



Universitat de Lleida

DEGREE CURRICULUM **FUNDAMENTALS OF NANOTECHNOLOGY**

Coordination: REY CASTRO, CARLOS

Academic year 2023-24

Subject's general information

Subject name	FUNDAMENTALS OF NANOTECHNOLOGY			
Code	101645			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Biotechnology	3	OPTIONAL	Attendance-based
Course number of credits (ECTS)	3			
Type of activity, credits, and groups	Activity type	PRALAB	PRAULA	TEORIA
	Number of credits	0.4	1.2	1.4
	Number of groups	4	1	1
Coordination	REY CASTRO, CARLOS			
Department	ENVIRONMENT AND SOIL SCIENCES AND CHEMISTRY			
Important information on data processing	Consult this link for more information.			
Language	100% english			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
DAVID , CALIN ADRIAN	calinadrian.david@udl.cat	1,6	
REY CASTRO, CARLOS	carlos.rey@udl.cat	2,6	

Subject contents

Syllabus:

Topic 1) Introduction. Physical characteristics of nanomaterials. Morphology. Size distributions. Polydispersity. Specific surface area.

Topic 2) Classification of nanomaterials. Chemical properties. Synthesis and conjugation methods. Interfacial properties and reactivity.

Topic 3) Interfacial properties. Surface charge and electrokinetic phenomena. Colloidal stability. Aggregation kinetics.

Topic 4) Instrumental techniques for detection and characterization. Electron and atomic force microscopy. Dynamic, static, and electrophoretic light scattering. Techniques based on adsorption. Single-particle ICP-MS. Fractionation and purification techniques.

Topic 5) Behavior in biological fluids. Biocompatibility. Macromolecular corona. Bioavailability, transport and bioaccumulation.

Topic 6) Applications in biomedicine, environment, agriculture and food.

Topic 7) Regulatory aspects. Environmental impact, food and health & safety issues.

Practical activities:

Laboratory practice. Characterization of the stability of nanoparticle dispersions using DLS and Laser Doppler Electrophoresis. (4h)

Bibliography

- W. Norde. (2011). Colloids and Interfaces in Life Sciences and Bionanotechnology, 2nd Ed. CRC Press.
- J. Gregory (2006). Particles in water. Properties and processes. CRC Press.
- J.R. Lead, E.Valsami-Jones (Eds.) (2014) Nanoscience and the Environment. Elsevier.
- M. Baalousha, J.R. Lead (Eds.) (2015) Characterization of Nanomaterials in Complex Environmental and Biological Media. Elsevier
- D.E. Reisner (Ed.) (2009) Bionanotechnology. Global Prospects. CRC Press
- C.M. Niemeyer, C.A. Mirkin (Eds.) (2004). Nanobiotechnology: Concepts, Applications and Perspectives. Wiley-VCH.
- A. Elaissari (Ed.) (2008). Colloidal Nanoparticles in Biotechnology. Wiley