

## CHEMISTRY 4104/5206 COURSE OUTLINE

### Physical Methods of Nanotechnology

**Instructor:** Dr. A. Ianoul (Office SC 227, Lab SC 312/326, anatoli.ianoul@carleton.ca)

**Lectures:** Tuesday, Thursday 1:05-2:25 pm, Please check Carleton Central for the room location.

**Grading:** 2 MT (2x13%), 2 projects (34% each): 1 or 2 presentation + 1 or 0 review paper, research articles discussion (6%). To discuss possibilities of extensions for late/missed assignments contact the instructor.

**Website:** Brightspace. **Text:** will be provided free of charge, periodic scientific literature.

#### Subjects to be covered:

1. Vacuum techniques (SEM, TEM, XRD, Auger): Theory and Applications
2. Optical techniques: Microscopy, spectroscopy, scanning confocal microscopy, plasmonics
3. Scanning probe techniques (STM, AFM, NSOM): Theory and Applications

Lecture	Date	Description
1	Jan 7	Introduction
2	Jan 9	Vacuum systems and techniques
3	Jan 14	Electron microscopy (SEM, TEM)
4	Jan 16	XPS
5	Jan 21	Auger
6	Jan 23	LEED, HREED
7	Jan 28	EXAFS, SEXAFS
8	Jan 30	Optical Microscopy
9	Feb 4	Near-field Optics
10	Feb 6	MT1
11	Feb 11	Photonic Crystals
12	Feb 13	Plasmonics
13	Feb 25	SPM: principles of operation
14	Feb 27	Probes in SPM
15	Mar 4	Presentation 1
16	Mar 6	Presentation 1
17	Mar 11	Presentation 1
18	Mar 18	Non-contact SPM
19	Mar 20	Low T SPM, Dynamic Force AFM
20	Mar 25	MT2
21	Apr 1	Molecular recognition force microscopy
22	Apr 3	Material Characterization using SPM
23	Apr 8	Presentation 2

## **Academic Accommodations and Regulations**

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes are outlined on the Academic Accommodations website (<https://students.carleton.ca/course-outline/>).

## **Chat GPT/Generative *ai* usage**

### ***ai Use in this course***

Students may use *ai* tools for basic word processing and formatting functions, including:

- Grammar and spell checking (e.g., Grammarly, Microsoft Word Editor)
- Basic formatting and design suggestions (e.g., Microsoft Word's formatting tools, PowerPoint Design editor)

### ***Documenting ai Use***

It is not necessary to document the use of *ai* for the permitted purposes listed above. If you have questions about a specific use of *ai* that isn't listed above, please consult your instructor.

## **Academic Integrity**

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in [Carleton University's Academic Integrity Policy](#). A list of standard sanctions in the Faculty of Science can be found [here](#).

Additional details about this process can be found on [the Faculty of Science Academic Integrity website](#).

Students are expected to familiarize themselves with and abide by [Carleton University's Academic Integrity Policy](#).

## **Student Rights & Responsibilities**

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the [7 Rights and Responsibilities Policy](#) for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.