McMaster University

ECE778 - Introduction to Nanotechnology

Notice: Class starts from January 12, 2012 (6:00 PM-9:00 PM) at ITB-A311

Course Coordinator:

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Instructors:

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Dr. Ravi Selvaganapathy (Nano-MEMs)
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Grading:

Attendance: 20%

One project - 80%

Detail Schedule:

Faculty	Topic	Lecture Number	Date	Slide	Project
Dr. Chin-Hung Chen	Nano electronics	**1**	January 12		
	Nano electronics	**2**	January 19		
Dr. Xun Li	Nano material	**1**	January 26		
		2	February 02		
Dr. Wei-Ping Huang	Nano photonics	**1**	February 09		
		2	February 14		
Spring Break	No class		February 23		
Dr. Matiar Howlader	Nano integration	**1**	March 01		
Guest Lecture 1			March 08		
Dr. Matiar Howlader	Nano integration	**2**	March 15		
Guest Lecture 2			March 22		

Lab Trip	Nano characterization		March 29		
Dr. Qi-Yin Fang	Nano biology and medicine	**1**	April 05		
		2	April 12		
Final Project Due			**May 03**		
Dr. Ravi Selvaganapathy	Nano MEMS	**1**	May 10		
		2	May 17		

Course Objectives:

This course provides a fundamental knowledge in nanotechnology. It focuses on the new physical phenomena due to the reduction of device dimension and the new applications as a result of these new phenomena. The topics include nano-materials, nano-electronics, nano-photonics, nano-biotechnology, nano-MEMS and nano-integration. Students will learn what should be considered in the nano-world, what new applications we might be benefited from, and what precautions we need to pay attention when dealing with issues in the nano-world.

References:

1. G. W. Bryant and G. S. Solomon, *Optics of Quantum Dots of Wires*, Artech House.
2. W. P. Kirk and M. A. Reed, *Nanostructures and Mesoscopic Systems*, Academic Press.
3. Rainer Waser, *Nanoelectronics and Information Technology - Advanced Electronic Materials and Novel Devices*, 2nd Edition, Wiley-VCH, 2005.
4. L. Novotny and B. Hecht, *Principles of Nano-optics*, Cambridge University Press.
5. C. M. Niemeyer, *Nanobiotechnology: Concepts, Applications and Perspectives*, Wiley-VCH, April 9, 2004.
6. R. Freitas, *Nanomedicine, Volume I: Basic Capabilities*, Landes Bioscience, 1st edition, October 15, 1999.
7. P. Prasad, *Introduction to Biophotonics*, Wiley-Interscience, April 8, 2003.
8. N. Maluf, *An Introduction to Microelectromechanical Systems Engineering*, Artech House 2000.
9. W. Trimmer, *Micromechanics and MEMS: classic and seminal papers to 1990, IEEE*.
10. G. T. A. Kovacs, *Micromachined Transducers Sourcebook*, McGraw-Hill, 1998.
11. M. Gad-el-Hak, *The MEMS Handbook*, CRC Press, 2002.
12. G. Karniadakis, A. Beskok, N. Aluru, *Microflows and Nanoflows: Fundamentals and Simulation*, Springer 2005.
13. Geshke, *Microsystem Engineering of Lab-on-a-chip Devices*, John Wiley Sons, 2004.
14. N. T. Nguyen, S. Wereley, *Fundamentals and Applications of Microfluidics*, Artech House Publishers, 2002.
15. Stephen D. Senturia, *Microsystem Design*, Kluwer Academic Publishers, 2000.
16. M. Madou, *Fundamentals of Microfabrication*, New York: CRC Press, 1997.
17. Rao Tummala, *Fundamentals of Microsystems Packaging*, McGraw-Hill Professional; 1 edition, May 8, 2001.
18. Zheng Cui, *Nanofabrication: Principles, Capabilities and Limits*, Springer; 1st edition, 2008.
19. James E. Morris and Debendra Mallik, *Nanopackaging: Nanotechnologies and Electronics Packaging*, Springer; 1 edition, November 2007.
20. P. Rai-Choudhury, *MEMS and MOEMS Technology and Applications*, SPIE Publications, December 1, 2000.

Course Policy Reminders:

"The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem that cannot be resolved by discussion among the persons concerned, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible."
"Students are reminded that they should read and comply with the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registration and available in the Senate Office."