

**WORCESTER POLYTECHNIC INSTITUTE  
MECHANICAL ENGINEERING DEPARTMENT**

*ME – 593M*

***MEMS and Nanotechnology***

Spring'2002

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**COURSE DESCRIPTION**

This course deals with micromechatronics and microelectromechanical systems (MEMS)/Nanotechnology. Micromechatronics is an emerging technology that couples the fields of mechanical and electrical engineering. MEMS are an enabling technology leveraging integrated circuit technology with mechanical actuation. Examples of micromechatronics/MEMS range from sensors that actuate automotive airbag deployment, to sophisticated microengine/transmission networks smaller than a gnat's eye. This course will introduce students to classification, design issues, analysis, fabrication techniques, and testing methodologies of micromechatronics/MEMS devices. Applications of MEMS will be discussed and illustrated with representative examples.

Simple MEMS devices, such as pressure sensors, can transform mechanical energy into an electrical output. More sophisticated MEMS devices, such as microengines, incorporate mechanical elements such as gears, cams, linkages, and springs with microelectronic control to produce linear or rotational motions that, in turn, may act on optical, chemical, or biological components. Many of these microdevices can, under certain conditions, behave as their macro world counterparts would. However, many do not. We will investigate some of these differences including scaling issues. Integration of multiple devices into systems will also be discussed.

Testing methods, particularly of dynamic systems, will be presented and students will be able to operate, analyze, and test actual MEMS devices.

A class project will give students an opportunity to design, analyze, fabricate, and test a micro system of their own.

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