

*The University of Western Ontario*  
Chemistry 9547T, Winter 2022  
**Surface Chemistry of Nanoparticles**

**Instructor:**

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**Description:**

This quarter course focuses on discussing the surface chemistry of colloidal nanoparticles. Fundamental concepts such as surface energy, solid-liquid interface, and surface adsorption will be introduced, with a particular emphasis on how these concepts apply to nanosized materials. We will discuss how the surface energy plays a role in the nanoparticle growth, and the factors that determine their sizes and shapes. We will also discuss how the use of ligands modifies the chemical properties of nanoparticles, including the unique properties of coated nanoparticles and nanoparticle composites.

**Learning outcome:**

Upon completion of this course, students will be able to

- gain fundamental understanding on chemical reactions on a solid surface
- realize the importance of surface structure control to the nanoparticle synthesis
- predict the stability of nanoparticles based on their surface structure
- propose general approaches to modify nanoparticles surface based on the desired application

**Topics:**

Tentative topics and schedule are the following:

- Introduction
  - ♦ Fundamentals of surface properties
  - ♦ Stabilization of nanoparticles
  - ♦ Surface at nanoscale

- Nanoparticles in water
  - ♦ Bare nanoparticles
  - ♦ Nanoparticles with surface modified by a foreign species
- Nanoparticles in organic media
  - ♦ Chemical bonding and surface structure
  - ♦ Morphology control
- Applications of surface functionalized nanoparticles
  - ♦ Discussions on current literatures

### **Resources:**

No textbook required.

Lecture notes and handouts will be provided as the course proceeds.

### **Lectures days (tentative):**

Days: Monday and Wednesday, First day of class: February 28, 2022

Time: 10:30 am – 12:00 pm (noon)

Location: TBD

### **Evaluation**

In-class discussion 20%

Presentation 40%

Written report: 40%

### **Course attendance and missed/late assignments**

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed.

### **Notes on Academic Honesty**

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_grad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

### **Health and Wellness**

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre.

Numerous cultural events are offered throughout the year. For example, please check out the Faculty of Music web page <http://www.music.uwo.ca/>, and our own McIntosh Gallery <http://www.mcintoshgallery.ca/>. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca/>. Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate chair), or other relevant administrators in their unit. Campus mental health resources may be found at [http://www.health.uwo.ca/mental\\_health/resources.html](http://www.health.uwo.ca/mental_health/resources.html).