Course Syllabus

1	**Course title**	Medical Laboratory Instrumentation and Techniques
2	**Course number**	0308241
3	**Credit hours**	2 theory
	Contact hours (theory, practical)	2 theory
4	**Prerequisites/co-requisites**	-
5	**Program title**	Clinical Laboratory Sciences
6	**Program code**	0308
7	**Awarding institution**	The University of Jordan
8	**School**	Science
9	**Department**	Department of Clinical Laboratory Sciences
10	**Course level**	2nd Year
11	**Year of study and semester (s)**	Fall 2023/ 2024
12	**Other department (s) involved in teaching the course**	
13	**Main teaching language**	English
14	**Delivery method**	■Face to face learning ☐ Blended ☐Fully online
15	**Online platforms(s)**	■ Moodle ■ Microsoft Teams ☐Skype ☐Zoom ☐Others……
16	**Issuing/Revision Date**	2/2024

17 Course Coordinator:

Name: Dr. Ahmed Abu siniyeh	**Contact hours:** Sunday & Tuesday 11;30 – 14:00 pm
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18 Other instructors:

Name:
Office number:
Phone number:
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Contact hours:

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19 Course Description:

This course provides a thorough exploration of clinical laboratory instrumentation principles, with a focus on practical applications and the critical processes of instrument selection and calibration. Students will gain familiarity with a broad spectrum of instruments, from foundational ones like spectrophotometers to advanced technologies such as hematology analyzers and molecular methods. Emphasizing hands-on knowledge, the curriculum covers effective identification and use of laboratory supplies, including separation techniques, temperature control instruments, microscopy, and the basic components of a centrifuge. By the course's conclusion, students will be well-equipped to apply their acquired skills in real-world clinical scenarios, ensuring precision and quality in laboratory analyses.

مركز الاعتماد وضمان الجودة

20 Course aims and outcomes:

A- **Aims:**

This course aims to equip students with a comprehensive understanding of clinical laboratory instrumentation principles, emphasizing their specific applications and the crucial process of instrument selection and calibration for quality analysis. Students will be introduced to a diverse range of instruments employed in clinical laboratories, including spectrophotometers, ion-selective electrodes, thermal equipment, centrifuges, and balances, as well as hematology analyzers, coagulation instruments, clinical chemistry analyzers, and advanced techniques like electrochemistry, electrophoresis, chromatography, molecular methods, automation, and immunochemical methodologies. The course focuses on practical knowledge, enabling students to identify and use laboratory supplies effectively. Additionally, it covers separation techniques, temperature control instruments like ovens and water baths, microscopy, photometers, desiccators, and the basic components of a centrifuge.

B- **Students Learning Outcomes (SLOs):**

For purposes of mapping the course SLOs to the Clinical Laboratory Sciences program SLOs, at the successful completion of the program, graduates are expected to be able to:

SLO(1). Understand and apply the theoretical foundations of medical laboratory sciences to accurately calibrate and operate advanced laboratory equipment.

SLO(2). Demonstrate knowledge of safety protocols, Ministry of Health regulations, and environmental preservation practices when handling samples of pathogens and chemical/biological risks.

SOL(3). Acquire in-depth technical knowledge to stay abreast of scientific advancements and actively participate in local and global applied research in the field.

SOL(4). Perform diverse analyses and effectively interpret results for various clinical samples across laboratory disciplines such as hematology, clinical chemistry, microbiology, urine analysis, body fluids, molecular diagnostics, and immunology.

SOL(5). Apply practical training to solve complex problems, troubleshoot issues, and interpret results, ensuring a connection between data and specific medical conditions for precise diagnosis.

SOL(6). Show effective communication skills to convey information accurately and appropriately in a laboratory setting.

SOL(7). Demonstrate a commitment to lifelong learning and innovation by applying modern techniques, critically analyzing information, and contributing to the creation and application of new knowledge in medical laboratory sciences which fulfil the requirements of national and international CBD.

SOL(8). Uphold professional behavior, ensuring the confidentiality of client information, and respecting client privacy throughout all aspects of laboratory work.

SOL(9). Apply managerial skills that align with quality assurance, accreditation, quality improvement, laboratory education, and resource management, showcasing competence in the effective administration of laboratory practices.

Descriptors	ILO/ID	Program SLOs / Course SLOs	SLO (1)	SLO (3)	SLO (5)	SLO (7)
Knowledge	A1	Recall fundamental principles of clinical laboratory instrumentation, including the types and uses of instruments such as spectrophotometers, ion-selective electrodes, and hematology analyzers.	X			
	A2	Comprehend the specific applications of advanced techniques like electrochemistry, electrophoresis, chromatography, molecular methods, and automation in clinical laboratory settings.		X		
Skills	B1	Apply knowledge to identify and effectively use various laboratory supplies and instruments for diagnostic purposes.		X		
	B2	Analyze separation techniques, demonstrating the ability to select and implement appropriate methods for specific analyses in a clinical context			X	
Competence	C1	Evaluate the importance of calibration in ensuring the quality of analysis, demonstrating competence in instrument selection and calibration processes.				X
	C2	Develop competence in utilizing temperature control instruments, microscopes, photometers, and desiccators for precise laboratory procedures, ensuring accuracy in diagnostic analyses.				X

