Course Syllabus of Diagnostic Parasitology

Faculty: Medicine and Health Science
Department: Health sciences
Program: Bachelor in Medical Laboratories

I. General information about the course instructor :

Name	Dr. Rashad Abdul-Ghani	Office Hours(2 Hours Weekly)					
Location & phone number	737259467	Sat	Sun	Mon	Tue	Wed	Thu
Email	r.abdulghani@ust.edu			2			

II. General information about the course:

1	Course Title :	Diagnostic Parasitology				
2	Course Code and Number :	BML474				
3	Credit Hours :	Credit Hours				Total
		Theoretical	Seminar/Tutorial	Practical	Training	
		1		*1*	---	2
4	Study Level and Semester:	4th year/ 1st semester				
5	Pre-requisites :	BML233- BML246				
6	Co-requisites :	None				
7	Program in which the course is offered:	Bachelor in Medical Laboratories				
8	Teaching Language:	English				
9	Instruction location:	University of Science and Technology, Sana'a ,Yemen				

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إدارة ضمان الجودة والاعتماد
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١٨ / ١١

الموصف : د. رشاد عبد الغني
المراجع : ا.د.محمد مهدي، د. مجاهد نصار
رئيس القسم: د. عبد الحبيب ردمان
عميد الكلية: د. عبد الله المخلافي

III. Course Description

This course provides undergraduate students with the knowledge and practice about different diagnostic parasitological procedures for clinical and epidemiological purposes. It provides the students with the essential knowledge and practical skills to properly collect, preserve, stain and examine different clinical specimens for parasites using microscopical, immunological and molecular methods in compliance with quality control standards within the context of total patient care and quality assurance in medical laboratory technology. The course is delivered by tutorials, laboratory demonstrations and hands-on practice, and achievement is continually assessed through laboratory logbooks, reports and portfolios of the students. Medical parasitology I and Medical parasitology II courses are prerequisites.

IV. Course Aims: This course aims to:

1. Provide the students with a theoretical background about the various procedures used in the diagnosis of parasitic infections from different clinical specimens.
2. Enable the students to critically analyze and propose solutions that ensure the quality in diagnostic parasitology in the appraisal of health problems and to choose cost-effective diagnostic approaches.
3. Equip the students with the practical skills to implement various diagnostic procedures within the context of quality assurance and to identify and report parasites in different clinical specimens.
4. Enable the students to effectively manage time, be involved in collaborative teamwork and use internet resources for continuing self-learning.

V. Course Intended Learning Outcomes (CILOs) :

- **After completing this course, students will be able to:**

1. Describe the best approaches for the collection, preservation and transport of clinical specimens for parasites.
2. List the different types, advantages and disadvantages of parasite concentration techniques, staining techniques and examination techniques used in diagnostic parasitology.
3. Recognize the different types and uses of special diagnostic techniques in parasitology for clinical and epidemiological purposes.
4. Construct charts for different diagnostic procedures in relation to different clinical specimens and the diagnostic stages of parasites detected.
5. Decide on choosing the best cost-effective diagnostic approaches for the diagnosis of parasitic infections among a variety of alternatives.
6. Apply safety precautions, quality control and quality assurance in diagnostic parasitology laboratory and properly use microscope to detect and differentiate the diagnostic stages of parasites.
7. Efficiently perform different procedures in diagnostic parasitology laboratory efficiently from specimen collection to examination and reporting of the result.
8. Distinguish artifacts in sediments of clinical specimens under microscope and differentiate them from diagnostic stages of parasites.
9. Perform special diagnostic techniques in parasitology for clinical and epidemiological purposes.
10. Manage time and communicate well with colleagues and staff and follow the code of conduct adopted by the institution.

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VI. Course Contents

Theoretical Aspect:

No.	Course Units	Sub-topics	Week due	Contact Hours
1	**Introduction to diagnostic parasitology**	•Reagents and equipment used in diagnostic parasitology. •Safety precautions in diagnostic parasitology laboratory. • Types of clinical specimens and the different parasites and their diagnostic stages recovered from each specimen type.	1st	1
2	**Collection, preservation and macroscopic examination of stool**	• Collection of stool specimens for diagnosis of parasitic infections. • Preservation of stool specimens and the types, advantages and disadvantages of different stool preservatives • Macroscopic examination of stool specimens.	2nd	1
3	**Concentration techniques of stool specimens**	• Purpose of stool concentration and types of concentration techniques. • Types, advantages and disadvantages of different stool sedimentation techniques (saline/ formol-ether/formalin ethyl acetate sedimentation techniques) • Types, advantages and disadvantages of different stool floatation techniques (zinc sulfate/ saturated solium chloride/ Sheather's sugar floatation techniques)	3rd, 4th	2
4	**Microscopic stool examination**	• Direct systematic microscopic examination of wet stool mounts using saline/ eosin/ iodine/ buffered methylene blue • Systematic examination of stool sediments for parasites • Identification of parasite diagnostic stages and common artifacts in stool sediments	5th	1
5	**Egg counting techniques**	Types, principles, advantages and disadvantages of egg counting techniques (Kato-Katz faecal thick-smear; Stoll's egg dilution technique; Formol-detergent field technique).	6th	1
6	**Special stool diagnostic techniques**	• Types, principles and uses of special techniques in diagnostic parasitology. • Scotch cellophane tape and anal swab (NIH) methods for pinworm • Miracidial hatching test for viability of Schistosoma species eggs • Tests for occult blood in stool	7th	1
7	**Mid-term exam**		8th	1
8	**Permanent staining of stool**	• Purpose, types, advantages and	9th	1

