University of Tripoli

Faculty of Medical Technology
Department of Medical Laboratory Sciences

Undergraduate Handbook

Scientific Program

SYLLABUS AND COURSE SCHEDULE

second edition

2023

Re-issue of the first edition
2017 version update

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June**2023**

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جامعة طرابلس / كلية التقنية الطبية

قسم علوم المختبرات الطبية

دليل البرنامج العلمي بكالوريوس

المنهج الدراسي والفصول الدراسية

الجزء الثاني

المقرراتوالمفردات الدراسية

بنظام الفصل

2023

إعادة إصدار الطبعة الأولى - تحديث إصدار 2017

أُعدت بواسطة:

أ. مريم عبد الله الاحجل ماجستير عضو هيئة التدريس كلية التقنية الطبية

أ. نجلاء عامر اليونسي ماجستير عضو هيئة التدريس كلية التقنية الطبية

المراجعة:

أ. خالد المصراتي ماجستير عضو هيئة التدريس كلية التقنية الطبية

تحت إشراف:الأستاذ الدكتور جمال مصطفى الخوجة

رئيس قسم علوم المختبرات الطبية

دليل البكالوريوس هو دليلك للحصول على درجة البكالوريوس في العلوم من كلية التقنية الطبية - جامعة طر ابلس

اقرأ الكتيب، وهو المرجع النهائي في جميع الدورات والبرامج في قسم علوم المختبرات الطبية .

لا تتردد في طلب النصيحة !

لا يعد الكتيب بديلاً عن التحدث مع رئاسة القسم العلمي.

مايو 2023

ابريل 2023/04/30

إعداد وتصميم مسبق / ا.د. جمال مصطفي الخوجه

رسالة رئيس قسم علوم المختبرات الطبية

يطيب لي وأعضاء مجلس قسم علوم المختبرات الطبية أن نتقدم بالبرنامج الأكاديمي لقسم علوم المختبرات الطبية والذي يتناول المقررات والمفردات الدراسية بنظام الفصل والذي سيعمل به ابتداء من خريف 2022 / 2023م.

وإذ أثمن عاليا جهود أعضاء مجلس القسم الذين بدلوا الجهد في إعداد هذا البرنامج لا يفوتنا إلا أن نتقدم بالشكر والامتنان لدعم السيد عميد ووكيل الشئون العلمية لكلية التقنية الطبية المتواصل في إتمام الجزء الأول من البرنامج.

لقد تم إعداد هذا البرنامج بالاستعانة بمراجع عالمية وعربية سابقة من كليات التقنية الطبية من خلال الاطلاع علي محتويات و اقتباس آلية الإعداد والإخراج ونمط الكتابة للشكل العام للبرنامج ومحتوياته العلمية والتي استعان بها أعضاء هيئة التدريس المكلفين بإعداد المقررات والمفردات ومنسق إعداد هذا البرنامج

لقد تم الانتهاء من إعداد البرنامج وفق الإطار الإداري علي النحو التالي:-

- وفق للجنة المكلفة من إدارة الجامعة لقد تم إعداد المقررات ومفرداتها بالسنة الأولي والتي تتكون من فصلين وتم وضعها بالبرنامج لتكتمل صورة الإعداد برنامج قسم علوم المختبرات الطبية وما مدى ألاحتياجاتها في متطلبات المقررات الدراسية وإعداد المفردات..
- وفقا لقرار رئيس الجامعة رقم (25) لسنة 2014 م بشان دمج قسمي المختبرات وعلم الامراض بكلية التقنية الطبية.
- وعلي قرار السيد عميد الكلية رقم (7) لسنة 2016م بشان تكليف عضو هيئة تدريس بمهام رئاسة قسم علوم المختبرات الطبية.
- وقرار السيد د. وكيل الكلية للشئون العلمية رقم (1) لسنة 2016م بشان تكليف السيد/ ا. د. جمال مصطفي الخوجه برئاسة قسم علوم المختبرات الطبية.
- ووفقا لقرار رئيس الجامعة رقم (166) لسنة 2015م بشان تشكيل لجنة تتولي مهام إعداد مقررات الدراسية بنظام الفصل لقسم علوم المختبرات الطبية بكلية التقنية الطبية..
- وما تناوله رئيس قسم علوم المختبرات الطبية مع لجنة المقررات حول بعض ملاحظات أعضاء هيئة التدريس بالقسم ومجلسه.
- وما تم عرضه من السيد رئيس قسم علوم المختبرات الطبية علي لجنة المقررات 2016/07/3م بشان اعتماد التعديلات للمقترح من ساعات تدريسية و مقررات.
- وبناء علي تكليف عميد كلية التقنية الطبية وإعادة تكليف السيد رئيس قسم علوم المختبرات الطبية للجان بشان إعداد مفردات المقررات وفق ما تم عرضه من لجنة المقررات الدراسية.
- وعلى محضر الاجتماع الثاني لقسم علوم المختبرات الطبية خريف2023م.
- وعلى محضر اجتماع مجلس الكلية 2023/04م.

تم إخراج الصورة النهائية الحالية بعد التطوير والتحديث، من وقائع الجزء الأول من مقررات دراسية ومفرداتها لقسم علوم المختبرات الطبية بكلية التقنية الطبية جامعة طرابلس، لاعتماد صورتها لبداية تنفيذها للعام الجامعي خريف 2016م.

إن ما عرض في البرنامج للقسم الحق في تغيير نمض او محتويات علمية إذا رأي ذلك ودوري وفق تطوير البرامج العلمية بالقسم ومستجدات وتوصيات علمية داخلية أو خارجية.

والله الموفق

ا.د. جمال مصطفي الخوجه
رئيس قسم علوم المختبرات الطبية

وزارة التعليم العالي والبحث العلمي
رئيس قسم علوم المختبرات الطبية
جامعة طرابلس - كلية التقنية الطبية

ابريل 2023/04/30 صدر في طرابلس

Accreditation

Undergraduate Handbook
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Committee members

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Najla Amer Elyounsi, MSc

Khaled A. Elmosrati, MSc

Professor Jamal M. El Khoga, DVM; MSc, Ph.D.

Board of Trustees

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Dean of Faculty of Medical Technology

Abdurrazag Emhimmed Urayet, Ph.D.

Member of the University Board, Member of Medical Laboratory Sciences Department
vice **Dean of Faculty of Medical Technology**

Professor Jamal M. El Khoga, DVM; MSc, Ph.D.

Member of Faculty Board, Member of Medical Laboratory Sciences Department
Head of Dept. of Medical Laboratory Sciences.

The undergraduate Handbook guides you to obtaining a Bachelor of Science degree at the University of Tripoli.

Read the Handbook, which is the definitive authority on all courses and programs at the Dept. of Medical Laboratory Science.

Don't hesitate to ask for advice!
Neither the Handbook is a substitute for speaking with an academic adviser advisor.

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CONTENTS

Message From the Committee that prepared this handbook.

We performed this humble work to provide our prospective students with the information required to make their decisions; However, we dedicate it to our department, faculty, and university. We hope all the best to all our students and colleagues.

Message From the Dean of the Faculty of Medical Technology

I am very proud to offer a practical, experience-based education in the field of medical sciences and technologies, which has been the mission of our college since its inception.Undergraduate studies programs are a curriculum for our students to become leaders with the moral sense and intellectual intensity needed to meet the challenges of the future, and our programs are an ideal opportunity for our students to implement their education.

Our goal is that the knowledge and research contributions of our faculty members continue to bring about continuous development, which has a positive impact on the College of Medical Technology and the Department of Medical Laboratory Sciences in particular and on the University of Tripoli in general.

With this message, I would like to conclude by wishing each and every one of our students, alumni and future students a successful and fruitful experience together.

Prof. Aisha Gashout, MSc, Ph.D.

Member of the University Board, Member of Medical Laboratory Sciences Department

Dean of Faculty of Medical Technology

Message From the Head of Medical Laboratory Science Department

The Department of Medical Laboratory Sciences is one of the scientific departments of the Faculty of Medical Technology; It was established to serve the healthcare sector and contribute to meeting the needs of its labor market.

The Department of Medical Laboratory Sciences aims to graduate national cadres who are scientifically trained and qualified to conduct all diagnostic analyzes in the laboratories of biochemistry, microbiology, hematology, blood transfusion, histology and other analyzes analyses to diagnose pathological conditions and/or provide physicians with accurate information on which they can base themselves in order to reach an appropriate decision to diagnose and treat pathological conditions.

Finally, I thank the faculty members and the assistant cadres of teaching assistants, technicians, and research assistants in the department who bear a great responsibility to prepare all means to provide students with accurate information and urge them to exert efforts in acquiring knowledge and laboratory skills and excelling in them in order to gain the trust of the community and the authorities of the healthcare sector.

I sincerely wish you all the best.

Professor Jamal M. El Khoga, DVM; MSc, Ph.D.

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2023

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Faculty of Medical Technology

Board of Trustees

2023

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Professor Jamal M. El Khoga, DVM; MSc, Ph.D.

Member of Faculty Board, Member of Medical Laboratory Sciences Department
Head of Dept. of Medical Laboratory Sciences.

Historical Statement
Faculty of Medical Technology

Department of Medical Laboratories Sciences	(1986 – 2023)
Department of Physiotherapy	(1996 – 2023)
Department of Dental Technology	(1996 – 2023)
Department of Public Health	(2001 – 2023)
Department of Intensive are & Anesthesia	(2001 – 2023)

Mission; Vision and Values (**see the calendar of the Faculty**)
https://uot.edu.ly/medt/

2023

Academic Affairs Committee

Medical Laboratory Sciences (Courses Presentation)

2014/2015

1.	Prof. Abdulhamid Al kout (Immunology & Serology)	leader of the Committee
2.	Prof. Jamal M. El Khoga, DVM, MSc, Ph.D. (Parasitology)	Member
3.	Prof. Altabet A. Altaher (Virology & Mycology)	Member
4.	Assistant Prof. Khaled Elbaruni (Hematology)	Member
5.	Omer A. eljerbi Ph.D, (Clinical Biochemistry)	Member
6.	Khaled A. Elmosrati MSc, (Biochemistry)	Member

Faculty & Department Affairs Committee (Syllabus Presentation)

June 2023

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Jamal M. El Khoga, Ph.D.	Organizer	(Parasitology)
Aisha A. Gashout, Ph.D.	Member	(Medical Parasitology)
Masaoud A. Elyousfi, Ph.D.	Member	(Microbiology)
Altabet A. Altaher, Ph.D.	Member	(Virology & Mycology)
Abdulhamid Al kout, Ph.D.	Member	(Immunology & Serology)
Abdulbaset abustta, Ph.D.	Member	(Immunology & Serology)
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Quality committees:-		
Mariam A. Elahjal, MSc	Member	

Study Plan for the B.Sc. Degree In Medical Laboratory Sciences
(B.Sc. MLS)

Medical Laboratory Sciences

Purpose of the MLS Student Handbook:

The MLS Student Handbook provides information about program requirements, policies, and procedures that specifically apply to students in the Medical Laboratory Science (MLS) program; as all students must be familiar with and follow all rules and regulations of the MLS department. The policies, procedures, and program requirements outlined in this handbook are in effect as of spring 2022-2023. Make sure to keep a copy of this Handbook for future reference.

Introducing the program of the Department of Medical Laboratory Sciences.

1. Program Name: **Bachelor of Medical Laboratory Sciences.**
2. The Educational Institution: **University of Tripoli.**
3. Faculty that the Program belongs to: **Faculty of Medical Technology.**
4. Academic Qualification Granted by the Program: **Bachelor's Degree.**
5. Total Credit Hours for Completing the Program:**184 Hours, Divided Into 8 Semesters.**
6. The Language of Instruction: **English.**
7. Program Administration: **Medical Laboratory Sciences Department Council.**
8. External References: **Scientific Departments of Several Faculties**.
9. Date Of Granting Permission to Practice: 2016-2017.
10. The Authority that Granted Permission to Practice: **University of Tripoli.**
11. Actual Date for starting to Practice: **2016-2017**.

The importance of the program. Brief about the program:

Medical laboratory is considered to be one of the most important medical specializations that students compete to enroll in at various universities locally and globally. Given the rapid progress in medical sciences and the tremendous development in biomedical Sciences, biotechnology, genetic engineering, and other advanced therapeutic techniques, which increases the demand for graduates of this specialization. Universities have to build their study plans and provide some programs and courses that support this qualitative shift in the area of applied medical sciences in order to keep up with this tremendous development. From this perspective, the Faculty of Medical Technology focused on developing the study plan for the program leading to a bachelor's degree in medical laboratories, considering the all advances that this field is witnessing over all the world.

Program Goals:

1. Preparing highly qualified specialists that meet the needs of the labor market in the field of medical laboratories.
2. Qualify the student with scientific and practical skills to work on diagnostic equipment and devices, and ensure quality in laboratories, in line with scientific progress in the specialty.
3. Encourage and support students to carry out research and actively participate in training programs in the field of specialization.
4. Motivate students to participate in developing community health awareness about infectious and endemic diseases.
5. Qualify students to join postgraduate programs related to the specialization.

Program vision:

the vision of the Bachelor of Medical Laboratory Sciences program is to become a pioneer in education and training in the field of medical laboratory sciences and scientific research, and to compete with similar ones in local and regional universities.

Program message:

Graduating scientifically, practically and, ethically qualified cadres in the field of medical laboratory sciences, who possess knowledge, concepts and, skills by providing an academic environment that stimulates creativity in the fields of applied medical scientific research.

By the end of the medical laboratory program, the graduate will be able to:

1. Identifying the chemical composition of important vital compounds in the body, methods of estimating them, and their role in diagnosing various diseases.
2. Knowledge of blood components, diseases and, malignant tumors that affect blood cells and lead to dysfunction of blood cells and its components.
3. Familiarity with the methods of various chemical analyzes and their conduct.
4. Familiarity with the practical applications of methods for preparing tissue samples and sections for microscopic examination.
5. Identify the cell organelles and cellular processes necessary for life, the genetic composition of RNA and, DNA, and its mechanism of action.
6. Knowledge of bacterial cell structure, reproduction and, growth in bacteria, bacterial inheritance, and physical properties required for bacterial growth, bacteria-host relationship and bacterial diseases.
7. Knowledge of the composition of viruses, methods of viral infection, and, diagnosis of viral diseases using modern techniques and methods of combating them.
8. Familiarity with the composition of fungi, their methods of reproduction and growth, methods of infection and, the diseases they cause.
9. Familiarity with parasites, their types, methods of infection, diseases that result from them, their diagnosis, and methods of treatment and prevention.
10. Identifying the chemical composition of important vital compounds in the body, methods of estimating them, and their role in diagnosing various diseases.
11. Knowledge of blood components, diseases, and, malignant tumors that affect blood cells and lead to dysfunction of blood cells and its components.
12. Familiarity with the methods of various chemical analyzes and, their conduct.

What jobs are the graduate expected to work in after completing this program?

Graduates of the BS-MLS program will be prepared to work in clinical laboratories, hospitals, Clinics, blood banks; fertility centers, pharmaceutical and biotechnology companies, Biotechnology factories, healthcare sector authorities, and related regulatory bodies. They will also be qualified to work in teaching and/training programs and may also qualify for entry into a variety of graduate degree programs.

Who is this program intended for?

Students interested in the MLS program can be high school or associate degree graduates interested in entering a service profession that is health related. These students should have a strong science background and an interest in laboratory work.

Admission system.

- Based on the student's desire, so that the student chooses three majors in which he sees himself.
- The student's overall grade point average and his success in a few fundamental courses related to the required specialty.
- The ability to absorb the program by students according to the available capabilities.
- Placement of the student based on the needs of the labor market.

The plan follows the semester system and is as following:

- The approved language of instruction for all classes is English.
- The general stage, which is represented in the preparatory year (first and second semesters), which is common to the different departments of the college.
- The classes, starting from the third semester, constitute the specialization stage (6 semesters), consisting of 106 units - 182 hours.
- A training period (internship) of 3 months.

Program graduation requirements

Passing the theoretical and practical courses of the program (134 credit hours), with a passing score of 60/100.

To obtain a general average as a minimum acceptable and a percentage of not less than 60%.

Performing graduation research project under supervision of the scientific committee of the department represented by one or two faculty members.

Passing the requirements of the 3-month internship in one of the accredited health institutions.

Program components: the number of weekly hours and courses.

Practical Applied Training "Clinical Training":

Clinical training is the main pillar on which the College of Medical Technology relies in the educational process. It aims to provide students with technical skills and qualify them in the medical aspects according to their specialization.

General goals of clinical training:

1. Provide the opportunity to hone knowledge, and gain skills and experience.
2. Provide information and data related to work and linking theoretical scientific knowledge with practical application in different work sites.
3. Bringing about positive changes in behavior and attitudes in student-work relations and employees.
4. Preparing scientifically and practically qualified technical teams to carry out job tasks efficiently and effectively.
5. Developing the student's professional and functional sense of belonging and working within an integrated health team.
6. Meet the labor market needs of trained national competencies.

Clinical training is divided into:

First: practical training

It is implemented in the laboratories of the college and aims to provide students with basic skills in the field of specialization before and during their enrollment in field training.

Second: field training (optional)

It is implemented in various health facilities such as hospitals, health centers and dispensaries, and aims to give the student full opportunities for actual practice to guarantee his mastery of all specialized skills.

Third: Intensive training (internship)

After the student successfully completes the academic studies in the college, he joins the intensive training (internship) program for a period of 3 months in the various health facilities and departments of the student's specialty so that he exercises the actual work tasks specified in the graduate's job description under joint supervision. Between the college and the officials in the training places. The intensive training aims to help the student improve his performance, develop his skills, raise his abilities, and increase his knowledge.

Grading Policy

Grading in the MLS program is defined by the following areas:

- Cognitive: includes written or computerized tests, quizzes, checklists, worksheets,
- Presentations and/or reports used to assess the student's knowledge of the subject area.
- Psychomotor: includes technical skills judged by performance on a combination of practical exercises and exams, image exams, the completion of procedures, checklists, worksheets, or other assignments.
- Affective: includes evaluation of behaviors like attendance and participation.

The assessment method:

The year/semester	Evaluation method /ratio
For all classes	Two mid-term exams, the first and the second / a test in the practical part / a final exam
	first midterm exam 15 marks
	Second midterm exam 15 marks
	Final practical exam 20 marks
	A final exam of 50 marks
For all classes	Materials that do not have the practical notch
	Two mid-term exams, the first and the second,30 marks
	A final exam of 70marks

Program intended learning outcomes

➢ Professional and practical skills:

- Maintain confidentiality and integrity, ability to make decisions, prioritize tasks, and work on multiple tasks simultaneously.
- Harmony and participation in dealing and communicating with the work team and management, either orally or in writing.
- Apply acquired skills and knowledge to new situations.
- Deal with potential mechanical, electrical, biologic, chemical, and radiologic risks.
- Keep personal hygiene and neatness in line with the professional workplace.
- Achieve consistency and reliability, as well as punctual attendance at work.
- The ability to write, analyze and diagnose data and the associated conclusions.
- Dealing with computers and converting diagnostic data into research papers, questionnaires and workshops to benefit everyone.
- Dealing with analysis devices of various types and how to compare them, harnessing them for the benefit of society, and contributing to their introduction and security in various health facilities.
- The student acquires high skills in diagnosing diseases and analyzing results.

Communication skills:

- Communicate effectively and efficiently with coworkers and members of the healthcare team.
- Read and comprehend written material.
- Record information accurately and clearly.

Technical skills:

- Perform fine repetitive motions such as pipetting.
- verify proficiency to handle dangerous chemicals, electrical equipment, and flammable and infectious materials.
- Demonstrate competence in all areas of the clinical lab.
- Work in areas with distracting noises, unpleasant odors, and in close proximity to fellow workers.
- Practice precise manipulations of clinical specimens, tools, devices, and clinical laboratory equipment.
- Adhere to standard precautions and meet safety standards applicable to the clinical laboratory
- Accurately identify, describe, and record fine details of clinical specimens both macroscopically and microscopically.
- Independently perform all diagnostic procedures and venipuncture safely and accurately, and report results accurately and timely in the clinical lab.
- Understand and comprehend printouts and instrument panels.

COURSE SPECIFICATION

COURSE PLAN

Courses Requirements:

University Requirements. **(UR)**
Faculty Requirements. **(FR)**
Department Requirements. **(DR)**

Courses Requirements	Compulsory (C)		Total Elective	Total
University requirements (UR)	28		-	28
Faculty Requirements (FR)	26		-	26
Department Requirements (DR)	70			70
Elective (EL)	10		10	10
Total Credite	134			134

Study Plan for the first year (General courses)

Premedical Year(1th year)

The program is designed to satisfy the mission of the University; faculty and the Department of Medical Laboratory Sciences.

A students undertaking this program should complete a total 28 credit / hours distributed as following:

- **Duration:** 2 semesters
- **University:** Tripoli University
- **Faculty:** Medical Technology

Courses Requirements	**Compulsory (C)**	**Elective**	**Total**
University requirements (UR)	28	-	28
Faculty Requirements (FR)	-	-	-
Department Requirements (DR)	-	-	-
Total	28	-	28

CURRICULUM STRUCTURE

University requirements (UR)

Fall semester (1th&)Spring Semester(2th)

No.	Code No.	Course Title	Credits/hrs	Prerequisite
1	AL141	Arabic languages	4	-
2	MP243	Medical Physics	4	-
3	CH152	General Chemistry	5	-
4	BI153	Biology	5	-
5	BS241	Biostatistics	4	-
6	EN 242	English Language	4	-
7	IT 224	Information Technology	2	
	Total Credits/hrs		28	

Study Plan for the B. Sc. Degree
Course Specifications
(Medical Laboratory Sciences (MLS))

GOALS

Medical Laboratory Sciences (MLS) are one of the important areas in Health Sciences, which supports the clinicians by providing laboratory test evidence in the treatment of patients. The goal of this curriculum is to produce clinical laboratory experts who are academically sound, technically skilled and fully capable of performing various clinical laboratory tests with quality control as well as interpretation of the results. Department of Medical Laboratory sciences is aiming to produce highly qualified graduates and subsequently to promote research excellence in a free and academic environment. Also has the goal to make students valuable contribution to medical treatment and people's health.

OBJECTIVES

The courses for MLS program have been designed to achieve the following objectives:

☐ Provide adequate educational background for careers in Medical Laboratory Science profession

☐ Study and support the existing Medical Laboratory Science practices in the private and public institutions through continuing education and training programs

☐ Assist Medical Laboratory Science and related organizations in solving their problems by providing consulting services.

Medical Laboratory Science in the Faculty of Medical Technology at the University of Tripoli offers a four-year professional degree program. Students acquire general certification from the Medical Laboratories Sciences (MLS).

Degree Title:

BSc. In Medical Laboratory Sciences (MLS)

Program Structure

The program is designed to satisfy the mission of the Faculty of Medical Technology and Medical Laboratory Sciences Dept. A students undertaking this program should complete a total 106 credit / hours and distributed as following:

- **Duration:** 6 semesters
- **University:** Tripoli University
- **Faculty:** Medical Technology
- **Department:** Medical Laboratories Sciences. (MLS)
-

Courses Requirements	Compulsory (C)	Elective	Total
University requirements (UR)	-	-	28
Faculty Requirements (FR)	26	-	26
Department Requirements (DR)	70	-	70
Elective (EL)	**10**	**10**	10
Total	106		134

Faculty and Department Requirements

The University of Tripoli has chosen a special coding system to identify the faculty of the university. The coding number of the faculty of Medical Technology is given the code (73).

Coding of Departments:

The Faculty of Medical Technology has chosen code number (01) for the Medical Laboratory Sciences bases on the first department established (1985 – 2016)

Course Numbering System

Each course consists of 7 digits that grouped in 5 field as follows:

Faculty Code	M	14
Department Code	L	1
Semester	3 - 8	
Course Level	Numbers (31 – 36 (+/-)	

Example:

Syllabus Structure :- ML433 Histopathology (2-2:3)

Definition of course code

Abbreviation of the Faculty	Department	Semester	Serial no. of courses
M	L	4	33

Symbolization of Credit Hours

About (x-x:x) . The first digit stands for the theoretical component of the course; the second , for the practical or lab part and the third, for the total credit hours. e.g.

Example:

Syllabus Structure :- ML433 Histopathology I. (2-2:3)

(Specialized Courses)

Department Requirements (DR)

No.	Code No.	Course Title	Hrs/ week Theoretical	Hrs/ week Practical	Total Credits	Prerequisite
1	ML432	Histopathology I	2	2	3	HS335
2	ML435	Molecular Biology	2	2	3	BC323 & BI153
3	ML531	Clinical Biochemistry I	2	2	3	BC433
4	ML532	General Hematology	2	2	3	PS336
5	ML533	Histopathology II	2	2	3	ML432
6	ML534	Immunology & Serology I	2	2	3	MB334
7	ML535	Medical Microbiology	2	2	3	MB334
8	ML536	Medical Parasitology I	2	2	3	MB334
9	ML631	Clinical Biochemistry II	2	2	3	ML531
10	ML632	Diagnostic Hematology	2	2	3	ML532
11	ML633	Immunology & Serology II	2	2	3	ML534
12	ML634	Medical Bacteriology	2	2	3	ML535
13	ML635	Medical Parasitology II	2	2	3	ML536
14	ML636	Medical Virology & Mycology	2	2	3	ML532
15	ML731	Blood Bank	2	2	3	ML633
16	ML732	Diagnostic Biochemistry	2	2	3	ML631
17	ML733	Diagnostic Medicaid Microbiology	2	2	3	ML634 & ML636
18	ML734	Diagnostic Molecular Biolog	2	2	3	ML434
	ML431	Analytical Chemistry II	2	2	3	ML331
Clinical training						
19	ML841	Clinical biochemistryPractice	/	10	4	ML732
20	ML842	Clinical Immunohematology Practice	/	10	4	ML731
21	ML843	Clinical hematologyPractice	/	10	4	ML632
22	ML844	Clinical Microbiology Practice	/	10	4	ML733
23	ML835	Student Project	/	/	FR (3)	Senior
Total Credits/hrs			38	78	73	
			hrs/week:	hrs/week:		

(Elective Courses)(EL)

No.	Code No.	Course Title	Hrs/ week Theoretical	Hrs/ week Practical	Total Credits	Prerequisite
1	EL436	Safety & Lab Management	2	2	3	/
2	EL434	Medical Lab. Instrumentation	2	2	3	MP243
3	EL726	Skills, presentations and research	2	-	2	SENIOR
4	EL725	Infection Control	2	-	2	SENIOR
Total Credits/hrs			8	4	10	

(Supportive Courses)(FR)

No.	Code No.	Course Title	Hrs/ week Theoretical	Hrs/ week Practical	Total Credits	Prerequisite
1	BC323	Biochemistry I	2	-	2	CH152
2	MB334	General Microbiology	2	2	3	BI153
3	AN332	Anatomy BI153	2	2	3	BI153
4	PS336	Physiology	2	2	3	BI153
5	HS335	Histology	2	2	3	CH153
6	ML331	Analytical Chemistry I	2	2	3	CH152
7	BC433	Biochemistry II	2	2	3	BC323
Total Credits/hrs			14	12	23/+3	

Teaching and learning methods:

- Study lectures for each course.
- Different practical lessons for each course.
- Field visits and submission of research and research papers within the course.
- General or specific exercises and assignments for each course.
- Methods of self-education, whether inside the library as well as the electronic libraries of the program or the university.

Department Affairs Committee(Teaching and learning resources) - 2023

Department members are responsible for implementing the program, including teaching, scientific research, and other services related to the program.

Affairs Committee (Teaching and learning resources) - 2023

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Library:
The Library opens its doors to students and faculty members daily from 9 am to 2 pm, some books and scientific reference are available.

Laboratories:
The department contains six laboratories that have some operating materials.
A warehouse is available to store materials.
Some teaching aids are available to display the teaching materials.

CURRICULUM STRUCTURE

Second Year (Sophomore)

Fall Semester (3rd)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
BC323	Biochemistry I.	FR	2	CH152	-
BCL323	Biochemistry I. Lab.				BC323
MB334	General Microbiology	FR	3	BI153	-
MBL334	General Microbiology Lab.				MB334
HS335	Histology	FR	3	BI153	-
HSL335	histology Lab.				HS335
ML331	Analytical Chemistry I.	DR	3	CH152	-
MLL331	Analytical Chemistry I. Lab.				ML331
PS336	Physiology	FR	3	BI153	-
PSL336	PhysiologyLab.			-	PS336
AN332	Anatomy	FR	3	BI153	-
ANL332	Anatomy Lab.				AN332
Total Credits/hrs			17		

Second Year (Sophomore)

*Spring semester (4th)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
BC433	Biochemistry II.	FR	3	BC323	-
BCL433	Biochemistry II. Lab.				BC433
EL436	Safety & Lab Management	EL	3	-	-
ELL436	Safety & Lab Management Lab.				EL436
EL434	Medical Lab. Instrumentation	EL	3	MP243	-
ELL434	Medical Lab. Instrumentation				EL434
ML431	Analytical Chemistry II.	DR	3	ML331	-
MLL431	Analytical Chemistry II. Lab.				ML431
ML435	Molecular Biology	DR	3	BC323 & BI153	-
MLL435	Molecular Biology Lab.				ML435
ML432	Histopathology I.	DR	3	HS335	-
MLL432	Histopathology I. Lab.				ML432
Total Credits/hrs			18		

Third Year (Junior)

Fall Semester (5th)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
ML531	Clinical Biochemistry I.	DR	3	BC433	-
MLL531	Clinical Biochemistry I. Lab.				ML531
ML535	Clinical Microbiology	DR	3	MB334	-
MLL535	Clinical Microbiology Lab.				ML535
ML534	Immunology & Serology I.	DR	3	MB334	-
MLL534	Immunology & Serology I. Lab.				ML534
ML532	General Hematology	DR	3	PS336	-
MLL532	General Hematology Lab.				ML532
ML536	Medical Parasitology I.	DR	3	MB334	-
MLL536	Medical Parasitology I. Lab.				ML536
ML533	Histopathology II.	DR	3	ML432	-
MLL533	Histopathology II. Lab.				ML533
Total Credits/hrs			18		

Third Year (Junior)

Spring Semester(6th)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
ML631	Clinical Biochemistry II.	DR	3	ML531	-
MLL631	Clinical Biochemistry II. Lab.				ML631
ML634	Clinical Bacteriology	DR	3	ML535	-
MLL634	Clinical Bacteriology Lab.				ML634
ML633	Immunology and serology II.	DR	3	ML534	-
MLL633	Immunology and serology II. Lab.				ML633
ML632	Diagnostic Hematology	DR	3	ML532	-
MLL632	Diagnostic Hematology Lab.				ML632
ML635	Medical Parasitology II.	DR	3	ML536	-
MLL635	Medical Parasitology II. Lab.				ML635
ML636	Clinical Virology & Mycology	DR	3	ML535	-
MLL636	Clinical Virology & Mycology Lab				ML636
Total Credits/hrs			18		

Fourth Year (Senior)

Fall Semester (7th)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
ML732	Diagnostic clinical chemistry	DR	3	ML631	-
MLL732	Diagnostic clinical chemistry lab				ML732
ML733	Diagnostic Medical Microbiology	DR	3	ML634& ML636	-
MLL733	Diagnostic Medical Microbiology lab				ML733
ML731	Immunohematology	DR	3	ML633	-
MLL731	Immunohematology lab				ML731
ML734	Diagnostic Molecular biology	DR	3	ML434	-
MLL734	Diagnostic Molecular biology lab				ML734
EL725	Infection control	EL	2	Senior	
EL726	Skills, presentations and research	EL	2	Senior	
Total Credits/hrs			16		

Fourth Year (Senior)

✱Spring Semester (8th) Clinical Practice

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
ML841	Clinical biochemistry practice	DR	4	ML732	-
ML842	Clinical immunohematology practice	DR	4	ML731	-
ML843	Clinical hematology practice	DR	4	ML632	-
ML844	Clinical microbiology practice	DR	4	ML733	-
ML835	Student Project		3	Senior	-
Total Credits/hrs			19		

II. Syllabus in Semester System

Bachelor Degree In Medical Laboratory Sciences

(B.Sc. MLS)

2022 - 2023

(B.Sc. MLS)

Second Year

Second Year (Sophomore)Fall Semester (3rd)

*Fall Semester(3rd)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
BC323	Biochemistry I.	FR	2	CH152	-
BCL323	Biochemistry I. Lab.				BC323
MB334	General Microbiology	FR	3	BI153	-
MBL334	General Microbiology Lab.				MB334
HS335	Histology	FR	3	BI153	-
HSL335	histology Lab.				HS335
ML331	Analytical Chemistry I.	DR	3	CH152	-
MLL331	Analytical Chemistry I. Lab.				ML331
PS336	Physiology	FR	3	BI153	-
PSL336	PhysiologyLab.			-	PS336
AN332	Anatomy	FR	3	BI153	-
ANL332	Anatomy Lab.				AN332
Total Credits/hrs			17		

Syllabus Description :-

Course Number:	BC323Biochemistry I. BCL323 Biochemistry I. Lab.	(2:2-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Khaled A. El mosrati, MSc, (Biochemistry) Tel.: 00218944621320
(Email:almsrati_khaled@hotmail.com). Lecturer, Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Biochemistry (I)	CH152	None	**Theoretical:** 2hrs.
Biochemistry (I) lab.	CH152	BC323	**Practical:** 2 hr.
Semester: 3rd	**Duration:** 16 Weeks		**Credit Hours:** 2

Course Main Aims: By the end of this course the student should be able to:

- Define nucleic acids and their chemical structure and know what the genetic codon is, and how proteins are synthesized.
- Understand the chemical structure of amino acids, their polymers (the proteins); and the essential knowledge about protein structure & function.
- Know the main biologically significant saccharides, and their properties, as well as brief summaries about their roles in living systems.

Be prepared to understand the future related subjects such as clinical chemistry, diagnostic chemistry, molecular biology and genetics.

Reference Book

Recommended books for theoretical

1. Harper's textbook of Biochemistry
2. Principles of Biochemistry by Lehninger (ISBN 1-57259-931-6)
3. Dr. Vasudevan
4. General, Organic & Biochemistry. Bettelheim & March (ISBN 0-03-020217-5)

Recommended books for practical's

1. Practicals Biochemistry – Plummer
2. Practical Biochemistry – Haroid Varley
3. Tools in Biochemistry – Cooper
4. Lynchs Medical Lab Technology – Stanley S. Raphael

Teaching Learning Activities:

The course content in Biochemistry I. will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Demonstrations
5. Seminars
6. Assignments

Syllabus Structure:-

Prepared By: -Khaled A. El mosrati, MSc, (Biochemistry) Tel.: 00218944621320
Reviewed By: -Prof. Mohamed A. Fadel, PhD, (Organic Chemistry), Tel:- 02182181493

Syllabus Structure: -BC323/BCL323 Biochemistry I. (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1, 2	**Introduction to Science of Biochemistry**. The Nucleic Acids. Chemical Structure of DNA and RNA. Double Helical Structure of DNA. Principles Characterize Living Cells. Biological Information Transfer. Protein Synthesis as an integrated function of DNA & RNA.	**Qualitative Detection of Proteins** in Clinical specimens. Quantitative Detection of Proteins in Clinical specimens.
3, 4	**Amino Acids & Proteins. Amino Acids** 'Structure, Properties, Classification. Biosynthesis of Amino Acids, Stereochemistry, Biochemistry of Peptide Bonds and Proteins Biosynthesis. Protein Structure & Function. Orders of Protein Structure. Denaturation.	**Methods of protein Separation and Purification.** - *Chromatography.*
5	**Classification of Proteins** According to Physical and Chemical Properties. Regulation of protein functions. Examples from the Medical Approach: Hemoglobin and Collagen.	- *Protein Electrophoresis.*
6, 7	**The Carbohydrates**. General Properties of Carbohydrates. Classification and Nomenclature. General Functions of Carbohydrates in the Living Systems. Biosynthesis of Carbohydrates. Photosynthesis as the Major and Main Source. Classification of Carbohydrates.	**Quantitative Detection of Carbohydrates**. - *Using reduction property.*
8	*Midterm Exam I.	
9, 10	**Monosaccharides**; Structure and Classification, Physical Properties. The Isomerism in Saccharides. Optical Rotation. Fischer Projections. Chemical Properties; Cyclic Oxidation, Glycoside Formation, Reactions of Carbonyl and Acetyl Groups.	**Differentiation between reducing and non-reducing sugars.**
11, 12	**Monosacchrides** as a Source of Energy in Living Systems. Examples of Monosaccharides from the Medical Approach. D-Glyceraldehyde, D-Ribose, Glucose, Fructose, Galactose. Derivatives of Monosaccharides; Deoxysugars. Sorbitol. Uronic Acid.	**Introduction to methods of determination of protein sequencing.**
13, 14	**Reducing Sugars. Aminosugars. Glycocylation** as a Post Translation Modification in Cellular Systems. Disaccharides. Examples of Biologically Significant Disaccharides; Maltose, Lactose, and Sucrose.	**Detection of starch.**
15	**Oligosaccharides and Polysaccharides**. Roles of Polysaccharides. Starch, Glycogen, Cellulose, Polysaccharides. Acidic Polysaccharides, significant examples: Hyluronic Acid, Hiparin.	
16	*Midterm Exam II.	

Syllabus Description :-

Course Number:	**MB334General Microbiology** **MBL334 General Microbiology Lab**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS),Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,
Prof Masaoud A. Elyousfi, PhD, (Microbiology) Tel.:- 00218925171560
(Email:masoud.elyousfi@yahoo.com), Department of MLS.
Hamida Sadk EL. Magrahi MSc, (General Microbiology) Tel.:- 00218925825096
(Email:Hamidasadkali@gmail.com). Lecturer, Department of MLS.

Program: **(MLS)**

Course:	**Prerequisite**	***Co requisite***	
General Microbiology	BI153	None	**Theoretical:** 2hrs.
General Microbiology Lab.	BI153	MB334	**Practical:** 2 hr.
Semester: 3rd	**Duration:** 16 Weeks		**Credit Hours**: **3**

Course Main Aims: This course introduces students to basics of general microbiology. This course consists of both lecture and laboratory (principles, and techniques, including microscopy, culturing, staining, and sterile techniques.).

Reference Book

Required Text:-

1. David P. C, David A. S, Michael T. M, John M.M, (2012). Brock, Biology of Microorganisms *14th*Ed.ISBN-13: 978-1292018317.
2. Gerard J. T, Berdell R. F, Christine L. C, (2010). An Introduction Microbiology, *10th* Ed. ISBN: 978-032150071.
3. Murray P.R, Rosenthal K. S, and Pfaller M. A. (2013). Medical Microbiology, *7th Ed*, (2013). ISBN: 978-08692-9.

Additional recommended textbooks:-

1. Tortora, Funke, Case: Microbiology – An Introduction; Pearson (Benjamin Cummings *12th* Ed. ISBN: 978-0133905557.
2. Joanne W, Linda S, Chris W, (2007). Prescott/Harley/Klein's Microbiology, 7*th Ed* ISBN: 0072992913 | 1088 pages | PDF | 79 MB.
3. Laboratory Manual: Hoeksema. J, Kendall H, (2012). Laboratory Manual for Microbiology Publishing Company, *2ndEd*. ISBN: 978-1-4652-1321-1.

Teaching Learning Activities:-

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Demonstrations
5. Seminars
6. Assignments

Syllabus Structure:-

Prepared By: -Prof. Masaoud A. Elyousfi, PhD (Microbiology), Tel:- 00218925171560

Reviewed By: -Hamida Sadk EL. Magrahi MSc, (GeneralMicrobiology) Tel.: 00218925825096

Syllabus Structure:- MB334/MBL334General Microbiology (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1+2	**The Diversity of Microorganisms:-** General differences among Bacteria, Fungi, Algae Protozoa, and Viruses. **Microbial Metabolism:-** Historical perspective of enzymes. Structure of enzymes. Naming and classification of enzymes. Mechanism of enzyme action. Factors affecting enzyme action. Enzyme inhibition and enzyme regulation.	**Introduction to the microbiology laboratory:-** **.** Safety Rules and Aseptic Techniques . Hand wash, and hand antiseptic. **Sterilization and Disinfection** **.** Methods of sterilization. . Methods of disinfection.
3+4	**Microbial Metabolism: Continue:** Oxidation-Reduction, Free energy change, High energy transfer compounds, Fermentation and Anaerobic processes in energy production, Phosphate Pathway and Enter-Dandruff Pathway.	**Microscope and Laboratory Instruments:** - Use and care of light microscope, Preparation of specimen for microscopic observation. Autoclave, Hot air oven, Incubator, and Anaerobic jar.etc
5	**Microbial Metabolism: Continue:** Aerobic processes in energy production**:-**Krebs cycle, Electron Transport Chain a. Utilization ofenergy in Bacterial motility an Transport of nutrients.	**Preparation and staining of specimens for light microscopy**: - . Smear preparation. . Dyes and simple staining. **Differential stain:-**Gram stain. – etc Acid Fast Stain.
6+7	**Microbial Genetics:-** Review of the DNA molecule. Structure DNA, Replication of DNA - RNA and protein synthesis, Replication of DNA in Eukaryotic and Prokaryotic. **Mutations:-**Typesof mutation. Mutagens and frequency.	**Structural stains (Special stains):-** . Endospore stain. . Capsule stain. . Negative stain. **Motility of Bacteria:-** Hanging drop method. . Inoculation of semisolid media with M.O . Inoculation of solid media with M.O
8	***Midterm Exam I.**	***Midterm Exam I.**
9+10 .	**Genetic transfer and recombination** :- . Transformation, Conjugation, Transduction , Plasmids and Transposes	**Culture Media, and isolation of pure culture:-** Liquid media.Semisolid Media. Solid media, Enriched media, Defined media.of bacteria.Cultivation of fungi, and Cultivation of viruses.
11	**Microbial mechanisms of pathogenicity: -**Infection and disease, Normal flora, and Opportunistic, Host/ parasite relationships. Patterns of diseases. Pathogen. Virulence, and virulence factors, Toxigenicity – Exotoxins, and endotoxins	**Biochemical tests:**Citrate Test, MR-VP Test, Indole Test. API System.
12	**Nosocomial infection:-** Definition Microorganisms in Hospital. Compromised Host. Chains of Transmission, Control of Nosocomial infection. Antibiotics, chemotherapeutics, Vaccines, and immunotherapy.	**Cellular Enzymes:**Coagulase Test, Catalase Test, Oxidase Test, Hemolysins Test.
13	**Mechanisms of Viral Pathogenesis**:- The mechanisms by which viruses evade the host's immune system. Envier. Factors and virus properties that enhance the emergence of "new" viruses.	**Cellular Enzymes:** Continue: Urease Test, Nitrate reductio and Gelatin Liquefaction test.
14.	**Mechanisms of Fungal Pathogenesis**	**Antibiotic Susceptibility tests:-** . Disk diffusion methods (Kirby-Bauer Test). = Broth dilution test. . Minimal inhibitory concentration. (MIC) . Minimal bactericidal concentration. (MBC).
15	**Mechanisms of Parasitic Pathogenesis**.	**Antibiotic Susceptibility tests: Continue**
16	***Midterm Exam II.**	

Syllabus Description :-

***Course Number:**	**AN332 Anatomy** **ANl332 Anatomy Lab**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS),Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
AN332 Anatomy	BI153	None	**Theoretical:** 2hrs.
ANl332 Anatomy Lab	BI153	AN332	**Practical:** 2 hr.
Semester: 3rd	**Duration:** 16 Weeks		**Credit Hours**: **3**

Course Main Aims: Detailed examination of the human body, organized by organ system (Integumentary, Skeletal, Muscular, Nervous, Cardiovascular, Lymphatic/Immune, Respiratory, Digestive, Urinary, and Reproductive (including Development). Primary emphasis on gross anatomy supported by animal dissections (including repeated use of preserved cats) and 3D models, with additional emphasis on cell-and tissue-level anatomy supported by microscope slides and histology images. For allied health professional majors**.**

Reference Book

- Textbook: *Human Anatomy* (9th edition/2018) by Martini, Tallitsch, and Nath; published by Pearson.

4. Demonstrations
5. Seminars
6. Assignments

Teaching Learning Activities:-

1. Interactive Lectures
2. Group Discussions
3. Practical

Syllabus Structure:-

Prepared By: - Department

Reviewed By: - Department

Syllabus Structure:- AN332 /ANL332Anatomy(2:2-3)

	Theoretical Content	**Practical Content**
Week	**General Objective**	
1+2	Orientation. Organ Systems.	• Describe in detail the gross and microscopic structures of the following human organ systems: Integumentary; Skeletal; Muscular; Central, Peripheral and Autonomic Nervous; Cardiovascular; Lymphatic/Immune; Respiratory; Digestive; Urinary; and Reproductive (including Development). • 2. Carry out detailed dissections of animal specimens. *Syllabus for Biology 231 (Crowther) Spring 2020* • 3. Use a microscope to observe cells and tissues. • 4. Apply knowledge of anatomy to clinical contexts. • 5. Use evidence-based learning techniques and technologies to explore core concepts in the biological sciences.
3+4	Cells, Tissues, Integument, Bones, Skeleton	
5	Articulations, Skeletal Muscle Axial Skeleton, Appendicular Skeleton.	
6+7	(Axial & Appendicular Muscles (Skeletal Muscles)	
8	*Midterm Exam I.	
9+10.	Brain & Cranial Nervous Tissue (Autonomic Ns) (Spinal Cord & Nerves)	
11	Blood Vessels. Surface. Lymphatic.	
12	Respiratory System. Digestive System	
13	Urinary System. Reproductive System	
14.	Review	
15	Review	
16	***Midterm Exam II.**	

Syllabus Description :-

***Course Number:**	**PS336 Physiology** **PSL336 Physiology Lab**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS),Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Program: **(MLS)**

Course:	**Prerequisite**	***Co requisite***	
PS336 Physiology	BI153	None	**Theoretical:** 2hrs.
PSL336Lab Physiology Lab	BI153	PS336	**Practical:** 2 hr.
Semester: 3rd	**Duration:** 16 Weeks		**Credit Hours**: **3**

Course Main Aims:

This is course covers the fundamental concepts and principles of human physiology. Physiology of the entire human body will be covered in these 3 credits, 13 week course. Aside from discussing all organ systems by investigating their functionality at the cellular, tissue and organ levels of organization, the overlying theme of the course will be that of *systems integration*. We will first study how individual organ systems work as stand-alone functional units. As the semester progresses, we will integrate our understanding of these systems so to build a picture of the organism level of organization (i.e., you). It will be assumed that you already possess a solid understanding of the fundamental concepts in biology.

Reference Book

1) Text: Human Physiology, D.U. Silverthorn, 8th ed. (2019)
2) Top Hat subscription ($26 fee) (see the Top Hat Syllabus for details)
3) Wi-Fi device (e.g., laptop, tablet, iPad, iPhone, Droid, etc.) (see the Top Hat Syllabus for details)

Recommended Resources:

1) Wikibooks - Human Physiology online book (https://en.wikibooks.org/wiki/Human_Physiology)
2) Khan Academy - Biology & Physiology lessons and practice (https://www.khanacademy.org/science)

Teaching Learning Activities:-

4. Demonstrations
5. Seminars
6. Assignments
1. Interactive Lectures
2. Group Discussions
3. Practical

Syllabus Structure:-

Prepared By: - Dept. of Medical Laboratories

Syllabus Structure:- PS336/PSL336 Physiology (2:2-3)

	Theoretical Content	**Practical Content**
Week	**General Objective**	
1+2	Introduction to Physiology	
3+4	Molecular Level of Organization	Recommended by lectures
5	Cellular and Tissue Levels of Organization	
6+7	Nervous System (Cells)	
8	***Midterm Exam I.**	
9+10	Nervous System (PNS Afferent)	
11	Muscle Physiology	
12	Cardiovascular System (Heart and Vasculature)	
13	Cardiovascular System (Blood)	
14.	Respiratory Physiology	
15	Endocrine System	

16	***Midterm Exam II.**	

Syllabus Description :-

***Course Number:**	**HS335 Histology** **HSL335 LabHistology**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Program: **(MLS)**

Course:	**Prerequisite**	***Co requisite***	
HS335 Histology	BI153	None	**Theoretical:** 2hrs.
HSL335 Lab Histology	BI153	HS335	**Practical:** 2 hr.
Semester: 3rd	**Duration:** 16 Weeks		**Credit Hours**: **3**

Course Description:
Medical Histology will cover the microscopic structure and function of human cells and tissues that make up the organ systems. The organization of cells and tissues are correlated with diagnostic imaging (e.g., electron microscopy and immunehistochemistry) of normal and pathologic tissues. Clinical exercises will be used to develop "problem solving" and "critical thinking" skills

Reference Book

Textbook
There is no required textbook for this course. Since I do not take any test questions from any textbooks, you can use any good histology textbook

Additional recommended textbooks:-

Some textbook recommendations for reference:
1. Histology: A Text and Atlas – Michael H. Ross PhD and Wojciech Pawlina MD
2. Netter's Essential Histology – William K. Ovalle and Patrick C. Nahirney
3. Junqueira's Basic Histology: Text and Atlas – Anthony Mesche

Teaching Learning Activities:-

4. Demonstrations
5. Seminars
6. Assignments
1. Interactive Lectures
2. Group Discussions
3. Practical

Syllabus Structure:-

Prepared By: - Dept. of Medical Laboratories

Syllabus Structure:- HS335/HS335 Histology(2:2-3)

	Theoretical Content	**Practical Content**
Week	**General Objective**	Lectures and Laboratories
1	Overview of Histology: Cells, Tissues, and Organs	The lectures describe the normal microscopic structure of cells, tissues and organs of the body. Also, the differential characteristics of these structures are considered, and the relationships between structure and function are emphasized. Laboratory exercises are an important aspect of Histology. Students should be able to differentiate the various histological structures from each other and recognize those structural variations that fall within the normal range.
2	Epithelium and Connective Tissue	
3	Integument	
4	Skeletal System	
5	Muscular System	
	*Midterm Exam I.	
6	Nervous System	
7	Special Senses	
8	Endocrine System	
9	Lymphatic System	
10	Respiratory System	
11	Cardiovascular System	
12	Digestive System I	
13	Urinary System	
14	Male Reproductive System	
15	Female Reproductive System	

	*Midterm Exam II.

Syllabus Description :-

Course Number:	**ML331Analytic Chemistry I.** **MLL331 Analytic Chemistry I. Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Abdulsalam.I. Rafida, PhD, (Analytic Chemistry) Tel.: 00218928539653

(Email:Abdulsalam.Rafida@hotmail.com. Lecturer, Department of MLS.

El Hussein. H. Arebi, PhD, (Analytic Chemistry), Tel:- 00218925009095

(Email:elhusseinarebi@gmail.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
ML331 Analytic Chemistry I.	CH152	None	**Theoretical:** 2hrs.
MLL331 Analytic Chemistry I. Lab.	CH152	ML331	**Practical:** 2 hr.
Semester: 3rd	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: The major objective of this course is to provide a rigorous background in those chemical principles that particularly important to analytical chemistry. A second aim is to introduce a wide range of techniques of modern analytical chemistry. A final goal is to teach those Laboratory skills, that will give students confidence in their ability to obtain high quality analytical data.

