

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: Cardiovascular Physiology
- Instructors: Dr. Safoura Raoufi; Dr. Masoumeh Kourosh Arami
- Course coordinator: Dr. Safoura Raoufi
- Head of Department: Dr. Siamak Shahidi
- Credit hours: Theory: 2.0 units; Practical: 0.0 units
- Program & student level: MSc in Physiology
- Term: Second semester, Academic Year 1402–1403
- Teaching location: School of Medicine
- Language of instruction: English

Session	Topic (Title)	Behavioral objectives	Learning domain	Teaching methods	Duration	Teaching aids	Assessment method
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1	Cardiac muscle	1. Explain the structure of cardiac muscle cells. 2. Describe the molecular mechanism of excitation–contraction coupling in cardiac muscle. 3. Explain the molecular mechanism of cardiac contraction.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A
2	Cardiac action potentials	1. Describe the fast-response cardiac action potential. 2. Describe the slow-response cardiac action potential.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A
3	Mechanical events of the cardiac cycle	1. Explain atrial mechanical function. 2. Explain ventricular mechanical function. 3. Describe cardiac valves. 4. Explain control of cardiac mechanical function.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A
4	Electrical events of the heart	1. Describe the cardiac conduction (excitation) system. 2. Explain regulation of the cardiac conduction system.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A
5	Hemodynamics of the circulatory system	1. Explain physical properties of the vascular system: blood flow and its types, series vs. parallel vascular arrangements, relationship between cross-sectional area and velocity/pressure, viscosity, Poiseuille’s law, Ohm’s law, compliance, capacitance, etc.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A
6	Vascular structure — Part I	1. Describe classification and structure of blood vessels. 2. Explain	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A

		arterial system function.					
7	Vascular structure — Part II	1. Explain venous system function. 2. Explain capillary system function.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A
8	Regional blood flow	1. Describe coronary blood flow and its regulation. 2. Describe cerebral blood flow and its regulation. 3. Describe skeletal muscle blood flow and its regulation. 4. Describe skin blood flow and its regulation. 5. Describe gastrointestinal blood flow and its regulation.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A
9	Principles of vector analysis of the ECG, cardiac axis, and ECG interpretation	Students should be able to: — State ECG leads and the role of each in the ECG — Explain general recording principles of the ECG — Describe the electrical axis of the heart — Plot mechanics, electricity, and heart sounds on a timeline alignment — Compare atrial and ventricular conduction times and show changes on ECG; predict QRS vector/axis from lead sums.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A
10	Local blood flow control in tissues	Students should be able to: — Explain metabolic control of local blood flow and roles of tissue factors — Describe myogenic mechanism and its role in	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A

		autoregulation of tissue blood flow.						
11	Neural regulation of heart rate and contractility	Students should be able to: — Describe vasomotor function and its role in blood pressure and effects on cardiac output — Describe vasomotor agents and their mechanisms on vessels.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A	
12	Regulation of cardiac performance	Students should be able to: — Explain intrinsic regulation of the heart and the Frank–Starling mechanism — Explain neural regulation of the heart — Explain chemical regulation of the heart.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A	
13	Regulation of peripheral circulation	Students should be able to: — Explain long-term autoregulation of local blood flow and oxygen’s role in changing tissue vascularity — Describe effects of humoral factors on circulation — Explain neural control of circulation, baroreceptor and chemoreceptor reflexes.	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A	
14	Blood pressure regulation	Students should be able to: — Differentiate normal vs. abnormal blood pressure ranges — Discuss physiological importance of systolic vs. diastolic changes — Describe blood pressure measurement methods and compare	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A	

		<p>their applications —</p> <p>Discuss blood pressure changes as afterload and effects on flow — Explain primary vs. secondary hypertension —</p> <p>Describe renal role in blood pressure regulation — Explain sympathetic system and cardiac hypertrophy roles in BP regulation.</p>					
15	Cardiac output and venous return — Part I	<p>Students should be able to: — Describe the cardiac output curve and factors affecting cardiac output — Define vascular function curve and its determinants — Explain effects of blood volume, vascular resistance, and venous tone on these curves.</p>	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A
16	Cardiac output and venous return — Part II	<p>Students should be able to: — Explain why the operating point lies at the intersection of the cardiac and vascular function curves — Show how evaluating these curves allows prediction of effects of blood volume, vascular tone, and contractility on cardiac output — Describe central neural mechanisms helping increase cardiac output during heavy exercise.</p>	Cognitive	Lecture and group discussion	2 hours	Video projector, computer, whiteboard	Oral Q&A

Student assessment table (grading scheme)

Assessment type	Date / When	Assessment tool	Weight (% of final grade)
Classroom Q&A	Selected sessions	Oral	10%
Seminar presentation	During some sessions	Oral presentation + Q&A	10%
Midterm exam	—	—	—
Final exam	According to academic calendar	Essay questions (descriptive)	80%
Other	—	—	—
Total	—	—	100%

References

1. Berne & Levy Physiology — latest edition
2. Guyton and Hall — Textbook of Medical Physiology — latest edition
3. Ganong — Review of Medical Physiology — latest edition