

**Summarized Course Description**

Course number: ECE 449	Course name: Microelectromechanical Devices
لغة تدريس المقرر: English	Pre-requisites: ECE 344
Credit hours: 3 (3-0-0)	Course level: Level – 8 or 9

**Course Description**

وصف المقرر :

Introduction to microsystem design, material properties, microfabrication technologies, structural behavior, sensing methods, fluid flow, microscale transport, noise, and amplifiers feedback systems. Design of microsystems (sensors, actuators, and sensing/control systems) of a variety of types, (e.g., optical MEMS, bioMEMS, inertial sensors) (e.g., sensitivity, signal-to-noise) using a realistic microfabrication process. Modeling and simulation in the design process. Design and Fabrication of practical MEMS examples.

**Course objectives**

أهداف المقرر :

1. Explore the world of microelectromechanical devices and systems ("MEMS").
2. Provide fundamental of related material properties, fabrication technologies,
3. Presents basic structural mechanics, sensing and actuation principles, circuit and system issues, packaging, calibration, and testing.

**Course Outcomes**

مخرجات التعليم:

On successful completion this course, the student should be able to:

1. Identify the relative importance of different physical phenomena based on length scale
2. Identify and describe the most commonly used fabrication processes in making MEMS devices
3. For a simple MEMS device, identify the major required fabrication steps and put them in the appropriate order (create a process flow)
4. Use the principles of elastic theory in predicting the stress/strain state of MEMS devices
5. List a number of common MEMS transducers and explain their operating principles
6. Explain in detail the operating principles of a piezoresistive MEMS pressure sensor, and predict the performance of such a device
7. Give a well-formed argument considering a microtechnology-based solution for a given problem.
8. Gain experience using English in spoken and written forms as a means of expressing technical ideas
9. Visualize structures created with microfabrication process sequences, creation of low-order dynamical device models.
10. Insert of learned models into the simulation of a complete electronic measurement circuit.

**Textbook and references**

الكتاب المقرر والمراجع المساندة:

**Text Book:** Senturia, Stephen D. *Microsystem Design*. New York, NY: Springer, 2004. ISBN: 9780792372462.

**References:**

Kovacs, Gregory T. A. *Micromachined Transducers Sourcebook*. New York, NY: McGraw-Hill, 1998. ISBN: 9780072907223.

Maluf, Nadim. *An Introduction to Microelectromechanical Systems Engineering*. Boston, MA: Artech House, 1999. ISBN: 9780890065815.

Nathan, Arokia, and Henry Baltes. *Microtransducer CAD: Physical and Computational Aspects*. New York, NY: Springer, 1999. ISBN: 9783211831038