

Course title: **Microacoustic Sensors**

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Abstract: The goal of this course is to introduce the fundamentals of both chemical and physical sensing, based on electro-acoustic micro-devices. To this purpose microacoustic, structures suitable for sensing applications, will be considered and analyzed under different aspects including principles of operation, design, technological processes of fabrication and testing. Many of the structures which will be considered are based on MEMS fabrication technologies. SAW type resonators and delay-lines exploiting different propagation modes including Rayleigh, Lamb, Love, SH, etc. will be considered, as well as BAW type resonators, including film bulk resonators (FBR), solidly mounted resonators (SMR) and the new generation of contour mode resonator (CMR) structures. Chemical sensors will be mainly oriented to the ultrasound-specialist-point-of-view, considering principles of operation and interaction mechanisms between acoustic wave propagation and chemically interactive materials (CIM), together with the expected performances. A fast overview on the main kinds of CIM utilized will be given. Physical microacoustic sensors for temperature, electrical and mechanical magnitudes will be finally described, together with the relative principles of operation. Design considerations for pressure sensors will be finally shown, based on finite element models.

CV of Enrico Verona.

Enrico Verona born in 1947, graduated in Electronic Engineering from the University of Roma “*La Sapienza*” (Italy) in 1973. After the military service (Officer in the Transmission Army) he worked for a short period of time at Selenia Industries (Rome) in the department of Microelectronic Technologies – R&D Division. Since 1976 he is working at the “*O.M. Corbino*” Institute of Acoustics (C.N.R.) first as fellow, then as Researcher (1982) and finally as Research Director (1991). Since 1982 he is Responsible of the Department of “*Surface Acoustic Waves and Acousto-Optic Interactions*” and from 1996 to 2001 he was Director of the Institute. In 1983 and 1984 he was visiting professor at the Department of Electronics of the University of Rome *La Sapienza* and in 1989/1990 at the Faculty of Engineering of the University of Perugia. He is member of the IEEE (Ultrasonics, Ferroelectrics and Frequency Control Society), and elected member of the *Russian Academy of Natural Sciences* – St. Petersburg branch.

His research interests include physical acoustics, and acousto-optic devices, surface acoustic waves, nonlinear acoustics, thin piezoelectric films and surface-acoustic-wave-based sensors. He is author of about 250 papers published on leading refereed journals, proceedings of national and international conferences, etc. He was tutor for Laurea Degree Thesis (Universities of Roma “*La Sapienza*” and “*Tor Vergata*”, University of Perugia), tutor for fellowship, PhD and Post-Doc people, and as a lecturer for tutorial courses. He has served as referee for many leading journals, including Thin Solid Films, Sensors and Actuators B, IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, Applied Physics Letters, etc.