

MICRO-615

Reliability of MEMS (EDOC)

Shea Herbert

Cursus	Sem.	Type
Advanced Manufacturing		Obl.
Microsystems and Microelectronics		Obl.

Language of teaching	English
Credits	1
Session	
Exam	Oral
Workload	30h
Hours	14
Courses	14
Number of positions	22

Frequency

Every 2 years

Remark

August 28 & 29, 2017

Summary

This doctoral class addresses the reliability of silicon and metal MEMS, covering i) Reliability Statistics, ii) Electrical Reliability of MEMS, iii) Mechanical Reliability of MEMS, and iv) Design for Reliability Paradigm.

Content

- Reliability Statistics and Modeling: Accelerated testing, bathtub curve, standard statistical models and applicability to microsystems.
- Tools and Techniques: Measurement and characterization techniques needed to measure microsystems for accelerated testing.
- Electrical Reliability of MEMS: Open and short circuits, dielectric charging and breakdown, corrosion, ESD, electromigration. Reliability in the microelectronics field will presented and contrasted with reliability in microsystems. Techniques to improve lifetime
- Mechanical Reliability of MEMS: Stiction, friction, wear, fatigue, crack growth, creep, effect of shock and vibration, delamination. Discussion of how to accelerate and therefore how to eliminate failure modes by improved design, packaging, materials choice, actuation technique.
- Design for Reliability Paradigm: Design rules and multidisciplinary approach to building reliability into the microsystem from the beginning.

Keywords

Reliability, MEMS, mechanical failure modes, electrical failure modes.

Learning Prerequisites**Recommended courses**

Understanding of main MEMS sensing and actuation principles