

Summer Academy in Applied Science and Technology Nanotechnology 2013

Welcome to University of Pennsylvania's SAAST Nanotech Program!

Nanotechnology, shortened to "Nanotech", is the study of the control of matter on an atomic and molecular scale. Generally, nanotechnology deals with structures of the size 100 nanometers or smaller, and involves developing materials or devices within that size. There has been much debate on the future of implications of nanotechnology. Nanotechnology has the potential to create many new materials and devices with wide ranging applications, such as in medicine, electronics, and energy production. On the other hand, nanotechnology raises many of the same issues as with any introduction of new technology, including concerns about the toxicity and environmental impact of nanomaterials.

Class time and dates

July 8th~ July 26th

Monday-Friday, 9am – 5pm.

Location

AM - Laboratory sessions – Skirkanich 225

PM - Lectures and Demos/activities – Berger Auditorium (Skirkanich Hall)

Content

This class will focus on the atomic and molecular structure and other concepts necessary to understanding why very small systems exhibit unique behavior. We will also explore various applications. Through lecture, class discussion, and labs, we will cover topics in nanomaterials, nanofabrication techniques, imaging nanostructures, real-life applications of nanotechnology, and nanoscience ethics.

Grading:

Homework - 20%

Labs - 10%

Quizzes - 25%

Presentations - 10%

Final Project - 35%

The SAAST Staff

Instructor

James McGonigle

Laboratory Instructor

Casey McQuade

Teaching Assistants

Amar Thacker

Praveen Bains

Resident TA's

Courtney Bender

Blake Bleier

Victor Ngo

Daniel Sha

SAAST Nanotech 2013 Syllabus

<u>Date</u>	<u>Lecture Topic(s)</u>	<u>Labs/Research</u>
Monday, 8 July	Intro to nanotechnology Atomic structure Atomic bonding	NanoDays Demos
Tuesday, 9 July	Lattices Phase Transformations Nanostructures	Liquid Crystals Library tutorial (pm)
Wednesday, 10 July	<i>11:30 am – master lecture</i> Characterization at the nanoscale <i>Guest talk - Dr. Roscio Cardona</i> <i>Super capacitors/conductive polymers</i>	Solar Cells
Thursday, 11 July	Top-down microfabrication Bottom-up microfabrication <i>Guest Talk: Kyle Keenan</i> <i>Microfabrication presentations</i>	Lab rotations: Conductive polymers AFM facility SEM facility
Friday, 12 July	Solar cells + fuel cells <i>Weekly Quiz</i>	Complete lab write-ups Group research project work (PM)
Monday, 15 July	Field trip (all day) DuPont Experimental Station and Hagley Museum	
Tuesday, 16 July	Nano-bio I	Bacterial transformation Encapsulation (polymers)
Wednesday, 17 July	Nano-bio II	Green Fluorescent Protein purification
Thursday, 18 July	<i>11:30 am – admission workshop</i> <i>Guest talk: Rajatesh Gudibande,</i> <i>Biosensors</i> Colloids and Quantum Dots	Biofuels catalysis Group research projects (PM)
Friday, 19 July	LEDs/OLEDs MEMS/NEMS <i>Weekly Quiz</i>	Complete lab write-ups Group research work (PM)
Monday, 22 July	Nano and the Environment Nanotechnology ethics	Colloidal nanoparticles synthesis and antimicrobial activity
Tuesday, 23 July	Work on group projects	Toxicology of nanoparticles
Wednesday, 24 July	Work on group projects	Complete lab write-ups Group research projects (PM)
Thursday, 25 July	<i>Weekly Quiz (last)</i>	Group research projects
Friday, 26 July	Final presentations and poster session	

