



Universitat de Lleida

DEGREE CURRICULUM  
**FUNDAMENTALS OF  
NANOTECHNOLOGY**

Coordination: REY CASTRO, CARLOS

Academic year 2022-23

## Subject's general information

<b>Subject name</b>	FUNDAMENTALS OF NANOTECHNOLOGY			
<b>Code</b>	101645			
<b>Semester</b>	1st Q(SEMESTER) CONTINUED EVALUATION			
<b>Typology</b>	<b>Degree</b>	<b>Course</b>	<b>Character</b>	<b>Modality</b>
	Bachelor's Degree in Biotechnology	3	OPTIONAL	Attendance-based
<b>Course number of credits (ECTS)</b>	3			
<b>Type of activity, credits, and groups</b>	<b>Activity type</b>	PRALAB	PRAULA	TEORIA
	<b>Number of credits</b>	0.4	1.2	1.4
	<b>Number of groups</b>	4	1	1
<b>Coordination</b>	REY CASTRO, CARLOS			
<b>Department</b>	CHEMISTRY			
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.			

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