

NANO 601 Spring 2026

Characterization of Nanomaterials

Section 001

Class Schedule

Course	Meet Days	Meet Time	Location	Instructor(s)
NANO 601 001 [LEC]	Tue, Thu <i>May 11 - Aug 5</i>	11:30AM - 12:50PM	EIT 3151	Guo-Xing Miao guo-xing.miao@uwaterloo.ca

schedule data automatically refreshed daily

Instructional Team

Instructor's contact info: guo-xing.miao@uwaterloo.ca

Office Hour: Thursdays right after the class (13:00-14:00 PM, EIT 4009)

TA: TBD

Course Description

Calendar Description for NANO 601

Background knowledge to identify the most suitable characterization techniques for a given material. Learn some of the most commonly used materials characterization techniques for probing a given material's physical properties, such as structure and morphology. Covers basic principles of techniques and illustrates their applications with selected example problems. Modern materials fabrication processes. Microscopy techniques. Structural analysis.

[View requirements for NANO 601 ^{\(1\)}](#)

Learning Outcomes

By the end of this course students should be able to...

know how to perform optical, electron, scanning probe, and ion based microscopy; how to use Xray, electron, and ion scattering for structural characterization; and how to apply thin film technologies, lithography, FIB, Stamp for device fabrications.

Tentative Class Plan

Week 1, optical microscopy;

Week 2/3, optical microscopy;

Week 4, scanning probe microscopy;

Week 5, ion microscopy;

Week 6/7, diffraction basics and XRD;

Week 8, electron diffraction;

Week 9, ion scattering diffraction;

Week 10, thin film technologies;

Week 11, lithography;

Week 12, FIB/stamp;

Required Materials & Technologies

Note: Any prices provided in course outlines are best estimates based on recent online prices and do not include shipping or taxes. Prices may vary between retailers.

This course has **no additional costs** for students.

Readings

Title / Name	Notes / Comments	Required	Used Versions Allowed	Price (CAD)
Introduction to Nanoscience, Stuart M. Lindsay		Optional / Supplemental	Yes	
Materials Characterization: Introduction to Microscopic and Spectroscopic Methods, Yang Leng		Optional / Supplemental	Yes	

Technology

Name of Technology	Notes / Comments	Required	URL (student access)	Price (CAD)
LEARN		Required		

Assessments & Activities

Component / Activity	Date or Due Date	Location / Submission Method	Weight (%)
Assignment #1	May 25	drop box	10%
Assignment #2	Jun 8	drop box	10%
Assignment #3	Jun 22	drop box	10%
Assignment #4	Jul 6	drop box	10%
Assignment #5	Jul 20	drop box	10%

Late / Missed Content

Late homework deducted in marks by 10% per day.

Assignment Screening

No automated assignment screening will be utilized within this course.

Generative AI

This course includes the independent development and practice of specific skills, such as **[fill this in with your discipline-specific skills]**. Therefore, the use of Generative artificial intelligence (GenAI) trained using large language models (LLM) or other methods to produce text, images, music, or code, like Chat GPT, DALL-E, or GitHub CoPilot, **is not permitted** in this class. Unauthorized use in this course, such as running course materials through GenAI or using GenAI to complete a course assessment is considered a violation of [Policy 71 \(2\)](#) (plagiarism or unauthorized aids or assistance). Work produced with the assistance of AI tools does not represent the author's original work and is therefore in violation of the fundamental values of academic integrity including honesty, trust, respect, fairness, responsibility and courage ([ICAJ \(3\)](#), n.d.).

You should be prepared to show your work. To demonstrate your learning, you should keep your rough notes, including sources, research notes, brainstorming, drafting notes and prompts. You may be asked to submit these notes along with earlier drafts of your work, either through saved drafts or saved versions of a document. If the use of GenAI is suspected where not permitted, you may be asked to meet with your instructor or TA to provide explanations to support the submitted material as being your original work. If you cannot sufficiently support your work, academic misconduct allegations may be brought to the Associate Dean.

In addition, you should be aware that the legal/copyright status of generative AI inputs and outputs is unclear. [More information is available from the Copyright Advisory Committee. \(4\)](#)

Students are encouraged to reach out to campus supports if they need help with their coursework including:

- [Student Success Office \(5\)](#) for help with skills like notetaking and time management
- [Writing and Communication Centre \(6\)](#) for assignments with writing or presentations
- [AccessAbility Services \(7\)](#) for documented accommodations
- [Library \(8\)](#) for research-based assignments

Administrative Policy

University Policy

Mental Health: At the University of Waterloo, we are dedicated to supporting your mental and emotional well-being. Our Counselling Services offer confidential support, including individual counselling, workshops, and crisis intervention.

If you're struggling, please reach out for help at 519-888-4096 or visit [their website \(9\)](#) for more information.

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility.

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read [Policy 70, Student Petitions and Grievances, Section 4 \(10\)](#). When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for their actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to [Policy 71, Student Discipline \(11\)](#). For typical penalties, check [Guidelines for the Assessment of Penalties \(12\)](#).

Appeals: A decision made or penalty imposed under [Policy 70, Student Petitions and Grievances \(13\)](#) (other than a petition) or [Policy 71, Student Discipline \(14\)](#) may be appealed if there is a ground. A student who believes they have a ground for an appeal should refer to [Policy 72, Student Appeals \(15\)](#).

Note for students with disabilities and disabling conditions: The University of Waterloo recognizes its obligations under the Ontario Human Rights Code to accommodate students with known or suspected disabilities and disabling conditions (e.g. medical conditions, injuries, impacts of trauma such as from violence or discrimination) to the point of undue hardship. To support this obligation, [AccessAbility Services \(16\)](#) (AAS) collaborates with all academic departments and schools to facilitate academic accommodations for students with disabilities and disabling conditions without compromising the academic integrity of the curriculum. If you believe you may require academic accommodations (e.g., testing accommodations, classroom accommodations), register with AAS as early in the term as possible by completing the [online application \(17\)](#). Students already registered with AAS must activate their accommodations for each of their courses at the beginning of each term using AAS' online system. If you require assistance, contact AAS by phone (519-888-4567 ext. 35082), email (access@uwaterloo.ca) or in-person (Needles Hall North, 1st Floor, Room 1401).

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.

Reference: Links from Document

1. <https://acal.fast.uwaterloo.ca/course/1265/NANO/601>
2. <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>
3. https://academicintegrity.org/images/pdfs/20019_ICAI-Fundamental-Values_R12.pdf
4. <https://uwaterloo.ca/copyright-at-waterloo/teaching/generative-artificial-intelligence%C2%A0>
5. <https://uwaterloo.ca/student-success/resources>
6. <https://uwaterloo.ca/writing-and-communication-centre/services-0/services-undergraduate-students>
7. <https://uwaterloo.ca/accessability-services/students>
8. <https://uwaterloo.ca/library/research-supports/quick-start-guide>
9. <https://uwaterloo.ca/students/health-and-well-being/counselling-appointments>
10. <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>
11. <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>
12. <https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties>
13. <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>
14. <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>
15. <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72>
16. <https://uwaterloo.ca/accessability-services/>
17. <https://uwaterloo.ca/accessability-services/students/applying-academic-accommodations/documentation-information-forms>

For technical support please email OutlineSupport@uwaterloo.ca

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