Department of Biology (BioMedical)

College of Science

Salahaddin University

Subject: Clinical Laboratory Techniques

Course Book – 4

1. **Lecturer's name: Asst. Prof. Dr. Qaraman Mamakhidr Koyee**
2. **Practical Lecturer's name: Asst. Lec. Chreska N. Ahmed**

Academic Year: 2022/2023

Course Book

1.Course name	**Clinical Laboratory Techniques (Theory & Practical)**
2. Lecturer in charge	**Dr. Qaraman M.K. Koyee** **Miss. Chreska N. Ahmed**
3. Department/ College	**Biology Department/ College of Science**
4. Contact	**e-mail: qaraman.koyee@su.edu.krd** **chreska.ahmed@su.edu.krd**
5. Time (in hours) per week	**Theory: 2** **Practical: 6**
6. Office hours	**17 hours per week**
7. Course code	**SBio 404**
8. Teacher's academic profile **Assist Prof.** **Dr. Qaraman M.K. Koyee**	**Dr Qaraman M.K. Koyee** is working as an **Assistant Professor** of **Parasitology** at Salahaddin University-Science College-Biology Department, since 11 Sept 2004 till now. He has **MSc in Medical Parasitology** and **PhD in Molecular Parasitology**. He has more than **20 published research**

	articles from **Local and International impact Journals** mostly around Parasite Identification and Taxonomy**.** He has **18 years** of **teaching experience** for different biological subjects (**Medical** / **General Parasitology**, Invertebrate Zoology, General and Basic Zoology, Virology, Mycology, Immunology, Microbiology, Parasite Phylogeny, Advanced Parasitology, Parasite Lab Diagnosis....) from different Colleges and Departments of the University. Currently, he is working on the **Biodiversity** and **Molecular Phylogeny of Parasites**. **The teaching experience is both theoretical and practical including:** **Undergraduate:** **1- Medical Parasitology.** **2- General Parasitology.** **3- Diagnostic Parasitology** **4- Mycology.** **5- Zoology.** **6- Immunology.** **7- Medical Entomology.** **8- Invertebrate Zoology.** **9- Laboratory Techniques.** **10- Helminthology.** **11- Haematology** **12- Virology** **13- Human Anatomy** **14- Protozoology** **Postgraduate:** 1- **Advanced Parasitology** (PhD & MSc.) 2- **Parasite Phylogeny** (PhD) 3- **Experimental Parasitology** (MSc.). 4- **Molecular Parasitology** (PhD) 5- **Topics in Biology** (MSc.) 2017 Discussion Committee (HD Parasitology Thesis) 2020 Discussion Committee (PhD Parasitology Dissertation). 2021 Discussion Committee (PhD Invertebrate Dissertation). 2023 Chairman of M.Sc. Discussion Committee (M.Sc. Parasitology)

