

Academic year Subject

Group

2018-19 11357 - Advances in Nucleic Acid Chemistry: Beyond the Double Helix Group 1

Subject

Subject / Group Degree Credits Period Language of instruction	11357 - Ad Master's De 3 First semest English	vances in Nucle egree in Chemic ter	eic Acid C cal Scienc	hemistry: Bey e and Technolo	ond the Dou ogy	ible Helix / 1
Professors						
Lecturers	Office hours for students					
	Starting time	Finishing time	Day	Start date	End date	Office / Building
Roberto De la Rica Quesada		You need to book a d	ate with the pr	ofessor in order to at	tend a tutoring se	ession.

Context

The course "Advances in Nucleic Acid Chemistry: Beyond the Double Helix" belongs to the Biological Chemistry module of the Master in Chemical Science and Technology. Nucleic acids such as DNA and RNA are versatile materials with a wide variety of functions that go beyond their original biological role. During these lectures the students will be able to familiarize with the utilization of nucleic acids as structural motifs in DNA nanotechnology, as electronic components of nanocircuits, as biorecognition elements in sensors and targeted drug delivery systems, and as biocatalysts. There will be a strong emphasis onrecent developments in this area, which has grown rapidly in the last 10 years.

Requirements

Skills

Specific

* To understand the different applications of nucleic acids in bionanotechnology .

Generic

* To have and understand knowledge which provides the ground or opportunity to be innovative in the development and/or application of ideas, often in a research-based context. To have the ability to apply the acquired knowledge and problem solving capacities in new or little-known environments in larger (or multidisciplinary) contexts related to a field of study. To have the ability to integrate knowledge and deal with the complexity of formulating judgements based on information which, being incomplete or limited, includes reflections on social and ethical responsibilities related to the application of knowledge

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and judgements. To have the knowledge to communicate conclusions, and the reasons that sustain them, to specialized and non-specialized audiences in a clear and unambiguous way. To posses the learning skills that will allow students to continue studying in a self-directed or autonomous way. .

Basic

* You may consult the basic competencies students will have to achieve by the end of the Master's degree at the following address: http://estudis.uib.cat/master/comp_basiques/

Content

Range of topics

- 1. Nucleic acids as structural materials. 1. Nucleic acids as structural materials Base pairing. DNA-programmed self-assembly of nanomaterials. Holliday junctions. Selfassembly of DNA nanoobjects. DNA origami.
- 2. Nucleic acids as electronic materials. 2. Nucleic acids as electronic materials Redox properties of nucleic acids. Circuit components made of nucleic acids. DNA nanowires.
- 3. Nucleic acids as biorecognition elements. 3. Nucleic acids as biorecognition elements Aptamers. SELEX. Aptamers for the development of biosensors. Aptamers in drug delivery and drug discovery.
- 4. Nucleic acids as biocatalysts. 4. Nucleic acids as biocatalysts Ribozymes. RNAzymes and DNAzymes. Amplification reactions for ultrasensitive biosensors.

Teaching methodology

In-class work activities (0.72 credits, 18 hours)

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Theoretical lectures	Large group (G)	During these lectures the students will acquire new theoretical knowledge on the subjects described in the "skills" section.	11
Practical classes	Practical work	Medium group (M) The students will use the previously acquired theoretical knowledge to solve problems. They will also be prompted to expose their findings in front of anaudience.	7

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Aula Digital platform.

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Distance education tasks (2.28 credits, 57 hours)



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Modality	Name	Description	Hours
Individual self- study	Literature research projec	t The students will have to develop in depth one particular theme of the module. This will include searching for information in databases and writing a critical assay on a given subject.	57

Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

Student learning assessment

Frau en elements d'avaluació

In accordance with article 33 of Academic regulations, "regardless of the disciplinary procedure that may be followed against the offending student, the demonstrably fraudulent performance of any of the evaluation elements included in the teaching guides of the subjects will lead, at the discretion of the teacher, a undervaluation in the qualification that may involve the qualification of "suspense 0" in the annual evaluation of the subject".

Practical work

Modality	Practical classes
Technique	Papers and projects (retrievable)
Description	The students will use the previously acquired theoretical knowledge to solve problems. They will also be prompted to expose their findings in front of anaudience.
Assessment criteria	Participates in discussions

Final grade percentage: 25% with a minimum grade of 5

Literature research project

Modality	Individual self-study
Technique	Papers and projects (retrievable)
Description	The students will have to develop in depth one particular theme of the module. This will include searching
	for information in databases and writing a critical assay on a given subject.
Assessment criteria	Finds relevant information, shows critical thinking, well-written and easy-to-follow assay.

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Final grade percentage: 75% with a minimum grade of 5

Resources, bibliography and additional documentation

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The bibliography consists in research papers that will be provided to the students during the lectures.

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