

<b>Course Title</b>	<b>Course Code:</b>	<b>Credit Hours:</b>
Micro-Electro-Mechanical-Systems (MEMS)	AE-486	3-0

**Textbooks:**

- Chang Liu, “Foundations of MEMS”, Pearson Education Asia
- Prime Faraday Technology Watch, “An Introduction to MEMS (Micro Electromechanical Systems)”

**Reference Book:**

- Stephen D. Senturia, “Microsystem Design”, Kluwer Academic Publishers
- Marc J. Madou, “Fundamentals of Microfabrication the Science of Miniaturization”, Taylor & Francis

**Course Objective(s):**

This course aims to equip students with:

- Understand Microelectromechanical Systems (MEMS), covering their historical significance
- Analysis of microstructures and mechanical properties of microscale materials. Resonant structures and their applications.
- Design MEMS with an emphasis on mechanical engineering perspectives

**Course Outline:**

- Evolution and Definitions of MEMS Technology
- Historical Development and Key Milestones in MEMS
- Established Applications of MEMS in Various Industries
- Emerging and Novel Applications of MEMS Technology
- Overview of The MEMS Market and Its Growth Trends
- Miniaturization Challenges and Solutions in MEMS Fabrication
- Photolithography Techniques Used in MEMS Manufacturing
- Materials Selection for Effective Micromachining Processes
- Bulk Micromachining Methods and Their Applications
- Surface Micromachining Techniques and Their Benefits
- High-Aspect-Ratio Micromachining for Complex Structures

- Computer-Aided Design (CAD) For MEMS Modeling and Analysis
- Finite Element Analysis (FEA) For MEMS Design Simulation
- Mechanical Transducers and Their Roles in MEMS Systems
- Thermal, Magnetic, and Radiation Transducers in MEMS Technology
- Microfluidic Devices and Their Applications In MEMS