

## CHEMISTRY 4104/5206 COURSE OUTLINE

### Physical Methods of Nanotechnology

**Instructor:** Dr. A. Ianoul (Office SC 227, Lab SC 312/326)

**Lectures:** Wednesday, Friday 8:35-9:55 am, in person SC115.

**Grading:**

**4104:** 2 MT (2x13%), 2 projects (34% each): 1 or 2 presentation + 1 or 0 review paper, research articles discussion (6%).

**5206:** 2 MT (2x12.5%), 3 projects (23% each): 2 presentation + 1 review paper, research articles discussion (6%).

**Website:** Brightspace. **Text:** will be provided, 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 10	Introduction
2	Jan 12	Vacuum systems and techniques
3	Jan 17	Electron microscopy (SEM, TEM)
4	Jan 19	XPS
5	Jan 24	Auger
6	Jan 26	LEED, HREED
7	Jan 31	EXAFS, SEXAFS
8	Feb 2	Optical Microscopy
9	Feb 7	Near-field Optics
10	Feb 9	MT1
11	Feb 14	Photonic Crystals
12	Feb 16	Plasmonics
13	Feb 28	SPM: principles of operation
14	Mar 1	Probes in SPM
15	Mar 6	Presentation 1
16	Mar 8	Presentation 1
17	Mar 13	Presentation 1
18	Mar 15	Non-contact SPM
19	Mar 20	Low T SPM, Dynamic Force AFM
20	Mar 22	MT2
21	Mar 27	Molecular recognition force microscopy
22	Apr 3	Material Characterization using SPM
23	Apr 5	Presentation 2
24	Apr 10	Presentation 2