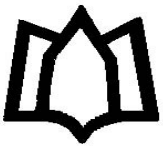
In the Name of God



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

Theory/Practical Lesson Plan Form

Dear Colleagues,

As the teaching-learning process is one that requires careful planning to achieve its objectives, the preparation of a lesson plan at the beginning of the educational process (as a map and guide for instructors and students) is essential. It serves as one of the main tools for the educational activities of instructors. Therefore, we kindly ask all instructors to pay utmost attention to completing the lesson plan.

Course and Instructor Information

- **Course Title:** Molecular Basis of Diseases
- **Instructors:** Dr. Razieh Amini, Dr. Rezvan Najafi
- **Course Coordinator:** Dr. Rezvan Najafi
- **Head of Department:** Dr. Rezvan Najafi
- **Credits and Type:** 1.5 Credits – Theoretical; Practical (hours as applicable)
- **Student Major and Level:** Ph.D. in Molecular Medicine
- **Semester:** First and Second Semesters
- **Teaching Location:** Pre-lab – Department of Molecular Medicine and Genetics

Lesson Plan Table

Session (s)	Topic	Behavioral Objectives (At the end of each session, students should be able to…)	Learning Domain	Teaching Method	Duration	Teaching Aids	Evaluation Method
1–2	Tumor Metastasis & Invasion – Mechanisms I & II	1. Describe the molecular processes involved in cancer progression and malignancy; 2. Define the stages of metastasis; 3. Explain molecular regulators of each stage; 4. Describe molecular changes in the malignant transformation of tumor cells; 5. Identify molecular inhibitory factors (internal and external) in tumor growth; 6. Define the process of tumor angiogenesis; 7. Compare tumor and normal angiogenesis.	Cognitive	Lecture and Group Discussion	120 min	Slides and Whiteboard	Q&A and Assignment Presentation
3–5	Molecular	1. Define	Cogniti	Lecture	120	Slides	Q&A

	Basis of Hematologic Disorders I, II & III	hematopoiesis; 2. Describe mechanisms determining hematopoietic stem cell fate; 3. Explain the relationship between hematopoietic stem cells and osteoblasts; 4. Describe molecular pathways involved in hematopoietic stem cell fate; 5. Define the structure and components of niches; 6. Identify factors influencing homing and mobilization of hematopoietic stem cells; 7. Compare normal and leukemic hematopoietic stem cells; 8. Describe features and types of myelodysplastic syndromes; 9. Identify features and types of myeloproliferative diseases; 10. Explain molecular changes, diagnostic, and	ve	and Group Discussion	min	and Whiteboard	and Assignment Presentation

		therapeutic points in myeloproliferative diseases; 11. Describe acute myeloid leukemias and their types; 12. Explain major mutations, diagnostic, and therapeutic notes in acute myeloid leukemias; 13. Describe lymphoid cancers and their types; 14. Explain major mutations, diagnostic, and therapeutic points in lymphoid cancers; 15. Provide diagnostic and therapeutic examples; 16. Propose solutions for therapeutic challenges.					
6–7	Molecular Basis of Rheumatoid Arthritis I & II	1. Define the immunologic and inflammatory processes in the disease; 2. Describe key factors involved in the disease; 3. Explain the molecular	Cognitive	Lecture and Group Discussion	120 min	Slides and Whiteboard	Q&A and Assignment Presentation

		pathogenesis; 4. Identify diagnostic, prognostic, and therapeutic biomarkers; 5. Present research examples on biomarker discovery.					
8–9	Molecular Basis of Cardiovascular Disease I & II	1. Describe cardiovascular diseases and the role of endothelium; 2. Define regulatory functions of endothelium and vascular endothelial mediators; 3. Identify molecular targets in cardiovascular diseases; 4. Describe biochemical factors in cardiovascular diseases; 5. Explain the role of epigenetics in cardiovascular diseases; 6. Present research examples on diagnostic, prognostic, and therapeutic biomarker discovery.	Cognitive	Lecture and Group Discussion	120 min	Slides and Whiteboard	Q&A and Assignment Presentation
10–11	Molecular Basis of	1. Define endocrine	Cognitive	Lecture and	120 min	Slides and	Q&A and

	Endocrine Disorders I & II	disorders; 2. Describe mutations involved in endocrine disorders; 3. Explain molecular processes in thyroid cancer; 4. Describe molecular pathways in adrenal disorders.		Group Discussion		Whiteboard	Assignment Presentation
12	Molecular Basis of Hemostasis	1. Define the hemostasis process and its molecular components; 2. Describe types of coagulation disorders and related molecular changes; 3. Present research examples on diagnostic, prognostic, and therapeutic biomarkers in coagulation disorders.	Cognitive	Lecture and Group Discussion	120 min	Slides and Whiteboard	Q&A and Assignment Presentation

Grading Scheme

Evaluation Type	Date	Evaluation Tool	Points
Quiz	—	Providing practical questions to assess the learner's skills	2
Project Presentation	—	Problem formulation and proposing solutions and hypothesis	2
Midterm Exam	—	Essay Test	7
Final Exam	—	Essay Test	7
Other	—	Active class participation, answering posed questions, and quality of seminar presentation	2
Total	—	—	**20**

Reference

- **Molecular Pathology and Diagnostics of Cancer**
- **Hereditary Tumors from Genes to Clinical Consequences**
- **Essential Concepts in Molecular Pathology**
- **Fundamental Molecular Biology**
- **Molecular Oncology: Principles and Recent Advances**
- **Articles**