NANOFABRICATN MANUF TECHNOLGY (NFMT)

NFMT 311: 3 s.h.
Materials, Safety & Equipment Overview for Nanotechnology
Focuses on issues encountered in the practice of "top down" and "bottom up" nanofabrication and the safe operation and maintenance of nanofabrication processing equipment and materials-handling procedures. Includes clean-room protocol, safety and environmental and health issues in the nanofabrication facility at Penn State University. 2 hrs. lec., 2 hrs. lab. Coreq: NFMT 312. Completed at Penn State University in State College during "Capstone Semester."

NFMT 312: 3 s.h.
Basic Nanotechnology Processes
Hands-on introduction to the processing sequences involved in "top down," "bottom up" and hybrid nanofabrication. Details a step-by-step description of processes to fabricate devices and structures. Stresses the importance of environmental control (gas, liquid, vacuum) in processing. 2 hrs. lec., 2 hrs. lab. Prereq: Admission to the NFMT "Capstone Semester. Coreq: NFMT 311. Completed at Penn State University in State College during "Capstone Semester."

NFMT 313: 3 s.h.
Thin Film Utilization
In-depth, hands-on exposure to depositing and etching a wide variety of materials, including dielectrics, semiconductors organics, polymers, metallic materials and molecular films. Students work in small teams and develop oral and written reports. 2 hrs. lec., 2 hrs. lab. Prereq: NFMT 311 and 312. Completed at Penn State University in State College during "Capstone Semester."

NFMT 314: 3 s.h.
Lithography
Hands-on treatment of all aspects of advanced pattern transfer and pattern-transfer equipment. Includes pattern-generation processes, photolithography, particle beam lithographic techniques, probe pattern generation and three types of lithography (embossing, stamp, self-assembled). 2 hrs. lec., 2 hrs. lab. Prereq: NFMT 311. Completed at Penn State University in State College during "Capstone Semester."

NFMT 315: 3 s.h.
Materials Modification in Nanotechnology
Detailed coverage of material-processing steps for molecular functionalization, cross-linking, metal silicidation, material oxidation, materials nitradion, barrier materials, alloying, annealing and doping. Includes avoiding unintentional materials modification via the use of diffusion barriers, encapsulation, electromigration, corrosion, stress effects and adhesion. 2 hrs. lec., 2 hrs. lab. Prereq: NFMT 311. Completed at Penn State University in State College during "Capstone Semester."

NFMT 316: 3 s.h.
Characterization, Testing Nanotech Structures & Materials
Examines a variety of techniques and measurements essential for testing and for controlling final device performance and final packaging. Problems and solutions concerning the interfacing of the macro-world with micro- and nano-scale devices will be analyzed and examined. 2 hrs. lec., 2 hrs. lab. Prereq: NFMT 311. Completed at Penn State University in State College during "Capstone Semester."