List of Publications

1. **Koyee, Q.M.K.** and Faraj, A.M. (2007). Primary in vitro cultivation of *Entamoeba histolytica* in two different media with local materials. J. Med. Sci., 11(1): 11-16.
2. **Koyee, Q.M.K.** and Faraj, A.M. (2007). Evaluation and efficiency of grape juice (natural and artificial) in diagnosing intestinal parasites. J. Med. Sci., 11(2): 37-41.
3. **Koyee, Q.M.K.** (2009). Prevalence of *Blastocystis homines* among Orphanage, Infirmary and Schoolchildren in Erbil cityKurdistan Region-Iraq. . J. Duhok Sci., 12(1).
4. **Koyee, Q.M.K.**; Ahmed, R.K., Aziz, K.K.; Ahmed, H.S. and Abdula, A.H. (2011). Infestation rate with *Polyplax spinulosa* (burmeister, 1839) among certain laboratory albino rats (*Rattus norvegicus*) in relation to different washing agents in two Erbil city universities. Zanco J. Med. Sci., 15(1): 47-52.
5. **Koyee, Q.M.K.** (2011). Intestinal parasitosis in relation to blood groups among certain Bangladesh, Turkish and Kurdish people in Erbil city. J. Koya. Univ., 21: 97-108 2
6. **Koyee, Q.M.K.** (2011). *Hyalomma aegyptium* as a dominant tick on tortoises of the genus *Testudo graeca* in Erbil Province-Iraq. J. Duhok Sci., 14(1): 186-190.
7. **Koyee, Q.M.K.** and Faraj, A.M. (2011). A Coprological Diagnostic Comparison Between Zinc Sulphate Floatation and Formalin: Ether Sedimentation with Two Natural Extracts (Pomegranate Molasses and Honey). Diyala Journal of Medicine, 1(2): 83-89.
8. **Koyee, Q.M.K.** (2011). Prevalence of Some Parasitic Helminthes Among Slaughtered Ruminants (Sheep, Goats and Cattle) in Hawler Slaughter House During 2010, Hawler, Kurdistan Region, Iraq. 4th International Scientific Conference Salahaddin University (18-20 Oct.), 2: 594-596.
9. **Koyee, Q.M.K.** and Faraj, A.M. (2012). Epidemiology of Intestinal Parasites among Food handlers in Erbil City. Duhok Med. J., 6(1): 1-12.
10. Ali, W.K.; **Koyee, Q.M.K.**; Ahmed, R.K. and Abdullah, S.M.A. (2012). *Cuclotogaster heterographus* (Phthiraptera: Philopteridae) Infestation on the body feathers of Turkey *Meleagris gallopavo* as a new host from Erbil City, Kurdistan Region, Iraq. 7th Scientific Conference Tikrit University, 837-841.
11. **Koyee, Q.M.K.** and Steffensense, K. (2012). VP16-LXRβ act as both antiproliferative and lipogenic factors in MCF-7 breast cancer cell line, Duhok Med. J., 6(2): 119-128.
12. Ahmed, R.K.; **Koyee, Q.M.K.** and Rahemo, Z.I.F. (2012). Intestinal Parasites of Experimental Rodents with Testing the Efficacy of Diagnostic Methods. Int. Res. J. of Pharmaceuticals. 2(3): 77-81.
13. **Koyee, Q.M.K.**; Ahmed, R.K. and Abdullah, S.M.A. (2013). Seasonal Prevalence of Intestinal Parasites among Human in Kurdistan Region, Iraq During 2009. J. Koya. Univ., 26: 105-114.
14. Ali, W.K.; **Koyee, Q.M.K.**; Ahmed, R.K. and Abdullah, S.M.A. (2013). Prevalence of some medical Insects and Arachnids (Lice and Scabies)

depending on records from the Ministry of Health in Kurdistan Region, Iraq. J. Pakistan Entomologist., 35 (2): 89- 93.

15. Al-Marjan, K.S.N.; **Koyee, Q.M.K.** and Abdullah, S.M.A. (2015). In Vitro Study On The Morphological Development Of Eggs (Nits) And Other Stages Of Head Lice *Pediculus humanus capitis* De Geer, 1767. Zanco Journal, 27 (3): 35-40.
16. **Koyee, Q.M.K.** and Faraj, A.M. (2015). Prevalence of *Cryptosporidium* spp. with other intestinal microorganisms among regular visitors of Raparin Pediatric Hospital in Erbil City-Kurdistan Region, Iraq. Zanco Journal, 27 (4):
17. **Koyee, Q.M.K.;** Khailany, R.A.; Al-Marjan, K.S.N.; and Abdullah, S.M.A. (2016). Molecular-Based Identification of *Polystoma integerrimum* by 28S r DNA, Phylogenetic and Secondary Structure Analysis. Jordan Journal of Bio logical Sciences (JJBS), 9 (2): 117-121
18. Hamad, K.Kh.; Ahmed, S.T. ; Ahmed, R.K. ; **Koyee, Q.M.K.** (2018). Phytotherapeutics: As anticipating substitutes to synthetic drugs in combating antinematicidal-resistant gastrointestinal nematodes of small ruminants. ZANCO Journal of Pure and Applied Sciences. 30 (4); 102-114
19. **Koyee, Q.M.K.** and Abdullah, S.M.A. (2019). Phylogenetic and secondary RNA structure analysis of monogenean gill ectoparasites (*Dactylogyrus* spp.) parasitizing certain freshwater fishes. Polish Journal of Veterinary Sciences (PJVS). 22(4): 667- 675. DOI: 10.24425/pjvs.2019.129979.
20. **Koyee, Q.M.K.** and Abdullah, S.M.A. (2019). Host Specificity, Community Components and Diversity Dynamics of *Dactylogyrus* spp. (Monogenean ectoparasites) Parasitizing Cyprinid Gills. Polish Journal of Environmental Studies (PJVS). 28(6): 1-13. DOI: 10.15244/pjoes/99064.

