

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ



**Hamadan University of Medical Sciences and Health Services  
Educational Deputy of the University  
Center for Studies and Development of Medical Sciences Education**

## **Lesson Plan: Theory of Immunohematology and Blood Bank**

**Dear Colleagues,**

As the teaching-learning process is one that cannot achieve its objectives without planning, it is essential to develop a lesson plan at the beginning of the educational process (as a roadmap and guide for instructors and students). Therefore, it is requested that esteemed instructors exercise utmost care in completing the lesson plan.

**Course and Instructor Information (All fields must be completed)**

- **Course Title:** Immunohematology and Blood Bank
- **Instructors' Full Names:** Dr. Mohsen Rastegari Pouyani, Dr. Mehdi Behzad
- **Course Coordinator's Full Name:** Dr. Mohsen Rastegari Pouyani
- **Head of Department's Full Name:** Dr. Mehdi Behzad
- **Type and Number of Credits:**  Theoretical — 1.5 credits

Practical/Internship — 0.5 credits

- **Student Major and Level:** Medical Immunology – Master's Degree
- **Academic Semester:** First Semester  Second Semester
- **Venue:** Classroom, Faculty of Medicine

**Immunohematology and Blood Bank – Lesson Plan**

Session	Topic	Behavioral Objectives	Instructor	Learning Domain	Teaching Method	Duration	Teaching Aids	Evaluation Method
---------	-------	-----------------------	------------	-----------------	-----------------	----------	---------------	-------------------

1	Antigen–Antibody Reaction	<p>1a. Name the types of antibodies in immunohematology, 1b. Describe each.</p> <p>&lt;br&gt; 2a. Identify types of antigen–antibody interactions, 2b. Compare them. &lt;br&gt; 3a. List factors influencing antigen–antibody interactions, 3b. Explain the effect of each. &lt;br&gt; 4a. Correctly classify serological reactions, 4b. Give examples.</p> <p>&lt;br&gt; 5. Compare direct (active), indirect, and passive hemagglutination.</p>	Dr. Mohsen Rastegari Pouyani	<p>1a. Cognitive (Knowledge)</p> <p>&lt;br&gt; 1b. Cognitive (Understanding)</p> <p>&lt;br&gt; 2a. Cognitive (Knowledge)</p> <p>&lt;br&gt; 2b. Cognitive (Evaluation)</p> <p>&lt;br&gt; 3a. Cognitive (Knowledge)</p> <p>&lt;br&gt; 3b. Cognitive (Understanding)</p> <p>&lt;br&gt; 4a. Cognitive (Synthesis) &lt;br&gt; 4b. Cognitive (Understanding)</p> <p>&lt;br&gt; 5. Cognitive (Evaluation)</p>	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
2	ABO Blood Group System (1)	<p>1a. Explain biochemical structure of ABO antigens, 1b. Illustrate them. &lt;br&gt; 2. Describe inheritance of ABO antigens. &lt;br&gt; 3a. Explain genetics of ABO antigens focusing</p>	—	<p>1a. Cognitive (Understanding)</p> <p>&lt;br&gt; 1b. Cognitive (Analysis) &lt;br&gt; 2. Cognitive (Understanding)</p> <p>&lt;br&gt; 3a.</p>	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A

