

# Nanofabrication Technology A.A.S. (NMT)

This program of study prepares students for technician-level jobs, including those in chemical technology, electronics technology, biotechnology, biopharmaceutical labs, micro-technology labs, and material science industry labs. Students will study electronics at LCCC for three semesters and complete the last semester at the nanofabrication facility at Pennsylvania State University (PSU). Industries involved with nanofabrication include microelectronics, optoelectronics, biopharmaceuticals, and materials. Current spending on nanotech by the U.S. government and industry exceeds \$3 billion a year. Over the next 10 years, nanotechnology will transform every industry sector, from advanced materials, agriculture, and chemicals to electronics, energy, defense, and transportation. Students will have an in-depth knowledge of nanofabrication industry practices and procedures.

**Upon successful completion of this program, graduates will be able to:**

- use digital circuits common to computers, such as logic gates, flip flops, counters and arithmetic circuits.
- interpret data sheets of various integrated circuits to select the proper integrated circuit for a given application.
- describe the fundamental concepts needed for a thorough understanding of modern biotechnology and its applications.
- list the objectives, techniques, and problems related to the application of biotechnology in many different fields.
- describe the basic material types used in nanofabrication.
- define and explain the interdisciplinary nature of the nanoscience field.
- properly operate equipment used in the basic nanofabrication process.
- explain the safety and health issues involved with the nanofabrication process.
- describe various vacuum pump systems and verify when a system is functioning properly.
- describe thin film deposition and etching practices.
- explain the aspects of photo-lithography from the design to mask fabrication to pattern transfer and inspection.
- demonstrate effective communication skills by writing technical reports based on laboratory experiences.
- demonstrate critical thinking/problem-solving abilities by analyzing a nonfunctioning electrical circuit, determining the problem, and restoring circuit operation.
- demonstrate interpersonal relations, teamwork, and work ethics through group laboratory projects.

First Semester		Credits
BGT 110	Fundamentals of Technology	3
ELE 120	DC Circuits	4
ELE 130	Digital Fundamentals	4
ENG 105	Research and Composition	3
MAT 130	Industrial Mathematics	3
		17

Second Semester		Credits
ELE 165	AC Circuits	4
ENG 107	Writing in the Workplace	3
CHE 108*	Essentials of Chemistry	4
Elective	Social Science/Humanities	3
		14

Third Semester		Credits
ELE 210	Electronic Circuits	4
PHY 110	Elements of Physics	4
Elective	Social Science/Humanities	3
Elective <sup>+</sup>	Technical	3
		14

Fourth Semester		Credits
◆(Course taken at PSU's Nanofabrication Facility)		
SMT 211	Materials, Safety and Equipment, Overview for Nanofabrication	3
SMT 212	Basic Nanofabrication Processes	3
SMT 213	Thin Film in Nanofabrication	3
SMT 214	Lithography for Nanofabrication	3
SMT 215	Materials Modification in Nanofabrication	3
SMT 216	Characterization, Packaging, and Testing of Nanofabricated Structures	3
		18
<b>Credit Total</b>		<b>63</b>

\*Students must elect CHE 108 or any chemistry course or sequence of chemistry courses CHE 108 or higher.

<sup>+</sup>Students may choose from one of the following courses: BGT 240 Industrial Automation, EGR 101 Engineering Graphics, ELE 175 Introduction to Microprocessors, or MAT 150 Introduction to Probability and Statistics.

◆Fourth semester class work is held at PSU's nanofabrication facility. These courses are designed to be capstone courses for the Nanofabrication Technology program. These courses are lab intensive, leveraging the nanofabrication facility at PSU's University Park campus. All lectures will be given in a technology classroom. This classroom is dedicated to the Center for Nanofabrication Manufacturing Technology and thus has a wide variety of specialized, hands-on materials and facilities continually available to students.

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