

ESM/BME/EST/MEC 213 Introduction to Interdisciplinary Studies in Nanotechnology (Elective)

Course Catalog description:

The emerging field of nanotechnology develops solutions to engineering problems by taking advantage of the unique physical and chemical properties of nanoscale materials. This interdisciplinary, co-taught course introduces materials and nano-fabrication methods with applications to electronic, biomedical, mechanical and environmental engineering. Guest speakers and a semester project involve ethics, toxicology, economic and business implications of nanotechnology. Basic concepts in research and design methodology and characterization techniques will be demonstrated. Course is cross-listed as BME 113, MEC 113 and EST 113, and is required for the Minor in nanotechnology Studies (NTS).

3 credits

Pre- or Corequisite(s): PHY 131 or PHY 125; CHE 131 or ESG 198

Text(s) or other required material:

“Nanotechnology: Understanding Small Systems”, by B. Rogers, S. Pennathur, J. Adams; CRC press, 2007

Course learning outcomes:

Understanding basic nature of nanotechnology; basics of nanomaterials, including electronic and mechanical properties; and the societal impact and managing possible risks of nanotechnology: present and future.

Topics Covered:

- Week 1. The nature of nanotechnology
- Week 2. Basics of nanomaterials, mechanical properties
- Week 3. Basics of nanomaterials, electronic properties
- Week 4. Characterization and imaging techniques; begin semester project
- Week 5. Manufacturing nanomaterials and nanotechnology
- Week 6. Case study: the role of nanotechnology in energy production and storage; fuel cell demonstration
- Week 7. Case study: the role of nanotechnology in medicine and health, including sensors, imaging, diagnostics and tissue engineering
- Week 8. Risks and nanotoxicology
- Week 9. The business of nanotechnology
- Week 10. Case study: environmental nanotechnology, including remediation and environmental impact
- Week 11. Laboratory visits
- Week 12. Societal impact of nanotechnology: present and future; ethics
- Weeks 13-14. Class presentations on semester research project on a current application of nanotechnology

Class/ Laboratory Schedule, i.e. number of sessions each week and duration of each session:

ESM	213	Studies in Nanotechnology	LEC	1	TU	5:15 PM	8:05 PM
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Contribution of Course to meet requirement of Criterion 5:

Engineering Science 50%, Laboratory Experience 10%, Mathematics __%, Basic Science 20%, General Education __%, Design Experience 20%

Relationship of course to program outcomes:

Person(s) who prepared this description and date of preparation: