

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 Information

- Course Title: Neurophysiology
- Instructors: Dr. Siamak Shahidi; Dr. Abdolrahman Sarifi
- Course Coordinator: Dr. Siamak Shahidi
- Head of Department: Dr. Siamak Shahidi
- Credit Hours: Theory: 2.5 units; Practical: 0.0 units
- Program & Level: MSc (Non-continuous) in Medical Physiology
- Term: First semester 1402–1403
- Teaching Location: Classroom 12, School of Medicine

Session-by-Session Syllabus

| Session | Topic(s) | Expected Learning Outcomes (Behavioral) | Learning Domain | Teaching Method(s) | Duration | Teaching Aids | Assessment Method(s) |
|----------------|---|---|------------------------|---------------------------|-----------------|---|-------------------------------------|
| 1 | Overview of Structure and Functions of the Nervous System; Cranial Nerves | 1. Describe the overall structure and primary functions of the nervous system. 2. Explain functions of the cranial nerves and how to test them. | Cognitive | Lecture, Q&A | 2.5 hours | Computer, PowerPoint, video projector, whiteboard | Written short-answer quiz; oral Q&A |
| 2 | Properties of Neurons, Synapses, and Neurotransmitters | 1. Describe types and properties of neurons and neuroglia. 2. Explain types and structures of synapses, neurotransmitters, synaptic events, and features of neuronal circuits. | Cognitive | Lecture, Q&A | 2.5 hours | Computer, PowerPoint, video projector, whiteboard | Written short-answer quiz; oral Q&A |
| 3 | Sensory Receptors and Sensory Coding | 1. Classify sensory receptors and describe their functions. 2. Explain receptor properties: energy transduction, receptor potential, stimulus–response relation, and adaptation. 3. Define sensory system concepts (sensory unit, receptor fields). 4. Describe elements that encode sensory information. | Cognitive | Lecture, Q&A | 2.5 hours | Computer, PowerPoint, video projector, whiteboard | Written short-answer quiz; oral Q&A |

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| 4 | Somatic Senses and Their Pathways | 1. Describe different somatic senses, their receptors, and corresponding sensory fibers. 2. Explain features of dorsal column–medial lemniscus and spinothalamic pathways. 3. Identify cortical areas for somatic senses and their features. 4. Describe clinical tests for somatic sensation. | Cognitive | Lecture , Q&A | 2.5 hours | Computer, PowerPoint, video projector, whiteboard | Written short-answer quiz; oral Q&A |
| 5 | Somatic Pain and Temperature Sensation | 1. Describe types of pain and their sensory pathways and features. 2. Explain properties of nociceptors. 3. Describe the endogenous antinociceptive system and its mechanisms. 4. Outline methods of pain relief. 5. Explain receptors, pathways, and properties of temperature sensation. | Cognitive | Lecture , Q&A | 2.5 hours | Computer, PowerPoint, video projector, whiteboard | Written short-answer quiz; oral Q&A |
| 6 | Physiology of the Visual System I | 1. Describe components of the eye and their functions. 2. Explain optical | Cognitive | Lecture , Q&A | 2.5 hours | Computer, PowerPoint, video | Written short-answer quiz; |

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| | | physics relevant to vision. 3. Describe retinal layers, cell types, and their connections. | | | | projector, whiteboard | oral Q&A |
| 7 | Physiology of the Visual System II | 1. Explain mechanisms of photoreceptor activation by light. 2. Describe visual signal pathways from retina to brain and their functions. 3. Explain visual reflexes. 4. Describe tests for different aspects of vision. | Cognitive | Lecture, Q&A | 2.5 hours | Computer, PowerPoint, video projector, whiteboard | Written short-answer quiz; oral Q&A |
| 8 | Auditory Physiology | 1. Describe functions of outer, middle, and inner ear. 2. Describe cochlear structure, auditory receptors, and their activation mechanisms. 3. Explain auditory pathways from cochlea to brain and their roles. 4. Explain mechanisms for sound localization, frequency, and intensity coding. 5. List main types of hearing disorders and their assessment methods. | Cognitive | Lecture, Q&A | 2.5 hours | Computer, PowerPoint, video projector, whiteboard | Written short-answer quiz; oral Q&A |