Researches under Publication:

- Certain species of Tape Worms that isolated from Domestic Pigeons of Erbil city.
- Fruit and Vegetable parasites in Erbil city
- Parasitic fauna of some amphibians in Erbil city

Magazine Articles:

- A new idea about sensitivity and resistance of parasitic protozoa to metronidazole. In BioNews Magazine, No.3, year 2007
- Transmission of parasites and their prevention. In BioNews Magazine, No.4, year 2008
- Pin worm transmission and sleep disruption among children.
- Toxoplasmosis and an important message to the pregnant women.

	Further academic training and Participation in Conferences 1. Teaching Mode Training held in Salahaddin University (Education Centre, Salahaddin University) (2007). 2. 4th international conference of Salahaddin University. (2011). 3. 4th Conference of biological sciences of Duhok University. (2012). 4. College of Science / Mathematic Department-Erbil Word and Windows Training / good degree 5. Central Laboratory / Erbil city Lab. of Haematology, Parasitology and Bacteriology (2003). 6. University of Salahaddin Training Centre –Erbil (USTC) English Course (1st July – 31st August 2007) 7. Rizgary Teaching Hospital – Laboratory Department From 8/7/2008 till 20/7/2010 3 8. PCR and Western Blot Technique Training / Sweden-Stockholm Advanced Molecular and Biochemical Techniques, From 13/10/2011 to 01/06/2012 9. ICDL-5 (Computer Training) / Computer Dept.-Science Education College-Erbil ICDL-5 (6 Weeks) 2013 10. 2nd Scientific Conference of the Faculty of Medical Sciences, University of Duhok-Iraq 19th -20th September 2012 11. Training program for COBAS E411 and COBAS C111 / Erbil Private KOLAB Laboratory for Clinical Analysis by Global Kurdi Group Company 18-23 / March 2017 12. 4th International Scientific Conference of Cihan University – Erbil on Biological Sciences (CIC-BIOS'17) – Cihan University - Erbil 26/27 – April - 2017 13. 2nd EPU symposium about Internationalization of Scientific Research in Kurdistan / Polytechnic University- Erbil 2/3 – May – 2017 14. Bioinformatics: Tools and Applications workshop. IT Dept. Science College / Salahaddin University - Erbil 16/17 – May - 2017 15. Health Education Seminar for Tourism Directorate / Erbil 20 – August - 2017 16. General Directorate of Tourism / Erbil 18 Jan. 2018
Miss. Chreska N. Ahmed	She joined Salahaddin University/ College of Science/ Biology department in **2004**, and obtained **BSc in general biology** in **2008**. - From **2009-2017**, worked at Salahaddin University/ College of Science/ Biology department, as an **Assistant Biologist.** - She has **14 years** of teaching experience at **(Biology and Environmental Science Department)** and she taught many different practical biology labs to help students doing experiments with assistant lecturer and professors.

