

TRANSFUSION MEDICINE WITH LABORATORY TECHNOLOGIES	
GENERAL INFORMATIONS	
Course coordinator	Assoc. Prof. Marina Samardžija, MD, PhD
Assistant/Associate	Asst. Prof. Marina Ferenac Kiš, MBiolMol, PhD Asst. Prof. Irena Jukić, MD, PhD Asst. Prof. Saška Marczi, MEdBiol et Chem, PhD Branislava Kojić Latas, MD Dejana Brkić Barbarić, MD Maja Marijanović, MD Sandra Vitaić, MD
Study Programme	Undergraduate University Study of Medical Laboratory Diagnostics
Status of the course	mandatory
Year of study, semester	3 rd year, 5 th semester
ECTS	3
Workload (hours)	Lectures: 15; Seminars: 5; Laboratory exercises: 15
Expected number of students	30-35
COURSE DESCRIPTION	
Course objectives	
The acquisition of knowledge of the fundamentals of blood group immunology, the immunological aspects of blood transfusion diagnostics and therapy, the immunological risks of transfusion therapy. Familiarizing students with the assurance measures for timely and safe transfusion therapy. Familiarizing students with the methodologies of laboratory immunohematology testing and mandatory testing for bloodborne diseases. Awareness of the consequences of undetected immunization against blood cell antigens and bloodborne pathogens.	
Course requirements and required competences	
No additional requirements	
Learning outcomes relevant to the study program	
1.1, 1.2, 2.1, 2.2, 2.3, 2.6, 3.1, 3.2	
Expected learning outcomes at the course level	
After completing lectures, seminars and exercises, independent study and passing the exam, students will be able to: <ol style="list-style-type: none"> 1. interpret the blood cell membrane structure and the antigenicity of molecules on the cell surface. 2. compare red blood cell group systems and blood group antigens on other cells. 3. conclude on the immune response, cellular and humoral. 4. interpret immunological barriers to non-selective blood cell transfusion. 5. discuss antigen-antibody reactions as a diagnostic test (cross-matching). 6. support the association of hemolysis with the use of an inappropriate blood product 7. interpret the hemolytic disease of the newborn (HDN) 8. evaluate the antigen-antibody reactions as a diagnostic test for detecting bloodborne pathogens. 9. compare and assess the choice of a diagnostic method. 	
Course content	
Lectures: <i>Lecture 1: Blood function and composition.</i> Transport and defensive function of the blood. Maintaining homeostasis. Blood composition <i>in vivo</i> and blood changes <i>in vitro</i> . <i>Lecture 2: Fundamentals of erythrocyte immunology.</i> Red blood cell groups ABO, Rh, other erythrocyte antigens.	

Biological function of blood groups. Immunization against red blood cell group antigens. Antibodies. Physicochemical characteristics of erythrocyte and autoantibodies.

Lecture 3: Introduction to immunohematology laboratory tests. Reaction between antigens and antibodies. Factors affecting hemagglutination *in vitro*. The most important characteristics of the tests for detecting and determining characteristics and specificities of antibodies. *Lecture 4: Characteristics of main immunohematology tests.* Determining and verifying the ABO blood group. Determining and verifying RH (D) antigens, Du or weak D, RH phenotype. Direct antiglobulin test. Detection of irregular antibodies. Cross-matching. Method for antibody elution from erythrocytes. Eluate testing for irregular antibodies. Autoimmune hemolytic anemia.

Lecture 5: Hemolytic disease of the newborn. Immunization. Antibody specificity. Transfusion therapy of the ABO hemolytic disease of the newborn. Transfusion therapy of the Rh hemolytic disease of the newborn. Use of Rh hyperimmune globulin. Intrauterine transfusion therapy.

Seminars *S1: Hematopoiesis:* Molecular and cellular basis of hematopoiesis. Cells and their communication. Influence of molecular biology on hematology. *S2: Immunization:* Primary and secondary immunization. Complement. Immune erythrocyte degradation. Intravascular erythrocyte degradation. Extravascular erythrocyte degradation. *S3: Clinical significance of ABO blood groups:* ABO blood group system in transfusion therapy.

Lab exercises:

Exercise 1: Introduction Basic laboratory testing rules. Blood sampling for laboratory testing. Blood sample characteristics. Test serums. Blood sample age and storage. Documentation management.

Exercise 2: Molecular diagnostic tests: Polymerase chain reaction (standard PCR). Real-time polymerase chain reaction (real-time PCR). Electrophoresis. Hybridization. Computer result processing.

Exercise 3: Diagnostic testing of hemagglutination on a slide. Tube test. Column and card tests. Solid-surface test – microplates. Prenatal immunohematology tests. Antibody titer. Direct antiglobulin test (DAT) on erythrocytes of the newborn obtained from umbilical cord. Test performance control.

Exercise 4: Laboratory testing for markers or bloodborne pathogens in transfusion medicine: Donor blood testing - mandatory tests in the Republic of Croatia. Enzyme immunoassays (EIAs). Confirmatory tests. Window period. Sensitivity and specificity of the tests. *Exercise 5: Lookback and traceback.* *Lookback and traceback processes.* Document traceability. Reading and interpreting results.

Form of instruction

Lectures; Seminars; Laboratory exercises

Student obligations

Attending all forms of instruction is mandatory, and the student must sit for all exams. A student can be excused from 30% of every form of instruction. Missed exercises must be compensated by sitting for an exam.

Monitoring student learning (Interconnectedness of learning outcomes, teaching methods and grading)

Type of exam: written exam.

Curricular activities	ECTS	Learning outcome	Student participation	Assessment methods	Points	
					Min.	Max.
Attendance (lectures, seminars, exercises)	1	1-8	Class attendance, Active participation, Completed exercise	Records	5	15
Seminars	1	1-8	Writing a seminar paper	Presentation	5	15
Final exam	2	1-8	Preparation for the final exam	Written exam	40	70

Total	3			50	100
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Valuation of the written part of the final exam

Percentage of correctly solved tasks (%)	Points
60-69.99	40
70-79.99	50
80-89.99	60
90-100	70

Formulation of the final grade:

Points achieved in class are combined with points achieved on the final exam. The grading shall be carried out by using absolute distribution, i.e. shall be based on the final achievement and compared to the numerical system as follows:

A – excellent (5): 90-100 points; B – very good (4): 80-89.99 points; C – good (3): 70-79.99 points; D – sufficient (2): 60-69.99 points.

Mandatory reading (available in the library or in other mediums)

Title	Number of copies in the library	Availability in other mediums
Labar, B. et al. Hematologija [Hematology]. Zagreb, Školska knjiga, 2017	7	
Balen S. Osnove transfuzijske medicine [Introduction to Transfusion Medicine]. Osijek: Medicinski fakultet Osijek, 2010	23	
Vrhovac, B. et al. Interna medicina [Internal Medicine]. Naklada Ljevak, Zagreb, 2008	15	

Additional reading

1. Mintz PD. Transfusion therapy. Clinical Principles and Practice. AABB Press; 2005

Quality monitoring methods ensuring the acquisition of competences upon completion

An anonymous, quantitative, standardized student survey on the course and the work of professors conducted by the Quality Assurance Office of the Faculty of Medicine Osijek.