



# Cellular Nanotechnology

## BIOMEDE 5635

**Credit Hours:**

3.00 - 3.00

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**Course Levels:**

Undergraduate (1000-5000 level)

Graduate (5000-8000 level)

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**Course Components:**

Lecture

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**Course Description:**

Application of nanotechnology to cells for sensing and subcellular manipulation. Synthesis and biological modification of quantum dots and magnetic nanostructures, their unique material properties, and their application.

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**Prerequisites and Co-requisites:**

Prereq: Sr or Grad standing in Engineering, or permission of instructor.

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**Course Goals / Objectives:**

- Describe types of inorganic nanostructures used in biology, their properties, synthesis, and surface modification
  - Describe mechanisms of nanostructure toxicity
  - Explain why inorganic nanoparticles are excellent imaging agents and give examples of their use in this application
  - Explain how nanoparticles can be used to alter cell adhesion and migration
  - Describe the difficulties inherent in delivering nanostructures to the cytoplasm
  - Describe how nanostructures can interface with cellular transport systems
  - Describe and give examples of nanostructures used to manipulate free and bound cellular proteins
  - Explain how nanostructures can be used for cellular delivery; give examples of delivery for cancer treatment and gene therapy
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**Course Topics:**

- Introduction to Nanostructures
  - Synthesis of Nanostructures
  - Nanostructure Toxicity and Modifications for Biological Use
  - Nanostructures for Sensing
  - Nanostructures to Modify Cell Adhesion and Migration
  - Nanostructure Cellular Entry
  - Intracellular Transport of Nanostructures
  - Nanostructures for Controlled Delivery
  - Nanostructures for Cancer Treatment
  - Nanostructure to Manipulate Proteins
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**Designation:**

Elective