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

Course and Instructor Information

- **Course Title:** Biochemistry – Discipline (Medical Program)
- **Instructors:** Dr. Nasrin Zia-Majidi, Dr. Mehdi Bahmani
- **Course Coordinator:** Dr. Mehdi Bahmani
- **Head of Department:** Dr. Iraj Khodadadi
- **Credits and Type:** 0.44 Credits – Theoretical; Practical: —
- **Student Major and Level:** Doctor of Medicine (M.D.) – Professional Doctorate
- **Semester:** Second Semester
- **Teaching Location:** Faculty of Medicine

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.

Lesson Plan Table

Session	Date	Topic	Behavioral Objectives	Learning Domain	Teaching Method	Duration	Teaching Aids	Evaluation Method
1	[illegible]	Lipid Metabolism (Fatty Acid Oxidation	1. Explain the formation of lipoproteins; 2. Describe the importance of fatty acid oxidation	Knowledge	Lecture; Group Discussion; PBL	2h	Power Point, Whiteboard, Education	Q&A; Quiz

		, Ketone Bodies)	and biosynthesis, and explain regulatory steps of synthesis and beta-oxidation; 3. Explain the regulation of fat synthesis and oxidation					al Video	

			; 4. Explain some general pathways of lipid metabolism						
2	[illegible]	Lipid Metabolism (Fatty Acid and C	1. Describe cholesterol synthesis pathways and key steps; 2. Explain trigly	Knowledge	Lecture; Group Discussion; PBL	2h	PowerPoint, Whiteboard, Educat	Q&A; Quiz	

		holesterol Biosynthesis)	ceride synthesis; 3. Describe diseases related to cholesterol and triglycerides; 4. Explain lipid-lowering drugs				ional Video		
3	(1	Heme Bio	1. Explain the impor	Knowled	Lecture	2h	Power Po	Q&A; Qu	

		synthesis – Porphyrias and Type s – Heme Catabolism – Bilirubin	tance of heme biosynthesis; 2. Describe the role of inhibitors and activators in heme biosynthesis; 3. Explain porphyrias and the	ge	; Group Discussion; PBL		int, White board, Educational Video	iz

		Metabolism Disorders	ir significance; 4. Explain bilirubin metabolism; 5. Describe diseases related to bilirubin metabolism						
4	[illegible]	Purine and Pyrimi	1. Explain the importance of purine an	Knowledge	Lecture; Group	2h	Power Point, Wh	Q&A; Quiz	

		dine Metabolism and Related Disorders	d pyrimidine cycles; 2. Describe inhibitors and activators in these cycles; 3. Describe metabolic disorders related to purines an		Discussion; PBL			itebaord, Educational Video	

			d pyrimidines						
5	-	Oxidative Phosphorylation	1. List methods of ATP production in the cell; 2. Explain the term oxidative phosphorylation; 3. Describe the electron trans	Knowledge	Lecture; TBL; Group Discussion	90 min	Slides, Animation, Whiteboard	Written Exam; Class Questions; Quiz	

port chain through the four complexes of the inner mitochondrial membrane; 4. Explain the chemiosmotic hypothesis and its link to ATP

			synthesis; 5. Describe ATP synthase pump function in ATP production; 6. Detail total ATP yield from one glucose molecule						
6	-	Ca	1. De	Kn	Le	90	Sl	Wr	

		rbohydrate Metabolism (Glycolysis, Krebs Cycle)	scribe the two phases and ten reactions of glycolysis; 2. Explain pyruvate fate under aerobic/anaerobic conditions; 3. Explain en	owledge	cture; TBL; Group Discussion	nin	ides, Animation, Whiteboard	itten Exam; Class Questions; Quiz

			ergetic yield of glycolysis under aerobic/anaerobic conditions; 4. Describe cellular regulation of glycolysis; 5. Explain pyruvate ent						

			ry into Krebs cycle; 6. Describe the eight reactions of Krebs cycle and their regulation; 7. Detail Krebs cycle yield per glu					

			cose						
7	-	Carbohydrate Metabolism (Gluconeogenesis, Pentose Phosp	1. Define gluconeogenesis; 2. Describe gluconeogenesis reactions and their regulation; 3. Explain entry of certain substrat	Knowledge	Lecture; TBL; Group Discussion	90 min	Slides, Animation, Whiteboard	Written Exam; Class Questions; Quiz	

		hate Pathway, Glycogen Metabolism)	esinto gluconeogenesis; 4. Name and describe roles of two pentose phosphate pathway products; 5. Describe two phases of pe						

			nto se ph os ph ate pat hw ay; 6. Ex pla in bio ch em ica l bas is of fav is m; 7. De fin e gly co ge nes is an d gly co ge nol ysi s; 8. De scr ibe gly co ge					

			nesis pathway; 9. Describe glycogenolysis pathway; 10. List glycogen storage diseases and explain biochemical causes						
8	-	Amin	1. Classify	Know	Lect	90	Slid	Writ	

		o Acid Metabolism	amino acids based on metabolic fate; 2. Describe catabolic pathways of amino acids; 3. Explain nitrogen entry into organic compou	ledge	ure; TBL; Group Discussion	in	es, Animation, Whiteboard	ten Exam; Class Questions; Quiz	

			nds; 4. Describe biosynthetic pathways of non-essential amino acids						
9	-	Urea Cycle and Metabolic Disord	1. Explain the purpose of the urea cycle; 2. Describe ammonium ion	Knowledge	Lecture; TBL; Group Disc	90 min	Slides, Animation, White	Written Exam; Class Ques	

		ers	transport to the liver; 3. Explain reactions of the urea cycle; 4. Describe disorders caused by enzymatic defects in the cycle and biochemical					tions; Quiz

			emical treatment basis						
10	-	Clinical Enzymology and Plasma Protein Types	1. Classify plasma enzymes and their diagnostic uses; 2. Explain causes of elevated plasma enzymes; 3.	Knowledge	Lecture; TBL; Group Discussion	90 min	Slides, Animation, Whiteboard	Written Exam; Class Questions; Quiz

			Describe importance of clinically relevant plasma enzymes; 4. Explain synthesis sites and function of plasma proteins; 5. Describe					

			importance of plasma proteins in diagnosis						
11	-	Integration of Metabolic Pathways	1. Describe feeding–fasting cycle phases; 2. Name main metabolic fuels and explain	Knowledge	Lecture; TBL; Group Discussion	90 min	Slides, Animation, Whiteboard	Written Exam; Class Questions; Qu

			in their homeostasis; 3. Explain hormonal regulation of metabolic fuels; 4. Describe metabolism of these fuels under special physiolo					iz

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Grading Scheme

Evaluation Type	Date	Evaluation Tool	Points
Quiz	Start of each session	—	5
Project Presentation	—	—	—
Midterm Exam	—	—	—
Final Exam	7 Jan 2024	MCQs and Essay Questions	10
Other (Practical)	—	MCQs and Laboratory Performance	5
Total	—	—	**20**

References

1. *Harper's Illustrated Biochemistry*
2. *Lehninger Principles of Biochemistry*
3. Devlin, T. *Biochemistry with Clinical Applications*, Transl. Saeedeh Abdollahpour, Parvin Pasalar, 2017 (Persian Ed.)
4. Nelson, D., Cox, M. *Principles of Biochemistry*, Transl. Javad Mohammadnejad et al., 7th ed., 2017
5. Rodwell, V. *Harper's Biochemistry*, Transl. Javad Mohammadnejad et al., 2023