		<p>on key amino acids in related enzymes, 3b. Classify hybrid transferases. &lt;br&gt; 4a. Name ABO subgroup types, 4b. Compare two common A subgroups. &lt;br&gt; 5a. List common ABO antibodies, 5b. Explain their formation and clinical significance. &lt;br&gt; 6. Explain uncommon ABO antibodies and their clinical importance.</p>		<p>Cognitive (Understanding) &lt;br&gt; 3b. Cognitive (Synthesis) &lt;br&gt; 4a. Cognitive (Knowledge) &lt;br&gt; 4b. Cognitive (Evaluation) &lt;br&gt; 5a. Cognitive (Knowledge) &lt;br&gt; 5b. Cognitive (Understanding) &lt;br&gt; 6. Cognitive (Understanding)</p>				
3	ABO Blood Group System (2)	<p>1. Compare cell and serum grouping. &lt;br&gt; 2. Describe steps of cell grouping by tube and slide methods. &lt;br&gt; 3. Explain reverse typing method. &lt;br&gt; 4. Compare grades and scores in tube agglutination. &lt;br&gt; 5a. Differentiate forward grouping discrepancies, 5b. Provide examples, 5c. Describe solutions.</p>	—	<p>1. Cognitive (Evaluation) &lt;br&gt; 2. Cognitive (Understanding) &lt;br&gt; 3. Cognitive (Understanding) &lt;br&gt; 4. Cognitive (Evaluation) &lt;br&gt; 5a. Cognitive (Analysis) &lt;br&gt; 5b. Cognitive (Understanding) &lt;br&gt; 5c.</p>	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A

		<p>&lt;br&gt; 6a. Differentiate reverse grouping discrepancies, 6b. Provide examples, 6c. Describe solutions. &lt;br&gt; 7. Explain quality control for ABO typing reagents.</p>		<p>Cognitive (Understanding) &lt;br&gt; 6a. Cognitive (Analysis) &lt;br&gt; 6b. Cognitive (Understanding) &lt;br&gt; 6c. Cognitive (Understanding) &lt;br&gt; 7. Cognitive (Understanding)</p>				
4	Rh Blood Group System (1)	<p>1. Present history of the Rh system. &lt;br&gt; 2a. List Rh antigens with immunogenicity order, 2b. Show antigen structures and RhAG protein with diagrams. &lt;br&gt; 3. Compare the Tippett, Fisher–Race, and Weiner nomenclature systems focusing on genetics. &lt;br&gt; 4a. Explain D antigen phenotypes (Du, mosaic D, DVI, DEL), 4b. Compare them for formation and transfusion reaction risk. &lt;br&gt; 5. Compare</p>	—	<p>1. Cognitive (Knowledge) &lt;br&gt; 2a. Cognitive (Knowledge) &lt;br&gt; 2b. Cognitive (Analysis) &lt;br&gt; 3. Cognitive (Evaluation) &lt;br&gt; 4a. Cognitive (Understanding) &lt;br&gt; 4b. Cognitive (Evaluation) &lt;br&gt; 5. Cognitive (Evaluation) &lt;br&gt; 6. Cognitive (Synthesis) &lt;br&gt;</p>	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A

		Rhnull and Rhmod syndromes regarding etiology, RBC morphology, and clinical signs.   6. Classify types of Rhnull syndrome.   7. Describe characteristics of Rh antibodies.   8. State differences between ABO and Rh systems.   9. Explain transfusion in Rh incompatibility.		7. Cognitive (Understanding)   8. Cognitive (Knowledge)   9. Cognitive (Understanding)				
--	--	---	--	--	--	--	--	--

<b>ession</b>	<b>Topic</b>	<b>Behavioral Objectives</b>	<b>Instructor</b>	<b>Learning Domain</b>	<b>Teaching Method</b>	<b>Duration</b>	<b>Teaching Aids</b>	<b>Evaluation Method</b>
<b>5</b>	Rh Blood Group System (2)	1a. Compare cell and serum grouping in Rh system, 1b. Describe steps of Rh typing.   2. Explain weak D testing procedures.   3a. Identify causes of weak D phenotypes, 3b. Explain their clinical significance.   4. Explain quality control for Rh typing reagents.	Dr. Mohsen Rastegari Pouyani	1a. Cognitive (Evaluation)   1b. Cognitive (Understanding)   2. Cognitive (Understanding)   3a. Cognitive (Knowledge)   3b. Cognitive (Understanding)   4. Cognitive (Understanding)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A

