

# MICROELECTROMECHANICAL SYSTEMS – MEMS

## 1. KEY INDICATORS

CFU/ECTS: 6

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Website Professor : not available

## 2. OBJECTIVES OF THE COURSE

The course will give to the students a detailed overview on the micro-fabrication technologies, a detailed overview on the working principle and application on the MICROELECTROMECHANICAL SYSTEMS (MEMS) ON SILICON.

## 3. ACQUIRED ABILITIES

At the end of the course the student will acquire the knowledge in the MEMS process technology and the problems to be solved to package and assembly MEMS devices. Furthermore the course will allow students to be able to interact with a MEMS foundry so to be able to follow-up a full MEMS project.

## 4. PROGRAM OF THE COURSE

The program of the course is organized as described in sequel and during the course the student will develop a group work designing a mems device:

1. INTRODUCTION: definition of a transducer and sensor, sensor classification, signal conversion, ideal characteristics of a sensor. Scaling rules.
2. MATERIAL PROPERTIES: physical laws, mechanical, thermal, electrical, magnetic, optical and chemical definitions and characteristics of materials.
3. FABRICATION TECHNOLOGIES AND MODELLING: principle of microelectronics abrications steps. bulk micromachining, surface micromachining, design rules for mems surface micromachining, principle of cad, cae and cam simulators.
4. MEMS in silicon: mechanical properties of silicon. pressure sensors, flux sensors, inertial sensors, biosensors and chemical sensors, radio frequency mems an micro-relays. other sensors (e.g. temperature, umidity, vibration, etc.).
5. MICRO-SENSORS CONTROL: driving circuits and sensor measurements. stability and noise. mems packaging and 3d packaging for nano- electronics. Sensor calibration.

## 5. REFERENCES

Professor's notes and PP slides

## 6. WEBSITE OF THE COURSE

Not available