Nanoscience and Nanotech: Industrial Application and Transformation
July 11-13, 2022

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.

	Intro and Context		
9:00 AM	**Nano Dictionary**	**What is nano intro / framing / terms**	
	Nano MAP for today	Outline for the course / day	
	Nano sensors, instruements, and data In	**. Textiles**	History, Why, Technology, Uses, Future
	(Established)	**Food**	""
		Oil and Gas	""
			""
	Manufacturing and Scaling....	see selected papers	Landscape of established mfg proceseses
	(Technologies)	reseach dive into SAM and roll-2-roll	New
	(Challenges)		
10:15-10:30	Break		
10:30 AM	**Nano and Sensors In Startups....**	**Hardware and Devices**	
	Analysis and Discussion	(what take to make a startup successful)	
12:00-1:00	Lunch		
	Getting into MIT.nano, Tour (fab)	**gown glove go....tools and examples**	
2:45-3:00	Break		
3:00-4:30	**Group exercise - project options, teaming, and start**		
4:30-5:00	**Mud Cards**		
5:00	Class Ends		
	Nano at Home	Watch Nano Explorations -	
		Review start-ups	

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

	Topics		
9:00 AM	**Discussion**	Q&A. MUD Clean-up	
		Review of Home Exercises	
	Nano in ...	**Light**	
		... Solar power	Technology, Uses, Future
		... Guiding -	
10:15-10:30	Break		
	Intro	**Nano / bio / medicine context**	
	Nano sensors, instruments, data in Resea	**Medical Sensors / Light**	Research Context, Results, Path to commercial
		... Integrated Photonics and Biosensors	
		... Nano Sensor Device Design and ML	
		Imaging - LUS	Research Context, Results, Path to commercial
	Discussion	(foreshadowing on nanoparticle reporters)	
12:00-1:00	Lunch		
	Getting into MIT.nano, Tour (metrology)	**Tools and Examples**	
	Twist and Shout	Why is our metrology so good. We control our world. Vibration analysis	
2:45-3:00	Break		
3:00-4:30	**Group exercise - project options, teaming, and start**		
4:30-5:00	**Mud Cards**		
5:00	Class Ends		
	Nano at Home	Watch Nano Explorations -	
		Review start-ups	

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?"□

	Topics		
9:00 AM	Discussion	Q&A. MUD Clean-up	
		Review of Homework	
	Spin spin spin	**NMR / MRI**	
	Nano in Research...	**Compute:**	
		(Computing Needs and Computing Platforms)_	
		... miniaturization of traditional compute	
		... Quantum computing	
10:15-10:30	Break		
	Nano in Research...	**Imaging**	
		Imaging and Learning (and visualization)	
	Discussion		
12:00-1:00	Lunch		
	Getting into MIT.nano, Tour (immersion)	**Tools and Examples**	
2:45-3:00	Break		
3:00-4:00	**Discussion Q&A and wrap-up: what's next**		
4:00-5:00	**Closing and recognition to all**		
5:00	Class Ends		