

Seminar 114

Hands-On Gage Calibration (3-day course)

Overview:

EXPANDED with NEW TOPICS! The Hands-On Gage Calibration course is a unique educational opportunity designed specifically for those who plan and perform calibrations of dimensional measuring tools, gages, and instruments. This course is taught at the world-class, Mitutoyo America A2LA accredited calibration laboratory in Aurora, Illinois, by experienced instructors and dimensional metrology experts. The class size is intentionally small – a maximum of 6 students – to ensure personalized and customized instruction to meet the needs of individual students.

Designed to meet modern quality management system requirements, this course combines “best practices” with practical “how-to” calibration procedures to perform typical hands-on calibrations. With the small size class, it is important that all students have the necessary background training to ensure they get the full benefit of the hands-on experience. Attendees should have general knowledge of calibration systems and experience operating various types of dimensional measuring instruments, equivalent to the Mitutoyo course EDU116, *Dimensional Metrology: Measurement, Inspection and Calibration*.

Course Details:

The Hands-On Gage Calibration course is active, hands-on and focused on the application of calibration procedures in the laboratory environment. Students will have the opportunity to complete actual calibrations to develop their skills. Due to the small class size, students will have some freedom to determine their own pace for covering the material.

The course will begin with some common dimensional calibrations but will allow individual students to cover topics of interest. The exact course content will therefore depend on the students attending. At the time of enrollment, students will complete a questionnaire to ensure the customized course meets their needs. Students will receive detailed handout materials with sample calibration procedures, photos and example worksheets. Some of the possible calibrations and methods that could be taught in this class are shown below. Calibration methods for other types of measuring instruments and gages are also possible as facilities allow. Please discuss any special requests at the time of registration.

The Hands-On Gage Calibration course will also include an overview of essential elements, policies and requirements of a modern gage calibration system. Topics include calibration system standards, traceability, estimates of uncertainty, laboratory accreditation, temperature issues, policies and control for calibration, and assessing laboratory performance.

	Item to be Calibrated	Calibration Method
Included	Micrometers – outside	Comparison to master gage blocks
Included	Calipers – vernier, dial, digital	Comparison to gage blocks and Caliper Checker
Included	Dial indicators	Indicator testers
Included	Digital indicators	Comparison to master gage blocks
Included	Height gages	Comparison to master gage blocks
Included	Length standards/micrometer standards	Mechanical comparison to master gage blocks
Optional	Gage blocks	Mechanical comparison to master gage blocks

Optional	Step gages	Mechanical comparison to master gage blocks
Optional	Height masters	Mechanical comparison to master gage blocks
Optional	Plain cylindrical ring gages	1-D comparator using master rings gages
Optional	Plain cylindrical plugs	1-D comparator using master gage blocks
Optional	Spheres	1-D comparator using master gage blocks
Optional	Pin gages	1-D comparator using master gage blocks
Optional	Pin gages	Laser scanning micrometer
Optional	Thread measuring wires	1-D comparator using master gage blocks
Optional	Radius gages	Optical comparator
Optional	Angle gages	Optical comparator
Optional	Thickness gages	1-D comparator using master gage blocks
Optional	Sine bars	1-D comparator using master gage blocks
Optional	Line scales	Vision CMM
Optional	Squares	Comparison to master square
Optional	Roundness of spheres/hemispheres/rings	Roundness measuring instrument
Optional	High accuracy roundness	Roundness measuring with reversal method
Optional	Flatness of optical flats	Optical comparison to optical flat
Optional	Straightness of precision straightedges	Form measuring instrument
Optional	High accuracy straightness	Form measuring instrument with reversal method
Optional	Cylindrical squares	Form measuring instrument with reversal method
Optional	Surface finish specimens	Surface finish instrument
Optional	Micrometers – inside	Comparison to master gage blocks
Optional	Micrometers – depth	Comparison to master gage blocks
Optional	Micrometer heads	1-D comparator using master gage blocks
Optional	Test indicators	Indicator tester
Optional	Linear gages	Comparison to master gage blocks
Optional	Height gages	Comparison to master gage blocks
Optional	Bore gages	Comparison to ring gages
Optional	Precision levels, Protractor	Sine bar and gage blocks
Optional	Squares	High accuracy CMM with reversal method
Optional	Length standards	High accuracy CMM
Optional	Plain cylindrical ring gages	High accuracy CMM
Optional	Plain cylindrical plugs	High accuracy CMM
Optional	Spheres	High accuracy CMM