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	specimens	disadvantages of techniques for the permanent staining of stool smears. • Permanent staining of faecal smears for intestinal protozoa (trichrome and iron haematoxylin) • Specialized staining techniques for coccidia and microsporidia: - Modified trichrome staining - Modified Ziehl-Neelsen & Kinyoun's acid-fast staining - Carbol fuchsin negative staining - Quick-hot Gram-chromotrope staining - Fluorescent staining (e.g. auramine O, calcofluor white)		
9	**Examination of urogenital specimens for parasites**	•Collection, preservation and macroscopic examination of urine specimens •Examination of urine for *S. haematobium* eggs & microfilariae of *W. bancrofti* and *O. volvulus* • Examination of urogenital specimens for trophozoites of *T. vaginalis*	10th	1
10	**Examination of blood specimens for parasites**	• Collection, processing, staining and examination of blood smears for malaria parasites. • Comparison between thick and thin blood smears for malaria parasites and differentiation of different stages of *Plasmodium* species. • Types, advantages and disadvantages of staining techniques for malaria and other blood parasites • Malaria parasite density estimation • Collection, concentration, staining and examination of blood for trypanosomes and microfilariae • Morphological differentiation of blood microfilariae	11th 12th	2
11	**Examination of skin specimens for parasites**	• Collection, preparation, staining and examination of skin specimens skin scrapings for *Leishmania* species. • Collection and examination of skin snips for *O. volvulus.*	13th	1
12	**Examination of biopsy, aspirates and other materials for parasites**	• Examination of lymph node aspirate, buffy coat and bone marrow preparations for parasites • Examination of cyst contents for *Echinococcus* species and testing the viability of protocolices • Examination of muscle biopsy for *T. spiralis* larvae and *T. solium* cysticerci. • Examination of corneal scrapings for *Acanthamoeba* species.	14th	1
13	**Immunodiagnosis and cultivation of parasites**	• Overview of intradermal and serological tests for the diagnosis of parasitic infections • Types, principles, uses, advantages and disadvantages of serological assays. • Special serological tests (such as: CAP test for invasive amoebiasis, BFT for	15th	1

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		trichinellosis) and rapid immuno-chromatographic tests. • Overview of culture systems used for the diagnosis of protozoa (such as NNN, TYI, etc.) • Culture methods for larval-stage intestinal nematodes (Harada-Mori strip method/ Petri dish method/ charcoal method/Koga agar method/ Baermann technique).		
14	**Final theoretical exam**		16th	1
Total number of weeks and hours			**16**	**16**

Second: Practical/Tutorial/Clinical Aspects :

No.	Practical/Tutorial/Clinical topics	No. of Weeks	Contact Hours
1.	**Introduction to diagnostic parasitology practice** - Microscopy and micrometry - Equipment and reagents in diagnostic parasitology laboratory - Safety precautions, disposal of specimens and slides and quality assurance in diagnostic parasitology laboratory	2nd	2
2.	**Ova and parasite (O & P) examination of stool** - Collection of stool specimens: Methods, timing, frequency, types of collected specimens, types of containers, safety, etc. - Preservation of stool specimens: types, use preparation and quality control of preservative, methods of preservation, *etc.* - Macroscopic and direct microscopic examination of stool unstained and stained wet mounts Identification of artifacts in stool sediments. - Faecal sedimentation techniques: Formol-ether/ formalin-ethyl acetate sedimentation techniques - Faecal concentration by floatation: Zinc sulfate floatation technique, etc. - Comparison between different concentration techniques.	3rd,4th,5th,6th	8
3.	**Egg counting techniques for intestinal parasites** - Stoll's egg dilution technique - Kato-Katz faecal thick-smear technique	7th	2
4.	**Special diagnostic techniques for stool examination** - Faecal occult blood testing - Modified Ziehl-Neelsen acid-fast staining - Trichrome staining	8th	2
5.	**Blood examination for malaria parasites** - Preparation and quality control of stains such as Giemsa and Leishman stains - Preparation and staining of thick and thin blood smears - Systematic examination of blood films for detection, identification and estimation of malaria parasite density - Rapid immunochromatographic tests for diagnosis of malaria parasites. *Note*: Bone marrow smears are processed in the same manner.	9th,10th,11th	6

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6.	**Examination of buffy coat and lymph node aspirates** - Preparation, staining and examination of buffy coat and lymph node aspirate smears for parasites (e.g. for *L. donovani*)	12th	2
7.	**Examination of skin specimens** - Collection, preparation, staining and examination of skin scraping smears for *Leishmania* species amastigotes - Collection, preparation and examination of skin snips for *O. volvulus* microfilariae	13th	2
8.	**Final practical exam**	14th	2
Total number of weeks and hours		13	26

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