بسمه تعالی 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 Details (Completing all items in this section is essential)

- Course title: Respiratory Physiology
- Instructor(s): Dr. Masoumeh Kourosh Arami; Dr. Fatemeh Ramazani Ali Akbari
- Course coordinator: Dr. Masoumeh Kourosh Arami
- Head of Department: Dr. Siamak Shahidi
- Credit hours: Theory: 2.0 units
- Program & student level: MSc (Master's)
- Term: First semester, Academic Year 1402–1403
- Teaching location: School of Medicine classrooms
- Language of instruction: English

Session schedule (16 sessions) — Persian dates preserved

Session	Topic (Title)	Behavioral objectives	Learning domain	Teaching methods	Duration	Teaching aids	Assessment method
1	Mechanics of respiration: inspiration and expiration	1. Define respiratory system structure and basic terminology. 2. Name inspiratory and expiratory muscles. 3. Explain pressures in the respiratory system. 4. Define lung compliance and describe factors affecting it.	Cognitive — Knowledge; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
2	Mechanics of respiration (II)	1. Explain structural and functional coordination of respiratory components. 2. Explain the mechanism of inspiration and expiration. 3. Name lung volumes and capacities. 4. Explain airway resistance and its determinants.	Cognitive — Comprehension; Cognitive — Knowledge	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
3	Pulmonary ventilation	1. Calculate basic lung volumes and ventilation. 2.	Cognitive — Application;	Lecture, instructional video,	2 hours	Video projector & computer, whiteboard,	Quiz; Oral Q&A;

		Define alveolar ventilation and calculate it. 3. Describe measurement and concepts of anatomical and physiological dead space.	Cognitive — Knowledge; Cognitive — Comprehension	oral Q&A		PowerPoint/ slides, video clips	Oral exam
4	Pulmonary circulation (I)	1. State pulmonary arterial pressure and factors affecting it. 2. Describe West zones 1,2,3 and factors influencing regional pulmonary blood flow. 3. Compare systemic vs pulmonary circulation in pressure, flow, and resistance.	Cognitive — Knowledge; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
5	Pulmonary circulation (II)	1. State Starling forces in pulmonary capillaries. 2. Explain pulmonary edema formation and contributing factors.	Cognitive — Knowledge; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
6	Pulmonary circulation (III)	1. Explain PO2 effect on alveolar blood flow (hypoxic pulmonary vasoconstricti	Cognitive — Comprehension; Cognitive —	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam

		on). 2. Explain exercise effects on regional pulmonary blood flow. 3. Name factors causing heterogeneous regional blood flow.	Knowledge				
7	Ventilation-perfusion ratio	1. Explain alveolar PO2 and PCO2 in different lung regions. 2. Describe regional ventilation distribution. 3. Explain the concept of ventilation/perfusion (V/Q) ratio.	Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
8	Ventilation-perfusion ratio (II)	1. Compare V/Q across lung regions. 2. Explain dead space and its effect on V/Q. 3. Define shunt and its effect on V/Q. 4. Compare alveolar PO2 and PCO2 in shunt vs dead space scenarios.	Cognitive — Evaluation; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
9	Gas diffusion laws and exchange	1. State diffusion laws (Fick, Henry, Dalton). 2. Describe respiratory membrane	Cognitive — Evaluation; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam

		properties. 3. Explain gas diffusion in the lung. 4. Define diffusion capacity and diffusion vs perfusion limitation.					
10	Gas transport in blood (I)	1. Explain hemoglobin molecular structure and its role in O2 transport. 2. Describe the O2-hemoglobin dissociation curve and influencing factors. 3. Define the Bohr effect. 4. Explain CO2 transport forms and the CO2 dissociation curve. 5. Define the Haldane effect.	Cognitive — Evaluation; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
11	Neural regulation of respiration	1. Explain objectives of respiratory regulation. 2. Name respiratory centers. 3. Describe generation of respiratory rhythm. 4. List reflexes involved in respiratory regulation	Cognitive — Evaluation; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam

		and explain their pathways and mechanisms.					
12	Chemical control of respiration	1. Describe peripheral and central chemoreceptors. 2. Explain ventilatory responses to changes in blood PO2. 3. Explain ventilatory responses to changes in blood PCO2. 4. Explain ventilatory responses to changes in blood pH.	Cognitive — Evaluation; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
13	Role of the respiratory system in acid-base balance	1. Define acid, base, pH, and buffer. 2. Explain the respiratory system's role in pH regulation of body fluids. 3. Describe compensatory responses to metabolic and respiratory pH disturbances.	Cognitive — Evaluation; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
14	Non-respiratory functions of the lung	1. Describe pulmonary defense mechanisms. 2. Explain clearance of inhaled particles. 3. Describe non-respiratory	Cognitive — Evaluation; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam

		functions of pulmonary circulation. 4. State metabolic activities of the lung.					
15	Respiratory system under stress and abnormal conditions	1. Explain ventilatory changes during light and heavy exercise. 2. List effects of high altitude and describe ventilatory adaptations. 3. List effects of diving and describe ventilatory adaptations to diving.	Cognitive — Evaluation; Cognitive — Comprehension	Lecture, instructional video, oral Q&A	2 hours	Video projector & computer, whiteboard, PowerPoint/ slides, video clips	Quiz; Oral Q&A; Oral exam
16	Student conferences (presentations)	Student presentations on assigned topics (details per instructor)	Cognitive — Application	Student seminars / presentations	Variable	Student materials, projector, whiteboard	Presentation + Q&A

Student assessment table (grading scheme)

Assessment type	Date / When	Assessment tool	Weight (points)
Quiz	23/08/1402	Written quiz	10
Project / Seminar	21/09/1402	Seminar presentation + oral Q&A	20
Final exam	According to academic calendar	Written exam (electronic)	70
Other	—	—	—
Total	—	—	100

References

1. Guyton and Hall — Textbook of Medical Physiology, 2021 edition
2. Ganong — Review of Medical Physiology, latest edition (2021)
3. Berne & Levy Physiology, latest edition (2021)
4. West — Respiratory Physiology: The Essentials, 2021 edition