Detailed teaching plan for the course

Protein Research Methods
Metode istraživanja proteina

Academic year:	2023/2024
Study:	Biotehnologija u medicini Istraživanje i razvoj lijekova
Course code:	IRL103
ECTS points:	5
Langauge of the course:	English, Croatian
Teaching hours of the course:	50 hours (12 lectures + 18 seminars + 20 practical exercises)
Pre-requisits for the course:	None
Course leader and contact:	
Title and name:	Izv.prof.dr.sc. Nicholas J. Bradshaw Doc.dr.sc. Željka Maglica
Address:	Fakultet biotehnologije i razvoja lijekova O-226¸ O-201
E-mail:	nicholas.b@biotech.uniri.hr, zeljka.maglica@biotech.uniri.hr
Consulting hours:	By arrangement over email
Associates & teaching hours:	Izv. prof. dr. sc. Nicholas J. Bradshaw 4.5 lectures + 12 seminars Doc. dr. sc. Željka Maglica 6 lectures + 10 seminars Doc. dr. sc. Christian A. Reynolds 1.5 lectures + 1 seminars Maja Juković 38 practical exercises Antonija Braut 38 practical exercises

Required literature:

Scientific papers will be supplied during the course.

Optional literature:

None

Course description:
Proteins are fundamental to how all biological systems function, being the core molecules encoded for by our DNA, and essential for biological processes varying from cell structure and system transduction, to immunity. Protein research is therefore at the heart of investigations in to biology, while most biotechnology approaches revolve around the creation of proteins in artificial systems.

This course will help students to understand both how we study and how we make use of proteins in biotechnology. In lectures, students will learn about experimental approaches to studying proteins, via cell biology, proteomics, biophysics and structural biology approaches. This will be supplemented by computer-based seminars in which students get experience of handling data and investigating proteins through bioinformatics. Students will also study individual proteins in group work. Finally, students will gain laboratory experience at producing, purifying and testing recombinant proteins from bacteria, using a combination of previously covered and novel experimental techniques.

Course objectives:
By the end of this course students should:

1) Understand the general structure of proteins (revision from previous years)
2) Understand typical functions of proteins, including protein-protein interactions, and how they are investigated experimentally
3) Understand proteomics approaches for identifying proteins and how data is handled for these experiments
4) Understand how the structure of proteins is studied experimentally, and have experience at bioinformatics approaches to investigating proteins structure.
5) Understand how proteins can be produced and purified from biological systems, and have experience of these processes in bacteria

Detailed teaching plan (lectures, seminars, exercises):
A. Lectures (12 hours):
P1. Overview of protein structure and function (1 hour)
P2. Expression systems for studying proteins (1.5 hours)
P3. Purifying proteins (1 hour)
P4. Industrial protein production (1 hour)
P5. Mass spectroscopy analysis (1.5 hours)
P6. Electrophoresis (1 hour)
P7. Investigating protein-protein interactions (1 hour)
P8. Biophysical approaches to studying proteins (1 hour)
P9. Structural biology methods for studying proteins (2 hours)
P10. Examples of techniques for studying specific proteins (1 hour)

B. Seminars (18 hours):
S1. Seminar introduction (1 hour)
S2-3. Protein bioinformatics (2.5 hours each, 5 hours total)
S4-S6. Paper break down 1 (1 hour each – 3 hours total)
S7. Protein presentations (2 hours each, 8 hours total)
S11. Protein presentation finale (1 hour)

C. Practical exercises (20 hours):
V1. Bacterial transformation (1.5 hours)
V2. Liquid stock cultures (0.5 hours)
V3. Test protein induction and expression (3 hours)
V4. Western blotting (4 hours)
V5. Antibody staining, and final culture set up (4 hours)
V6. Protein purification (4 hours)
V7. Protein concentrations & SDS-PAGE (3 hours)

Final exam and grading:
Continuous assessment during the course (70%)
70% of the final grade will come from continuous assessment, divided as follows:

Mid-course exam (Kolokvij, 15%)
Seminar work (40%)
Practical exercises (15%)

Final exam – 30%
The final exam is 30% of the final grade. The exam will consist of multiple choice questions and questions requiring short answers.

