

HTI 5127 Nanobiotechnology Credit Value: 3

Originating Staff & Department: Dr. Thomas M.H. Lee / Dr. Mo Yang (HTI)

Pre-requisite: Nil

Recommended Background Knowledge: General Chemistry and Biology

Learning Outcomes:

At the completion of the subject, students should be able to:

- discuss the fundamentals of biofunctionalized nanostructured materials;
- apply the unique properties of these bio-nanomaterials for novel biomedical, biotechnological, as well as electronics applications;
- analyze the performance of these nanoscale technologies as compared to their macro- or micro-scale counterparts;
- integrate knowledge of chemistry, biology, and engineering to design nano-enabled devices;
- identify promising areas/future directions in the nanobiotechnology field;
- appraise the value of nanobiotechnology in scientific, economic, social, and environmental contexts.

Syllabus:

Introductory overview; preparation, characterization, and properties of nanostructured materials (e.g., metal nanoparticle, quantum dot, carbon nanotube, polymeric nanocarrier, and silica nanoparticle); biofunctionalization of nanomaterials (e.g., cell, nucleic acid, and protein); applications of biofunctionalized nanomaterials (e.g., diagnostics and screening technologies, drug delivery); nanofabrication/nanopatterning techniques and applications in implants, prostheses, and tissue engineering; DNA nanostructures and DNA-templated electronics; toxicity, health, and environmental issues.