UNIVERSITA' DEGLI STUDI DI CATANIA

DOTTORATO DI RICERCA IN SCIENZA DEI MATERIALI E NANOTECNOLOGIE

COURSE DESCRIPTION

Name	Scanning Probe Microscopies
Teacher(s)	Francesco Ruffino
Email	francesco.ruffino@ct.infn.it
CFU* (lecture+lab [h])	2 (6+12)
Assessment **	By slide presentation

* 1 CFU = 6 h lectures OR 12 h in lab OR a combination (3h lectures+6h lab, or 4+4, or 2+8, …)

** it must be within the course duration. Please, indicate: written, oral, by slide presentation.

PROGRAM

1) Scanning Probe Microscopies: the local probe approach, basic principles, operation modes, experimental set-up, design and instrumentations, historical overview and role in nanotechnology
2) Scanning Probe Microscopies typologies: scanning tunneling microscopy, atomic force microscopy, conductive atomic force microscopy, magnetic force microscopy, Kelvin probe microscopy.
3) Nanofabrication using scanning probe microscopy: atomic scale manipulation of matter, local anodic oxidation, nanolithography.
4) Laboratory activity: Images acquisition and analysis with scanning probe microscopies: images acquisition, images manipulation, artifacts, images analysis.
5) Laboratory activity: Applications of scanning probe microscopies to the analysis of nanostructured metallic, insulating, semiconducting surfaces.

REFERENCES

1. K. S. Birdi, "Scanning Probe Microscopies: Applications in Science and Technology", CRC Press, 2003.
2. E. Meyer, H. Hug, R. Bennewitz, "Scanning Probe Microscopy: the Lab on a Tip", Springer-Verlag, 2003.
3. R. Wiesendanger, "Scanning Probe Microscopy and Spectroscopy: Methods and Applications", Cambridge University Press, 1995.
4. D. Sarid, "Scanning Force Microscopy: with Applications to Electric, Magnetic, and Atomic Forces", Oxford University Press, 1994.