

Precision Metrology

Spring Semester 2017

Graduate School, Mechanical and Aerospace Eng

Seoul National University

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Lecture Schedule: 17:00-18:15 MON/WED, Room 301-301

Lab schedule: To be fixed

Course Outline:

This course is to teach fundamental methods and essential techniques for precision metrology on machines, machine tools, and mechanical systems. It is also to provide various optical based manufacturing metrology techniques for precision manufacturing application. Fundamental theory for metrology is taught with various practical applications, and practical implementation is demonstrated during specially arranged lab schedules.

Contents:

Introduction to Machine Metrology

Error propagation and Uncertainty

Linear positional error measurement

Straightness and Flatness error measurement

Angular Error measurement

Roundness Error Measurement

Volumetric error analysis and calibration for Machines

Spindle error measurement

Surface Roughness measurement

Optics and interferometry based metrology

Nano metrology and Scanning probe microscopy

Labworks:

Linear positional error measurement using laser interferometer

Flatness measurement of surface using precision level

Nano 3D surface measurement using the Interferometric microscope/AFM

Text:Handout

Reference:1.Theory and Design for Mechanical Measurements, Gigliola etal., Wiley

2.Metrological Analysis and Performance Tests, Vol.4, Handbook of Machine Tools,

M.Weck

Evaluation:Mid Exam(30%), Final Exam(30%), Lab/Report(30%), Attendance(10%)