Fee Schedule:

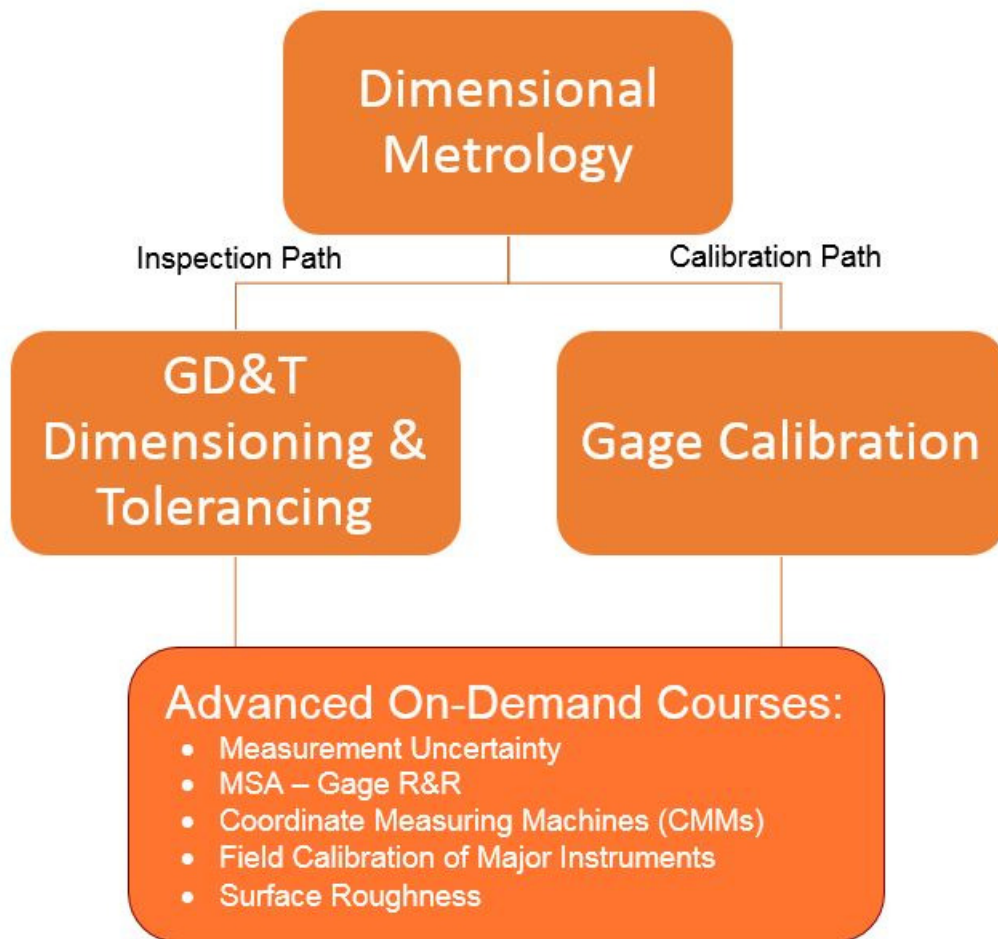
Advance pricing is available when registration is completed more than two weeks prior to the start of the class.

3-day Hands-On Gage Calibration: Advance pricing - \$1,861 per student
Standard pricing - \$2,044 per student

A 5% discount is available when registering at least three students from the same organization. This discount is increased to 10% if one organization takes all 6 slots for this course.

Comprehensive Curriculum of the Mitutoyo Institute of Metrology:

The Mitutoyo Institute of Metrology offers a number of courses to meet the educational needs of measurement professionals. Our three core courses shown below are scheduled regularly throughout the year. Many of our courses are taught at Mitutoyo locations across the country. All of our courses are available to be brought onsite – our instructors are all experts and onsite courses can be easily customized to meet the educational needs of the customer.



Mitutoyo and the Mitutoyo Institute of Metrology is a worldwide organization. We are proud to state that more than 200,000 engineers, technicians, and managers have attended our measurement seminars over the years. If you wish to register or if you have additional questions, please contact us at 630-723-3620, 888-MITUTOYO, or email mim@mitutoyo.com