21. Topic Outline and Schedule:

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Laboratory Safety and Regulations	A1, A2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
	1.2	Laboratory supplies, equipment & instruments	A1, A2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
2	2.1	Laboratory supplies, equipment & instruments	A1, A2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
	2.2	Laboratory supplies, equipment & instruments	A1, A2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1

3	3.1	Laboratory Measurements	A1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
	3.2	Laboratory Measurements	A1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
4	4.1	Laboratory Mathematics and Calculations	A1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
		Laboratory Mathematics and Calculations	A1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
5	5.1	Preparing Solutions and reagents	A1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
	5.2	Preparing Solutions and reagents	A1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
6	6.1	Basic Separation Techniques	A2, C1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
	6.1	Basic Separation Techniques	A2, C1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
7	7.1	Microscopy	C1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
		Microscopy	C1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
8	8.1	Microscopy	C1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
		Microscopy	C1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
9	9.1	Microscopy	C1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
		Microscopy	C1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
10	10.1	Principles of Instrumentation	A1, A2, B1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
	10.2	Principles of Instrumentation	A1, A2, B1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
11	11.1	Principles of Instrumentation	A1, A2, B1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
	11.2	Principles of Instrumentation	A1, A2, B1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
12	12.1	Clinical Laboratory Automation	A1, A2, B1	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
13	13.1	Instruments used in Hematology Lab	A2, B1, C2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1

	13.2	Instruments used in Hematology Lab	A2, B1, C2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
14	14.1	Instruments used in Molecular Lab	A2, B1, C2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
	14.2	Instruments used in Molecular Lab	A2, B1, C2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
15	15.1	Instruments used in Histology Lab	A2, B1, C2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
	15.2	Instruments used in Histology Lab	A2, B1, C2	Face to Face	Lecture Room	Synchronous	Quiz, Exam	Reference 1
16		FINAL EXAM						

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Quizzes & Assignments	20		All SLOs	Every week	On campus
First Exam					
Second Exam or (Mid Exam)	30	Topics covered till week 7	A1. A2, C1	Week 8	On campus
Final Exam	40	All required chapters	All SLOs	Week 16	On campus

23 Course Requirements

Students are directed and encouraged to use all possible resources:
a) use the internet as a learning source.
b) a series of short movies is promoted
c) students are encouraged to learn a suitable software package as a learning tool.

24 Course Policies:

A- Attendance policies:

- Attend and participate in all classes: attendance will be taken.

Class time will be used to discuss, elaborate, expand, etc., on the written modules. This may include formal/informal lectures, audio visual presentations, demonstrations, labs, etc.

B- Absences from exams and handing in assignments on time:

1. A student who has been absent for 15% or more of the total hours of any course, including absences for medical or compassionate reasons, may be required to withdraw from that particular course.
2. Students who miss quizzes or examinations will automatically be assigned a mark of zero unless the respective instructor, or the Program Head, has been notified of the reason for absence *PRIOR* to the commencement of the exam. Acceptable reasons will be evaluated at the time (e.g., illness - medical certificate may be required, serious illness or death in the family, etc.). Supplemental examinations may be allowed in legitimate cases.

C- Health and safety procedures:

All students need to be immunized against hepatitis B, immunization certificate must be forwarded to the coordinator of the hospital training. Pregnancy affects immunization and it is the responsibility of the student to notify the health person as soon as possible of her pregnancy. If there are fees related to immunization, it is the responsibility of the student.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

E- Grading policy:

Evaluation	Point %	Date
Assignments or Quizzes	30%	
Midterm Exam	30%	Will be announced in due time.
Final Exam	40%	Will be announced in due time.

F- **Available university services that support achievement in the course:**

- The University Computer Lab.
- The University Main Library.
- The University e-library.

25 References:

A- **Required book(s), assigned reading and audio-visuals:**

1.HENRY'S Clinical Diagnosis and Management by Laboratory Methods. 22 edition Richard A. McPherson, Matthew R. Pincus. Elsevier, 2011

B- Recommended books, materials, and media:

- Essential Laboratory Skills for Biosciences, M.S. Meah and E. Kebede-Westhead-University of East London
- District Laboratory Practice in Tropical Countries by Monica Cheesgrough.
- Basic Clinical Laboratory Techniques: Barbara H. Estridge
- A Manual of Laboratory and Diagnostic Tests 8th edition By Frances Fischbach,Marshall B.Dunning lll

26 Additional information:

Name of Course Coordinator: **Dr. Ahmed Abu siniyeh** Signature: *Ahmed Abu siniyeh* Date: 2-2024

Head of Curriculum Committee/Department: **Dr. Suzan Matar** Signature: *Suzan Matar*

Head of Department: **Dr. Ahmed Abu siniyeh** Signature: *Ahmed Abu siniyeh*

Head of Curriculum Committee/Faculty: **Dr**. **Mu'ayyad Al Hseinat** Signature: *Mu'ayyad Al Hseinat*

Dean: **Prof. Mahmoud Jaghoub** Signature: *Mahmoud Jaghoub*