	1. Toxicology and Quality Control Lab at (Environmental Science Department) **2. Histology and embryology** **3. Food and industrial microbiology** **4. Ecology and pollution** **5. Microbial genetic** **6. Virology** **7. Comparative anatomy** **8. Entomology** **9. Medical entomology** **10. Microbial physiology** **11. Sewage microbiology** **12. Molecular and biotechnology** **13. Micro technique** **14. Hematology** **15. Medical Parasitology** **16. Invertebrates** **17. Botany** In **2019**, She got **MSc. Degree in Parasitology** in Salahaddin University/ College of Science/ Biology department-Erbil/Iraq. She is currently, working as an **Assistant Lecturer** at Salahaddin University- College of science-Biology department, her specialist is **Parasitology**. -She has one published Research article in **ZANCO Journal of Pure and Applied Sciences.** (**Chreska Nooraldin Ahmad**, Kareem Khoshnow Hamad and Fikry Ali Qadir, 2019. *Haemonchus contortus* as a model in assessing activity of Citrullus colocynthis fruit extract to control benzimidazole-resistant parasitic nematodes. *ZANCO Journal of Pure and Applied Sciences*, 31 (5); 61-70.
9. Keywords	Parasitology, Diagnosis, Taxonomy & Identification

10. Course overview:

Clinical Laboratory Technique is a science that deals with the study of general and specific techniques in diagnosing of diseases and the most abundant protocols for doing laboratory tests, including direct wet mount, floatation concentration, sedimentation concentration, modified acid-fast stain, sample collection, preservation, processing, temporary and permanent slide preparation. The course will be 3 credit hours. Two credit hours will be designated for theory lectures and one credit hour for practical parts. The course will contain an introductory part, in which basic concepts of Clinical Laboratory Techniques are introduced and major terms are defined; then, specialized topics will be tackled in a systematic approach to cover the major laboratory procedures of the routine and rare laboratory tests.

Clinical Laboratory Technique is a dynamic field that has always been on the frontier of clinical investigation within the scope of human disease, therefore student can get secure employment through having more scientific knowledge about all diagnostic techniques and procedures. The best way for investing their quality in making private laboratory.

11. Course objective:

The course is especially planned for undergraduate students who intend to work in diagnostic laboratories. Upon the completion of the course, students would have benefited from the following objectives of the course:

1. Explain major concepts in clinical laboratory tests, including General Stool Examination (GSE), General Urine Examination (GUE), Seminal Fluid Analysis (SFA), Temporary and Permanent parasitological slide preparation… etc.
2. Elucidate the basis of Gastro-intestinal and Urinary system diseases, including intestinal disorders, hepatic diseases, Dysentery and diarrhoea, and infertility disorders.
3. Clarify in detail the major concepts regarding the major human exudates for identification.
4. Provide the latest information regarding the newest techniques utilized by laboratory specialists to treat and diagnose gastro-intestinal, blood, and urinary disorders.

12. Student's obligation

- Students should attend all lectures and not miss any lecture time.
- Additionally, for each lecture, the student should prepare and follow up with sufficient studying time to cover the material presented in the class during that lecture.
- It is highly advised not to accumulate material until before the examination time. Cramming will definitely weaken the student's ability to understand and retain valuable information.
- Students prefer to attend all the seminars on time which held in our department especially seminar about Laboratory Diagnostic Techniques.

13. Forms of teaching

Teaching with technology can deepen student learning by supporting instructional objectives.

- Data Show Projector
- Whiteboard
- Video and Practical Laboratory Techniques

14. Assessment scheme

Breakdown of overall assessment and examination

Grading System:

Mean Examination (Theory): **10 %**
Activity (Theory): **5 %**
Total Theory: 15%
Practical Examination: **15%**
Quizzes: **6%**
Weekly Reports: **8%**
Activities (Practical): **6%**
Total Practical =35 %
Final examination: **50% theory**

15. Student learning outcome:

1. Interpret biological and biochemical test results and evaluate the test result to analyse the differential diagnosis and suggest further tests to determine the actual diagnosis for a wide range of human disorders.
2. Understand and be able to communicate different conditions associated with various organs of the body systems.
3. Understand how to process, preserve, diagnose and interpretate the laboratory specimen results.
4. Communicate scientific concepts clearly, concisely and logically.
5. Practise biological tests within the laboratory environment safely and with due regard to occupational health and safety guidelines.