Exam times:
The 1st exam sitting will be on 07.06.2024, 9.00-11.00, O-030.
The 2nd exam sitting will be on 21.06.2024, 9.00-11.00, O-268.
The 3rd and 4th exam sittings will be by arrangement with the course leader

Format of the final grade (according to the Pravilniku o studijima Sveučilišta u Rijeci):
Students can obtain a maximum of 70% of grade points from continuous assessment in class, and 30% from the final exam. Students who, during the continuous part of the class, achieved:

- from 0 to 34.9% of grade points cannot take the final exam
- more than 35% of grade points can take the final exam

According to the total number of grade points achieved, the following final grades are awarded:

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

The final grade is the sum of the points achieved during classes and the points achieved on the final exam, and the passing grades are excellent (5), very good (4), good (3) and satisfactory (2).

Academic integrity:
Students are obliged to respect the principles of academic integrity and refer to the documents of the University of Rijeka: the Code of Ethics of the University of Rijeka and the Code of Ethics for Students.

All students are asked to respond to the evaluation of the quality of the teaching work of teachers and associates, so that the teaching in this course can be improved based on the assessments and suggestions. Evaluation of classes through the ISVU system is carried out using the "Studomat" application on a form defined at the University of Rijeka level, and the results are anonymous. You can find more information about all aspects of this process in the Handbook for Study Quality of the University of Rijeka.

Timetable

Week 1

Date	Group	Time	Location	Teaching	Teacher
16.05.24	Svi	9.00-9.45	O-030	P1	Nicholas Bradshaw
	Svi	10.00-10.45	O-030	S1	Nicholas Bradshaw
17.05.24	Svi	9.00-10.15	O-030	P2	Nicholas Bradshaw
	Svi	10.30-11.15	O-030	P3	Nicholas Bradshaw

Week 2

Date	Group	Time	Location	Teaching	Teacher
20.05.24	All	11.00-11.45	O-030	P4	Željka Maglica
	1	9.00-11.00	O-339	S2	Nicholas Bradshaw
	2+3	12.00-14.00			
21.05.24	All	11.00-12.15	O-030	P5	Christian Reynolds
	2	9.00-11.00	O-339	S3	Nicholas Bradshaw
	1+3	12.30-14.30			
22.05.24	All	11.00-11.45	O-030	P6	Nicholas Bradshaw
	All	12.00-12.45	O-030	S4	Nicholas Bradshaw
23.05.24	All	11.00-11.45	O-030	P7	Željka Maglica
	All	12.00-12.45	O-030	S5	Christian Reynolds
24.05.24	All	9.00-10.00	O-030	Mid-course exam	
	All	10.00-10.45	O-030	P8	Željka Maglica
	All	11.00-11.45	O-030	S6	Željka Maglica

Week 3

Date	Group	Time	Location	Teaching	Teacher
27.05.24	All	11.00-12.30	O-030	P9	Željka Maglica
	All	13.30-15.30	O-030	S7	Željka Maglica
	3	9.00-10.30	O-353	V1	Maja Juković Antonija Braut
	1	15.30-17.00	O-352		
	2	15.30-17.00	O-353		
28.05.24	All	10.00-10.45	O-030	P10	Željka Maglica
	All	11.00-12.30	O-030	S8	Željka Maglica
	All	13.30-15.00	O-030	S9	Željka Maglica
	3	9.00-9.45	O-353	V2	Maja Juković Antonija Braut
	1	15.00-15.45	O-352		
	2	15.30-16.15	O-353		
29.05.24	All	11.00-12.30	O-030	S10	Željka Maglica
	3	8.00-11.00	O-352	V3	Maja Juković Antonija Braut
	1	13.00-16.00	O-352		
	2	13.00-16.00	O-353		

Week 4

Date	Group	Time	Location	Teaching	Teacher
03.06.24	2	8.00-12.00	O-352	V4	Maja Juković Antonija Braut
	1	14.00-18.00	O-353		
	3	14.00-18.00	O-353		
04.06.23	2	8.00-11.00	O-352	V5	Maja Juković Antonija Braut
	1	13.30-17.30	O-352		
	3	13.30-17.30	O-353		
05.06.24	1	8.00-12.00	O-353	V6	Maja Juković Antonija Braut
	2	13.00-17.00	O-352		
	3	13.00-17.00	O-353		
06.06.24	1	9.00-12.00	O-353	V7	Maja Juković Antonija Braut
	2	14.00-17.00	O-352		
	3	14.00-17.00	O-353		
	All	12.30-13.30	O-030	S11	Željka Maglica
07.06.24	All	9.00-11.00	O-030	Final exam (1st sitting)	