

MASTER MODULE	SEMESTER	CREDITS	COURSE TYPE
Nanotechnology: Physics and Applications	2nd	6	Optative
PROFESSOR(S)	CONTACT DETAILS		
Francisco Manuel Gómez Campos Enrique González Marín	Dpto. Electrónica y Tecnología de los Computadores, 2ª planta, Edificio de Física, Facultad de Ciencias. Despachos 11 and 14. Correo electrónico: fmgomez@ugr.es y egmarin@go.ugr.es		
	TUTORIALS TIMETABLE		
	http://directorio.ugr.es/static/PersonalUGR/*/show/f55a9cf2a750b55ab6e5a24ac1182e92 (Professor Francisco Manuel Gómez Campos) Monday and Tuesday from 9:00 to 12:00 (Professor Enrique González Marín)		
MASTER DEGREE			
University Master in Physics: Radiations, Nanotechnology, Particles and Astrophysics, University of Granada			
TEACHING DATES AND TIMES			
Second semester, Tuesday 16:00 - 17:00; Thursday: 16:00 - 18:00			
PRE-REQUISITES FOR REGISTRATION			
Basic knowledge on Solid State Physics, Statistical Mechanics, Quantum Physics, Electromagnetism and Numerical Methods.			
BRIEF CONTENTS DESCRIPTION			
Quantum dot, quantum wire and nanotube properties for energy applications. Solar cells based on nanostructures for energy harvesting. Thermoelectric systems, piezoelectric nanogenerators.			



Storage: modelling of nanostructured electrodes in batteries, supercapacitors and fuel cells.

PROGRAM

THEORETICAL CONTENT:

Unit 1.- Introduction: Applications of nanotechnology in energy. A panorama

Unit 2.- Properties of low-dimensionality systems for energy applications: quantum dots, quantum wires, nanotubes and graphene.

Unit 3.- Third Generation Solar Cells

Unit 4.- Solar cells based on quantum dots

Unit 5.- Nanostructures in thermoelectric and piezoelectric systems

Unit 6.- Energy storage. Nanostructured electrodes.

PRACTICAL CONTENT:

Lab practices

Simulation of various nanostructures using applications located at www.nanohub.org

Simulations of devices for generating and storing energy and nanostructures in Matlab environment or equivalent

BIBLIOGRAPHY

- S. Datta, "Quantum Transport: Atom to Transistor", Cambridge University Press, Nueva York, 2005
- J. Bisquert, "Nanostructured Energy Devices. Equilibrium Concepts and Kinetics", CRC Press, 2015
- A. Luque, S. Hedegus, "Handbook of Photovoltaic Science and Engineering" 2ª Ed., Wiley, 2010
- W.C. H. Choy (Ed), "Organic Solar Cells. Materials and Device Physics", Springer, 2013
- J. Wu, Z.M. Wang (Eds), "Quantum Dot Solar Cells", Springer, 2014
- S. Priya, D.J. Inman (Eds), "Energy Harvesting Technologies", Springer, 2009
- X. Wang, Z.M. Wang (Eds), "Nanoscale Thermoelectrics", Springer, 2014
- Selected papers



**UNIVERSIDAD
DE GRANADA**

INFORMACIÓN SOBRE TITULACIONES DE LA UGR
masteres.ugr.es