

Detailed teaching plan for the course
Protein Research Methods
Metode istraživanja proteina

Academic year:	2025/2026
Study:	Biotehnologija u medicini Istraživanje i razvoj lijekova
Course code:	IRL103
ECTS points:	5
Language of the course:	English and Croatian
Teaching hours of the course:	50 hours (12 lectures + 19 seminars + 20 practical exercises)
Prerequisites 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 5 hours lectures + 12 hours seminars Doc. dr. sc. Željka Maglica 6 hours lectures + 6 hours seminars Doc. dr. sc. Christian A. Reynolds 1 hour lecture + 1 hour seminar Dr. Antony S. K. Yerabham 2 hours seminars Maja Juković 20 hours practical exercises Matea Kršanac 40 hours 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.

Detailed teaching plan (lectures, seminars, exercises):*A. Lectures (12 hours):*

- P1. Overview of protein structure and function (1 hour)
- P2. Electrophoresis (1 hour)
- P3. Expression systems for studying proteins (1 hours)
- P4. Purifying proteins (1 hour)
- P5. Investigating protein-protein interactions (1 hour)
- P6. Mass spectroscopy analysis (1 hour)
- P7. Biophysical approaches to studying proteins (1 hour)
- P8. Phage display (1 hour)
- P9. Structural biology methods for studying proteins (2 hours)
- P10. Fluorescence-based techniques (1 hour)
- P11. Single molecule techniques (1 hour)

B. Seminars (18 hours):

- S1 & S4. Paper break down 1 (1 hour each – 2 hours total)
- S2 & S3. Protein bioinformatics (2 hours & 2 hours, 4 hours total)
- S5 & S6. Membrane protein purification: from lab bench to industry, (1 hour each – 2 hours total)
- S7, S8, S10 & S11. Protein presentations (2 hours each, 8 hours total)
- S9. Revision of techniques (1 hour)
- S12. 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*) - 10%

Seminar work – 20%

 Bioinformatics seminar classwork (S1-S2) - 5%

 Protein presentations (S6-S9) - 10%

 Web pages (S10) – 5%

Practical exercises – 20%

 Entrance exams - 10% (2% each)

 Laboratory journal – 10%

Final exam – 50%

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 06.06.2025, 9.00-11.00, O-030.

The 2nd exam sitting will be on 23.06.2025, 14.00-16.00, 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 75% of grade points from continuous assessment in class, and 50% from the final exam. Students who, during the continuous part of the class, achieved:

- from 0 to 24.9% of grade points cannot take the final exam
- more than 25% 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
13.05.26	All	11.00-11.45	O-339	P1	Nicholas Bradshaw
		12.00-12.45	O-339	P2	Nicholas Bradshaw
14.05.26	All	11.00-10.45	O-339	P3	Nicholas Bradshaw
	All	12.00-12.45	O-339	P4	Nicholas Bradshaw

15.05.26	All	11.00-11.45	O-339	P5	Željka Maglica
	All	12:00-12:45	O-339	S1	Nicholas Bradshaw

Week 2

Date	Group	Time	Location	Teaching	Teacher
18.05.26	All	12:00-12:45	O-339	P6	Christian Reynolds
	1	9:00-11:00	O-339	S2	Nicholas Bradshaw
	2+3	12:00-14:00			
19.05.26	All	13:00-13:45	O-339	S4	Christian Reynolds
	1	9:00-11:00	O-339	S3	Nicholas Bradshaw
	2+3	12:00-14:00			
20.05.26	All	11:00-12:00	O-339	Mid-course exam	
	All	12:00-12:45	O-339	P7	Željka Maglica
	All	13:00-13:45	O-339	P8	Željka Maglica
21.05.26	All	11:00-13:00	O-339	P9	Željka Maglica
	All	16:00-17:00	Zoom*	S5	Antony Yerabham
22.05.26	All	11:00-11:45	O-339	P10	Nicholas Bradshaw
	All	12:00-12:45	O-339	P11	Željka Maglica
	All	16:00-17:00	Zoom*	S6	Antony Yerabham

*Lessons over Zoom will be held using this link:

<https://us06web.zoom.us/j/5169460322?pwd=Qm5QV2owWVVIM2lWcWlTQkU1REVlZz09>

Meeting ID: 516 946 0322

Passcode: Rijeka



Fakultet biotehnologije i razvoja lijekova
Faculty of Biotechnology and Drug Development

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Week 3

Date	Group	Time	Location	Teaching	Teacher
25.05.26	All	11:00-13:00	O-339	S7	Bradshaw / Maglica
	1	9:00-10:30	O-353	V1	Maja Juković Matea Kršanac
	2	9:00-10:30	O-352		
	3	13:00-14:30	O-353		
26.05.26	All	11:00-12:30	O-339	S8	Bradshaw / Maglica
	All	12:30-13:30	O-339	S9	Željka Maglica
	3	10:00-10:45	O-353	V2	Maja Juković Matea Kršanac
	1	10:00-10:45	O-352		
	2	14:00-14:45	O-353		
27.05.26	All	11:00-12:30	O-339	S10	Bradshaw / Maglica
	2	8:00-11:00	O-353	V3	Maja Juković Matea Kršanac
	3	8:00-11.00	O-352		
	1	13:00-16:00	O-353		
28.05.26	All	12:00-13:30	O-339	S11	Bradshaw / Maglica
	1	8:00-12.00	O-353	V4	Maja Juković Matea Kršanac
	2	8:00-12:00	O-352		
	3	14:00-18:00	O-353		
29.05.26	No classes				

Week 4

Date	Group	Time	Location	Teaching	Teacher
01.06.26	3	8:00-12:00	O-353	V5	Maja Juković Matea Kršanac
	1	8:00-12:00	O-352		
	2	13:00-17:00	O-353		
02.06.26	2	8:00-12:00	O-353	V6	Maja Juković Matea Kršanac
	3	8:00-12:00	O-352		
	1	13:00-17:00	O-353		
03.06.26	All	12:00-13:00	O-339	S12	Bradshaw / Maglica
	1	9:00-12:00	O-353	V7	Maja Juković Matea Kršanac
	2	9:00-12:00	O-352		
	3	13:00-16:00	O-353		
04.06.26	National holiday				
05.06.26	All	8:00-9:30	O-030	Final exam (1 st sitting)	