Reference Book

1. D. A. Skoog, D. M. West, F. J. Holler, and S. R. Crouch: Analytical Chemistry: An Introduction, 7th Edition, Saunders College Publishing, 1999.
2. Gary D. Christian. Analytical Chemistry, John Wily & Son. (ISBN 0-471-09867-10), 1999.
3. قاسم كامل. الكيمياء المعملية، الدار العربية للكتاب، ليبيا وتونس، الطبعة الاولي 1989 م

Teaching Learning Activities

The course content in **Analytic Chemistry** will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Homework
5. Seminars
6. Assignments

Syllabus Structure:-

Prepared and Reviewed By:-

Abdulsalam.I. Rafida, PhD, (Analytic Chemistry)

El Hussein. H. Arebi, PhD, (Analytic Chemistry), Tel:- 00218925009095

Syllabus Structure:- ML331/MLL331 Analytic Chemistry I. (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**An introduction analytical Chemistry:** - Qualitative analysis. - Quantitative analysis. - SI units and prefixes, rules & style conventions. - Mixtures and solutions.	**Introduction (Tour of the Lab):** - Lab safety precautions. - Use of quantitative analytical equipment. - Formation for experimental write-up. - Risk Assessment (generalreagents).
2	**Solution:** Solute - Solvent. **Molecular Weight (m.wt): (Formula Weight).** • Atomic mass Unit (amu). • Mole: mole (mol).	**Solution preparation and dilutions** - Preparation of 0.1 M HCl solution from stock solution. Preparation of 0.1 N HCl solution from stock solution.
3	**Avogadro's Number:** - Calculation of Avogadro's number for one mole. **Concentration:**Molarity (M).	• Preparation of 0.5 M NaOH (solution). • Preparation of 0.5 N NaOH (solution).
4	**Equivalent weight (eq.wt)& Normality (N).**	- **Preparation of 0.05 M and 0.05 N from HCl (dilution solution).** - **Preparation of 0.05 M and 0.05 from NaOH (dilution solution).**
5	**Equivalent weight (eq.wt) & Normality (N).**	- **Preparation of 2% from HCl by Percentage (solution).** - **Preparation of 2% from NaOH by Percentage (Solution).**
6	**Calculating of N, M by Density and Specific Gravity.**	**Preparation of solution from HCl**by Volume Ratios.
7	**Calculating of M from N or vice versa.**	**Determination of pH** - Chemical called an indicator (dye). - pH meter
8	***Midterm Exam I.**	***Midterm Exam I.**
9	**Part per thousand (ppt), Part per million (ppm), Part per billion (ppb).** **Weight percent pph (w/w %), (w/v %) and (v/v %).**	**Preparation of a primary standard and standardization acids:** Standardization of hydrochloric acid against sodium carbonate Solutions
10	**Conversion to concentration ppm from Nand %.** **Equation dilution for M, N and ppm Concentration.**	**Preparation of a primary standard and standardization abase:** Standardization of sodium hydroxide against potassium hydrogen phthalate.
11	**Concentration by Volume Ratios.** **Concentration by Percentage Composition % :** - If the solute is solid compounds. - If the solute Liquid Compounds. - Percentage of Elements in solution (Compounds). - Percentage of Elements by Chemical Formal.	**Determination of elements** by spectrophotometer
12	**Definition of Standard Solution:** - Primary Standard Solution (PSS). - Secondary Standard Solution (SSS). - Preparation of Primary Standard and Secondary Standard.	**Determination of elements** by Flame Photometer
13	**Electrolytes:** Strong Electrolytes. Weak Electrolytes. Common Acids and Bases. Polyprotic Acids.	• **Determination of elements by Atomic Absorption.**
14	**Water:** Auto-ionization of water. Ion-Product Constant. K_w.	
15	**PH scale:** Calculating the pH. General Review.	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Second Year Fall Semester (3rd)

LABORATORY (LAB)

LAB. BCL323Biochemistry (I)**(credit hour 1)**

MLS, Second Year, Third Semester
The Practical Work should be full at the Faculty Laboratories

LAB. MBL334 Microbiology**(credit hour 1)**

MLS, Second Year, Third Semester
The Practical Work should be full at the Faculty Laboratories

LAB. ANL332Anatomy (I)**(credit hour 1)**

MLS, Second Year, Third Semester
The Practical Work should be full at the Faculty Laboratories

LAB. PSL336physiology (I)**(credit hour 1)**

MLS,Second Year, Third Semester
The Practical Work should be full at the Faculty Laboratories

LAB. HSL335 Histology (I)**(credit hour 1)**

MLS, Second Year, Third Semester
The Practical Work should be full at the Faculty Laboratories

LAB. MLL331Analytical Chemistry (I)**(credit hour 1)**

MLS, Second Year, Third Semester
The Practical Work should be full at the Faculty Laboratories

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

First Year
Second Semester.

Second Year (Sophomore)

∗Spring semester (4th)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
BC433	Biochemistry II.	FR	3	BC323	-
BCL433	Biochemistry II. Lab.				BC433
EL436	Safety & Lab Management	EL	3	-	-
ELL436	Safety & Lab Management Lab.				EL436
EL434	Medical Lab. Instrumentation	EL	3	MP243	-
ELL434	Medical Lab. Instrumentation				EL434
ML431	Analytical Chemistry II.	DR	3	ML331	-
MLL431	Analytical Chemistry II. Lab.				ML431
ML435	Molecular Biology	DR	3	BC323 & BI153	-
MLL435	Molecular Biology Lab.				ML435
ML432	Histopathology I.	DR	3	HS335	-
MLL432	Histopathology I. Lab.				ML432
Total Credits/hrs			18		

Syllabus Description :-

Course Number:	BC433Biochemistry II. BCL433Biochemistry II. Lab.	(2:1-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Khaled A. El mosrati, MSc, (Biochemistry) Tel.: 00218944621320

(Email:almsrati_khaled@hotmail.com). Lecturer, Department of MLS.

Prof. Mohamed A. Fadel, PhD, (Organic Chemistry), Tel:- 02182181493

(Email:M.Fadel@uot.edu.ly), Department of MLS.

Program: **(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Biochemistry II.	BC323	None	Theoretical: 2hrs.
Biochemistry II. Lab.	BC323	BC433	Practical: 1 hr.
Semester: 4th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: This course is just a continuation to the course of Biochem I.

By the end of this course, medical laboratory students should be able to:Define Biochemistry of enzymes and understand the bases of enzymology, the main lipids that have physiological and/or medical significance, bases of human and nutrition and digestion, main pathways of metabolism and production of chemical energy.

Reference Book

1. Harper's textbook of Biochemistry
2. Principles of Biochemistry by Lehninger
3. Dr. Vasudevan

Recommended books for practicals

1. Practicals Biochemistry – Plummer
2. Practical Biochemistry – Haroid Varley
3. Tools in Biochemistry – Cooper
4. Lynchs Medical Lab Technology – Stanley S. Raphael

Teaching Learning Activities

The course content in Biochemistry II. will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Seminars
5. Assignments

Syllabus Structure:-

Prepared and Reviewed By:-

Khaled A. El mosrati, MSc, (Biochemistry) Tel.: 00218944621320

Prof. Mohamed A. Fadel, PhD, (Organic Chemistry), Tel:- 02182181493

Syllabus Structure:- BC433/BCL433Biochemistry II. (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Enzymes**.The nature of enzymes, Properties, classification and nomenclature. Specificity, Factors effecting enzyme activity. Denaturation.	**Enzymatic Assays**. Syntheitic substrates and Determination of Enzymes through evidence of activity.
2	**Kinetics and catalytic properties,** Micaelis Menton Formula. Inhibitors, Regulations of enzymic activity. Substrate specificity, rate enhancement. Active sites and mechanism of action.	
3	**Lipids.**Introduction, Identification, Biological significance. Classification according to chemical structure. Fats and Fatty Acids. Structure, Types, Properties of Fats;	**Determination of Enzyme Specific Activity**
4	**Hydrogenation, Saponification, Rancidity. Waxes**. Chemical structure, Physical properties, Biological significance. Complex Lipids. Classification. Phospholipids – Classification according to chemical structure**.**	
5	**Structure of cell membrane.** Sphingolipids. The myeline sheet and its role in multiblesclerosis. Glycolipids and their general structure and physiological role. Steroids, general description.	**Studying Enzyme catalytic properties.**
6	**Cholesterol, biosynthesis and sources,** metabolism and systemic transportation. Role in heart diseases. Lipid storage diseases, general description.	
7	**Biochemistry of Ster oid** Hormones.Adrenocorticoids, Sex Hormones, Anabolic steroids, oral contraceptive. Biochemistry of Bile Salts. Biochemistry of prostaglandins & Leukotriens. Action of Anti-inflammatory Drugs.	**Detection of Lipids.**
8	*Midterm Exam I.	*Midterm Exam I.
9	**Nutrition & Digestion**.Identification and Classfication of Nutrients.Calories. Carbohydrates, Fats, and proteins in Diet. Vitamins. Classification and health problems.	**Techniques of Lipids Separation.**
10	**Water & Minerals.** Major Minerals. Trace Elements.Diagestion of Carbohydrates. Hyperglycemia Hypoglycemia. Diagestion of Lipids. Diagestion of Proteins.	
11+12	**The Metabolism.** Carbohydrates Metabolism and its disorders. Lipids Metabolism and its disorders. Protein Metabolism and its disorders.	**Practicing how to convert** oil into solid lipid (butter), hydrogenation of plant oil.
13+14+15	**Bioenergetics.** (How the Body Converts Food to Energy). Cells and Mitochondria. The Principal Compounds of the Common **Catabolic Pathway.** The TCA Cycle (Kreb's Cycle. The Oxidative Posphorylation.	
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	**ML431 Analytical Chemistry (II)** **MLL431Analytical Chemistry Lab (II)**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Abdulsalam.I. Rafida, PhD, (Analytic Chemistry) Lecturer, Department of MLS.

El Hussein. H. Arebi, PhD, (Analytic Chemistry), 00218925009095

(Email:elhusseinarebi@gmail.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
ML431Analytical Chemistry (II)	ML331	None	**Theoretical**: 2hrs.
ML431Analytical Chemistry (II) Lab.	ML331	ML431	**Practical:** 2 hr.
Semester: 4th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: The major objective of this course is to provide a rigorous background in those chemical principles that particularly important to analytical chemistry. A second aim is to introduce a wide range of techniques of modern analytical chemistry. A final goal is to teach those Laboratory skills, that will give students confidence in their ability to obtain high quality analytical data.

Reference Book

1. D. A. Skoog, D. M. West, F. J. Holler, and S. R. Crouch: Analytical Chemistry: An Introduction, 7th Edition, Saunders College Publishing, 1999.
2. Gary D. Christian. Analytical Chemistry, John Wily & Son. (ISBN 0-471-09867-10), 1999.
3. قاسم كامل. الكيمياء المعملية، الدار العربية للكتاب، ليبيا وتونس، الطبعة الاولي 1989 م

Teaching Learning Activities

The course content in Analytic Chemistry will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Homework
5. Seminars
6. Assignments

Syllabus Structure:-

Prepared and Reviewed By:-

Abdulsalam.I. Rafida, PhD, (Analytic Chemistry)

El Hussein. H. Arebi, PhD, (Analytic Chemistry), Tel.:00218925009095

Syllabus Structure: -ML431/MLL431Analytical Chemistry II. (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Definitions of acids and bases:-**Definitions of acids and bases: Common acid-base theories: - Lavoisier's definition. - The Arrhenius definition.	**How to Make a Phosphate Buffer Solution**.
2	- The proton (Brønsted-Lowry) definition. - The solvent-system definition. - The electronic (Lewis) definition.	**Acid - base titrations**.
3	**Chemical equilibrium: - Acid/Base dissociation**. -Acid-dissociation constant, K_a. - Calculating K_a from the pH. - Calculating pH from K_a. - Calculating Percent Ionization. - **Solubility- Solubility** Products, factors affecting solubility.	**Preparation of Acid - base indicators for titrations.**
4	**Salts :- Acid-Base Titrations:** - Acid base titration- (indicators, standard solutions). - Aqueous- solution chemistry (solution properties): 1. Electrolytes (Weak and strong electrolytes). 2. Activity and ionic strength.	**Titrations of acid with bases or vice versa.**
5	**Measure pH:** -PH calculations for acid, base and salt solutions. - Other "p" Scales. - $K_a$and K_b. - Buffer solutions (buffer capacity, pH calculation).	**Determination of chloride in aqueous samples (Titration).**
6	**Redox reactions: -** Definition, oxidation and reduction. (Redox and electron exchanges, Types of redox reactions). - Potassium permanganate and potassium dichromate as oxidants Standard iodine solution.	**Determination of calcium in aqueous samples (Titration).**
7	**Analytical Methods of analysis: - Classical Methods: -** Precipitation;Extraction; Distillation;Boiling or melting points and Gravimetric. Titrimetric measurements.	**Determination of calcium and magnesium in aqueous samples (Titration).**
8	***Midterm Exam I.**	*Midterm Exam I.
9	**Gravimetric Methods of Analysis:** - Gravimetric of analysis technique. - Calculations associated with weight titrations.	**Determination of carbonate and bicarbonate in aqueous samples (Titration).**
10	**Volumetric analysis (Titration):-**Definition of some terms. - Indicators, equivalent point and end point.	**Determination of hardnessin water samples (Titration).**
11	**Analytical Methods of analysis: -** Instrumental Methods: - Conductivity - Electrode potential - Light absorption or emission - Mass-to-charge ratio ❖ Fluorescence.	**Applied of Gravimetric Methods of Analysis.**
12	**Types of Instrumental Methods: -** Spectroscopic methods: Introduction .Theory and applications. - Atomic emission and absorption spectroscopy.	**Prepare of blood samples for analysis.**
13	**Chromatography:** Introduction .Theory and applications.	**Analysis of blood samples by spectrophotometer**
14	**Classification according to the force of separation:-** Adsorption chromatography - Partition chromatography - Ion exchange chromatography - Gel filtration chromatography. ❖ Affinity chromatography.	Revision
15	**Analytical Methodology: -** Plan, Sampling, Sample preparation, Analytical measurement, Data Analysis. - Selecting an Analytical Method.	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	ML435Molecular Biology MLL435MolecularBiology Lab	(2:2-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Abir Mabruk M. Benashur, MSc, (MolecularBiology) Tel.: 00218214623051

(Email:abirjori@gmail.com). Lecturer, Department of MLS.

Abdulwahab A. Al.Deib, PhD,(MolecularBiology) Tel.: 00218926428134

(Email:abdula1959@yahoo.com.br). Lecturer, Department of MLS.

Najla Amer Elyounsi, MSc,(Molecular Biology), Tel:-00218917154089

(Email:najla.elyounsi@yahoo.com), Department of MLS.

Program: **(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Molecular Biology	BC323 & BI 153	None	**Theoretical**: 2hrs.
Molecular Biology Lab.	BC323 & BI 153	ML435	**Practical:**2 hr.
Semester: **4th**	**Duration:16 Weeks**		**Credit Hours**: **3**

Course Main Aims: By the end of the course, students should be able to defines the molecules in cells, and describes the major molecular processes that lie behind most biological events (replication of DNA, transcription and processing of RNA, translation of genetic information into proteins), and emphasizes the techniques and experiments that lead to this information.

Reference Book

1. **Lodish H, Berk A, Kaiser CA, Krieger M, Bretscher A, Ploegh H, Amon A and Scott MP**, 2012.*Molecular Cell Biology, 7th edition*. New York: W. H.
2. **Robert F. Weaver, 2012.***Molecular Biology, 5th edition*. McGraw-Hill, Inc. ISBN 978–0–07–352532–7
3. Introduction to molecular biology by **Deanna Raineri.ISBN 0-632-04379-2**
4. **Freifelder, D., Malacinski, G.M., 1987**, Essentials of Molecular Biology, John and Bartlett v Publishers, London.
5. **Malestrom. 2009**. Nature Reviews Molecular Cell Biology.

Teaching Learning Activities

The course content in Molecular Biology will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Seminars
5. Assignments

Syllabus Structure:-

Prepared By: -Abir Mabruk M. Benashur, MSc, (MolecularBiology) Tel.:- 00218214623051

Reviewed By: - Abdulwahab A. Al.Deib, PhD,(MolecularBiology) Tel.:- 00218926428134
Najla Amer Elyounsi, MSc, (MolecularBiology)Tel:- 00218917154089

Syllabus Structure:- ML435/MLL435 Molecular Biology (2:2-3)

	Theoretical Content	**Practical Content**
Week	**General Objective**	
1	**Review of cell structure and function** a. The Diversity and Commonality of Cells b. The Molecules of a Cell c The Work of Cells d. Investigating Cells and Their Constituents	
2+3	**Molecular structure and function of genes** a. Discovery of DNA as genetic material b. Structure of nucleic acids c. Gene, genomes, and chromosomes d. DNA replication	***Learning sterile technique, pipetting, preventing contamination***
4	**RNAs and their structure & function** a. The Central Dogma b. Transcription of protein-coding genes (Copying DNA Into RNA) c. RNA Processing	***- Extraction and purification of target genomic DNA***, * Isolation of genomic DNA, ****** Physical, chemical and enzymatic disruption of cellular structure, * Binding of DNA and RNA to an affinity column and removal of other ***cellular components by centrifugation***
5+6	**From Messenger RNA to Protein: The Process of Translation** a. The Genetic Code b. Components of Protein Synthesis c. Translation: Building a Protein	- ***Washing the bound nucleic acids by centrifugation***:- * Recovery of nucleic acids from the column by elution and centrifugation * Examination of recovered DNA to assess yield, quality and purity.
7	**Chromosomes, chromatin and function**	***b. Purification of DNA from Cell Lysate***
8	***Midterm Exam I.**	***Midterm Exam I.**
9+10	**Mutations** a. Types of Gene Mutations b. Causes of Mutations and DNA Repair Mechanisms	***- Agarose Gel Analysis of Purified DNA*** * Making the gel (for a 1% gel, 100mL volume)
11+12	**Regulation of Gene Expression in Bacteria (prokaryotes)** 1. Regulated Versus Constitutive Genes 2. Transcriptional Regulation and Operons 3. Translational and Posttranslational Regulation of Bacterial Genes	**** Nanodrop Quantification of DNA*** ***Estimating DNA Concentration by A260***
13+14	**Regulation of Gene Expression in Eukaryotes** a. Regulatory Proteins Affect RNA Polymerase Binding and Efficiency of Transcription Initiation b. Other Mechanisms for the Regulation of **Eukaryotic Genes**	Revision
15	**Recombinant DNA** a. Generating Recombinant DNA b. Isolating Specific Recombinant Clones c. Analyzing and Using Cloned Genes	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	**ML432Histopathology I.** **MLL432 Histopathology I. Lab.**	**(2: 2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, and Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Office of the department of Medical Laboratories Sciences Tel:-00218214623051, see also references.

