

Republic of Yemen
Ministry of Higher Education & Scientific Research
21 SEPTEMBER UNIVERSITY of MEDICALS & APPLIED SCIENCES



Faculty of Laboratory medicine..

Department of MICROBIOLOGY & IMMUNOLOGY

Course Specification of Advanced Diagnostic Microbiology

Course No. (03.12. 318)

Prepared by:	Reviewed by:	Head of the Department:	Vice Dean for Quality affairs	Dean of College:
Dr\Ghamdan Ahmed Altahish	Dr Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	Dr\Gamil Taher Abdul Mughni	Associate Prof. Dr. Ebtessam Al-Zabedi

I. Course Identification and General Information:				
1	Course Title:	Advanced Diagnostic Microbiology		
2	Course Code & Number:	03.12.318		
3	Credit Hours:	Theory Hours		
		Lecture	Exercise	Practical
		4	0	4
		Credit Hours		
		6		
4	Study Level/ Semester at which this Course is offered:	4 th year / 1 st Semester & 2 nd Semester		
5	Pre –Requisite (if any):	Systemic virology , mycology & bacteriology		
6	Co –Requisite (if any):	None		
7	Program (s) in which the Course is Offered:	Bachelor in laboratory medicine		
8	Language of Teaching the Course:	English		
9	Study System:	Semester		
10	Mode of Delivery:	Regular		
11	Location of Teaching the Course:	University Campus		
12	Prepared by:	Dr. Ghamdan AL-tahish		
13	Date of Approval:	2022-2023		

II. Course Description	
	It provides students with knowledge on laboratory methods used to diagnose pathogens in clinical specimens. Provide in depth Know the procedures used in diagnosis of microbial diseases and Identify different types of microorganisms by using different laboratory techniques. Also the course, will give the students theoretical and practical aspects of microbiological techniques., principles of automation, antimicrobial susceptibility testing, and infection control , their modes of action, host-parasite relationships, and identification of pathogenic and nonpathogenic Gram +ve and -Ve bacteria in clinical specimens. It will also focus on different Mycobacterial species. Each student will be required to identify unknown bacteria in different media.

III. Alignment Course Intended Learning Outcomes with program outcomes

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III. Course Intended Learning Outcomes (CILOs)		Referenced PILOs
A. Knowledge and Understanding: <i>Upon successful completion of the course, students will be able to:</i>		
a1	Discuss the basic principles of diagnosis of the most likely pathogens and principles of biochemical tests used to identify isolated pathogen.	A1
a2	Demonstrate the principles of antimicrobial sensitivity testing.	A1
a3	Mention the most important infectious clinical conditions and outline the etiologies, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention and control of the most likely organisms causing such diseases.	A3, A4
B. Intellectual Skills: <i>Upon successful completion of the course, students will be able to:</i>		
b1	Create a chart for laboratory diagnosis of common pathogens and select the best antibiotics to be used in patient treatment.	B1, B2
b2	Interpret basic microbiological tests results, serological and molecular tests for the diagnosis of infectious diseases and Correlate according to evidence the causal relationship of microbes and diseases	B3, B4
C. Professional and Practical Skills: <i>Upon successful completion of the course, students will be able to:</i>		
c1	Apply the principles of immunological and molecular techniques for the diagnosis of infectious diseases	C1
c2	Perform clinical specimen collation in correct manner, isolation, characterization , identification. distinguish positive and negative results and choose the appropriate antibiotic for susceptibility testing for isolated pathogen.	C3
D. Transferable Skills: <i>Upon successful completion of the course, students will be able to:</i>		
d1	Educate the population and patients through acceptable customer service interactions, Demonstrate oral and written effective communication skills,	D1
d2	Collaborate with patients, communities, organizations, and with members of the health team.	D3

III. Alignment Course Intended Learning Outcomes with Teaching Strategies and Assessment methods :

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

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	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1	Discuss the basic principles of diagnosis of the most likely pathogens and principles of biochemical tests used to identify isolated pathogen.	Lectures	Exam
a2	Demonstrate the principles of antimicrobial sensitivity testing.	Lectures	Exam
a3	Mention the most important infectious clinical conditions and outline the etiologies, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention and control of the most likely organisms causing such diseases.	Lectures	Exam

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1	Create a chart for laboratory diagnosis of common pathogens and select the best antibiotics to be used in patient treatment.	Lectures Lab classes	Exam , Practical exams
b2	Interpret basic microbiological tests results, serological and molecular tests for the diagnosis of infectious diseases and Correlate according to evidence the causal relationship of microbes and diseases	Lectures Lab classes	Exam , Practical exams

C Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1	Apply the principles of immunological and molecular techniques for the diagnosis of infectious diseases	Lectures Lab classes	Exam , Practical exams
c2	Perform clinical specimen collation in correct manner, isolation, characterization , identification. distinguish positive and negative results and choose the appropriate antibiotic for susceptibility testing for isolated pathogen.	Lectures Lab classes	Exam , Practical exams

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(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

	Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1	Educate the population and patients through acceptable customer service interactions, Demonstrate oral and written effective communication skills,	Lectures Lab classes	Exam , Practical exams
d2	Collaborate with patients, communities, organizations, and with members of the health team.	Lectures Lab classes	Exam , Practical exams

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	contact hours	contact hours	Learning Outcomes
1	Introduction to diagnostic microbiology and Specimen Collection and Management	Definition of diagnostic microbiology, General Concepts in Specimen, definition and types of specimens, Collection & Handling of different specimens. Specimen transport and preservation. Lab Safety and Biological Safety Cabinets	1	2	a1,b1,a3
	Principles of microbial diagnosis	Steps of microbial diagnosis, microscopic and culture characteristic, selection of biochemical tests, serological and molecular methods, and	1	2	a2,b3
2	Antibiotic Susceptibility Testing	Antimicrobial Susceptibility Testing Methods: Selection of Antimicrobial agents Resistance Supplemental Methods for Antimicrobial Resistance detection	2		a1,a2
3	Blood stream Infections:	Anatomy of circulation system (Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional	2	2	a1,a2,b1

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		and rapid diagnostic methods, Treatment and prevention) <input type="checkbox"/> Enteric fever / Typhoid fever, Bacterial endocarditis, <input type="checkbox"/> Bacteraemia, Septicemia, Pyrexia of unknown origin (PUO). <input type="checkbox"/> intravenous catheter associated infection. Blood Specimen : collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report			
4	Gastrointestinal infections:	Anatomy and physiology of Gastrointestinal tract Resident microbial flora (Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional and rapid diagnostic methods Treatment and prevention) Food poisoning, Traveler's Diarrhoea, Food poisoning, Cholera , salmonella ,shigella <u>Antibiotic Associated Diarrhea , <i>E. coli</i> strains associated with diarrhoeal disease</u> Stool Specimen: collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report	2	2	a1,a3,b1
5	Upper Respiratory Tract Infections (RTIs):	Anatomy of URT , normal flora (Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention) Rhinitis ,EpiGlottitis ,croup Pharyngitis and tonsillitis, Diphtheria Nasal carriage Nasal, Throat and nasopharyngeal Specimens: Collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report	2	2	a2,b1,a3
6	Lower Respiratory Tract Infections (RTIs):	Anatomy of LRT (Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention) Pneumonia, bronchitis, Bronchiolitis Mycobacterium tuberculosis, Fungal and anaerobic infection Sputum Specimens : collection, transportation,	2	2	a1, b1

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		cultivation, identification, susceptibility testing of isolated pathogen and writing final report			
7	Oral, Throat and Stomach Infections:	(Terminology, mechanism of infection, etiology, conventional and rapid diagnostic methods) oral cavity infection: Vincent angina (trench mouth): Stomatitis Oral Thrush Periodontal infections Stomach Infections : Peptic ulcer (<i>H. pylori</i>). Oral specimens: collection, transportation, Processing , cultivation, identification, susceptibility testing of isolated pathogen and writing final report	1	2	a1, b1,a3
8	Urinary Tract Infection:	Anatomy of UT, normal flora (Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention) Cystitis Pyelonephritis. Acute urethral syndrome Asymptomatic bacteriuria Uncomplicated and complicated UTI Urine Specimens: collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen, colonies Count , interpretation and writing final report	2	2	a1,a2,c1
9	Eye Infection:	Anatomy of eye (Terminology, mechanism of infection, etiology, conventional and rapid diagnostic methods) <input type="checkbox"/> Blepharitis, keratitis- Corneal ulcer <input type="checkbox"/> Conjunctivitis- Trachoma Conjunctival specimen : collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report	1	2	a1,a2,c1
10	Ear Infections	Anatomy of ear (Terminology, mechanism of infection, etiology, conventional and rapid diagnostic methods) <input type="checkbox"/> Otitis media, <input type="checkbox"/> External ear Ear specimen : collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report	1	2	a1,a2,b2
11	Skin and wound	Anatomy of skin, (Terminology, types and mechanism of infection,	2	2	a1,a2,c1

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	infections:	etiology, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention) Skin Infections Infections of the subcutaneous tissues. Infections of muscle fascia and muscle Diabetic foot infections wound infection Burn ifection Pus specimen: collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report			
12	Genital tract infections	Anatomy of male and female genital tract, (Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention) (Terminology, mechanism of infection, etiology, conventional and rapid diagnostic methods) Sexually transmitted infections (STI)/ Reproductive tract infections (RTIs) Gonorrhea, <i>Chlamydia trachomatis</i> Prostatitis Genital ulcers Vaginal infections Infectiob transmitted from mother to fetus Urethral, vaginal, cervical , ulcer genital specimen: collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report	2	2	a1,a2,b2
13	Central nervous infections:	Anatomy of CNS, meninges (Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention) Meningitis Encephalitis Meningoencephalitis: Brain abscess: Bacterial,viral and fungal Meningitis Meningitis in Neonates CSF specimen: collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report	2	2	a1,a2,b1
14	Bone infection	(Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional	1	2	a1,a2,b1

