Mechanical Engineering Dept. Department

Syllabus
ME 445: Principl/Nanostru Mat/Sen Tech (3-0-3)

Course Catalog Description:

Technological needs, justification and scope; Nanostructure materials and their properties; Top down and bottom up manufacturing techniques as typified by electrochemical and laser machining, chemical vapor deposition (CVD), Physical vapor deposition (PVD), Sputtering, Sol-gel synthesis and Ball milling; Industrial applications and future potential; Introduction to sensor basics; Primary sensor mechanisms, electrical measurement techniques, Characterization of sensors, Sensor fabrication principles; Enabling technologies; Applications in Saudi oil, gas, petrochemical industry and utilities

Course Pre-requisites:

- ME 205: Materials Science

Course Objectives:

1. be familiar with the important methods for processing nanostructured materials, especially those that are suitable for mechanical property studies.
2. Students will develop an understanding of scale-dependant properties of materials and their link to functionality and applications

Course Learning Outcomes:

CLO1. Explain the concept of nanotechnology as it applies to materials

CLO2. Distinguish between top-down and bottom-up synthesis methods

CLO3. sensors strategy and type of signals

CLO4. fabrication techniques

Learning Resources:

- None

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
group project	1	20.0%
final exam	1	30.0%

Assessment Task	Week Due	Weight
major exam 1	1	15.0%
interview	1	10.0%
presentation	2	10.0%
maj exam 2	None	15.0%

Lecture Weekly Schedule:

Week#	Topics
1	Technological needs, justification and scope
	Nanostructure materials and their properties
2	Nanostructure materials and their properties (Continue)
3	Nanostructure materials and their properties (Continue)
	Top down and bottom up manufacturing techniques as typified by electrochemical and laser machining
4	Top down and bottom up manufacturing techniques as typified by electrochemical and laser machining (Continue)
	chemical vapor deposition (CVD)
5	chemical vapor deposition (CVD) (Continue)
	Physical vapor deposition (PVD)
6	Sputtering, Sol-gel synthesis and Ball milling
7	Sputtering, Sol-gel synthesis and Ball milling (Continue)
8	ndustrial applications and future potentia
9	ndustrial applications and future potentia (Continue)
	Introduction to sensor basics
10	Introduction to sensor basics (Continue)
	Primary sensor mechanisms, electrical measurement techniques, Characterization of sensors, Sensor fabrication principle
11	Primary sensor mechanisms, electrical measurement techniques, Characterization of sensors, Sensor fabrication principle (Continue)
12	Primary sensor mechanisms, electrical measurement techniques, Characterization of sensors, Sensor fabrication principle (Continue)
	Enabling technologie
13	Enabling technologie (Continue)
14	Applications in Saudi oil, gas, petrochemical industry and utilities
15	Applications in Saudi oil, gas, petrochemical industry and utilities (Continue)