

# ELT 220 : Material, Safety, and Equipment Overview for Nanofabrication

This course provides an overview of the materials, safety and equipment issues encountered in the practice of "top down" and "bottom up" nanofabrication. It focuses on safety, environmental and health issues in equipment operation and materials handling as well as on clean-room protocol. Topics to be covered include: clean-room operation, OSHA lab standard safety training, health issues, Biosafety Levels (BSL) guidelines, and environmental concerns. Safety issues dealing with nanofabrication equipment, materials, and processing will also be discussed including those pertinent to biological materials, wet benches, thermal processing tools, plasma based equipment, stamping and embossing lithography tools, vacuum systems and pumps, gas delivery systems and toxic substance handling and detection. Specific material handling procedures to be discussed will include corrosive, flammable, and toxic materials, biological materials, carcinogenic materials, DI water, solvents, cleaners, photo resists, developers, metals, acids, and bases. The course will also concentrate on safe equipment maintenance and operation. Students will be given an overview of basic nanofabrication materials, equipment and equipment operation. This technical overview and operational introduction to processing equipment and characterization tools will include: chemical processing, furnaces, vacuum based processing (physical vapor deposition equipment, chemical vapor deposition equipment, and dry etching equipment), and lithography as well as scanning probe microscopy (e.g., atomic force microscopy), optical microscope, electron microscopy (e.g., scanning electron microscopy), ellipsometer, nanospec, and profilometer equipment.

**Credits** 3

**Notes**

Course offered on the Penn State University Campus in partnership with the Penn State University Nanotechnology Program.