

# Dakota County Technical College

## NANO 1200: Fundamentals of Nanotechnology II

### A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: \*.\*

OJT Hours/Week: \*.\*

Prerequisites:

This course requires all four of these prerequisites

MATS 1300 - College Algebra

BIOL 1500 - General Biology

NANO 1100 - Fundamentals of Nanotechnology I

PHYS 1100 - College Physics I

Corequisites: None

MnTC Goals: None

The second semester course focuses on the material science, chemistry and physics aspects of the nanoscale. The course begins with the discussion of elemental material attributes and how environment can impact properties and performance of the starting material. Crystal structure and material properties are then discussed with an emphasis on differences in interactions and measurements at various scale realms. Using the current semiconductor fabrication process as a foundation, students are introduced to the concepts and limitations of current photolithography and etching processes. New approaches toward electronic circuits are introduced as students gain an understanding of the current process and necessary operation concepts for today's electronic devices. Finally, the concepts of fluid mechanics, optics, photonics and lasers are discussed with an emphasis on new devices and applications based on nanoscale properties. Students taking this course should either have taken chemistry and the second semester of physics or be enrolled in these courses concurrent with the 1200 course.

**B. COURSE EFFECTIVE DATES:** 08/23/2004 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

### D. LEARNING OUTCOMES (General)

1. nanotechnology being applied to sensors, thermoelectric materials, thin films, electronics and other technologies such as composite materials
2. physical parameters important for different applications
3. potential societal impacts of nanobiotechnology
4. terminology and vocabulary used to discuss nanoscale phenomena as it applies to chemistry and physics
5. tools used to work at the nanoscale in scientific areas

### E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

### F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

### G. SPECIAL INFORMATION

None noted