Nanoscience

Hosted by the University of Tokyo
4 ? 15 July, 2011

Download a PDF version of the course profile

Course Description

This Lecture series provides a general overview of nanoscience, which has grown very rapidly in the last few years. It consists of 3 sub-courses of lectures. Each sub-course will include visits to active laboratories in the University of Tokyo.

Biotechnology: This sub-course focuses on advanced biomedical science and technology bound to the drug discovery. For example, the use of drug transporter function in the delivery of a drug to the target organ will be discussed. Advanced bioimaging technology reveals where and when genes and their products function in the body during the development and pathological processes. Useful derivatives of natural products are synthesized by rationally designed, structure-based mutants of the biosynthetic enzymes. Unique molecules involved with the carbohydrate recognition and the carbohydrate presentation will be illustrated to play important roles in pathological processes.

Biomedicine and Nanobiotechnology: This sub-course focuses on the understanding of the structure and functions of the living systems at the nano level as a basis for the development of bioinspired structures and functions as well as for the establishment of methodologies to integrate living components, including biomolecules and cells, into nanodevices while regulating their functions. To effectively achieve this goal, the course sets 4 topics: (1) Mechano-bioengineering; (2) Biodevice Technology; (3) Nanotechnology and Materials Science for Nanoscale Cell Therapy and (4) Nano Bioelectronics.

Nanotechnology: This sub-course covers fundamentals and applications of nanotechnology mainly established in a field of semiconductors, including the following four topics. (1) Nanostructures for advanced photonics; (2) Silicon-based integrated nanoelectronics; (3) Physics and technology of semiconductor nanostructures, and (4) Spintronics: fundamentals and applications.

A one-day excursion related to the lecture will be organized for GSP students as part of the course.

Students may take this course concurrently with Japan in Today?s World, Sustainable Urban Management and Introduction to the Japanese Language GSP courses offered by the University of Tokyo.

Target Audience

Undergraduate or Graduate students in any field are welcome.

Delivery Method, Exams & Learning Outcomes

The courses of ?biotechnology?, ?biomedicine and nanobiotechnology? and ?nanotechnology? research comprises 4 lectures and every lecture is 1.5 hour in duration. A 1 hour laboratory tour will be offered after every 2 lectures. This course attracts 1.5 credits at the University of Tokyo. Contact hours are estimated at 18 hours for lectures, and 6 hours for laboratory tours.

Planned Course Syllabus

Part I: Biotechnology
(1) Bioimaging and genetics of programmed cell death signal
(2) Membrane transporters and drug response
(3) Engineering of natural products biosynthesis
(4) Carbohydrate recognition in action

Part II: Biomedicine and Nanobiotechnology
(1) Mechano-bioengineering
(2) Biodevice Technology
(3) Nanotechnology and Materials Science for Nanoscale Cell Therapy
(4) Nano Bioelectronics

Part III: Nanotechnology

(1) Nanostructures for advanced photonics
(2) Silicon-based integrated nanoelectronics
(3) Physics and technology of semiconductor nanostructures
(4) Spintronics: fundamentals and applications

Assessment will be made in consideration of attendance frequency and several short essays on the subjects chosen from each sub-course of Nanoscience lectures (one from Biotechnology, one from Biomedicine and Nanobiotechnology, and one from Nanotechnology) submitted no later than the designated date.

Where You Will Stay

Students will be accommodated in Hotel Kizankan, located close to the University of Tokyo?s Hongo Campus (Approximately 5 minutes walk). For further information about the Hotel Kizankan, visit: **www4.ocn.ne.jp/~kizanweb/**

Costs

Tuition fee: JPY 22,200
Accommodation: JPY 85,000 (does not include meals and other costs)
Estimated living expenses: approximately JPY 3,000 per day

Further Information

For further information about this course, visit http://www.adm.u-tokyo.ac.jp/res/stuex/IARU_GSP/index.html

---

THE BASICS:

Lecturers:
Faculties from the fields of Engineering and Pharmaceutical Sciences

Tuition: JPY 22,200

Accommodation costs:
JPY 85,000

Target audience:
Undergraduate or Graduate students in any field are welcome.

About the University of Tokyo:

Founded in1877, the University of Tokyo (Todai) is a prestigious leading university that provides a full spectrum of academic activities which allows students to develop intellectual depth while acquiring professional skills. It has been a supportive collaborator in various IARU initiatives such as the Global Security and Sustainable Cities research projects. The spirit of perseverance towards the creation of a global research and education network distinguishes Todai from its peers. With its belief in the value of providing a varied academic environment, Todai brings an inherent richness of culture in its engagement with the Alliance. For more information, visit: http://www.u-tokyo.ac.jp/index_e.html

---

http://www.iaru.ethz.ch/gsp/courses2011/tokyo/02/profile