Course Plan for Bachelor Program - Study Plan Development and Updating Procedures/ Pharmacy Department	QF02/0408-4.0E

Study Plan No.	**2021/2022**		**University Specialization**		**Bachelor of Pharmacy**	
Course No.	**0201380**		**Course Name**		**Clinical Biochemistryand Clinical Nutrition**	
Credit Hours	**3**		**Prerequisite *Co-requisite**		**Biochemistry + Pathophysiology**	
Course Type	☐ Mandatory University Requirement	☐ University Elective Requirement	☐ Faculty Mandatory Requirement	☐ Support Course family requirements	☑ **Mandatory Requirement**	☐ Elective Requirement
Teaching Style	☐ Full Online Learning		☑ **Blended Learning**		☐ Traditional Learning	
Teaching Model	☐ 2 Synchronous: 1Asynchronous		☑ **2 Face to Face: 1 Asynchronous**		☐ 3 Traditional	

Faculty Member and Study Divisions Information *(to be filled in each semester by the subject instructor)*

Name	Academic rank	Office No.	Phone No.	E-mail	
			-		
Office Hours (Days/Time)	**Office hours to be announced**		**Office hours to be announced**		
Division number	**Time**	**Place**	**Number of Students**	**TeachingStyle**	**ApprovedModel**
				Blended Learning	**1 Face to Face: 1 Asynchronous**

Brief Description

This course provides an overview of the key aspects of clinical biochemistry which is a branch of laboratory medicine in which biochemical methods are used for the study of diseases. This course provides knowledge for pharmacy students about the principles of the biochemical analysis of clinical samples and how biochemical investigations can be employed in the diagnosis, monitoring and management of diseases. Case studies are used to highlight and explain the biochemical disorders underlying clinical diseases. This course also provides an overview of the importance of appropriate nutrition support;enteral nutrition, parenteral nutrition and relating the biochemical indices with patient's nutritional status.

Learning Resources

Course Book Information (Title, author, date of issue, publisher ... etc)	1. Clinical Biochemistry: An Illustrated Colour Text, 5e by Allan Gaw MD PhD FRCPath FFPM PGCertMedEd, Michael J. Murphy FRCP Edin FRCPath, Rajeev Srivastava and Robert A. Cowan BSc PhD (Jul 16, 2013) 2. Krause's Food & the Nutrition Care Process, MEA edition by L. Kathleen Mahan Janice Raymond , 8th December 2016, Elsevier.
Supportive Learning Resources (Books, databases, periodicals, software, applications, others)	1. Marks' Basic Medical Biochemistry (Lieberman, Marks's Basic Medical Biochemistry) by Alisa Peet MD, Michael A. Lieberman PhD and Allan Marks MD (Mar 29, 2012) 2. Harper's Illustrated Biochemistry, 29e Robert K. Murray, David A Bender, Kathleen M. Botham, Peter J. Kennelly, Victor W. Rodwell, P. Anthony Weil. Copyright © 2012 by The McGraw-Hill Companies, Inc
Supporting Websites	American Society for Parenteral and Enteral Nutrition: http://www.nutritioncare.org/ European Society for Parenteral and Enteral Nutrition: http://www.espen.org Infusion nurses Society: http://www.ins1.org

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The Physical Environment for Teaching	☑ **Classroom**	☐ **Labs**	☑ **Virtual Educational Platform**	☐ **Others**
Necessary Equipment and Software	Moodle.			
Supporting People with Special Needs				
For Technical Support	E-learning &Open Educational Resources Center E-mail: elearning@zuj.edu.jo Phone: +962 6 4291511 ext. 425/362.			

Course learning outcomes *(K= Knowledge, S= Skills, C= Competencies)*

No.	Course Learning Outcomes	The Associated Program Learning Output Code
Knowledge **The student should be able to:**		
K1	Explain the normal water and electrolyte balance in the human body and the effects of diseases on this balance.	**MK3**
K2	Explain carbohydrate and lipid metabolism disorders and their biomarkers analyzed in the biochemistry lab.	**MK3**
K3	Identify criteria for appropriate nutrition support, enteralnutrition, parenteral nutrition, indications for uses and contraindication.	**MK3**
Skills The student should be able to:		
S1	Correlate the changes in biochemical investigations to the molecular basis of diseases.	**MS2**
S2	Explain the use of laboratory tests in disease diagnosis in a manner suitable for a clinical audience.	**MS3**
S3	Explain to patients the importance of appropriate nutritional support in healthcare.	**MS3**
S4	Interpret blood gas analysis results for identification and management of acid–base disorders.	**MS2**
S5	Interpret renal function tests (RFTs), liver function tests (LFTs), hormonal assay tests, and cardiac and bone biomarkers analyzed in the biochemistry lab.	**MS2**
Competencies The student should be able to:		
C1	Interpret symptoms and diagnostic test results to identify the associated disease.	**MC1**
C2	Interpret patient biochemical laboratory findings preformed in clinical practice.	**MC1**
C3	Advise patients and other health care professionals on the interpretation and implications of biochemical laboratory findings.	**MC2**

