Metrology

I often say that when you can measure what you are speaking about and express it in numbers, you know something about it.

But when you can not measure it, or when you can not express it in numbers, your knowledge is of a meagre and unsatisfactory kind.

Lord Kelvin

Precision Metrology

Spring Semester 2018
Graduate School, Mechanical and Aerospace Eng
Seoul National University
Professor: Heui Jae Pahk (301-1521, hjpahk@snu.ac.kr)
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, mechanical systems, manufacturing. It is also to provide various optical based manufacturing metrology techniques for 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

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%)