

Faculty of Medicine in Rijeka

**Curriculum
2023/2024**

For course

Experimental Antibody Development

Study program: **Medical Studies in English (R)** (elective)
University integrated undergraduate and graduate study
Department: **Centre for Proteomics**
Course coordinator: **prof. dr. sc. Lenac Roviš Tihana**

Year of study: **5**
ECTS: **1.5**
Incentive ECTS: **0 (0.00%)**
Foreign language: **Possibility of teaching in a foreign language**

Course information:

Course Overview:

The elective course on advanced topics in immunology and antibody development is designed to provide fifth/sixth-year medical students with a comprehensive understanding of immunization processes and the development of monoclonal antibodies. The course explores cutting-edge techniques and applications in antibody research and immunotherapy. Students will have the opportunity to engage in hands-on laboratory exercises and seminars, enabling them to gain practical experience and contribute to the advancement of immunotherapy research.

The course is intended primarily for students who are oriented towards molecular medicine and branches that include immunology, infectology, microbiology, oncology, pathology, pharmacology, molecular diagnostics, etc.; also to those students who want to understand the molecular basis on which the processes of immunization and antibody production are based, such as future epidemiologists and experts involved in vaccine development. The aim of the course is to integrate acquired theoretical knowledge from immunology and infectology using examples and to empower the student in experimental work in the laboratory using the example of the development of monoclonal antibodies to a protein antigen.

Course Structure:

L1 (1h) Introduction to immunization processes and the production of proteins as immunogens

L2 (2h) The process of producing monoclonal antibodies using the hybridoma technique and the phage display technique

L3 (1h) Recombinant antibodies, protein-based vaccines and vaccines using proteins as carriers

L4 (2h) Development of antibodies for the needs of immunotherapy with examples of own patents in the immunotherapy of tumors (1h) and viruses (1h)

Exercises (14 h): The maximum number of students is limited to three due to the experimental nature of the course and the use of several scientific laboratories. The exercises will include 14 hours of experimental work with supervision of procedures involved in the development and characterization of murine monoclonal antibodies, including but not limited to: BCA assay of immunogen concentration in a sample; ELISA assay of supernatant of hybridoma cell lines (1/3 of 96-well plate) for immunogen of interest; test of positive supernatants of hybridoma cell lines to identify native immunogens by immunofluorescence or flow cytometry or immunoblotting method - exercises are adapted to current laboratory activities.

Seminars (5h): Presentations of the students' experimental results in the form of a report which, in addition to the achieved results, will contain a short theoretical introduction to the research problem and the possibility of exploiting the antibodies in the development of which they participated.

List of assigned reading:

Selected review, scientific or applicative papers related to an individual experimental task (immunogen of interest)

List of optional reading:

Curriculum:

Lectures list (with titles and explanation):

L1. Introduction to immunization processes and the production of proteins as immunogens

The student will be able to:

1. Applies knowledge of molecular and cellular mechanisms that are important in the process of immunogen preparation and immunization.

L2. The process of producing monoclonal antibodies

The student will be able to:

Defines the steps in the production of monoclonal antibodies
Discusses the merits of different methods for obtaining antibodies

L3. Recombinant antibodies, protein-based vaccines and vaccines using proteins as carriers

Student će biti osposobljen da:

1. Definiira pojam rekombinantnog protutijela i subjediničnog (proteinskog) cjepiva
2. Opiše razloge korištenja proteina kao nosača prilikom razvoja cjepiva

L4 (2h) Development of antibodies for immunotherapy with examples of own patents in the immunotherapy of tumors (1h) and viruses (1h)

The student will be able to:

Discuss some current principles of immunotherapy
Describe the concept of antibody-based intellectual property

Seminars list (with titles and explanation):

S - Seminars

Seminars (5h): Presentations of the students' experimental results in the form of a report which, in addition to the achieved results, will contain a short theoretical introduction to the research problem and the possibility of exploiting the antibodies in the development of which they participated.

Practicals list (with titles and explanation):

E - 14 hours of supervised experimental work (max. 3 students)

Exercises (14 h): The maximum number of students is limited to three due to the experimental nature of the course and the use of several scientific laboratories.

The student will be able to:

Create a plan for the rational selection of laboratory tests and the interpretation of their results for the validation of antibodies used in medicine.

Student obligations:

regular attendance of classes (lectures, seminars, exercises)

preparing a seminar /passing the final exam

Exam (exam taking, description of the written/oral/practical part of the exam, point distribution, grading criteria):

Other notes (related to the course) important for students:

The maximum number of students is limited to three due to the experimental nature of the course and the use of several scientific laboratories.

COURSE HOURS 2023/2024

Experimental Antibody Development

Lectures (Place and time or group)	Practicals (Place and time or group)	Seminars (Place and time or group)
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List of lectures, seminars and practicals:

LECTURES (TOPIC)	Number of hours	Location
L1. Introduction to immunization processes and the production of proteins as immunogens	1	
L2. The process of producing monoclonal antibodies	2	
L3. Recombinant antibodies, protein-based vaccines and vaccines using proteins as carriers	1	
L4 (2h) Development of antibodies for immunotherapy with examples of own patents in the immunotherapy of tumors (1h) and viruses (1h)	2	

PRACTICALS (TOPIC)	Number of hours	Location
E - 14 hours of supervised experimental work (max. 3 students)	14	

SEMINARS (TOPIC)	Number of hours	Location
S - Seminars	5	

EXAM DATES (final exam):
