



## Korea University International Summer Campus (KU ISC) 2021

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June 28, 2021 ~ August 5, 2021

### ISC509 – Micro/Nano Machining

#### I . Instructor

Professor	:	Jeong Bong (JB) Lee
E-mail	:	jbleeutd@gmail.com
Home Institution	:	The University of Texas at Dallas
Office	:	Virtual
Office Hours	:	Virtual office hours available (appointment by email)

#### II . Textbook

Required Textbook	:	None (Slides and other reading materials available for download)
Recommended Additional Readings	:	V. Kaajakari, "Practical MEMS," Small Gear Publishing, 2009 (ISBN: 978-0-9822991-0-4) S. Senturia, "Microsystem Design," Kluwer Academic Publishers, 2001 (ISBN: 0792372468)

#### III. Course Description and Objectives

This course is designed to study micro/nano fabrication technologies and their applications to devices and systems. Fabrication techniques such as bulk micromachining using silicon and surface micromachining with/without silicon along with miscellaneous micro/nano machining techniques and emerging materials are studied. Applications of those micro/nano fabrication techniques such as mechanical, biomedical devices are also studied. Specific topics in principles and application of micro/nano devices include scaling issues in micro/nano dimensions, beams as micromechanical springs, damping and mechanical harmonic resonators, capacitive sensing, piezoresistive sensing, accelerometers, pressure sensors, thermal sensors, pyroelectricity, electrostatic and thermal actuators, biomedical implantable devices including neural probes, and trend in wearable devices.

#### IV. Grading

Midterm Exam	:	40%
Final Exam	:	40%
Assignments	:	0%
Participation	:	20% (Attendance in all class is required. Advanced notice for absence is required for excused absence.)

## V. Class Outline

Date	Topic	Chapter	Remarks
June 28 (Mon)	Introduction & overview	N/A	Online
June 29 (Tue)	Bulk Micromachining 1	N/A	Online
June 30 (Wed)	Bulk Micromachining 2	N/A	Online
July 1 (Thu)	Surface Micromachining	N/A	Online
July 5 (Mon)	Miscellaneous micro/nano fabrication technologies	N/A	Online
July 6 (Tue)	Scaling in micro/nano dimensions	N/A	Online
July 7 (Wed)	Beams as micromechanical springs	N/A	Online
July 8 (Thu)	Damping & mechanical harmonic resonators	N/A	Online
July 13 (Tue)	Capacitive sensing principle	N/A	Online
July 14 (Wed)	Capacitive sensors	N/A	Online
July 15 (Thu)	Accelerometers	N/A	Online
July 16 (Fri)	<b>Midterm Exam</b>	N/A	Online
July 19 (Mon)	Piezoresistive sensing principle	N/A	Online
July 20 (Tue)	Pressure sensors	N/A	Online
July 21 (Wed)	Electrostatic actuation 1	N/A	Online
July 22 (Thu)	Electrostatic actuation 2	N/A	Online
July 26 (Mon)	Thermal actuation	N/A	Online
July 27 (Tue)	Shape memory alloys & Pyroelectrics	N/A	Online
July 28 (Wed)	Emerging materials	N/A	Online
July 29 (Thu)	Neural Probes	N/A	Online
Aug 2 (Mon)	Biomedical implantable devices	N/A	Online
Aug 3 (Tue)	Wearable Devices	N/A	Online
Aug 4 (Wed)	<b>Final Exam</b>	N/A	Online
Aug 5 (Thu)	/ Graduation Day	N/A	Online