Universitat de les Illes Balears

Syllabus

Academic year	2017-18
Subject	11357 - Advances in Nucleic Acid Chemistry: Beyond the Double Helix
Group	Group 1, 1S
Syllabus	A
Language	English

Subject

Name	11357 - Advances in Nucleic Acid Chemistry: Beyond the Double Helix
Credits	0.72 in-class (18 hours) 2.28 distance (57 hours) 3 total (75 hours).
Group	Group 1, 1S (Campus Extens)
Period	First semester
Language	English

Lecturers

Lecturers	Office hours for students					
	Starting time	Finishing time	Day	Start date	End date	Office
Roberto De la Rica Quesada roberto.drica@uib.es	11:00	12:00	Wednesday	01/09/2017	01/09/2018	QA213

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

The present course belongs to the Biological Chemistry module and therefore shares the basic competences described for that particular module. Additional competences are outlined below.

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

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(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 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

Theme content

1. Nucleic acids as structural materials. 1. Nucleic acids as structural materials
   Base pairing. DNA-programmed self-assembly of nanomaterials. Holliday junctions. Self-assembly 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

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 Campus Extens platform.

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Distance education work activities

Modality	Name	Description	Hours
Individual self-study	Literature research project	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

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 minimum grade 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.

Final grade percentage: 75% with minimum grade 5

Resources, bibliography and additional documentation

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

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