



INSTITUTO DE FÍSICA
FACULTAD DE FÍSICA

COURSE	:	CLASSICAL ELECTRODYNAMICS
TRANSLATION	:	ELECTRODINÁMICA CLÁSICA
NUMBER	:	FIM8530
CREDITS	:	15 UC/ 9 SCT
MODULES	:	2
REQUISITES	:	FIZ0321
CONECTOR	:	AND
RESTRICTIONS	:	030401, 030501, 030801, 030802, 030803, 020601, 020701
CHARACTER	:	MINIMUM
FORMAT	:	THEORETICAL LECTURES
QUALIFICATION	:	STANDARD
FORMATIVE LEVEL	:	MAGISTER
DISCIPLINE	:	PHYSICS

I. COURSE DESCRIPTION

The course presents a modern vision of Classical Electrodynamics, covering a wide variety of topics ranging from topics in Electrostatics, Radiation Theory, Non-Linear Optics, etc.

II. LEARNING OUTCOMES

Achieve a broad and modern vision of Classical Electrodynamics.

III. CONTENT

1. Electrostatics. Some contour problems, multipolar expansion, dielectrics.
2. Magnetostatics and applications.
3. Maxwell's equations, gauge transformations, applications.
4. Electromagnetic waves, wave guides, propagation in crystals and anisotropic media.
5. Special Relativity and Lorentz Group, concepts of Relativistic Mechanics, Covariant Formulation of Electrodynamics, conservation theorems and Noether currents.
6. Movement of charges in external fields, loss of energy of charged particles when crossing matter.
7. Lienard-Wichert potentials and radiation, Synchrotron radiation, non-relativistic radiation limit (electric dipole, magnetic dipole and quadrupole radiation).
8. Non-Linear Optics.
9. Magneto-Hydrodynamics.

IV. METHODOLOGICAL STRATEGIES

- Lecture classes
- Expository bibliographic work

V. EVALUATIVE STRATEGIES

- Homework: 30%
- Tests: 50%
- Topical exposures: 20%



INSTITUTO DE FÍSICA
FACULTAD DE FÍSICA

VI. BIBLIOGRAPHY

REQUIRED

- J. D. Jackson. Classical Electrodynamics, Third Edition, Wiley, 1999.
- C. A. Brau. Modern Problems in Electrodynamics, Oxford, 2004.
- L. D. Landau, E. M. Lifshitz. The Classical Theory of Fields, 4th edition, Pergamon, Oxford and Addison-Wesley, 1987.
- L. D. Landau, E. M. Lifshitz. Electrodynamics of Continuous Media, 2nd Edition, Addison-Wesley, 1984.
- O. Barut. Electrodynamics and Classical Theory of Fields and Particles, Dover, 1980.

OPTIONAL

N/A