# Nanotechnology, AAS

## School of Math, Science and Engineering

The Nanotechnology AAS prepares students for work in diverse fields such as biotechnology, pharmaceutical research, nanomanufacturing, semiconductor manufacturing, and more. Students learn to work with materials at nanoscale in analysis, production, and data collection. Graduates' skills include product flow, quality control, and problem solving. Students complete the first three semesters at Westmoreland then complete nanotechnology courses at the Nanofabrication Facility at Penn State University (PSU) in University Park, PA. Students need to apply for admission for the nanotechnology program at PSU at least one semester prior to the semester at PSU. Tuition for MPT courses completed at Penn State will be equal to Westmoreland tuition.

### Career Opportunities

Occupations for graduates of this program include laboratory, quality control, and manufacturing technicians in fields such as bionanotechnology, medicine, pharmaceutical and semiconductor manufacturing, optoelectronics, biomedical applications, and microelectromechanical devices.

### Program Learning Outcomes

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

- Demonstrate an understanding of nanotechnology principles and concepts
- Apply concepts from chemistry, engineering, electronics and mathematics to nanotechnology experiments and nanomanufacturing.
- Apply understanding of nanofabrication manufacturing systems to practical situations and laboratory results to experimental applications.
- Operate and maintain nanotechnology electromechanical equipment used in nanotechnology laboratories and basic nanofabrication manufacturing.
- Identify, analyze and troubleshoot problems using systems approach.
- Schedule production, test materials, integrate systems.
- Communicate effectively and appropriately; record and report information significant to the job.

| Sugg. Term | Seq # | Course ID | Course Title | Cr. | Term Offered | Prereq(s) | Options Available |
|---|---|---|---|---|---|---|---|
| 1st Fall | 1 | PDV 171 | Career Pathway Exploration | 3 | F | | |
| | 2 | MPT 101 | Introduction to Nanotechnology | 1 | F, Sp, Su | | |
| | 3 | MTH 157 | College Algebra | 3-4 | F, Sp, Su | MTH 100, 100A or Placement | MTH 158, 172, 173, 271, 272, 275, 277, 108, or 109 |
| | 4 | ENG 161 | College Writing | 3 | F, Sp, Su | | |
| | 5 | CHM 107 | Introductory Concepts in Chemistry I | 4 | F, Sp, Su | MTH 052 or 052A or Placement | CHM 108, 155, 156, or 264 |
| 1st Spring | 6 | ENG 162 | Technical Communication | 3 | F, Sp, Su | ENG 161 | ENG 164 |
| | 7 | CPT 145 | Introduction to Computer Technology | 3 | F, Sp, Su | | CPT 150, 160, DFT 258, or 266 |
| | 8 | PHY 107 | Applied Physics | 4 | F, Sp, Su | MTH 100, 100A, 108, or Placement | PHY 155, 156, 255, or 256 |
| | 9 | Elective | Restricted Program Elective | 3-4 | F, Sp, Su | | |
| | 10 | Elective | Restricted Program Elective | 3-4 | F, Sp, Su | | |
| 2nd Fall | 11 | SOC 155 | Principles of Sociology | 3 | F, Sp, Su | | PSY 160, ECN 255, 256, or GEO 155 |
| | 12 | PHL 155 | Introduction to Logic | 3 | F, Sp, Su | | PHL 161, SPC 155, or 156 |
| | 13 | Elective | Restricted Program Elective | 3-4 | F, Sp, Su | | |
| | 14 | Elective | Restricted Program Elective | 3-4 | F, Sp, Su | | |
| 2nd Spring | 15 | MPT 211 | Material Safety & Equipment | 3 | Sp, Su | MTH 157 & ENG 161 | |
| | 16 | MPT 212 | Basic Nanotechnology Process | 3 | Sp, Su | MTH 157 & ENG 161 | |
| | 17 | MPT 213 | Materials in Nanotechnology | 3 | Sp, Su | MTH 157 & ENG 161 | |
| | 18 | MPT 214 | Patterning in Nanotechnology | 3 | Sp, Su | MTH 157 & ENG 161 | |
| | 19 | MPT 215 | Material Modification for Nano | 3 | Sp, Su | MTH 157 & ENG 161 | |
| | 20 | MPT 216 | Char, Testing of Nano Structures | 3 | Sp, Su | MTH 157 & ENG 161 | |

Total Program Credits 60-65*

* This program requires at least 60 credits. Courses taken to fulfil Restricted Program Electives may not also be used to fulfil other course requirements within the program.

Restricted Program Electives:
ALH 120 Pharmacology
ALH 122 Medical Terminology
BIO 107 Human Biology
BIO 145 Botany
BIO 155 General Biology I
BIO 156 General Biology II
BIO 171 Anatomy & Physiology I
BIO 172 Anatomy & Physiology II
BIO 210 Zoology
BIO 255 Making Sense of Classical Genetics
BIO 265 Microbiology
CHM 275 Biochemistry
BIO 285 Molecular Genetics
BUS 158 Principles of Management
BUS 260 Small Business Management
BUS 262 Entrepreneurship
CHM 107 Intro. Concepts in Chemistry
CHM 108 Intro. Concepts in Chemistry II
CHM 155 General Chemistry I
CHM 156 General Chemistry II
CHM 250 Organic Chemistry I
CHM 251 Organic Chemistry II
CHM 225 Chemistry for the Health Sciences
CPT 145 Introduction to Computer Technology
CPT 150 Microcomputer Concepts

Restricted Program Electives continued:
CPT 160 Introduction to Programming
CPT 163 Java Programming
CPT 180 C++ Programming
CPT 182 Operating Systems
CPT 213 Java Programming II
DFT 112 Introduction to Design, Materials and Processing
EGR 104 Engineering Materials
EGR 210 Quality Control
EGR 221 Statics and Strength of Materials
EGR 227 Kinematics
ELC 102 Electronic Devices
ELC 106 Circuit Analysis I
ELC 107 Circuit Analysis II
ELC 114 Digital Techniques
ELC 202 Linear Electronics
ELC 206 Microprocessors
ELC 213 Microprocessor Applications
MTH 160 Introduction to Statistics
PHY 107 Applied Physics
PHY 155 College Physics I
PHY 156 College Physics II
PHY 255 Engineering Physics I
PHY 256 Engineering Physics II
PHY 258 Modern Physics
PHY 259 Thermodynamics and Fluid Mechanics