(Email:westcost2022@gmail.com)(j.elkhoga@mt.uot.edu.ly),Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Histopathology I.	HS335	None	**Theoretical:** 2hrs.
Histopathology I. Lab.	HS335	ML432	**Practical:**2 hr.
Semester: 4th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: Students will be able to prepare staining reagents and perform tissue processing, sections cutting and staining sections of tissues. In addition, they will gain knowledge about frozen sections and special histopathological techniques.

Reference Book

1. C. F. A. Culling, R. T. Allison and W. T. Barr (1985): Cellular Pathology, Technique, Fourth edition (ISBN: 0-407-72903-8), Butter worths publisher.
2. C. F. A. Culling, R. T. (1974): Hand book of histopathology & histochemical techniques, 3rd edition.
3. Hopwood. D. (1968): Fixatives and Fixation: a review. Histochem. J., I,132-360.
4. Horobin, R.W. (1982): Histochemistry. Butterworths, London.
5. Sterens A, (1982): In Theory and Practice of Histological Technique. 2nd edition.

Teaching Learning Activities

The course content in Basic Histopathology I. will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Seminars
7. Assignments

Syllabus Structure:-

Prepared and Reviewed By:-

Reference Book. Office of the department of Medical Laboratories Sciences Tel:-00218214623051

Syllabus Structure: -ML432/MLL432 Histopathology I. (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**General understanding of the terms**– Histology, histopathology and histopathological techniques.	**Basic steps of tissue processing.** Collection and storage of tissue samples Processing of samples for sectioning
2	**General organization of histopathological laboratory and basic requirements of histopathology laboratory**. (Glasswares, chemical and Reagent, Equipment and Instruments). Responsibilities of a histotechnologist.	***Preparation of fixatives and fixation***
3	**General introduction to processing of tissues**. Cell nucleus, cyto. Membrance, cytoplasm, cell division).	***Embedding.***
4	**Basic stops in tissue processing fixation**, embedding, microtomy, staining, mounting.	***Microtomy.***
5	**Fixation and fixatives**- Aim of fixation, classification of fixation, classification of fixatives, Different fixatives used, its advantages and disadvantages.	***Staining.***Staining of tissue samples Fixation and decalcification of samples
6	**Decalcification- Aim of decalcification**, selection of tissue, fixation, and decalcifying agents used. Decalcification techniques.	***Mounting.***
7	**Tissue processing**- Technique of dehydration, clearing (Aim of cleaning, different cleaning agents), Impregnation, techniques of casting Blocking, section cutting.	**Various methods of preparation of tissue sections.** Examination of tissue samples for determination of different parameters.
8	*Midterm Exam I.	*Midterm Exam I.
9	**Principles, operation, parts and use of automatic tissue processors**.	**Paraffin section, celloidin embedding, frozen section.**
10	**Different types of microtomes, microtone knives.**	**Decalcification.**
11	**Staining**- Principles of staining Basic staining techniques, special stains in histopathological studies.	**Tissue processing (Manual / Automatic).**
12	**Mounting**- Different mounting media and mounting techniques.	**Section cutting and sharpening of microtone knife**
13	**Museum techniques**- General introduction, organization of museum, mounting of museum specimens	
14	**Frozen sections**- Principles, methods used, freezing micro sections, staining of frozen sections and application of frozen sections.	Revision
15	**Immunohistochemistry**	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

***Course Number:**	**EL436 Safety & Lab. Management** **ELL436 Safety & Lab. Management Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,
If you have questions about the course or its content contact the Course Coordinator,

Prof. Abdulhamid Al kout, PhD, (Immunology&Serology) Tel.: 00218913753493
(Email:dr.alkout@gmail.com). Lecturer, Department of MLS.
Abdulaziz Mohamed Dwaya, MSc, (Medical Microbiology) Tel:- 0021892701599
(Email:abdelaziz.dwaya@gmail.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Safety & Lab. Management	None	None	**Theoretical:** 2hrs.
Safety & Lab. Management Lab.	None	EL436	**Practical:** 2hr.
Semester: 4th	**Duration:16 Weeks**		**Credit Hours**: **3**

Course Main Aims: The main objective of this course is to provide a general guide for working in clinical laboratories. At the end of this course, the students will be able to define, manage, and describe the basic principles and management function of biohazards of biological wastes, and, it will establish the basic safety principles for laboratory procedures, equipment, and work practices.

Reference Book

1. **General Laboratory Safety Manual**: Guidelines for the Safe Handling of Hazardous Materials and other Common Laboratory Hazards, Environmental Health and Risk Management Department, 2006 (university of Houston.
2. **Harmening DM. (2012). Laboratory Mangement**: Principles and Processes. 3rd Ed. D.H Publishing & Consulting, Inc.
3. **Laboratory Safety Manual** : Environmental Health, Safety and Risk Management Department P.O. Box 6113, SFA Station Nacogdoches, Texas 75962-6113, January 2010
4. **QUALITY MANAGEMENT PROGRAM LABORATORY SERVICES**: Guidance for Laboratory Quality Manuals.

Additional recommended textbooks:

5. **Iinne and Ringsrud, Clinical Laboratory Science** – The Basic and Routine Techniques, 4th ed., 1999, C. V. Mosby, pp 23-42.
6. **Biosafety in Microbiological** and Biomedical Laboratories (BMBL) 5th Edition.
7. **Center for Disease Control and Prevention.**

Teaching Learning Activities

The course content in safety & Lab. Management will be covered by:
1. Interactive Lectures
2. Group Discussions
3. Practical
4. Demonstrations
5. Seminars

Syllabus Structure:-

Prepared By: - Prof. Abdulhamid Al kout, PhD, (Immunology&Serology) Tel.: 00218913753493
Reviewed By: - Abdul-Aziz Mohamed Dwaya, MSc, (MedicalMicrobiology) Tel:- 0021892701599

Syllabus Structure: -EL436/ELL436Safety & Lab. Management (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Introduction to managements:-** Definition and General Principles - Concepts of Management Function of Management	-
2	**Health Laboratory management:-** Definition and Principles - Role of Laboratory in Health Care and Training of Laboratory Personnel	**Student presentation group and discussion groups**
3	**Laboratory Organization:-** Organization of Health - Laboratory Service - Structure and Function of Laboratory Service - Safe Laboratory Design	
4	**Laboratory Policies:-** Definition and Purpose Laboratory Hours and Emergency Work - Work Load Capacity of the Laboratory - Collection of Specimens Delivery of Reports - Reporting of Results and Record Keeping	**Collection samples techniques**
5	**Management of Laboratory Resources:-** Management of Time and Space Management of Equipment and Supplies	**Lab Documentation practice**
6	**Quality Assurance:-** Introduction - Definition and Purposes of QA - Components of Quality Assurance	**Student presentation group and discussion groups**
7	**Quality Control:-** Definition - Types of QC - Assessing Value of Tests	
8	***Midterm Exam I.**	***Midterm Exam I.**
9	**Introduction to Safety Standards and History of Safety:- -** Laboratory departments - Comprehensive Laboratory Safety Program **.**	**Writing Assignment for Laboratory safety**
10	**General Laboratory Safety 1:-** General Safety Guidelines - Laboratory Chemical Storage and Inventory (Laboratory Standard and Hazard Communication)	**Laboratory Safety Training**
11	**General Laboratory Safety 2:- -** Exposure Control Measures - Hazardous Chemicals and Hazard Communication Program etc...	**Hazard Communication Act Training**
12	**Standerd Operating Procedures:-**Housekeeping Eating, Drinking, Smoking - Electrical ***Fire Safety Equipment:- -*** Fire Extinguishers - Fire Alarms – Sprinklers - Fire Blankets	**Fire Extinguisher Training**
13	**Biological Safety Cabinets** Personal Protective Equipment (PPE) Biosafety in Microbiological and Biomedical Laboratoriesetc.	**Biological safety cabinet certification Donning and doffing of PPE**
14	**Radiation and Chemical waste - Environmental releases - Emergency Procedures: -**Basic Emergency etc.	**Biological waste and autoclave training Exercises in :-** Emergency procedures - Emergency equipment
15	**Chemical Spills Hazardous Waste Storage and Disposal Miscellaneous: -** Surplus - Defrosting Research Freezer	**Spill drill exercise Laboratory waste disposal exercise**
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

***Course Number:**	**EL434Medical Lab. Instrumentation** **ELL434Medical Lab. Instrumentation Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Eida Mohamed Elmansorry PhD, (Immunology& Serology), Tel.: 00218214623051

(Email:aia_m2004@yahoo.com). Lecturer, Department of MLS.

Adel Mukhtar Elyagoubi, PhD, Medical Physics, Tel:- **00218923509097**

(Email: **Ad.elyagoubi@uot.edu.ly**), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Medical Lab. Instrumentation	MP 243	None	**Theoretical:** 2hrs.
Medical Lab. Instrumentation Lab.	MP 243	ML434	**Practical:**2 hr.
Semester: 4th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: This course will provide the essentially required knowledge for students to recognize, manage, and safely operate instruments, devices, and equipment that are usually needed and encountered in clinical laboratories.

Reference Book

1. Douglas A. Skoog, F. James Holler and Timothy A. Nieman: Principles of Instrumental Analysis. (5th Ed.) 1998, Harcourt College Publisher (Harcourt Asia PTE Limited), Singapore.
2. S. M. Khopkar: Basic Concept of Analytical Chemistry. 1998, New Age International (P) Ltd., Publisher, New Delhi.
3. Hand book of Biomedical Instrumentation by R S khandpur
4. Bio-medical instrumentation & measurement – Cromwell

Teaching Learning Activities

The course content will be covered by:
1. Lectures
2. Group Discussions
3. Practical
4. Demonstrations
5. Clinical lab postings
6. Seminars
7. Assignments

Syllabus Structure:-

Prepared and Reviewed:-

Adel Mukhtar Elyagoubi,PhD, Medical Physics, Tel:- 00218923509097

Eida Mohamed Elmansorry PhD, (Immunology& Serology), Tel.: 00218214623051.

Syllabus Structure:- EL434/ELL434 Medical Lab. Instrumentation (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Introduction of Lab instrumentation,** Principals of safety in medical laboratory. A Procedure Manual for routine maintenance and uses of laboratory equipments.	-
2	**Microscope:-** - Introduction & terminologies - Components of microscope - Types of microscopes - Operation , Working Principle & Trouble shooting of microscope - Use , care & maintenance - Defects in lens	***Microscope :-*** Uses, instruction types Maintenance, care of instruments Adjustment of lens system.
3	**Centrifuge:-** - Introduction- Principle and Basic components- Operation, Care & maintenance - Calibration of speed & Time	**Centrifuge**: -Uses instruction types, maintenance and care.
4	**Incubator:- -** Introduction- Principle and Basic components- Operation, Care & maintenance - Calibration of temperature	**Incubator:-** Uses, instruction types, role of incubator in different labs., maintenance and care of instruments
5	**Laboratory Balance** –Introduction- Ttypes of balances- Operation, Care & maintenance	
6	**Sterilization instruments**:- -Hot Air oven -Autoclave -Aim of use -Difference in principle	**Hot Air oven -Autoclave:-**Uses, instruction types, their role for sterilization. Maintenance, care of instruments
7	**Other Laboratory Equipments:-** - Water Bath - Water Distillation -Shaker &Rotator & Mixer	**Water Bath**, water distillation etc. -Aim of use- Maintenance, care of instruments.
8	***Midterm Exam I.**	***Midterm Exam I.**
9	**Colorimeter: --** Introduction - Relation between Energy and wavelength - Reactions between electromagnetic waves and material - Components & Basic Principle - Handling & maintenance - etc.	
10	**Spectrophotometer single and double beam.** - How can find unknown concentration sample with known concentration sample (one point). - How can find unknown concentration sample using multi known concentration samples (multi points, Calibration curve).	**PH –meter** Types, uses and maintenance
11	**Complete blood cells counter (sysmax)** - Aim of use -Principle and basic components - Handling & maintenance - Calibration.	**Study of different types Maintenance**
12	**Chambers, Pipettes, Slides, test tubes, containers, and Petri dishes: -**Study different types and learn how to use them.	
13	**Microtome: --**Introduction-Types - Handling & maintenance.	**Role of this instrument in Histopathology laboratory**
14	**Thermo cycler** –Introduction- steps of use instructions - Aim of use	**Applications in Polymerase chain reaction**
15	Revision	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Second Year Fall Semester (4th)

LABORATORY (LAB)

LAB. BCL433Biochemistry (II)(credit hour 1)

MLS, Second Year, Fifth Semester
The Practical Work should be full at the Faculty Laboratories

LAB. MLL431 Analytical Chemistry (II)(credit hour 1)

MLS, Third Year, Fourth Semester
The Practical Work should be full at the Faculty Laboratories

LAB. MLL435 Molecular Biology(II)(credit hour 1)

MLS, Second Year, Fourth Semester
The Practical Work should be full at the Faculty Laboratories or at the NHS

LAB. MLL432 Histopathology (I)(credit hour 1)

MLS, Second Year, Fourth Semester
The Practical Work should be full at the Faculty Laboratories or at the NHS
Pathology Laboratory exist in the Faculty / Hospital where the Practical training has to be undertaken. Following parameters / guidelines have been suggested:
a. It is mandatory for the Faculty to have its own well equipped and modern pathology laboratory.
b. Senior Pathologist should manage the pathology laboratory in the Faculty / Hospitals.

LAB. ELL436 Safety & Lab Management (credit hour 1)

MLS, Second Year,Fourth Semester
The Practical Work should be full at the Faculty Laboratories or at the NHS

LAB. ELL434 Medical Lab. Instrumentation. (credit hour 1)

MLS, Second Year, Fourth Semester
The Practical Work should be full at the Faculty Laboratories or at the NHS

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Third YearFifth Semester

Third Year (Junior)

Fall Semester (5th)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
ML531	Clinical Biochemistry I.	DR	3	BC433	-
MLL531	Clinical Biochemistry I. Lab.				ML531
ML535	Clinical Microbiology	DR	3	MB334	-
MLL535	Clinical Microbiology Lab.				ML535
ML534	Immunology & Serology I.	DR	3	MB334	-
MLL534	Immunology & Serology I. Lab.				ML534
ML532	General Hematology	DR	3	PS336	-
MLL532	General Hematology Lab.				ML532
ML536	Medical Parasitology I.	DR	3	MB334	-
MLL536	Medical Parasitology I. Lab.				ML536
ML533	Histopathology II.	DR	3	ML432	-
MLL533	Histopathology II. Lab.				ML533
Total Credits/hrs			18		

Syllabus Description :-

Course Number:	**ML531Clinical Biochemistry I.** **MLL531 Clinical Biochemistry I. Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Omer A. eljerbi, PhD, (ClinicalBiochemistry), Tel.:- 00218925661019

(Email:om_eljerbi@yahoo.com), Department of MLS.

Program: **(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Clinical Biochemistry I.	BC433	None	**Theoretical:** 2hrs.
Clinical Biochemistry I. Lab.	BC433	ML531	**Practical:**2 hr.
Semester: 5th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: The rapid development of clinical biochemistry has been an outstanding feature of medicine in the recent few decades. The present title is a survey of the whole field of this subject from the standpoint of workers in hospital laboratories. It is hoped that it will particularly benefit students training in clinical pathology, hospital biochemists, and laboratory technologists. The title should be especially useful to students studying for exams in the chemical pathological techniques of the medical laboratorysciences. However, the tests described are also used in many laboratories not directly concerned with diagnosis and treatment.

Reference Books:

1. Tietz Fundamentals of Clinical Chemistry, 6e (Fundamentals of Clinical Chemistry (Tietz))
2. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th Edition ... of Clinical Chemistry and Molecular Diagnostics.

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Practical
3. Clinical lab postings
4. Seminars
5. Assignments.

