



NANOSCIENCE AND NANOTECH: Industrial Application and Transformation

July 11–13, 2022 | Instructors: Brian Anthony, Vladimir Bulović | professional.mit.edu/nano

COURSE OVERVIEW

DAY 1

- A brief introduction to nano: Surprisingly familiar yet ripe for discovery
- Nano science through the lens of new companies and entrepreneurship
- Nanoscience: New behaviors in physical systems
- Nanotechnology: Applying insights across disciplines
- Survey of new companies, current applications and their supporting toolsets and established companies deploying new products in new markets
- Tour of fabrication and metrology toolsets inside new MIT.Nano facility
- Collaborative analysis
- The focus theme of the course is sensors and sensing systems
- The design and use of: Sensors that are made via nano fabrication
- Instruments to characterize phenomena at the nano scale:
 - The use of data from sensors for manufacturing and decision making
 - The use of data from instruments for accelerated learning and modeling

DAY 2

- Case studies of startup companies, MIT-based research and/or commercialized applications in nanoscience and nanoengineering
- Facilitated discussion
- Interactive discussions about participants' existing and planned use of nano

DAY 3

- The visualization and interaction side of data from nano metrology and sensors: Managing, processing, and visualization
- Final Q&A and wrap-up: What next?"



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Note: All times are US Eastern Daylight Time. Schedule is subject to change.

	DAY 1: MONDAY, JULY 11	DAY 2: TUESDAY, JULY 12	DAY 3: WEDNESDAY, JULY 13
9:00 AM	<p>Nano dictionary: What is nano intro, framing, and terms</p> <p>Nano MAP for today: Course outline for day</p> <p>Nano sensors, instruments, and data in: Textiles; food; oil and gas</p> <p>Manufacturing and scaling: Technologies and challenges</p>	<p>Discussion: Q&A; MUD clean-up</p> <p>Technology, uses, and future of nano in: Light, solar power, and guiding</p>	<p>Discussion: Q&A; MUD clean-up; review of homework</p> <p>Spin spin spin: NMR / MRI</p> <p>Nano in research: Computing needs and computing platforms; miniaturization of traditional compute; quantum computing</p>
10:15–10:30 AM	Break	Break	Break
10:30 AM	<p>Nano and sensors in startups: Hardware and devices</p> <p>Analysis and discussion</p>	<p>Intro to nano in bio and medicine</p> <p>Nano sensors, instruments, and data in research: Medical sensors / light, integrated photonics and biosensors, nano sensor device design and machine learning, and LUS imaging</p> <p>Discussion: Foreshadowing on nanoparticle reporters</p>	<p>Nano in research: Imaging and learning (and visualization)</p>
12:00–1:00 PM	Lunch Break	Lunch Break	Lunch Break
1:00–2:45 PM	<p>Getting into MIT.Nano, Tour (fab)</p> <p>Gown glove go: Tools and examples</p>	<p>Getting into MIT.Nano, Tour (metrology): Tools and examples</p> <p>Twist and Shout: Why is our metrology so good; We control our world; Vibration analysis</p>	<p>Getting into MIT.Nano, Tour (immersion): Tools and examples</p>
2:45–3:00 PM	Break	Break	Break
3:00–4:30 PM	<p>Group exercise: Project options, teaming, and start</p>	<p>Group exercise: Project options, teaming, and start</p>	<p>Discussion Q&A and wrap-up: What's next</p> <p>Closing and recognition to all</p>
4:30–5:00 PM	MUD cards	MUD cards	
5:00 PM	<p>Class ends</p> <p>Nano at Home: Watch Nano Explorations; Review start-ups</p>	<p>Class ends</p> <p>Nano at Home: Watch Nano Explorations; Review start-ups</p>	<p>Class ends</p>