CÓDE	NAME OF MODULE	TYPE
	CLASSICAL ELECTRODYNAMICS	M

M = mandatory
E = elective

3.3.1. Learning goals of the module.

(List the specific learning goals that the current module should provide to the student; goals can focus on content, skills, or attitudes.)

THE INTERACTION AMONG CHARGES IS THE ONE THAT DETERMINES THE STRUCTURE OF MATTER FROM THE ATOMIC LEVEL UP TO THE FORMATION OF MACROSCOPIC STRUCTURES. FURTHERMORE, THE INTERACTION OF THE ELECTROMAGNETIC FIELD WITH MATTER IS THE BASIS OF A GREAT NUMBER OF TECHNIQUES DEVOTED TO THE ANALYIS OF THE STRUCTURE OF THE MATERIALS. IN MANY PROBLEMS CLASSICAL ELECTRODYNAMICS PROVIDES AN ADEQUATE DESCRIPTION OF THE INTERACTIONS IN NANOSTRUCTURES. THE AIM OF THIS SUBJECT IS TO FAMILIARIZE THE STUDENT WITH THE BASIC CONCEPTS OF ELECTRIC AND MAGNETIC FIELDS, THE RESPONSE OF MACROSCOPIC SYSTEMS TO EXTERNAL FIELDS, AND THE RELATION OF THIS RESPONSE WITH THE MICROSCOPIC STRUCTURE OF THE MEDIUM. MOREOVER, BASED ON THE MAXWELL EQUATIONS THE FUNDAMENTAL CONCEPTS OF OPTICS WILL BE PRESENTED, AND THE PROPAGATION, REFLEXION AND REFRACTION OF ELECTROMAGNETIC WAVES WILL BE STUDIED.

3.3.2. Methodology: learning activities and credit value of the module (ECTS).

3.3.2.1. Learning activities.

(Time required to teach the module; links to other modules included in the MSc Program and suggested chronological sequence with the latter)

THE SUBJECT WILL CONSIST IN 45 HOURS OF THEORETICAL LECTURES AND SEMINARS.

SINCE THE AIM OF THIS SUBJECT IS THAT THE STUDENT ADQUIRES BASIC KNOWLEDGES, THE SUBJECT WILL BE TAUGHT DURING THE FIRST QUADRIMESTER OF THE FIRST YEAR OF THE MASTER. IN THIS WAY THE STUDENT WILL BE ABLE TO APPLY IN A SISTEMATIC WAY THE ADQUIRED KNOWLEDGE IN THE DEVELOPMENT OF MANY SUBJECTS OF THE MASTER, SUCH AS:

FUNDAMENTAL OF SOLID STATE PHYSICS
LOW DIMENSIONAL SYSTEMS AND NANOSTRUCTURES
FUNDAMENTALS OF NANOSCALE CHARACTERIZATION
NANOSTRUCTURAL PROPERTIES

3.3.2.2. ECTS credit value (and time)
1 ECTS credit = 25 hours UPV/EHU

TYPE OF LECTURE[1]	Theory		Practice							Evaluation	
	M[2]	S	PA	PL	PO	TA	TAI	PCL	PCC	Periodic Grading	Final Grading
Classroom lectures											
Personal work [3]											
TOTAL											

(1) M (standard lecture); S (seminar); PA (practical exercises in classroom); PL (practical exercises in laboratory); PO (practical exercises with computers); TA (non-industrial workshops); TAI (industrial workshops); PCL (clinical practice); PCC (field practice); the acronyms are taken from the Spanish wording.

(2) M = maximum allowed is 60% of the full classroom lectures .

(3) Personal work = time that the student would use to prepare and develop individual and group assignments.

3.3.2.3. Module Program.

(Lectures)

Lecture 1	INTRODUCTION TO ELECTROSTATICS. PROBLEMS OF ELECTROSTATICS WITH CONDUCTORS.
Lecture 2	DIELECTRIC MEDIA. POLARIZATION. BOUNDARY CONDITIONS IN THE PRESENCE OF CONDUCTORS. ELECTROSTATIC ENERGY.
Lecture 3	MAGNETOSTATICS. MAGNETIZATION. BOUNDARY PROBLEMS IN THE PRESENCE OF MAGNETIZABLE MEDIA.
Lecture 4	FARADAY LAW. MAXWELL EQUATIONS. ENERGY OF THE ELECTROMAGNETIC FIELD.
Lecture 5	ELECTROMAGNETIC WAVES. PROPAGATION. REFLEXION. REFRACTION.
Lecture 6	RETARDED POTENTIALS. RADIATIVE SYSTEMS. RADIATION OF AN OSCILLATING DIPOLE. POTENTIALS CREATED BY A MOVING CHARGE.

3.3.2.4. Bibliography.

(Basic and specialized bibliographies, journal references, internet addresses, etc.)

J. D. JACKSON, "CLASSICAL ELECTRODYNAMICS", JOHN WILEY AND SONS, 1999

F.E. LOW, "CLASSICAL FIELD THEORY", JOHN WILEY AND SONS, 1997

B. DI BARTOLO, "CLASSICAL THEORY OF ELECTROMAGNETISM", WORLD SCIENTIFIC, 2004

W. GRENIER, "CLASSICAL ELECTRODYNAMICS", SPRINGER VERLAG, 1998.

A. S. ILYNSKI, G. YA. SLEPYAN, A. YA. SLEPYAN, "PROPAGATION, SCATTERING AND DISSIPATION OF ELECTROMAGNETIC WAVES", PETER PETEGRINUS, 1993

R. P. FEYNMAN, R. B. LEIGHTON, AND M. SANDS, "THE FEYNMAN LECTURES ON PHYSICS: VOL. 2", ADDISON-WESLEY, 2006.

3.3.3. Criteria and methods for evaluation and grading

(Analysis of the methodology that will be used to evaluate the learning process of the student)

3.3.4. Learning resources

3.3.5. Language and number of groups attending the module

1	NUMBER OF GROUPS
x	LANGUAGE: ENGLISH

3.3.6. Fields of science and technology to which the module is related

CODE	FIELD
	PHYSICS OF CONDENSED MATTER
	APPLIED PHYSICS

3.3.7. Department in charge of the Program

CODE	DEPARTMENT [1]
	DEPARTMENT OF MATERIALS PHYSICS

3.3.8. Teachers in charge of the module

DNI	Teacher UPV/EHU	Number of credits
	Alberto Rivacoba	1.5
	J. Iñaki Juaristi	1.5

DNI	Teacher other institutions	Number of credits