Syllabus Structure:-

Prepared and reviewedby: - Omer A. eljerbi, PhD, (Clinical Biochemistry), Tel.:- 00218925661019

Syllabus Structure: -ML531/MLL531 Clinical Biochemistry I (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Basic of Techniques involved in clinical Biochemistry: -** Laboratory Requirements Chemical Reagents, Distilled and deionized water. Centrifugation, photometer,colorimeter and spectrophotometer. Endpoint reaction method, Rate of reaction method, Visible kinetic method and UV-kinetic method. Basics of semi automation and fully automation in Clinical Biochemistry.	
2	**Handling the specimens:**Specimen collection, special precautions in specimen collection, Labeling, Entry of records, Specimen processing, Preservation, Specimen stability, Use of anticoagulants, Separation of serum or plasma. Disposal of biological material.	
3	**Blood Glucose and Diabetes**: Mechanism of glucose absorption and digestion, Hormone regulation of glucose metabolism, Glycosylation of Hemoglobin A1C. Hypoglycemia, Glycosuria. Types of Diabetes, Complication of diabetes, Insulin resistance diabetes, Micro albuminuria, Glycogen storage diseases.	**Estimation of blood glucose,** OGTT, Spot sample for GDM test, Glyco- Hb estimation.
4	**Plasma proteins:** Introduction. Separation of plasma proteins, Electrophoresis and interpretation, Estimation of plasma proteins – albumin , globulin A/G Ratio , □-globulins, function, Hyper/ Hypo Gama globulinaemia , IgG, IgA, IgM, Fibrinogen, PT, PTT, Protein in urine, Albumin, Myoglobin. Total protein, protein in CSF.	**Estimation of plasma protein and albumin.** Protein electrophoresis Urine protein and albumin test
5	**Lipids, Lipoprotein and Dyslipoproteinaemia.** Cholesterol and phospholipids, Triglycerides, Classification and metabolism of lipoproteins: chylomicrons, VLDL, IDL, LDL, HDL. Reference range. Disorders of lipid metabolism, atherosclerosis, Myocardial infarction, Ketone body formation, Ketosis, obesity.	**Cholesterol test** **HDL test** **LDL test** **Triglyceride test**
6	**Kidney function and Electrolytes balance**: Blood Urea Nitrogen, Urea, Uric acid, Creatine, Creatinine, Creatinine Clearance Test (C.C.T), Sodium, Potassium, Chloride, Urine albumin, Fractional Excretion of Sodium (FENa).	**Urea test, Creatinine test ,Uric acid test**
7	**Liver Function Test**: Serum Bilirubin, Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST), -Alkaline phosphatase (ALP), Gamma GT, Albumin, Globulin, INR.	**Bilirubin test** ALT,SAT, ALP,GGT Test
8	***Midterm Exam I.**	***Midterm Exam I.**
9	**Cardiac Enzymes**:Total CPK, CPK-MB, Troponin, Myoglobin, Total LDH, LDH-isoenzymes; LDH1, LDH2, LDH3, LDH4, LDH5, SGOT or AST. Myocardial infarction	CPK test - SGOT test - LDH test
10	**Acid phosphatase , Lipase , Serum globulin**	**Lipase test**
11	**Serum Renin , Plural fluid , D- Dimer**	
12	**VMA , PJP, Plural fluid , Peritoneal fluid**	
13	**S-Bicarbonate , Blood Ammonia , GGT Sample**	
14	**Ferritin , Folic acid , Transferrin**	**Ferritin test**
15	**Quality Control,** management , Statistical calculation	
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	ML535 Clinical Microbiology MLL535 Clinical MicrobiologyLab.	(2:2-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Prof. Masaoud A. Elyousfi, PhD (Microbiology), Tel.:- 00218925171560

(Email:masoud.elyousfi@yahoo.com), Department of MLS.

Hamida Sadk EL. Magrahi MSc, (General Microbiology) Tel.: 00218925825096

(Email:Hamidasadkali@gmail.com). Lecturer, Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Medical Microbiology	MB334	None	**Theoretical:** 2hrs.
Medical Microbiology Lab.	MB334	ML535	**Practical:**2 hr.
Semester: 5th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: This course is designed as an introductory course in Clinical Microbiology for college students. This course is designed to meet curriculum requirements for students in the Medical Laboratory Technician Program**.**

Course Description: This course is designed as an introductory course in Clinical Microbiology for college students. The course is a combination of lectures and laboratory tutorials sessions that teach the fundamentals of clinical microbiology in theory and practice. This course is designed to meet curriculum requirements for students in the Medical Laboratory Technician Program.

The theoretical content: Covers an introduction to clinical microbiology: Clinical bacteriology (Infections associated with pathogenic bacteria and their diagnosis), Clinical mycology (Classification of medically important fungi and their general identification process, pathogenesis and treatment), Clinical virology(Classification of animal viruses, isolation, identification, cultivation and purification of viruses) and Clinical Parasitology(Classification and clinical diagnosis of protozoa).

The laboratory content covers the laboratory role in infection control and specimen collection and processing, microscopic examination of materials From Infected Sites, use of colony morphology for the presumptive identification of microorganisms, antimicrobial agent mechanism of action and resistance, antimicrobial susceptibility testing. Immunodiagnostic (serologic tests) and molecular diagnostic of infectious disease, identification of significant bacterial isolates, identification of medically significant fungi, protozoa and viruses.

Reference Books:

1. **Diagnostic Microbiology. 5th Edition** by Connie R. Mahon MS MT (ASCP) CLS (Author), Donald C. Lehman EdD Mt (ASCP) SM (NRM) (Author), George Manuselis Jr. MA MT MT(ASCP) (Author).ISBN-13: 978-0323089890
2. **Laboratory Manual for Microbiology Fundamentals**: A Clinical Approach2nd Editionby Steven Obenau (Author), Susan Finazzo (Author) .ISBN-13: 978-1259293863/
3. **Clinical Microbiology Procedures Handbook** (3 Vols) 3rd Edition by Lynne S. Garcia (Editor).ISBN-13: 978-1555815271

Teaching Learning Activities

The course content will be covered by:
1. Lectures
2. Practical
3. Seminars
4. Assignments.

Syllabus Structure:-

Prepared and Reviewed By: -Prof. Masaoud A. Elyousfi, PhD. (Microbiology), Tel.:- 00218925171560

Syllabus Structure:- ML535/MLL535Medical Microbiology (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Introduction to clinical microbiology**. **Clinical Bacteriology:** Classification of Pathogenic Bacteria. General methods ofisolation and identification of pathogenic bacteria.	**The Laboratory Role in Infection**. Control and Specimen Collection and Processing. Microscopic Examination of Materials From Infected Sites.
2	**Infections associated with the following Gram**-positive bacteria: *Bacillus anthracis, Clostridium and Pneumococcus.* Infections associated with the following Gram-positive bacteria *Corynebacterium.*	**Use of Colony Morphology for the Presumptive Identification of Microorganisms.** Antimicrobial Agent Mechanism of Action and Resistance. Antimicrobial Susceptibility Testing.
3	**Infections associated with the following Gram-positive** bacteria:Streptococcal infections and Staphylococcal infections.	**Immunodiagnostic of Infectious Diseases (Serologic Tests):** Enzyme Immunoassay (EIA). Immunofluorescent Assays (IFA)/ Complement Fixation (CF). Hemagglutination Inhibition Assays (HAI).Western Blot. Neutralization Tests.
4	**Infections associated with the following Gram-negative bacteria** : **Enterobacteriaceae**: *Salmonella, Shigella, Klebs Proteus, Yersinia, and Escherichia.* ***Vibrios.***	**Molecular Diagnostic of Infectious Diseases:** Electrophoresis. PCR Technique. DNA Probe. DNA Extraction Biotechniques. Different DNA sequencing methods
5	**Infections associated with the following Gram-negative** bacteria: *Pseudomonas, Neisseria, Haemophilus, Campylobacter, Bordetella and Brucella.*	**Clinical Bacteriology:**Laboratory Identification of Significant Isolates: Staphylococci, Streptococci and Enterococci.
6	Infections associated with *Mycoplasma, Mycobacterium tuberculosis, and Mycobacterium leprae.* Infections associated with *Spirochetes – Treponema*	**Laboratory Identification of Significant Isolates:** **Aerobic Gram Positive Bacilli.** **Anaerobic Gram Positive Bacilli.**
7	**Infections associated with *Spirochetes*** *–Borrelia and Leptospira,*. Actinomycetes, *Rickettsiae and Chlamydiae*	Laboratory Identification of Significant Isolates: Nessieria, Morexella and Haemophilus.
8	***Midterm Exam I.**	***Midterm Exam I.**
9	**Clinical Mycology:**Classification of Medically important fungi. General identification process of medically important fungi.	**Laboratory Identification** of Significant Isolates: Enterobacteriaceae-Vibrio, Aeromonas, Plasmodium and Campylobacter Species.
10	**Etiology, Lab diagnosis, Pathogenesis**and Treatment of Superficial *Trichophyton* Systemic (Candidiasis) diseases of human.	**Diagnosis of upper and Lower Respiratory TractInfections-Diagnosis of Skin Infection. Diagnosis of the Central Nervous System Infections**.
11	**Clinical Virology:**Classification of animal viruses. Isolation, Identification, Cultivation and Purification of animal viruses.	**Diagnosis of Gastrointestinal Infection**. Diagnosis of genital Infection and Sexually Transmitted Diseases. Diagnosis of the Urinary Tract Infections.
12	**Clinical Virology (continue):**Poxvirus, Herpes virus, Adeno virus, Hepatitis B virus. VRNA viruses –Retrovirus, Picorna virus, Reo virus, Herpes virus, Rhabdo virus, Toga virus, etc..virus	**Clinical Mycology:** Medically Significant Fungi. (Common Yeasts and Molds): Describe safety precautions, including the use of biological safety cabinets, for handling fungal cultures. ….
13	**Clinical Parasitology:** Protozoa and helminthic infections – mechanism of disease production by parasites. Etiology, Pathogenesis, Clinical diagnosis of following protozoans – *Entamoeba histolytica, Giardia lamblia, Leishmania, Plasmodium* and *Cryptosporidium.*.	**Clinical Virology:** List the types of specimens suitable for viral cultures. List cell cultures. Explain the procedures for the proper handling, transport and storage of viral specimens.
14	**Clinical Parasitology (continue):** Etiology, Pathogenesis, Clinical diagnosis of following Nematode – *Trichonella*y, Pathogenesis, Clinical diagnosis of following Cestodes – *Tinea, Diphyllobottrium.* Etiology, Pathogenesis, Clinical diagnosis of following Tremtode – *Schistosoma.*	**Clinical Parasitology:** Protozoans of Clinical Importance; Helminthes Parasites. Wet mount technique of living organisms.
15	Revision	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	**ML534Immunology & Serology I.** **MLL534 Immunology & Serology I. Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Prof. Abdulhamid Al kout PhD, (Immunology & Serology)l Tel.: 00218913753493

(Email:dr.alkout@gmail.com), Department of MLS.

Eida Mohamed Elmansorry, PhD, (Immunology & Serology) , Tel.: 00218214623051

(Email:aia_m2004@yahoo.com), Department of MLS.

.Prof. Abdulbaset abustta, PhD, (Immunology&Serology), Tel.:- 00218913254812

(Email:abustta@yahoo.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Immunology & Serology I.	MB334	None	**Theoretical:** 2hrs.
Immunology & Serology I. Lab.	MB334	ML534	**Practical:** 2 hr.
Semester: 5th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: - Study of Components of the immune system Innate and Adaptive immunity, Humoral immune response, Cellular immune response, Role of immune responses against intra- and extra-cellular pathogens, and make knowledge about harmful immune responses.

Reference Book

1. Laboratory Immunology and Serology , Neville J. Bryant, 3rd Edition
2. Immunology: Introductory Text Book- Nandini Shetty
3. Immunology- Kuby
4. Immunology- A Short Text Book- Md. Akram Hossain
5. Immunodiagnostics- S.C.Rastogi

Teaching Learning Activities

The course content in Immunology& Serology I. will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Seminars
5. Assignments

Syllabus Structure:-

Prepared By:-

- Abdulhamid Al kout PhD, (Immunology & Serology), Tel.: 00218913753493
- Eida Mohamed Elmansorry, PhD, (Immunology & Serology) , Tel.: 00218214623051

Reviewed by: -.Prof. Abdulbaset abustta, PhD, (Immunology&Serology), Tel.:- 00218913254812

Syllabus Structure: -ML534/MLL534Immunology&Serology I. (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**The components of Immune system:** The White blood cells of immune system derive from precursors in the bone marrow; their origin and maturation.	-
2	**Primary and Secondary lymphoid organs:** Their types, functions and distribution	-
3	**Principles of innate and adaptive immunity:** The main difference between specific and non-specific immunity.	-
4	**Innate immunity:** mechanisms of the front line of host defence	**Antibacterial test for tears and sweat**
5	**Pattern recognition in innate immunity**: Definition of cytokines, Receptors and chemokines and knowledge of their function briefly.	-
6	**Inflammation:** Mechanisms of Vascular response and Cellular responses **Phagocytosis:** Types of phagocytic cells and process of phagocytosis	**Wound for Microscopy exam** **Phagocytosis test**
7	**Complement system:** kinds of complement pathways, their activation and regulation.	**Measurement of complement components**
8	**Midterm Exam I**	**Midterm Exam I**
9	**Antigens:** characters and Factors affecting immunogenicity.	-
10	**Adaptive immunity:** Cells involved their morphology and function.	**Detection of CD4 and CD8 on Lymphocytes**
11	**Immunoglobulins:** Structure of an antibody molecule, their types and general functions	**Detection of IgG,IgM,IgA,IgE,IgD on serum sample**
12	**Antigen recognition by B cells:** The interaction of the antibody with specific antigen.	-
13	**Antigen recognition by T cells:** T cells receptors, MHC molecules	-
14	**Generation of lymphocytes receptors I**: Diversity in immunoglobulins	-
15	**Development and survival of lymphocytes I**: Development of B lymphocytes	-
16	***Midterm Exam II.**	

Syllabus Description :-

Course Number:	**ML532 General Hematology** **MLL532 General Hematology Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Khaled Elbaruni, PhD, (Hematology)Tel.: 00218922826919

(Email:kelbaruni@yahoo.ie), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
General Hematology	PS336	None	**Theoretical:** 2hrs.
General Hematology Lab.	PS336	ML532	**Practical:** 2 hr.
Semester: 5th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: The course will provide the basic knowledge on Hematology and its general application to Medical Laboratory Sciences.

Reference Book

Latest editions of the following books:

1. Essentials of Hematology by Haufbrand.
2. Practicals in Hematology by J.V. Dacie.
3. Medical Laboratory Technology by Lynch.
4. Wintrobe's clinical Hematology

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Group Discussions
3. Practical
4. Blood donation camps
5. Seminars
6. Assignments.

Syllabus Structure:-

Prepared By: - Khaled Elbaruni, PhD, (Hematology)Tel.: 00218922826919

Reviewed By: Eman A. Abdulwhed, MSc, (Hematology) Tel: 00218214623051

Syllabus Structure:-ML532/MLL532 General Hematology (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Introduction** • Definition of hematology and its importance • Blood composition • Function of blood	
2	**Formation of blood cells (Haematopoiesis)** Sites & aspects of blood cell formation • Blood formation in embryo & fetus • Blood formation after birth (adult life)	Introduction to laboratory safety
3+4+5	**Steps in blood cells formation** • Development & maturation of red blood cells (Erythropoiesis) • Development & maturation of white blood cells (Leukopoiesis) Development & maturation of platelets (Thrombopoiesis)	Quality assurance & Quality control in hematology laboratory
6	**Growth factors &control of haematoposis**	
7	**Reticulocytes** • Description • Clinical significance • Normal range	
8	**Midterm Exam I**	**Midterm Exam I**
9	**Hemoglobin** • Structure • Synthesis • Function (hemoglobin-oxygen dissociation curve)	Reticulocyte count
10	**Red cell destruction** • Extravascular destruction • Intravascular destruction	
11	**Collection of blood samples** • Sits of blood collection • Techniques of blood collection • Handling of blood samples • Storage &Transport..etc	Red blood cell count ,White blood cell count & Platelet count
12	**Anticoagulants**	
13	**Erythrocyte sedimentation rate (ESR)** **Hematocrit (PCV)** **Absolute values (MCV, MCH, MCHC)**	Hematocrit measurement , Red cells indices & Erythrocyte sedimentation rate (Westergren technique)
14+15	**Changes in blood cells morphology** • Pathological • Non- pathological	Blood film preparation and staining
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	**ML536Medical Parasitology I.** **MLL536Medical Parasitology I. Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Prof. Jamal M. El Khoga, PhD, (MedicalParasitology), Tel.: 00218922826919

(Email:westcost2022@gmail.com)(j.elkhoga@mt.uot.edu.ly), Department of MLS.

Aisha Gashout, PhD, (Medical Parasitology), Tel.: 00218214623051

(Email:a_gashout@hotmail.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Medical Parasitology I.	MB334	None	**Theoretical:** 2hrs.
Medical Parasitology I. Lab.	MB334	ML536	**Practical:** 2 hr.
Semester: 5th	**Duration:16 Weeks**		**Credit Hours**: **3**

Course Main Aims: The objective of this course is to familiarize the student with current areas of emphasis in a) studies of protozoan parasites of medical importance, and b) protozoan diseases of global importance. This information will be useful to students when they study protozoan parasites in the laboratory. Laboratory Methods in Parasitology: This course consists of lectures and laboratory exercises during which methods and most basic techniques as well as laboratory diagnoses of common parasitic infections are explained and understood.

