

# ***PHYS 4574***

## ***Nanotechnology***

**Lectures** : TTh 5:00-6:15 pm, Room 112 Robeson Hall

**Text** : *Introduction to Nanoscale Science and Technology*, M. Di Ventra, S. Evoy, J.R. Heflin, eds.

**Instructor** : Prof. R. Heflin, Room 107 Robeson, ext. 1-4504, rheflin@vt.edu

**Office Hours** : M 11:00-12:00, Th 1:00-2:00, and by appointment.

### **Rationale of course :**

The evolution of microelectronic, optoelectronic, magnetic, integrative, and biomedical technology increasingly calls for revolutionary approaches to device design and manufacturing. More than ever, a cross-cutting background is required to address some of the fundamental issues involved in these areas. Specifically, nanoscale science and engineering is a broad and interdisciplinary area of research and development activity that has been growing explosively worldwide in the past several years. It has the potential for revolutionizing the ways in which materials and products are created and the range and nature of functionalities that can be accessed. This course provides an overview of the manufacturing challenges and revolutionary changes that the such fields will be facing within the next two decades, as well as prospective solutions made possible by such novel approaches to device design and manufacturing.

**Web Page** : [www.phys.vt.edu/~rheflin/s07-4574](http://www.phys.vt.edu/~rheflin/s07-4574)

The web page will have pdf files of the lecture transparencies and of some supplementary reading materials, as well as links to items of interest.

<b>Grades</b> :	Tri-weekly writing assignments (~4) :	40%
	Reading evaluation quizzes (~5) :	30%
	Final Team Project :	30% (15% paper/15% presentation)

- Writing assignments will consist of 2-3 page (double-spaced) overviews of current literature.
- Quizzes will be closed book/notes and primarily of a short answer, qualitative nature. Quizzes will be announced in advance.
- The Final Project will be a more in-depth survey of a current research topic selected by each team of 2-4 students. The project will consist of a 10 page (double-spaced) written report and a ~15 minute presentation made during the time scheduled for the Final Exam.

### **Course Topics:**

I. Nanoscale Fabrication and Characterization	15 %
II. Nanomaterials and Nanostructures	15%
III. Nanoscale and Molecular Electronics	15 %
IV. Nanotechnology in Magnetic Systems	15 %
V. Nanotechnology in Integrative Systems	10 %
VI. Nanoscale Optoelectronics	15 %
VII. Nanobiotechnology	15 %