

VICE DIRECTORATE OF PHYSICAL METROLOGY

Course: Density Metrology

Intended for:

The course is designed for professionals and technologists with knowledge of physics and engineering and who carry out activities of a metrological nature in their company.

Identification:

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| Course name | Density Metrology | Course duration | Three (3) days – 24 hours |
| Minimum # of slots | Three (3) people | Maximum # of slots | Four (4) people |
| Place | The courses are taught in the Instituto Nacional de Metrología, located on Avenida Carrera (AK) 50 No. 26-55, Int 2 (CAN), Bogotá D.C. | Cost | Resolution & current rate |
| For information & registration: www.inm.gov.co link http://www.inm.gov.co/index.php/serviciosinm/capacitacion Tel. (571) 254 22 22 extensions 1417 & 1428 | | | |

Course Objective:

- Introduce the theoretical and practical foundations of measurement and the calibration of instruments that measure the density of solids and liquids for the industrial, commercial, research, academic and other fields, or others who require them.
- Provide the metrological basis (traceability and uncertainty) of measurement and of the calibration of instruments that measure the density of solids and liquids.
- Provide criteria for the selection of the instruments and methods required for the measurement of this magnitude, according to application.

Course Content:

Day One

1. Fundamental concepts of density
2. Density of solids (measurement methods)

3. Density of liquids (measurement methods)
4. Air and water density (calculation methods)
5. Calibrating density measuring instruments
6. Corrections due to temperature and pressure
7. Traceability in the magnitude of density
8. Metrological hierarchy of density
9. Estimation of uncertainty in density

Day Two

1. Density measurement practice with liquids and solids using different methods
2. Density measurement instrument calibration practice

Day Three

1. Continue density measurement instrument calibration practice
2. Estimation of uncertainty exercise
3. Calibration certificates

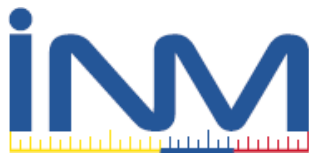
Documentary Basis of Course:

- JCGM 200:2012, International Vocabulary of Metrology –Basic & General Concepts & Associated Terms
- JCGM 100:2008, Evaluating Measurement Data – Guide to the Expression of Uncertainty in Measurement
- SIM Inter-American Metrology System. SIM Guide for the Calibration of Hydrometers– Cuckow Method. May 2016.
- SIM Inter-American Metrology System. SIM Guide for the Calibration of Oscillating Densimeters. Mayo. 2016.
- NTC 5904-1 Densimeters that Operate Under the Oscillation Principle, Part 1: Laboratory Instruments. (ISO 15212-1 (1998) and Technical Rectification 1:2008)
- NTC 5863-1 Glass Material for Laboratories: Densimeters for General Use. Part 1: Specifications. (ISO 649-1 (1981))
- NTC 5863-2 Glass Material for Laboratories: Densimeters for General Use. Part 2: Methods of Testing & Use. (ISO 649-2 (1981))

Requirements

Participants should:

- Have taken the Basic Metrology course
- Have taken the Measurement Uncertainty course
- Have a laptop computer or a scientific calculator with statistical capabilities



Important Information

In the event of partial attendance (missing more than 20% of the course) on the part of the participant, the INM will not award an "Attendance Certificate" or refund money from the course payment.

The courses are taught in the Instituto Nacional de Metrología located on Avenida Carrera (AK) 50 No. 26-55, Int 2 (CAN), Bogotá D.C., from 8:15 to 17:00 hours.

Users should consult about the availability of space before depositing payment: Tel. (571) 254 22 22 extensions 1417 & 1428.