Reference Book

Latest editions of the following books:

1. Text book of Parasitology by K.D. Chatterjee, Chatterjee medical Publishers, Calcutta.
2. Parasitic diseases in man by Richard Knight English Language Book Society.(ELBS)

Recommended Books.

1. Ash L, Orihel TC: Parasites: A Guide to Laboratory Procedures and Identification. American Society of Clinical Pathologists, Chicago, 1987.
2. Bogitsh BJ and Cheng TC: Human Parasitology. WB Saunders, Philadelphia, 1990.
3. Castro GA: Trematodes: schistosomiasis. p 1710. In Kelly WN (ed):Textbook of Internal Medicine. JB Lippincott, Philadelphia, 1989.
4. Hunter GW, Swartzwelder JC, Clyde DF: A Manual of Tropical Medicine. 5th Ed. WB Saunders, Philadelphia, 1976.
5. Jeffrey HC, Leach RM: Atlas of Medical Helminthology and Protozoology. Churchill Livingstone, Edinburgh, 1968.
6. Lee DL: The Physiology of Nematodes. Oliver and Boyd, Edinburgh, 1965.
7. Smyth JD: The Physiology of Trematodes. Oliver and Boyd, Edinburgh, 1966.
8. Schmidt GD, Roberts LS: Foundations of Parasitology. 3rd Ed. Times Mirror/Mosby College Publishers, St Louis, 1985 .
9. Zamen V: Atlas of Medical Parasitology. Lea&Febiger, Philadelphia, 1979.

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Group Discussions
3. Practical
4. Demonstrations
5. Seminars
6. Assignments

Syllabus Structure :-

Prepared and Reviewed By:-

Prof. Jamal M. El Khoga, PhD, (Medical Parasitology), Tel.: 00218922826919

Aisha Gashout, PhD, (Medical Parasitology), Tel.: 00218214623051

Syllabus Structure:- ML536/MLL536 Medical Parasitology I. (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Introduction to Parasitology:-** - Definition of Parasites, Host, Symbiosis (Host parasite relations) - Terminology, and life cycles - Transmission routes and Diseases caused by parasites - Diagnostic Methods and Preventions - Epidemiology and distribution of parasites - Scientific Nomenclature of parasites	**Quality control and Assurance in Parasitology: -**Collection and transport of parasitological - Specimens, Use of equipment -Quality of reagent and stains. Performance of a technique. Detection and recognition of parasites - Reporting and results.
2	**Taxonomy of the Parasites of Medical importance:** Basic Classification and Characteristic of Parasites of Medical importance:	**Stool examination :** - Preservation of Specim **Pseudo-parasites and pitfalls** - Technical methods for Identify parasites: - Examination of Stool Specimens:
3	**Morphology and General Characteristic of Phylum Protozoa: -**Intestinal Protozoa, Blood Protozoa & Tissue protozoa.	
4	**Intestinal Protozoa**Entamoeda (6 species): **Entamoeba histolytica*. *E. coli, E. hartmanni, E. gingivalis, Endolimax nana* and the pathogenic etc.	**Microscopic Examination** Direct wet and Iodine stained procedures - Concentration Technique
5	**Intestinal Protozoa *:*** **Entamoeba histolytica*	**Detection and identification of other Entamoeba species** Microscopy and visual presentation (differential morphology)
6	**Intestinal flagellate:** **Giardia lamblia*	**Detection and identification** of *Giardia lamblia:* a) wet mout, b) In stool (MIF stains).
7	**Intestinal Sporozoa*(Coccidia):*** *CryptosporidiumparvumandIsosporabelli* ***Intestinal Ciliate:****Blantidiumcoli*	**Detection and identification of other intestinal sporozoa (coccidia).** Microscopy and visual presentation (differential morphology with Acid Fast basili stain)
8	*Midterm Exam I.	*Midterm Exam I.
9	**Uro-genital Protozoa (Flagellates)** **Trichomonas vaginalis*	**Detection and identification** of *Trichomonas vaginalis by wet preparation*
10	**Blood and Tissue Protozoa:** Introduction and classification **: I. Hemoflagellates and II**.**Hemosporidia**	**Examination of Blood and other body Fluids Specimens:** - Direct Microscopic examination,- **Detection and identification of Leishmania species**.
11	**I. Hemoflagellates*: 1.*** Leishmania spp.: *- Leishmania Tropica - Leishmania mexicana - Leishmania braziliensis*	
12	- Leishmania donovani	**Detection and identification of Leishmania**species II: Visceral l.
13	**2**. *Trypanosomabruzi* (African *trypanosomiasis*), *Trypanosomacruzi* (Americanan trypanosoma)	**Detection and identification** of Trypanosomes, a) In blood (thin-thick blood film), b) biopsy
14	**II**. ***Hemosporidia:*** 1. *Plasmodium falciparum, P.vivax, P.oval and malariae,* **2.***Toxoplasmagondii*	
15	Revision	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	ML533Histopathology II. MLL533 Histopathology II. Lab.	(2:2-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Contact the office of the department Tel: 00218214623051

(Email:westcost202@gmail.com)(j.elkhoga@mt.uot.edu.ly)

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Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Histopathology II.	ML432	None	**Theoretical:** 2hrs.
Histopathology II. Lab.	ML432	ML533	**Practical:** 3 hr.
Semester: 5th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: Students will be able to prepare staining reagent and perform tissue processing, section cutting, stain tissue section, handle frozen section and museum sample.

Reference Book

1. C. F. A. Culling, R. T. Allison and W. T. Barr (1985): Cellular Pathology, Technique, 4th edition (ISBN: 0-407-72903-8), Butter worths publisher.
2. C. F. A. Culling, R. T. (1974): Hand book of histopathology & histochemical techniques,3rd edition.
3. Hopwood. D. (1968): Fixatives and Fixation: a review. Histochem. J., I,132-360.
4. Horobin, R.W. (1982): Histochemistry. Butterworths, London.
5. Sterens A, (1982): In Theory and Practice of Histological Technique. 2nd edition.

Teaching Learning Activities

The course content in Histopathology II. will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Demonstrations
5. Seminars
6. Assignments

Syllabus Structure:-

Prepared and Reviewed By:-

Contact the office of the department Tel: 00218214623051

Syllabus Structure: -ML533/MLL533 Histopathology II. (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Laboratory handling:** Practical aspect of laboratory management hazards and safety in histopathological laboratory techniques	-
2+3	**Fixatives** - Definition of fixatives A) Simple fixative: Aldehyde & Gluteraldehyde, Oxidizing agents, Protein denaturing agents and other reagents with unknown mechanism B) Compound fixatives: Classification and preparation of compound fixatives C) Histochemical Fixatives.	**Fixation and decalcification of samples**
4+5	**Tissue Processing (**Manual and automatic technique) Collection, Labeling and Fixation of Specimen *A) Dehydration* - Definition, *B) Clearing agent* - Definition, Purpose, Criteria of ideal clearing agent, *C) Impregnation and Infiltration* - Definition, Purpose, *D) Embedding* - Definition, Types of embedding media, etc.	**Various methods of preparation of tissue sections.** Examination of tissue samples for determination of different parameters. Processing of section Cutting.
6+7	**Section Cutting** *A) Microtome Knives:* a)Parts of knives, classification of microtome knives based on size & manner in which they are ground, b)Knives sharpening both (honing & stropping), Types of hones used, procedure of honing types of strops used, procedure for stropping, c) Care of Microtome knives, d) Lubricants used, Abrasives	
8	Midterm Exam I.	*Midterm Exam I.
9+10	**Section Cutting** *B) Microtomes:* Definition, Principle, Parts and Types a) Rocking, b) Rotary, c) Sliding Base-sledge, d) Freezing, e) Cryostat (their parts, principle, advantages and disadvantages), Care of microtome *C) Technigue of section cutting:*-Requirements, procedure, deparaffinization, adhesives, causes & remedies of improper sections.	**Section Cutting** Technique of section cutting
11+12	**Histology Routine and Special Staining** Definition, Classification, Stain preparation and staining Procedure, Principle of Interpretation, a) Haematoxyline and Eosin Stain	**Section cutting and sharpening of microtone knife** **Staining techniques.**
13+14	**Histology Routine and Special Staining** b) Papanicolou Technique (PAP) for Diagnostic Exfoliative Cytology c) Periodic Acid Schiffs (PAS) for Carbohydrates d)	
15	Revision	Revision
16	Midterm Exam II	*Midterm Exam II

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Second Year Fall Semester (5th)

LABORATORY (LAB)

LAB. MLL531 Clinical Biochemistry I.(credit hour 1)

MLS, Third Year, Fifth Semester
The Practical Work should be full at the Faculty Laboratories

LAB. MLL535Medical Microbiology(credit hour 1)

MLS, Third Year, Fifth Semester
The Practical Work should be full at the Faculty Laboratories

LAB. MLL534Immunology & Serology (I)(credit hour 1)

MLS, Third Year, Fifth Semester
The Practical Work should be full at the Faculty Laboratories

LAB. MLL532General Hematology(credit hour 1)

MLS, Third Year, Fifth Semester
The Practical Work should be full at the Faculty Laboratories

LAB. MLL536Medical Parasitology (I) (credit hour 1)

MLS, Third Year, Fifth Semester
The Practical Work should be full at the Faculty Laboratories

LAB. MLL533Histopathology (II)(credit hour 1)

MLS, Third Year, Fifth Semester
The Practical Work should be full at the Faculty Laboratories

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Third YearSixth Semester

Third Year (Junior)

Spring Semester(6th)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
ML631	Clinical Biochemistry II.	DR	3	ML531	-
MLL631	Clinical Biochemistry II. Lab.				ML631
ML634	Clinical Bacteriology	DR	3	ML535	-
MLL634	Clinical Bacteriology Lab.				ML634
ML633	Immunology and serology II.	DR	3	ML534	-
MLL633	Immunology and serology II. Lab.				ML633
ML632	Diagnostic Hematology	DR	3	ML532	-
MLL632	Diagnostic Hematology Lab.				ML632
ML635	Medical Parasitology II.	DR	3	ML536	-
MLL635	Medical Parasitology II. Lab.				ML635
ML636	Clinical Virology & Mycology	DR	3	ML535	-
MLL636	Clinical Virology & Mycology Lab				ML636
Total Credits/hrs			18		

Syllabus Description :-

Course Number:	**ML631Clinical Biochemistry II.** **MLL631 Clinical Biochemistry II. Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Omer A. eljerbi, PhD, (ClinicalBiochemistry), Tel.:- 00218925661019

(Email:om_eljerbi@yahoo.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Clinical Biochemistry II.	ML531	None	**Theoretical:** 2hrs.
Clinical Biochemistry II. Lab.	ML531	ML631	**Practical:**2 hr.
Semester: 6th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: Course Main Aims: The rapid development of clinical biochemistry has been an outstanding feature of medicine in the recent few decades. The present title is a survey of the whole field of this subject from the standpoint of workers in hospital laboratories. It is hoped that it will particularly benefit students training in clinical pathology, hospital biochemists, and laboratory technologists. The title should be especially useful to students studying for exams in the chemical pathological techniques of the medical laboratorysciences. However, the tests described are also used in many laboratories not directly concerned with diagnosis and treatment.

Reference Books:

1. Tietz Fundamentals of Clinical Chemistry, 6e (Fundamentals of Clinical Chemistry (Tietz))
2. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th Edition ... of Clinical Chemistry and Molecular Diagnostics,

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Practical
3. Clinical lab postings
4. Seminars
5. Assignments.

Syllabus Structure:-

Prepared andreviewedby: - Omer A. eljerbi, PhD, (ClinicalBiochemistry), Tel.:- 00218925661019

Syllabus Structure: -ML631/MLL631Clinical Biochemistry II (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**An Introduction to Cancer, Malignant Tumor, Benign Tumor,**	Preparation of Standard Curve for Creatinine Calculation of Creatinine Concentration using Standard curve.Sores of Reagent ; Home Made Reagent
2	**Treatments are used for Metastatic cancer**,	
3	**End Products of Metabolism and Other Tests**	Preparation of Standard Curve for Albumin Calculation of Albumin Concentration using Standard curve Sores of Reagent ; Home Made Reagent
4	**Osmolality and Water-Load Test.**.	Preparation of Standard Curve for Phosphorus Calculation of Phosphorus Concentration using Standard curve Sores of Reagent ; Home Made Reagent
5	**Electrolyte Tests.**	
6	**Sodium assay**:	Preparation of Standard Curve for Calcium Calculation of Calcium Concentration using Standard curve Sores of Reagent ; Home Made Reagent
7	**Magnesium assay** :	
8	*Midterm Exam I.	*Midterm Exam I.
9	**Thyroid Function Tests**	Preparation of Standard Curve for Total Protein Calculation of Protein Concentration using Standard curve Sores of Reagent ; Home Made Reagent
10	Primary Hypothyroidism : TSH ↑→T4 ↓ , T3 ↓ Hyperthyroidism : TSH ↓ → T4 ↑ , T3 ↑ ,	
11	**Some investigation which helps to monitor Parathyroid gland function and Calcium balance** : PTH , Calcium , Phosphorus , Vitamin D , Urea , Creatinine , CBC , Blood film . PTH ↑ → Calcium ↑, Phosphorus ↓, PTH↓ → Calcium ↓,Phosphorus ↑.	Preparation of Standard Curve for Cholesterol Calculation of Cholesterol Concentration using Standard Curve Sores of Reagent ; Home Made Reagent
12	**Pituitary Hormone Assessment for Hypopituitarism :**Luteinizing Hormone -LH , Follicle Stimulating Hormone - FSH , Thyroid Stimulating Hormone – TSH , Free Thyroxine - FT4 , Sodium – Na+	
13	**Aldosterone Hormone Assessment for Primary or Secondary Aldosteronism.**	Preparation of Standard Curve for Uric Acid Calculation of Uric Acid Concentration using Standard curve - Sores of Reagent ; Home Made Reagent
14	**Some investigation which helps to monitor Myocardial Infarction and Pulmonary Infarction** : Total CPK , CPK-MB , CPK-MM ,TNT , Myoglobin , SGOT , LDH , D-Dimers , CBC .	
15	**Adrenal Cortex Function** Aldosterone Hormone Assessment for Primaryaldosteronism :Adrenocorticotropic Hormone ACTH , Renin Enzyme , Creatine Phosphokinase -CPK , CPK- Isoenzyme CPK- MB , Urea , Creatinine , Sodium Potassium .Congenital Adrenal Hyperplasia , Adrenal Insufficiency , Sign and symptoms . Laboratory Tests : Cortisol , ACTH , ACTH- Stimulation Test, Cortictropin –Releasing Hormone CRH , Aldosterone , Electrolytes , BUN , Creatinine , Glucose , Insulin .	Preparation of Standard Curve for Urea Calculation ofUrea Concentration using Standard curve Sores of Reagent ; Home Made Reagent
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	ML634 Clinical Bacteriology MLL634Clinical Bacteriology Lab.	(2:2-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Prof. Masaoud A. Elyousfi, PhD, (Microbiology),Tel:- 00218925171560

(Email:masoud.elyousfi@yahoo.com), Department of MLS.

Hamida Sadk EL. Magrahi MSc, (General Microbiology) Tel.: 00218925825096

(Email:Hamidasadkali@gmail.com). Lecturer, Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Clinical Bacteriology	ML535	None	**Theoretical:** 2hrs.
Clinical Bacteriology Lab.	ML535	ML634	**Practical**: 2 hr.
Semester: 6th	**Duration:16 Weeks**		**Credit Hours**: **3**

Course Main Aims: Discuss the following bacteria group for their clinical and pathological aspect and then describe the laboratory tests that will yield a definitive identification for each specific bacterium.

The theoretical lectures:

cover systemic pathogenic bacteria including the Enterobacteriaceae, Vibrionaceae, Aeromonas (Aeromonas hydrophila) and Plesiomonas , Campylobacters , Helicobacter , Pseudomonas , The Gram positive cocci, The Gram Negative Cocci, The Mycobacteria, Some other important bacteria, The Anaerobic Bacteria, The Spirochetes, Rickettsiae, Chlamydia, Actinomycetes, Mycoplasma and cell wall-defective bacteria and Actinomycetes, Norcardiosis and Actinomycetoma diseases of humans, their pathogenesis, modes of transmission, epidemiology, methods for isolation and identification.

The laboratory sessionsfocus on the specimens used for bacterial isolation, antigen detection and molecular diagnostic tests (Collection and transport of different specimens), Isolation of bacteria by the Streak, spread and pour plate method, methods of enriched, selective and enrichment culture techniques used to isolate bacteria from clinical materials, Identification of Enterobacteriaceae, Staphylococci, Streptococci, Pseudomonas and Vibrios, Mycobacteria. Techniques of anaerobiosis, identification of microbes in air, foods, soil, and water. Also, the skin tests: Mantoux, Lepromin and automation in microbiology.

