Sveučilište u Rijeci
University of Rijeka

BIOtech
Odjel za biotehnologiju
51000 Rijeka, Radmile Matejčić 2
Tel. +385 51 584 550
Fax. +385 51 584 599
e-mail: ured@biotech.uniri.hr

Detailed curriculum for the course:

Nanochemistry

Academic year: 2020/2021

Program: Biotechnology for the Life Sciences (1st year)

Course code: EBIL177

ECTS points: 3

Language of the course: English

Teaching hours: 30 hours (20 lectures, 5 seminars, 5 practical work)

Pre-requisites for enrolment: No specific courses required.

Course leader and contact information:

Title and name: Assistant Prof. Daniela Kalafatovic
Address: Department of Biotechnology (Odjel za biotehnologiju), O-810
E-mail: daniela.kalafatovic@uniri.hr

Time period: 15th February 2021 – 26th February 2021

Teaching staff: Assistant Prof. Daniela Kalafatovic
(15 hours lectures, 5 hours seminars, 5 hours practical work)
Assistant Prof. Jelena Ban
(2 hours lectures)
Patrizia Jankovic, mag. med. chem.
(3 hours lectures)

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Required literature:

- Ludovico Cademartiri, Geoffrey A. Ozin: "Concepts of Nanochemistry", 2009, Publisher John Wiley & Sons
- Students are encouraged to independently search the literature on topics relevant to the course.

Course description:

Students will receive continuous assessment from the course leader who will teach the students on a regular basis. Students will actively participate in seminars consisting of an oral presentation related to the course topic. They will be also introduced to the laboratory work (AFM) and will have the possibility to learn image processing for AFM. At the end of the course, they will have a final exam, accounting for 50% of the student's grade for the course.

Learning outcomes:

Upon completion of the course program, students will be able to:
- Define and explain the basic concepts in the field of nanochemistry
- Understand and describe the synthesis, characterization, functionalization, and applications of nanomaterials
- Prepare and present a seminar paper related to the most recent techniques in the field

Detailed course content:

Chemistry plays a significant role in the emerging interdisciplinary fields of nanoscience and nanotechnology. The nanoscale refers to materials with dimensions on the scale of nanometers (a thousandth of a thousandth of a thousandth of a meter). Control of the material world at the scale of atoms and molecules can produce materials with fundamentally different properties and behaviour and has been touted as the next technological revolution. Some questions we will consider include: What nanotechnology already exists? What makes nanomaterials special? How can they be prepared? What tools can be used to study such materials?

A. Lectures:
L1. Introduction to nanochemistry (2)
L2. Supramolecular chemistry (2)
L3. Peptide self-assembly (2)
L4. Peptides as minimalistic catalysts (3)
L5. Peptide nanomaterials, hydrogels (2)
L6. Smart (stimuli responsive) materials (3)
L7. Biomaterials for biomedical applications (2)
L8. Artificial intelligence in the design of peptides (2)
L9. Atomic force microscopy for soft materials (2)

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Seminars (5 hours)
Most recent scientific publications in the field will be presented by students working in groups, followed by discussion with the course peers. Students will perform peer reviews of presented articles. Each presentation will have a brainstorming session.

Practical exercises
P1. Introduction to AFM analysis and image processing (5 hours).

Requirements, methods of assessment and evaluation:

Examination deadlines:

The final exam will be Friday 26th February 2020, 14:00, room O-269.

For those who need to retake the test, the second test sitting will be Friday 5th March 2020, 14:00, room O-269.

Additional test sittings (maximum two more) will be by arrangement between the students and teacher.

Qualification and grades (according to *Pravilniku o studijima Sveučilišta u Rijeci*):

Assessment during the course (50%)
Students will obtain score during the course, in the following areas:

Seminar work (25%:) – Students will be graded based on work done in class and/or as homework from seminars.

Practical work (25%) – Students will be assessed based on the abilities and results demonstrated in the practical exercises.

Final exam (50%)
Eligibility to sit the final exam will be based on scores achieved during the course (out of a maximum of 50%).

- Students scoring between 0 and 34.9% will not be allowed to sit the final exam
- Students scoring between 35% and 70% will be allowed to sit the final exam

Final grades
The following grades will be awarded based on the final score:

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Percentage score	ECTS grade	Numerical grade
90% to 100%	A	Excellent (5)
75% to 89.9%	B	Very good (4)
60% to 74.9%	C	Good (3)
50% to 59.9%	D	Satisfactory (2)
0% to 49.9%	F	Unsatisfactory (1)

The final grade is based on the sum of percentage points accumulated during the course and on the final exam. Passing grades are excellent (5), very good (4), good (3) and satisfactory (2).

To complete the course students must attain a passing mark for the entire course (50% or higher) as well as achieving at least 15% of the 30% available on the final exam.

Additional information:

Academic integrity

Students are required to respect the principles of academic integrity, and refer to the documents: *Ethical rules of the University of Rijeka* and *Ethical rules for students*.

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Schedule of classes:

Week 1:

Date	Group	Time	Room*	Activity	Teacher
15.02.21	All	11:00-13:00	O-268	L1	Daniela Kalafatovic
16.02.21	All	10:00-12:00	O-268	L2	Daniela Kalafatovic
		14:00-16:00	O-268	L3	Daniela Kalafatovic
17.02.21	All	09:00-12:00	O-268	L4	Patrizia Jankovic
		14:00-16:00	O-268	L5	Daniela Kalafatovic
18.02.21	All	10:00-13:00	O-268	L6	Daniela Kalafatovic

Week 2:

Date	Group	Time	Room	Activity	Teacher
19.02.21	All	10:00-12:00	O-268	L7	Jelena Ban
22.02.21	All	10:00-15:00	O-268	S	Daniela Kalafatovic
23.02.21	All	10:00-12:00	O-268	L8	Daniela Kalafatovic
24.02.21	All	11:00-13:00	O-268	L9	Daniela Kalafatovic
25.02.21	All	10:00-15:00	O-268	P1	Daniela Kalafatovic
26.02.21		14:00	O-268	Final exam	Daniela Kalafatovic

* Some lectures might be held online depending on the current covid-19 situation.