

EC530- Micro-Electro Mechanical Systems

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2

COURSE COORDINATOR

Dr. Khaled Shehata

TEXT BOOK

S.Fatikov, V.Renold, "Microsystems technology and Microrobotics"

COURSE DESCRIPTION

MEMS technology, revolution and advantages of MEMS technology. Description of the MEMS applications, and its fabrication techniques. Studying the nature of piezoelectricity and piezoresistivity. Description of the microsensors, microactuators, different system issues and the scaling effect. Finally describing the Microassembly and an overview on Microrobotics.

PREREQUISITE:

EC 434

RELATION OF COURSE TO PROGRAM

Elective

COURSE INSTRUCTION OUTCOMES

The student will be able to achieve an understanding of the micro-electro-mechanical-systems (MEMS).

TOPICS COVERED

- Introduction to MEMS technology
- MEMS applications (medical, BIOMEMS, microfluidics, environmental, automotive, military, RF & electronics applications)
- MEMS fabrication techniques (Silicon properties and basic layer techniques, material deposition and removal methods)
- The nature of piezoelectricity and piezoresistivity
- Microactuators
- Microsensors
- System Issues: Post-Processing Steps and Techniques
- Scaling, Scaling Effects.
- Scaling of Forces.
- Microassembly and Microrobotics

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional component Content			
Math and Basic Sciences	Engineering Topics	General Education	Other
	✓		

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course aspects
A	An ability to apply knowledge of mathematics, science, and engineering	a ₁ a ₂
B	An ability to design and conduct experiments, analyze and interpret data.	
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability	c ₁ c ₂ c ₃
D	An ability to function on multi-disciplinary teams.	
E	An ability to identify, formulate, and solve engineering problems	
F	An understanding of professional and ethical responsibility	
G	An ability to communicate effectively	
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	
I	A recognition of the need for, and an ability to engage in life-long learning.	
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	j ₂
k	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	k