16. Course Reading List and References:

1. Garda, L.S. (2021). Practical Guide to Diagnostic Parasitology. 3rd Ed. Wiley. 568pp.
2. Mundt, L.A. and Shanahan, K. (2016). Graff's Textbook of Urinalysis and Body Fluids. 3rd Ed., Wolters Kluwer. 318pp
3. WHO (2003). Manual of Basic Techniques for a health Laboratory. 2nd Ed., Geneva. 384pp.

17. The Topics: Week Numbers	**The Lecture name topics**
Week 1	**Introduction to Clinical Laboratory Techniques**
Week 2	**Basic Laboratory Skills.**
Week 3	**Clinical Specimens collection and processing**
Week 4	**Laboratory Quality control and quality assurance**
Week 5	**Types of the clinical laboratory**
Week 6	**Data Managements and Analytical errors**
Week 7	**Laboratory Test reports and documentation**
Week 8	**Clinical Lab Result Interpretation**
Week 9	**Stool Concentration Technique (Floatation & Sedimentation)**
Week 10	**Faecal Fat, Faecal pH & Stool reducing sugar tests**
Week 11	**General Urine Examination**
Week 12	**Seminal Fluid Analysis (SFA)**
Week 13	**Pseudo-parasites and artifacts**
Week 14	**Cobas E411 and Cobas C111**
Week 15	**Examination**
Examination	
Week Numbers	**The Practical Topics**
Week 1	**General Lab instruments**
Week 2	**Lab Result documentation**
Week 3	**Lab Result Interpretation**
Week 4	**Modified Acid Fast Stain for *Cryptosporidium* spp.**
Week 5	**Formalin-Ether Sedimentation Technique**
Week 6	**Saturated Salt Solution Floatation Technique**
Week 7	**General Urine Examination (GUE)**

Week 8	**Seminal Fluid Analysis (SFA)**
Week 9	**Faecal Fat, Faecal pH & Stool reducing sugar tests**
Week 10	**Faecal Occult Blood (FOB)**
Week 11	
Week 12	**Baermann Technique**
Week 13	**Immunochromatographic Method for detecting *E. histolytica*, *G. lamblia* and *Cryptosporidium***
Week 14	**Pseudo-parasites and artifacts**
Week 15	**Examination**
Examination	

19. Examinations: Theory

Examples of Semester Examinations

Theory of Clinical Laboratory Techniques Exam

Q1: Define the following

Faecal fat Test, PVA, Lugol's Iodine, Charcoat lyden crystals, Urobilin

Q2. Write the important of the following

1. Celophane Tape Technique.
2. Zink-sulphate floatation Technique
3. pH of urine sample.
4. Sperm motility index

Q3. What are the differences between amoebic and bacillary dysentery?

Q4. What has been the “gold standard” for stool collection systems?

Q5. What is the basis for the recommendation that three stools should be collected on alternate days, rather than 3 days in a row or three in one day?

Lecturer

Assist Prof. Dr. Qaraman M.K. Koyee

Examination (Practical)

Examples of Semester Examination

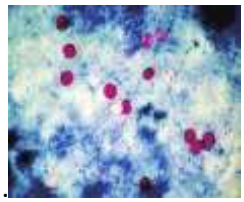
Practical Clinical Laboratory Techniques exam

Q1/ What is the principle of the following techniques

1. Acid-fast stain
2. Concentration method

3. Flotation techniques

Q2/ Identify the following slides:

1.  2.  3.  4.  5. 

Q3/ Write the methods of faecal sample preservation in Lab?

Q4/ what are the abnormal colours of urine & possible causes mention them briefly?

Q5/ How could you prepare the permanent slide in lab? mention the steps

Lecturer

Miss. Chreska N. Ahmed

20. Extra notes:

21. Peer review پێداچوونەوەی