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| 9 | Physiology of Vestibular, Gustatory, and Olfactory Systems | 1. Describe semicircular canals, utricle, and saccule structure, receptor activation mechanisms, and effects of stimulation. 2. Describe taste bud structure, receptor activation by primary stimuli, and taste thresholds. 3. Describe olfactory epithelium structure, olfactory receptors and stimuli, and neural pathways from olfactory bulb to CNS and their functions. | Cognitive | Lecture, Q&A | 2.5 hours | Computer, PowerPoint, video projector, whiteboard | Written short-answer quiz; oral Q&A |
| 10 | Motor Functions of the Spinal Cord; Spinal Cord Reflexes | 1. Identify principal components involved in movement control and their roles. 2. Describe muscle receptors and spinal reflexes and their mechanisms. | Cognitive | Lecture, Q&A | 2.5 hours | Video projector, computer, whiteboard, PowerPoint | Class discussion and oral questions each session; final exam |
| 11 | Cortical and Brainstem Control of Motor Function | 1. Describe brainstem control reflexes and roles of its structures. 2. Describe motor cortical areas and their functions. | Cognitive | Lecture, Q&A | 2.5 hours | Video projector, computer, whiteboard, PowerPoint | Class discussion and oral questions each session; final exam |

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| 12 | Contributions of the Cerebellum to Motor Control | 1. Describe cerebellar functions and functional divisions. 2. Explain cerebellar neuronal circuits and clinical deficits from cerebellar lesions. | Cognitive | Lecture , Q&A | 2.5 hours | Video projector, computer, whiteboard, PowerPoint | Class discussion and oral questions each session; final exam |
| 13 | Contributions of the Basal Ganglia to Motor Control | 1. Describe basal ganglia components, their circuits, and functions. | Cognitive | Lecture , Q&A | 2.5 hours | Video projector, computer, whiteboard, PowerPoint | Class discussion and oral questions each session; final exam |
| 14 | Cerebral Cortex: Higher Brain Functions, Learning, and Memory | 1. Explain higher brain functions such as cognition, memory, learning, and speech, and roles of CNS regions and general mechanisms. | Cognitive | Lecture , Q&A | 2.5 hours | Video projector, computer, whiteboard, PowerPoint | Class discussion and oral questions each session; final exam |
| 15 | Behavioral and Motivational Mechanisms — Limbic System and Hypothalamus | 1. Describe CNS (including limbic system) roles in behavior and internal motivation. 2. Identify limbic system components and known functions. | Cognitive | Lecture , Q&A | 2.5 hours | Video projector, computer, whiteboard, PowerPoint | Class discussion and oral questions each session; final exam |
| 16 | States of Brain Activity — Sleep, Brain Waves, Epilepsy, | 1. Explain basics of electroencephalography and brain waves. 2. Identify | Cognitive | Lecture , Q&A | 2.5 hours | Video projector, computer, whitebo | Class discussion and oral questions each |

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| | Psychoses, and Dementia | structures controlling sleep–wake states and stages of sleep with their features. | | | | ard, PowerP oint | session; final exam |
| 17 | Autonomic Nervous System and the Adrenal Medulla | 1. Describe the autonomic nervous system and adrenal medulla and their generalized roles in controlling body systems. | Cognitive | Lecture , Q&A | 2.5 hours | Video projector, computer, whiteboard, PowerP oint | Oral questions each session; final exam |
| 18 | Student Presentations | Advanced topics related to earlier sessions (from textbooks and articles). | Cognitive and Psycho motor | Skill-building: preparing and delivering a scientific presentation | 4 hours (depending on number of students) | Video projector, computer, whiteboard, PowerP oint | Group discussion |

Student Assessment

| Assessment Type | Timing | Assessment Tool | Share of Total |
|-----------------|---|-----------------------------------|----------------|
| Quiz | Randomly during many sessions | One or two short-answer questions | 5% |
| Midterm Exam | Arranged with class | Essay (short-answer) exam | 45% |
| Final Exam | According to faculty schedule | Essay (short-answer) exam | 45% |
| Other | Attendance, class participation, and final presentation | — | 5% |
| Total | — | — | 100% |

Attachments: — (none provided)

References

- Guyton & Hall, Textbook of Medical Physiology, 2021 edition (primary reference), and course lecture notes
- Ganong’s Review of Medical Physiology, latest edition (2021)
- Berne & Levy Physiology, latest edition (2021)

- Best & Taylor Physiology, latest edition (for further reading)