

Building a Nanotechnology Program Using NACK's Resources

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Formation of the program

- A proposal for establishing a nanotechnology program at Ivy Tech –South Bend was written by a group of administrative and faculty members
- The central office of Ivy Tech in Indianapolis approved the proposal
- The Indiana Commission of Higher Education approved the program
- I was hired in March 2011 as chair and the only faculty member for the program
- First nanotechnology students entered the program in August 2011

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Adopting a Curriculum for Nanotechnology Program at Ivy Tech

- I attended two workshops at Penn State NACK center in summer 2011:
 - 1) Nanotechnology Course Resources I: Safety, Processing, and Materials
 - 2) Nanotechnology Course Resources II: Patterning, Characterization, and Applications
- I realized that I could adopt the NACK Center curriculum and use labs and lectures developed by NACK

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Why Ivy Tech decided to Adopt NACK Curriculum?

- Well-designed curriculum that teaches a wide range of nanotechnology skills to students
- Availability of the curriculum at www.nano4me.org
- Impressive record of employment for NACK alumni

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Nanotechnology Curriculum at Ivy Tech

- Leads to Associate of Science degree in Nanotechnology
- Consists of 65 credit hours of general education and nanotechnology courses
- Consists of 8 nanotechnology courses, each 3 credit hours
- One internship
 - 2 credit hours
 - Could be industrial or academic
 - Example: Nanotechnology Undergraduate Research Fellowship (NURF) at Notre Dame

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Nanotechnology Courses and sequence

Semester 1

NANO 101: Fundamentals of Nanotechnology

NANO 102: Materials, Safety, & Equipment Overview for Nanotechnology

Semester 2

NANO 201: Basic Nanotechnology Processes

NANO 211: Materials in Nanotechnology

Semester 3

NANO 221: Patterning for Nanotechnology

NANO 231: Materials Modification in Nanotechnology

Semester 4

NANO 241: Characterization and Testing of Nanotechnology Structures & Materials

NANO 251: Electronics and Solid State Devices in Nanotechnology

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How do you build a nanotechnology lab or a clean room?

What if there is not enough Funding?

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Again, NACK has a solution!

Remote Access to their equipment

Example: Remote Access to SEM

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You can also form partnership with a university and use its cleanroom

- University of Notre Dame agreed to let Ivy Tech students to use its nanofabrication facility and cleanroom
- Notre Dame charges Ivy Tech for an internal fee
- Ivy Tech adds the fee to students' tuition

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**Or, if funding is available start
building your own nanotechnology
lab or cleanroom**

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Ivy Tech Nanotechnology Laboratory

Ivy Tech has its own nanotechnology laboratory which will become “cleanroom” in near future

It has:

- Scanning Electron Microscope
- Atomic Force Microscope
- Optical Microscope
- Thermal Evaporator with sputtering capability
- Vacuum Training Systems
- Profilometer
- Ellipsometer
- Mask Aligner
- Spin Coater

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We have made Progress at Ivy Tech

- We now have a full-fledged Nanotechnology Program
- Enrollment is growing
- We offered an immersion semester of Nanotechnology similar to that of NACK
- We received accreditation from Association of Technology, Management and Applied Engineering (ATMAE)

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Summary: How to build a nanotechnology program

- Hire a nanotechnology faculty member or divide the load of teaching nanotechnology courses among several faculty members
- Use NACK Resources
- Use remote access
- Gradually acquire some equipment and build your own lab

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