

COURSE DESCRIPTIONS

Faculty	Allied medical sciences				
Department	Medical laboratory sciences			NQF level	7
Course Title	Hospital Laboratory Training in Clinical Biochemistry & Endocrinology	Code	902494	Prerequisite	100 credit hours
Credit Hours	3	Theory	0	Practical	3
Course Leader	Dr. Saad Alfawaeir,	email	s.alfawaeir@jadara.edu.jo		
Lecturers	Prof. Dr. Osama Althunibat	emails	O.Althunibat@jadara.edu.jo		
Lecture time	8:00-14:00, Friday	Classroom	HOS	Attendance	Fulltime
Semester	1st-24-25	Production	2021	Updated	2024
Type of Teaching	<input checked="" type="checkbox"/> Face to Face <input type="checkbox"/> Blended <input type="checkbox"/> Online				

Short Description

A one semester long clinical laboratory practice in affiliated hospital laboratories, in Clinical Biochemistry & Endocrinology laboratories. The training in Clinical Biochemistry & Endocrinology section provides the student the opportunity to receive actual experience to deal with sampling and analysis, as well as report writing. This training is under the supervision of specialized laboratory technologists from the hospitals and the department as well.

Course Objectives

By the end of this course, the student will be able to:

1. Learn how to apply theoretical and applied skills at the clinical biochemistry lab in hospitals using clinical samples.
2. Learn how to obtain, process, analyze, and report results.
3. Develop analytical and diagnostic skills in performing laboratory tests and develop the ability to interpret test results.
4. Develop troubleshooting skills and identify issues relating to performance of laboratory techniques and equipment.
5. Develop ability to perform quality assurance and quality control measures inside the lab.

6. Learn how to properly apply safety precautions, utilize personnel-protective equipment, and manage laboratory accidents or emergencies.

Course Intended Learning Outcomes (CILOs)	
A. Knowledge - Theoretical Understanding	
B. Knowledge - Practical Application	
C. Skills - Generic Problem Solving and Analytical Skills	
<ul style="list-style-type: none"> • b1. Analyze interferences and sources of errors for preventing false positive/negative/elevated/reduced results. S1 • b2. Assess quality control and quality assurance measures for maintaining the required level of accuracy and precision. S2 	
D. Skills - Communication, ICT, and Numeracy	
<ul style="list-style-type: none"> • b3. Perceive the ability to communicate information and arguments effectively using written and oral skills for instance, patient education (if needed) is a critical part of certain assays.. (S3) 	
E. Competence: Autonomy, Responsibility, and Context	
c1Combine the knowledge gained through field training in application of the test and its correlation with the diagnosis of related disorders and abnormalities and the sample required to perform the test, including any precautions regarding the type of sample, the time of collection, handling, processing, transport, and preservation.. (C1).	
Teaching and Learning Methods	
<input type="checkbox"/> Face to Face Lectures <input type="checkbox"/> Brain Storming <input type="checkbox"/> Synchronous remote <input type="checkbox"/> Asynchronous remote <input type="checkbox"/> Using Video <input type="checkbox"/> Discussions <input type="checkbox"/> Research Project <input type="checkbox"/> Case Study <input type="checkbox"/> Field visit <input type="checkbox"/> Problem solving	
Assessment Methods	
<input type="checkbox"/> Formative Assessment <input type="checkbox"/> Quiz <input type="checkbox"/> Lab Exam <input type="checkbox"/> Homework <input type="checkbox"/> Project Assessment <input type="checkbox"/> Oral Presentation <input type="checkbox"/> Midterm <input type="checkbox"/> Final Exam	

Course Contents					
Week	Hours	CLOs	Topics	Teaching & Learning Methods	Assessment Methods
1.	3	b1, b2, b3, c1	Biochemical calculations: <ul style="list-style-type: none"> • Unit conversion from mg/dL to mmol/L and vice versa. • Anion Gap • Osmolarity/ Osmolar gap 	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.

