UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Electromagnetic Radiations

2122-1-F1701Q138

Aims

Provide knowledge and skills in the field of protection against non-ionizing radio frequency electromagnetic radiation, intercepting the most relevant topics for operating in the field of environmental, health and workplace protection, both in the field of public controls and in support of operators.

Contents

Physics of radio frequency electromagnetic radiation, interaction with matter, environmental sources of radio frequency electromagnetic radiation, broadcasting and telecommunication technologies, basic modalities for assessing personal exposures, interaction of radio frequency electromagnetic radiation with the human body and physiological response, legislation and its origin

Detailed program

History of generators and applications of RF non-ionizing radiation; Review of electrostatics and electrodynamics; Maxwell's equations in vacuum and propagation of the EM field; periodic and harmonic quantities - RMS values; formulation of the dissipated power; EM field energy; S vector power density and wave impedance of the vacuum; antennas - applications and propagation diagrams; near-field and far-field; calculation of exposure of targets; radioelectric signals: analogue and digital encodings; personal telecommunication techniques: 1, 2, 3, 4, 5 generations; interaction with dielectrics of time-varying fields: complex dielectric constant; relaxation of polarization and energy absorption; conductivity; specific absorbtion rate (SAR) and relationship with the power density vector; SAR in the human body; physiological response to the increase in tissue temperature due to interaction with EM fields; systemic and localized deterministic damage; limitation system: guidelines, international and national legislation; epidemiology and hypothesis of stochastic damage.

Prerequisites

Knowledge of electromagnetism; general knowledge acquired during the three years of a technical-scientific faculty

Teaching form

Lectures, including seminars with guided contacts to experts from the public and private sectors; the lessons will be held in person or in TLC according to the provisions in force

Textbook and teaching resource

See above

Semester

Second semenster

Assessment method

Oral examination, possibly supported by the voluntary presentation of a short in-depth text on topics similar to those of the course; possession of the notions provided and related skills are assessed, through the discussion of theoretical and practical aspects of protection against non-ionizing radiofrequency radiation

Office hours

Please write to giuseppe.sgorbati@unimib.it for agreements