Mechanisms for Direct Evaluation of Learning Outcomes

Type of Assessment / Learning Style	Fully Electronic Learning	Blended Learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm Exam	%30	**%30**	%30	0
Participation / Practical Applications	0	**0**	0	60%
Asynchronous Interactive Activities	%30	**%30**	%30	0
Final Exam	%40	**%40**	%40	40%

Note: *Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.*

Schedule of Simultaneous / Face-to-Face Encounters and their Topics

Week	Subject	Learning Style*	Reference **
1	Introducing clinical biochemistry repertoire and specimen collection Fluid and electrolyte balance	Lecture	Clinical Biochemistry: An Illustrated Colour Text - Chapter 1: Section 1,2,3,4 Chapter 2 Section: 5,6,7
2	Hyponatraemia and hypernatraemia: Assessment and management.	Lecture	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 8,9,10
3	Hyperkalaemia and hypokalaemia Investigation of renal functions	Lecture	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section:11,12,14,15
4	Urinalysis Acid-base: concepts and vocabulary Acid-base disorders: diagnosis and management	Lecture	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 16,17,18,19,20,21,22,24
5	Proteins and enzymes as biomarkers in the blood Myocardial infarction	Lecture	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 25,26,27

6	Liver function tests Diabetes mellitus: Diagnosis andmonitoring	Lecture	Clinical Biochemistry: An Illustrated Colour Text-- Chapter 2 Section: 28,29,30,31,32,33,34
7	Clinical disorders of lipid metabolism Calcium homeostasis. Hypocalcaemia and hypercalcaemia	Lecture	Clinical Biochemistry: An Illustrated Colour Text- Chapter 4 Section:66,67,68 Chapter 2 Section:35,36
8	Phosphate and magnesium homeostasis Bone diseases and bone biomarkers **Midterm exam**	Lecture	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 37,38,39
9	Endocrine control, Dynamic function tests Pituitary functions Growth disorders	Lecture	Clinical Biochemistry: An Illustrated Colour Text- Chapter 3 Section: 40,41,42,43
10	Thyroid function tests Hypothyroidis m Hyperthyroidis m	Lecture	Clinical Biochemistry: An Illustrated Colour Text- Chapter 3 Section: 44,45,46
11	Hypofunction of the adrenal cortex Hyperfunction of the adrenal cortex	Lecture	Clinical Biochemistry: An Illustrated Colour Text- Chapter 3 Section: 47,48,49
12	Introduction to clinical nutrition Rational and criteria for appropriate nutrition support	Lecture	Krause's Food & the Nutrition Care Process - PartII: Section 13.1
13	Enteral nutrition access and administration Indications for uses & contraindication. Monitoring and Evaluation	Lecture	http://www.nutritioncare.org/ http://www.espen.org

14	Parenteral nutrition access and administration Indications for uses & contraindication. Monitoring and Evaluation	Lecture	http://www.nutritioncare.org/ http://www.espen.org http://www.ins1.org
15	Refeeding syndrome Transitional feeding	Lecture	Krause's Food & the Nutrition Care Process - Part II: Section 13.6, 13.7
16	Final Exam		

** Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.*
*** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.*

Schedule of Asynchronous Interactive Activities *(in the case of e-learning and blended learning)*

Week	Task / Activity	Reference	Expected Results
1	Fluid and electrolyte balance (Recorded lecture)	Clinical Biochemistry: An Illustrated Colour Text - Chapter 1: Section 1,2,3,4 Chapter 2 Section: 5,6,7	
2	Hypernatremia: Assessment and management. (Recorded lecture)	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 8,9,10	
3	Hyponatremia/ Hypernatremia Case Study	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 8,9,10	
4	Urinalysis (Recorded lecture)	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section:14,15	
5	Renal failure Case Study	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section:11,12,14,15	
6	Metabolic acid-base disorders: diagnosis and management (Recorded lecture)	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 16,17,18,19,20,21,22,24	
7	A case study on metabolic/respiratory acid base disorders	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section:	

		16,17,18,19,20,21,22,24	
8	Liver function tests (Recorded lecture)	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 28,29,30,31,32,33,34	
9	An Interactive Clinical Case of Jaundice	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 28,29,30,31,32,33,34	
10	Calcium, Phosphate and magnesium homeostasis, Bone diseases and bone biomarkers (Recorded lecture)	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 37,38,39	
11	A case study on bone disease	Clinical Biochemistry: An Illustrated Colour Text- Chapter 2 Section: 35, 36, 37,38,39	
12	Thyroid function tests & adrenal gland disorders (Recorded lecture)	Clinical Biochemistry: An Illustrated Colour Text- Chapter 3 Section: 44,45,46,47,48,49	
13	Endocrine case study	Clinical Biochemistry: An Illustrated Colour Text- Chapter 3 Section: 40,41,42,43,44,45,46,47,48,49	
14	Enteral nutrition access and administration Indications for uses & contraindication. Monitoring and Evaluation (Recorded lecture)	**http://www.nutritioncare.org/** **http://www.espen.org**	
15	Specialized nutrition support: EN, PN (Interactive Clinical Case)	**http://www.nutritioncare.org/** **http://www.espen.org**	
16	**Final Exam**	-	-