2.	3	b1, b2, b3, c1	Biochemical calculations: <ul style="list-style-type: none"> Beer's law calculations Buffer calculations-Henderson hasselbalch equation/ blood buffer 	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
3.	3	b1, b2, b3, c1	Biochemical calculations: <ul style="list-style-type: none"> Enzymatic activity Dilution and dilution factor GFR and creatinine clearance 	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
4.	3	b1, b2, b3, c1	Biochemical calculations: <ul style="list-style-type: none"> Friedwald Equation- measurement of LDL-C AST/ALT ratio 	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
5.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues Blood withdrawing procedure.	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
6.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues What are the chemical structure, the definition, and the clinical significance of each of the following clinical chemistry markers? Glucose, urea, creatinine, uric acid, general formula of amino acids, cholesterol, general formula of triglycerides, bilirubin.	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
7.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues What is the definition of: Clinical chemistry, protein, hormone, enzyme, coenzyme, cofactor, activator, hyponatremia, hypokalemia, hypernatremia, hyperkalemia, hypophosphatemia, hyperphosphatemia, hypocalcemia, hypercalcemia, hypomagnesemia, hypermagnesemia, hyperlipidemias, azotemia, uricemia, Addison's disease, Cushing's syndrome, Conn's disease, ketone bodies, antioxidant, metabolic acidosis, metabolic alkalosis, respiratory acidosis, respiratory alkalosis?	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.

8.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues Know all endocrine glands and their released hormones, and function and clinical significance of each hormone.	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
9.		b1, b2, b3, c1	Clinical, biochemical, & analytical issues The Clinical chemistry tests to evaluate: Liver function, Kidney function, pulmonary function, cardiac function, diabetes, pancreatic function, bile function, thyroid function, lipid profile, osteoporosis, osteomalacia, cuffed sample, dehydration, hemolysis, gout, cancer, chemical poisoning (e.g., ethylene glycol, organophosphates, arsenic, led).	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
10.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues The serum normal ranges of the following clinical chemistry markers? Glucose, Urea, Creatinine, cholesterol, triglycerides, bilirubin, calcium, sodium, potassium, magnesium, protein, chloride, PCO_2 , PO_2 , bicarbonate, and blood pH.	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
11.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues The plasma proteins (each band in the electrophoresis contains what types of proteins); all plasma enzymes and the clinical significance of each one.	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
12.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues Thyroid disorders and the clinical chemistry tests required to diagnose each disorder.	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
13.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues What are the water-soluble and lipid-soluble vitamins, signs of vitamin B ₁₂ deficiency, & sings of vitamin D deficiency?	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.

14.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues Main tumor markers and their clinical significance.	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
15.	3	b1, b2, b3, c1	Clinical, biochemical, & analytical issues The following clinical chemistry techniques are used for which set of tests: Automation-routine chemistry, spectrophotometry, ion-selective electrode, electrophoresis, ELISA, oximeter, atomic absorption spectrophotometer, fluorometer, flow cytometer, HPLC.	Hands on procedures/ Observation	Attendance/ Hospital evaluation/ Reports/ Comprehensive exam.
16.		b1, b2, b3, c1	Comprehensive Exam		

Infrastructure	
Textbook	Any textbooks covering the training material
References	Handouts, Hospital Lab Manuals, Kit sheets.
Required reading	
Electronic materials	
Other	University library, Internet, expert people, trainees (assigned by the department)

Course Assessment Plan						
Assessment Method		Grade	CLOs			
			b1	b2	b3	c1
First (Midterm)						
Second (if applicable)						
Final Exam		50%	8	8	8	26
Coursework						
Coursework assessment methods	Assignments					
	Case study					
	Attendance, Discussion, and interaction (Supervisor evaluation)	10%	2	2	2	4
	Hospital evaluation	20%	5	5	4	6
	Lab tests and assignments					
	Presentations					
	Oral Exam	20%	4	5	6	5

Total	100%	19	20	20	41
--------------	-------------	-----------	-----------	-----------	-----------

Plagiarism
<p>Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code).</p> <p>Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.</p>