6	Other Blood Group Systems (1)	1a. List clinically significant blood group systems other than ABO and Rh, 1b. Explain their importance in transfusion.   2. Explain key features of Kell, Kidd, and Duffy systems (antigens, antibodies, inheritance).	—	1a. Cognitive (Knowledge)   1b. Cognitive (Understanding)   2. Cognitive (Understanding)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
7	Other Blood Group Systems (2)	1. Describe MNS, Lewis, and P blood group systems.   2a. Compare antigens and antibodies in these systems, 2b. Explain their clinical relevance.	—	1. Cognitive (Understanding)   2a. Cognitive (Evaluation)   2b. Cognitive (Understanding)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
8	Antiglobulin Test (Coombs Test)	1. Explain principle of DAT and IAT.   2a. Detail procedural steps, 2b. Interpret results.   3. Identify causes of false positives and false negatives.	—	1. Cognitive (Understanding)   2a. Cognitive (Knowledge)   2b. Cognitive (Evaluation)   3. Cognitive (Analysis)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
9	Pre-transfusion Testing	1. Explain steps in compatibility testing.   2. Describe crossmatching methods and interpretation.   3. Explain antibody screening and identification.	—	1. Cognitive (Understanding)   2. Cognitive (Understanding)   3. Cognitive (Analysis)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A

<b>10</b>	Blood Components	1. List types of blood components.   2a. Explain preparation methods, 2b. State storage conditions and shelf life.   3. Explain indications for each component.	—	1. Cognitive (Knowledge)   2a. Cognitive (Understanding)   2b. Cognitive (Knowledge)   3. Cognitive (Understanding)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
<b>11</b>	Blood Component Therapy	1. Describe principles of blood component therapy.   2. Match component selection with patient needs.   3. Identify possible complications.	—	1. Cognitive (Understanding)   2. Cognitive (Application)   3. Cognitive (Knowledge)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
<b>12</b>	Transfusion Reactions (Acute)	1. Classify acute transfusion reactions.   2a. Explain pathophysiology, 2b. State clinical features.   3. Describe immediate management steps.	—	1. Cognitive (Knowledge)   2a. Cognitive (Understanding)   2b. Cognitive (Knowledge)   3. Cognitive (Application)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
<b>13</b>	Transfusion Reactions (Delayed)	1. Classify delayed transfusion reactions.   2. Explain causes and prevention.   3. Describe laboratory workup.	—	1. Cognitive (Knowledge)   2. Cognitive (Understanding)   3. Cognitive (Application)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
<b>14</b>	Hemolytic Disease of the Newborn (HDN)	1. Describe etiology and immunopathogenesis.   2. Explain antenatal and postnatal diagnosis.	—	1. Cognitive (Understanding)   2. Cognitive (Application)  	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A

		  3. State principles of management and prevention.		3. Cognitive (Application)				
15	Autoimmune Hemolytic Anemia (AIHA)	1. Classify AIHA types.   2. Explain pathophysiology and serologic findings.   3. State treatment options.	—	1. Cognitive (Knowledge)   2. Cognitive (Understanding)   3. Cognitive (Application)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
16	Blood Donor Selection and Screening	1. Explain donor eligibility criteria.   2. Describe medical history and physical exam requirements.   3. List mandatory screening tests.	—	1. Cognitive (Understanding)   2. Cognitive (Knowledge)   3. Cognitive (Knowledge)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A
17	Blood Bank Quality Assurance	1. Explain importance of QA in blood banking.   2. Describe components of a QA program.   3. Outline common errors and preventive measures.	—	1. Cognitive (Understanding)   2. Cognitive (Knowledge)   3. Cognitive (Application)	Lecture / Discussion	2 hours (Theoretical)	Video projector	Q&A

### Grading Scheme

Evaluation Type	Date	Evaluation Tool	Points (out of total)
-----------------	------	-----------------	-----------------------

<b>Quiz</b>			
<b>Project Presentation</b>			
<b>Midterm Exam</b>			
<b>Final Exam</b>		Essay Test (Theoretical section)	15
		Essay Test (Practical/Internship section)	5
<b>Other</b>			
<b>Total</b>			<b>20</b>

---

### References

1. Kathy D. Blaney. *Basic and Applied Concepts of Blood Banking and Transfusion Practice*, Latest edition.
2. AABB (*American Association of Blood Banks*), *Technical Manual*, Latest edition.