.

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/undergrad-students/degree-planning.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.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>

Dalhousie COVID-19 information and updates: <https://www.dal.ca/covid-19-information-and-updates.html>