Hands-on Course in Nanotechnology
(includes Field-trip to Argonne National Laboratory)

Course Title: Fundamentals of Micro and Nanofabrication
Course code: 029:135 (PHYS: 3750), 3 s. h

Course description:

Link: https://isis2.uiowa.edu/isis2/courses/details.page?id=738142&ci=162297

What is the course about?
This undergraduate/graduate multidisciplinary course listed by the Department of Physics and Astronomy and offered by the Optical Science and Technology Center will be available for the second time in the Spring of 2014. Students from various disciplines were enrolled in this course last Spring. The topics of the course deal with the fundamentals of micro- and nano-fabrication techniques involved in the manufacture of a wide range miniature devices with applications in areas as diverse as computing, communications, energy, medicine, genomics and bio-medical. The course involves a series of laboratory experiments where students acquire hands-on experience on state-of-the-art tools in the new cleanroom in the University of Iowa Microfabrication Facility (UIMF), in the Optical Science and Technology Center (OSTC).

Key Course Modules and hands-on Labs: Lithography, NanoImprint, Atomic Layer Deposition, Electron Beam metal deposition and dielectric sputterer, Reactive Ion Etching, Scanning Electron Microscope, 3D Optical Profiler and Ellipsometry.

Field trip to the Argonne National Laboratory
A free field trip to the Center for Nanoscale Materials, Argonne National Laboratory has been arranged for the students enrolled in this course. This trip is made possible through the Associate Dean Curriculum Award.

Why is this course important?
The field of Micro- and Nano-fabrication is the meeting ground of engineering, biology, physics, medicine and chemistry. Most of these disciplines converge at the nano-scale towards the same building blocks, principles, tools of investigation and fabrication. This emerging field is already impacting many areas of nanotechnology by generating new products and enabling technologies that will enhance our lives on many levels. It is estimated that about 2 million workers in this
field will be required by the year 2020 [1], with over half of the workers required in North America alone. Some experts have characterized the field of Nanotechnology to be in the process of giving birth to the second industrial revolution [2]. The overarching benefit of this course is to address the potential shortage of these skills by equipping students with the key fundamentals and hands-on skills in the area of micro- and nano-fabrication. The course also encourages interdisciplinary learning since disciplines such as chemistry, physics, biology, materials science and engineering are central to the study, experimentation and further development of nanotechnologies [3]. It is a fact that students work with computers and high-tech devices but probably, most of them have remote ideas about the micron- and nano-technologies involved despite the fact that these devices are fabricated using a suite of micro- and nano-fabrication tools. They are comfortable with the concept of moving information around electronically but the idea of literally creating and moving ‘nano-size’ features to build devices is still remote to them. This course offers a general approach to nanotechnology, micro- and nano-fabrication with the objectives of (a) providing a solid theoretical, hands-on and broad information base on which students can build upon, and (2) creating a versatile nanotechnology workforce that can move from industry to industry [4].


For more information on this course, please contact:

Aju Jugessur Ph.D.
Director, University of Iowa Microfabrication Facility
Professor (Adj.), Department of Physics and Astronomy
OSTC, Iowa Advanced Technology Labs, University of Iowa, 205 N. Madison,
Iowa City, Iowa 52242 US, Office: 202 IATL, 319-353-2342, Fax 319-353-1989
E-mail: aju-jugessur@uiowa.edu