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		and rapid diagnostic methods, Treatment and prevention) Acute and chronic Osteomyelitis Bone marrow aspirate or bone biopsies : Collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report			
15	Joint infection	(Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention) Septic (infectious) arthritis: Non septic arthritis Synovial fluid: Collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report	1	2	a1,a2,b1
16	Serous fluids infection	Anatomy and physiology of Serous fluids (Terminology, types and mechanism of infection, etiology, epidemiology, clinical features, conventional and rapid diagnostic methods, Treatment and prevention) <u>Empyema</u> pericardial effusion: Ascites Serous fluids: Collection, transportation, cultivation, identification, susceptibility testing of isolated pathogen and writing final report	1	2	a1,a2,b1,b2
17	seminars	Advances in diagnostics microbiology techniques	2	2	
18	Mid term		2	2	
19	Final exam		2	2	
	Number of Weeks /and Units Per Semester		32	36	

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B- Practical Aspect

Order	Practical Experiments	Number of Weeks	Contact Hours	Learning Outcomes
LAB 1	Lab safety and Specimen Collection , General View on the Parameters Used in the Process of Microorganism	1	2	c1 ,c2
LAB 2	Ear swab , Collection, transportation, culturing, isolation, identification, staining (Gram) of particular specimens and antibiotic sensitivity tests.	1	2	c1 ,c2
LAB 3	Throat, and nose swab Collection, transportation, culturing, isolation, identification, staining of particular specimens and antibiotic sensitivity tests.	1	2	c1, c2
LAB 4	Sputum Collection, transportation, culturing, isolation, identification, staining (Gram & ZN) of particular specimens and antibiotic sensitivity tests.	1	2	c1, c2
LAB 5	Urine (MSU) Collection, transportation, culturing, isolation, identification, staining of particular specimens and antibiotic sensitivity tests.	1	2	c1, c2
LAB 6	Stool culture : Collection, transportation, culturing, identification of microorganisms. -Parasites, pus cells, red cells and other findings.	1	2	c1, c2
LAB 7	Genital discharges Collection, transportation, culturing, isolation, identification, staining of particular specimens and antibiotic sensitivity tests.	1	2	c1, c2,d1

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LAB 8	Pus/wound culture Collection, transportation, culturing, isolation, identification, staining (Gram & ZN) of particular specimens and antibiotic sensitivity tests.	1	2	c1, c2
LAB 9	Blood ,CSF ,Pleural Fluid and Ascitic Fluid Collection, transportation, culturing, isolation, identification, staining (Gram & ZN) of particular specimens and antibiotic sensitivity tests.	1	2	c1, c2,d1
LAB 10	Rapid review in diagnosis of common fungal infections - Microscopic examination and culture of specimens in Mycology	1	2	c1, c2
LAB 10	Final practical exam	1	2	c1, c2,d1
Number of Weeks/Contact Hours per Semester		10	20	

V. Teaching Strategies of the Course:	
1-	Lectures
2-	Practical session

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VI. Assessment Methods of the Course:

No	Assignment
1	Written Exams (Short Essays) and Quizzes
2	Multiple Choice Questions (MCQ)
3	Practical Exams (PE)

VII. Assignments:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Midterm Exam	8	20	20%	a1,a2 ,b1,a3
2	Practical exam	14	30	30%	c2 ,c1
3	Final Exam	16	50	50%	a1,a2,a3 ,b1
	Total	100		100%	

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IX. Learning Resources:

1- Required Textbook(s) (maximum two).

1-	Delost, Maria. (2015). Introduction to Diagnostic Microbiology for the Laboratory Sciences: Jones and Bartlett. ISBN 9781284032314.
2-	Mim's Medical Microbiology. Richard V Goreing, 4th edition (2008); Publisher: Elsevier publications
3.	Oxford Handbook of Infectious Diseases and Microbiology. Second edition. Oxford University Press 2017

2- Essential References.

1-	Jawetz, Melnick, & Adelberg's Medical Microbiology, 28e Riedel, Stefan Published by McGraw-Hill Education, 2019 ISBN 10: 1260012026 ISBN 13: 9781260012026
2-	Bailey & Scott's Diagnostic Microbiology 15th Edition Patricia M. Tille- February 4, 2021

3- Electronic Materials and Web Sites etc.

1-	https://sites.google.com/site/allmicrobiologysite/ https://Asm.org
2-	http://medicallabtechno.weebly.com/uploads/7/5/1/5/7515789/monica-cheesbrough-district-laboratory-practice-in-tropical-countries-part-1.pdf
3-	https://sites.google.com/site/allmicrobiologysite/diagnostic-medical-microbiology
4-	http://www.microbelibrary.org
	http://www.bact.wisc.edu/Bact330/330Lecturetopics

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XI. Course Policies:

1	Class Attendance: Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	Tardiness: -If the student dose not attend for more than 6 times, the student will be obligated to withdrew from the course
3	Exam Attendance/Punctuality: No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	Assignments & Projects: Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	Cheating: Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	Forgery and Impersonation: Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	Other policies: The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration

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