

UN2600

Fundamentals of Nanoscale Science and Engineering

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John Jaszczak, Physics

102 Fisher (7-2255, jaszczak@mtu.edu)

Bruce Seely, Social Sciences

215 Acad. Off. Bldg (7-2113; bseely@mtu.edu)

Course Web Site: <http://nano.mtu.edu/un2600-sp06.htm>

GENERAL

This class is designed to be an introductory seminar on the topic of nanotechnology. The course will be oriented toward first and second year students, especially for those considering a minor in Nanoscale Science and Engineering (Nanotechnology), but all MTU students are welcome.

The class has a couple of general goals. **First**, we intend to examine three specific aspects of nanotechnology: (1) the basic science underlying the field; (2) aspects of engineering and scientific applications at the nanoscale; and (3) the societal implications of nanoscale science and engineering. In a two-credit course, we cannot explore any dimension in great depth. But we intend to give you a working knowledge of the basics in each area. **Second**, we hope to familiarize students with the trends of current research in nanotechnology. A number of MTU faculty will deliver short presentations on their work and their fields of expertise. **Third**, we will ask students to explore a specific topic of their choosing, preparing a report that summarizes their findings and then presenting a summary of that report to the class.

COURSE EXPECTATIONS

Because this is a two-credit course, we have scaled the work load accordingly. The main expectations we have are that you will attend all class meetings and read the assigned text by Ratner and Ratner, *Nanotechnology: A Gentle Introduction to the Next Big Thing*. Most weeks the reading involves one, or at most two, chapters. It is likely that we will identify other readings on occasion – mainly new articles – to accompany some of the course topics. We will try and make these available to you electronically or through the library's electronic database facilities.

It is important that you complete the reading assigned for each class period, given our plans for the class meetings. This is a seminar, which means that students bear partial responsibility for the conduct of the class. We assume that in an elective class like this, you want to be here, and will accept that responsibility and come prepared and ready to participate. In practical terms, a seminar means we will spend part of each hour discussing the assigned reading. A significant part of the final course grade will rest on participation, determined by attendance at the class sessions or lectures and on actual contributions to class discussions.

We also expect each student to undertake a small research project to explore the state of the art in some area of nanoscience or nano-engineering. You choose the topic, clearing it with one of the faculty members involved. We will provide a style sheet and complete project description. We expect the paper to be 7-10 pages in length. Among the questions to think about in selecting a topic are these: What is the state of the art in X area of nano research? What are the scientific or engineering challenges facing researchers in a given domain (biomedical engineering, computing, manufacturing, etc.)? What are the scientific implications of work at this scale for a given field of science and engineering? What tools are required to advance nanoscale work? We plan to

arrange for project reports to be delivered poster session-style at the end of the term. The only other requirement will be that *every project* must include attention to the societal implications of the area under investigation. Full details will be distributed after the course is underway. Each student will then present their paper to the class during Week 13. A poster style presentation is recommended.

We will not give exams or quizzes, given the seminar style. We may, however, ask that students prepare quick reaction assignment that will not be graded. You will be asked to fill out a “Most Memorable Item” sheet after every class. Four short papers will be assigned.

RESOURCES

As mentioned, the main resource for the class is the Ratner and Ratner book. But important tools for the class include the course web site and the nano home page: <http://nano.mtu.edu>, which contains general information, including materials about on-going nano activities at Michigan Tech, and other materials of interest to the class. We will maintain a course email list un2600-l. You can use the moderated list to ask questions of the faculty, or discuss relevant topics with the class.

GRADES

Class Participation	30%,
Research Project	40%
In-class, short papers	30%

PRELIMINARY SCHEDULE

See the course web site at <http://www.nano.mtu.edu/un2600-sp06.htm>

MTU ADA Statement

MTU complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990 (ADA). If you have a disability and need a reasonable accommodation for equal access to education or services at MTU, please call Dr. Gloria Melton, Dean of Students, at 2212. For other concerns about discrimination, you may contact your advisor, department head/chair, or the Affirmative Action Office.