Required Texts:

1. **Medical Microbiology. JawetzMelnick** and Adelbergs– January 1, 2013.ISBN-13: 978-0071790314.
2. **Diagnostic Microbiology. 5th Edition by Connie R. Mahon MS MT(ASCP) CLS**(Author), Donald C. Lehman EdD MT(ASCP) SM(NRM)(Author), George Manuselis Jr. MA MT(ASCP)(Author).ISBN-13: 978-0323089890.
3. **Laboratory Manual for Microbiology Fundamentals**: A Clinical Approach2nd Editionby Steven Obenauf(Author), Susan Finazzo(Author) .ISBN-13: 978-1259293863/
4. **Clinical Microbiology Procedures Handbook** (3 Vols)3rd Edition by Lynne S. Garcia(Editor).ISBN-13: 978-1555815271.

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Practical
3. Seminars
4. Assignments.

Syllabus Structure:-

Prepared and Reviewed By: -Prof Masaoud A. Elyousfi, PhD, (Microbiology), Tel:- 00218925171560

Syllabus Structure: - ML634/ MLL634Clinical Bacteriology (2:2-3)

	Theoretical Content	**Practical Content**
Week	**General Objective**	
1	**The Enterobacteriaceae*:*** General characterization and classification of ***Enterobacteriaceae.*** **Enterobacteriaceae-I:*Escherichia coli* - *Shigella:* Enterobacter: Morphology, pathogenicity and laboratory diagnosis.**	**Determine Specimens used for bacterial isolation**, **Isolation of bacteria by the Streak**, spread and pour plate method.
2	**Enterobacteriaceae-II**: **Salmonella - Klebsiella - Proteus:**	**Methods of enriched, selective and enrichment culture techniques** etc.
3	**Enterobacteriaceae-III**: -***Serratia - Yersinia:*** **Morphology, pathogenicity and laboratory diagnosis - *Yersinia* pestis and Plague. Vibrionaceae: - *Vibrios***	**Identification of Enterobacteriaceae:** Morphology, characteristic and Laboratory diagnostic tests
4	**Aeromonas (***Aeromonashydrophila***) and Plesiomonas. Campylobacters: - Helicobacter: - Pseudomonas:**	**Identification of Enterobacteriaceae. Identification of Staphylococci:** Morphology , characteristic and Laboratory diagnostic tests
5	**The Gram positive cocci: Staphylococci** (pyogenic cocci and coagulase-negative Staphylococcus): **Streptococci** (classification):	**Identification of Staphylococci: Continue Identification of Streptococci:** Morphology , characteristic and Laboratory diagnostic tests
6	**Gram Negative Cocci: Neisseria The Mycobacteria*: -Mycobacterium tuberculosis - Mycobacterium lepraeand*leprosy - Anti-tuberculosis treatment.**	**Identification of Streptococci:** Continue **Identification of Pseudomonas and Vibrios:** Morphology, characteristic and Laboratory diagnostic tests.
7	**Some other important bacteria: Overview: - *Hemophilus influenza*. – Bordetella and, Brucella**. **- *Bacillus anthracis* and, *Bacillus cereus.***	**Identification of Pseudomonas and Vibrios: Continue**
8	**Midterm Exam I.**	**Midterm Exam I.**
9	**Some other important bacteria (Continue):** *4.* ***Legionellae pneumophila*** 5. **Aeromonas, FrancisellaandBrucella**. 6. **Listeria** and **Erysipelothrix.** **7. *Corynebacterium diphtheria* and infections**.	**Identification of Mycobacteria:** Morphology, characteristic and Laboratory diagnostic tests.
10	**The Anaerobic Bacteria: *Clostridia :-*** Overview: non-spore forming anaerobes and the main biological characteristics	**Identification of Mycobacteria (Continue). Techniques of Anaerobiosis**
11	**The Spirochetes, Rickettsiae, Chlamydia, Actinomycetes, Mycoplasma and cell wall-defective bacteria: - Spirochetes and the diseases etc..**	**Identification of Microbes in Air, foods, Soil, an Water.**
12	***Rickettsiae* and the diseases: Chlamydia and the diseases:**	**Identification of Microbes in Air, foods, Soil, a Water: Continue**
13	**Mycoplasma and cell wall-defective bacteria:**	**Skin tests : Mantoux, Lepromin**
14	**Actinomycetes, Norcardiosis and Actinomycetoma**	**Automation in Microbiology**
15	**Some other important bacteria (Continue): *Legionellae pneumophila* - Aeromonas, Francisella** and **Brucella -Listeria** and **Erysipelothrix.*Corynebacterium diphtheria* and infections**.	**Identification of Mycobacteria:** Morphology, characteristic and Laboratory diagnostic tests.
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	ML633Immunology & Serology (II) MLL633Immunology & Serology Lab (II).	(2:2-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Prof. Abdulhamid Al kout PhD, (Immunology&Serology) Tel.: 00218913753493

(Email:dr.alkout@gmail.com), Department of MLS.

Eida Mohamed Elmansorry, PhD, (Immunology& Serology) , Tel.: 00218214623051

(Email:aia_m2004@yahoo.com), Department of MLS.

Prof. Abdulbaset abustta, PhD, (Immunology&Serology), Tel.:- 00218913254812

(Email:abustta@yahoo.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Immunology & Serology (II)	ML534	None	**Theoretical:** 2hrs.
Immunology & Serology Lab. (II)	ML534	ML633	**Practical:**2 hr.
Semester: 6th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims Study of Components of the immune system Innate and Adaptive immunity, Humoral immune response, Cellular immune response, Role of immune responses against intra- and extra-cellular pathogens, and make knowledge about harmful immune responses.

Reference Book

1. Ivan Roitt, Jonathan Brostoff and David Male (Ed.):*Immunology*, (3rd Ed.) 1993, Mosby-Year Book Europe Limited, London.
2. Laboratory Immunology and Serology, Neville J. Bryant, 3rd Edition.
3. Ivan Roitt: *Essential Immunology*, (8th Ed.) 1994, Blackwell Scientific Publication, London.

Teaching Learning Activities

The course content in Immunology& Serology II. Will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Seminars
5. Assignments

Prepared By:-

Abdulhamid Al kout PhD, (Immunology&Serology), Tel.: 00218913753493

Eida Mohamed Elmansorry, PhD, (Immunology& Serology) , Tel.: 00218214623051

Reviewed by:-

Prof. Abdulbaset abustta, PhD, (Immunology&Serology), Tel.:- 00218913254812

Syllabus Structure: -ML633/MLL633Immunology& Serology II. (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Generation of lymphocytes receptors Ⅰ:** Generation of T cell receptor ligands, diversity of T cell receptors against different antigens	**Agglutination tests**: direct agglutination, Haemagglutination (Blood Typing), Indirect agglutination (ASO, Widal test, CRP test, Brucellosis).
2	**Development and survival of lymphocytesⅡ**: Development of T lymphocytes.	**Agglutination tests:** Passive Agglutination, Agglutination inhibition reactions
3	**Immunological Tolerance:** Positive and Negative selection mechanisms, why our immune system do not react against self-tissues.	Coombs test
4	**Survival and maturation of lymphocytes in peripheral lymphoid tissues:** Lymphocytes are found in particular locations in peripheral lymphoid tissues.	**Precipitation reactions**: Double diffusion, Radial immunodiffusion Countercurrentimmunoelectrophoresis
5	**T cell mediated immunity:** Antigen presentation to T lymphocytes and role of MHC molecules.	**Immunoassays:** RIA, ELISA
6	**General properties of effector T cells:** Interaction of activated T cells with their target cells.	**Direct and Indirect** Immunofluorescences (dark stains)
7	**cell-mediated cytotoxicity:** Function of CD8 Tcells.	**Isolation of Lymphocytes**, Assay for cytotoxic T cells
8	**Midterm Exam I.**	**Midterm Exam I.**
9	**Humoral immune response:** B cells activation by helper T cells	**Immunohistochemistry**
10	**Immune system in health and disease:** Failures of Host defence mechanisms,immunodeficiency diseases,AIDS	**Heterophile antibodies**: VDRL test, Weil-Felix reaction, Paul Bunnel test
11	**Allergy and hypersensitivity:** Hypersensitivity type I,Ⅱ,III, IV.	**Testing for allergic responses**
12	**Auto immunity:** organ-specific and systemic autoimmune diseases.	**Rheumatoid arthritis test** **Antinuclear antibodies test**
13	**Transplantation:** Graft rejection is an immunological response	HLA Typing
14	**Manipulation of the immune response:** Basic concepts of anti-inflammatory drugs and immunosuppressive drugs.	Flow cytometry and FACS analysis
15	**Immunization and Vaccination: Types** of vaccines and their role in protective immunity.	**Immunoblotting**
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	ML632Diagnostic Hematology MLL632Diagnostic Hematology Lab.	(2:2-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Khaled Elbaruni, PhD, (Hematology) Tel.: 00218922826919

(Email:kelbaruni@yahoo.ie), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Diagnostic Hematology	ML532	None	**Theoretical:** 2hrs.
Diagnostic Hematology Lab.	ML532	ML632	**Practical:** 2 hr.
Semester: 6th	**Duration:16 Weeks**		**Credit Hours**: **3**

Course Main Aims: The course will provide the student with knowledge and understanding of hematological diseases and the key diagnostic methodologies used in laboratory.

Reference Book

Latest editions of the following books:

1. Essentials of Hematology by Haufbrand.
2. Practicals in Hematology by J.V. Dacie.
3. Medical Laboratory Technology by Lynch.
4. Wintrobe's clinical Hematology

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Group Discussions
3. Practical
4. Demonstrations
5. Clinical lab postings
6. Blood donation camps
7. Seminars
8. Assignments.

Syllabus Structure:-

Prepared By: -Khaled Elbaruni, PhD, (Hematology) Tel.: 00218922826919

Reviewed By: -Eman A. Abdulwahed, MSc, (Hematology) Tel: 00218214623051

Syllabus Structure: -ML632/MLL632Diagnostic Hematology(2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	***Introduction to anemias*** • Definition • Clinical features • Symptoms • Classification & Laboratory investigations	Microscopic examination of blood films
2+3	***Anemias caused by decreased or impaired production of RBCs*** • Iron deficiency anemia • Megaloblastic anemia • Sideroblastic anemia • Aplastic anemia	Serum iron, Serum ferritin, & TIBC
4+5	***Anemias caused by increased destruction of RBCs*** • Hereditary RBC membrane defects • RBC enzymopathies • Hemoglobinopathies • Thalassemias	Sickling Test Hemoglobin electrophoresis Osmotic fragility test G6PD Assay
6+7	***Miscellaneous erythrocyte disorders*** • Acute blood loss • Anemia of renal failure • Anemia of chronic infections • Anemia of endocrine disorders	
8	***Midterm Exam I**	**Midterm Exam I.**
9+10+11	***Leukocyte disorders*** Benign disorders of WBCs Malignant disorders of WBCs • Acute Leukemias • Chronic Leukemias	Differential white cell count
12+13+14	***Hemostasis & introduction to thrombosis*** • Normal hemostasis • Quantitative platelet disorders • Disorders of clotting factors	Principles and methods of assessment of coagulation: BT, CT, Prothrombin time, partial thromboplastin time,
15	***Laboratory evaluationof hemorrhages & thrombosis***	thromboplastin regeneration time.
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	**ML635MedicalParasitology II.** **MLL635Medical Parasitology II. Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Associate Prof. Aisha Gashout, PhD, (Medical Parasitology), Tel.: 00218214623051

(Email:a_gashout@hotmail.com), Department of MLS.

Prof. Jamal M. El Khoga, PhD, (MedicalParasitology), Tel.: 00218922826919

(Email:westcost2022@gmsail.com)(j.elkhoga@mt.uot.edu.ly), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Medical Parasitology II.	ML536	None	**Theoretical:** 2hrs.
Medical Parasitology II. Lab.	ML536	ML635	**Practical:** 2 hr.
Semester: 6th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: The course covers the general characteristics and morphological details of selected parasitic nematodes. In addition to the lectures, discussion will include previous publications, epidemiological, historical and evolutionary aspects of each organism of interest. A weekly laboratory will enable the student to learn the most frequently used techniques in diagnosis and research on these organisms.

Reference Book

Latest editions of the following books:

1. Text book of Parasitology by K.D. Chatterjee, Chatterjee medical Publishers,Calcutta.
2. Parasitic diseases in man by Richard Knight English Language Book Society. (ELBS)

Recommended Books.

10. Ash L, Orihel TC: Parasites: A Guide to Laboratory Procedures and Identification. American Society of Clinical Pathologists, Chicago, 1987.
11. Bogitsh BJ and Cheng TC: Human Parasitology. WB Saunders, Philadelphia, 1990.
12. Castro GA: Trematodes: schistosomiasis. p 1710. In Kelly WN (ed): Textbook of Internal Medicine. JB Lippincott, Philadelphia, 1989.
13. Hunter GW, Swartzwelder JC, Clyde DF: A Manual of Tropical Medicine. 5th Ed. WB Saunders, Philadelphia, 1976.
14. Jeffrey HC, Leach RM: Atlas of Medical Helminthology and Protozoology. Churchill Livingstone, Edinburgh, 1968.
15. Lee DL: The Physiology of Nematodes. Oliver and Boyd, Edinburgh, 1965.
16. Smyth JD: The Physiology of Trematodes. Oliver and Boyd, Edinburgh, 1966.
17. Schmidt GD, Roberts LS: Foundations of Parasitology. 3rd Ed. Times Mirror/Mosby College Publishers, St Louis, 1985.
18. Zamen V: Atlas of Medical Parasitology. Lea&Febiger, Philadelphia, 1979.

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Group Discussions
3. Practical
4. Demonstrations
5. Seminars
6. Assignments

Syllabus Structure:-

Prepared and Reviewed By:-

Prof. Jamal M. El Khoga, PhD, (MedicalParasitology), Tel.: 00218922826919

Aisha Gashout, PhD, (Medical Parasitology), Tel.: 00218214623051

Syllabus Structure:-ML635/MLL635Medical Parasitology. (2:3-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	Introduction to **Helminths**	**Examination of Stool Specimens:**
2	**Classification and Characteristics of Helminths**	**1**- Macroscopic direct examination of parasites
3	**I. Platyhelminths:** **- Cestodes**: 1. **Intestinal tapeworms of man** - *Taenia saginata* - *Taenia solium* (cysticerosis)	e.g. Ectoparasites : lice, tikes, medianworms, Banc proglottits, loa loa in subcojunctiual tissue.
4	**2. Extraintestinal larval tapeworms of man:** - *Echinococcus granulosus* - *Echinococcus multilocular*	**2-** Microscopic Examination Direct wet and Iodine stained procedures Concentı Technique
5	**II. Trematodes**: - **Characteristics** of Fluks	- Zinc flotation concentration Technique (Flota
6	**1. Intestinal** flukes: *Faschiola buski*. **2. Liver** flukes: *Clonorchis sinensis,* *Fasciola hepatica*	Techn.).Formalin-ethyl acetate concentration Tecl (Sedimentation Techn.) **Examination of sputum** or in bronchial-lavage
7	**3. Pulmonary** flukes: *Paragonismus westermani*	
8	*Midterm Exam I.	**Midterm Exam I.**
9	**4. Blood** flukes : *Schistosoma haematobium,* *S. mansoni,* *S. japonium*	***Examination of Blood and other body Fluids Specimens:*** - Direct Microscopic examination of parasites a) In blood (thin-thick blood film)
10	**Nematohelminths:- Characteristics** of Round worms	b) In stool (MIF stains) or urine.
11	**1. Intestinal Nematodes of man:** - *Stongyloides stercorali , Ascaris lumbricoides*	- Detection of Occult Blood
12	- *Enterobius vermiculalis* - *Ancylostoma duodenale and Necator americanus*	**Calibration of Ocular Micrometer to measure parasites**
13	**2. Blood and tissue Nematodes of man:**	- Immundiagnostic Techniques
14	- **Filariasis**: - *Wuchereria bancrofti* - *Loa loa* - *Onchocerca volvulus*	- Molecular biology methods
15	Revision	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	ML636Clinical Virology & Mycology MLL636 Clinical Virology& Mycology Lab.	(2:2-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Prof. Altabet A. Altaher , PhD, (Virology&Mycology), Tel:- 00218913223677

(Email:altabet.altaher@gmail.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Clinical Virology & Mycology	ML535	None	**Theoretical:** 2hrs.
Clinical Virology& Mycology Lab.	ML535	ML636	**Practical:** 2 hr.
Semester: 6th	**Duration:16 Weeks**		**Credit Hours**: **3**

Course Main Aims: This course will enable students to become familiar with most common viruses causing infections in man and animals. Also will enable him to become familiar as well with medically important fungi and to diagnose the infections caused by fungi.

Reference Book

Latest editions of the following books:

1. P.R. Murray, K.S. Rosenthal, G.S. Kobayashi and M.A. Pfaller: *Medical Microbiology* (8th Ed.) 2015, Mosby, St. Louis.
2. M. C. Timbury: *Notes on Medical Virology*, 1997, Churchill Livingstone, New Delhi.
3. D. Greenwood, R. C.B. Slack and J. F. Peutherer: *Microbiology* (15th Ed.) 2012, Churchill Livingstone, London.
4. B. A. Forbes, D. F. Sahm and A. S. Weissfeld*: Bailey & Scott's Diagnostic Microbiology* (11th Ed.) 2012, Mosby, St. Louis
5. P.R. Murray, K.S. Rosenthal, G.S. Kobayashi and M.A. Pfaller: *Medical Microbiology* (8th Ed.) 2015, Mosby, St. Louis.
6. J. Chander*: Textbook of Medical Mycology* (2nd Ed.) 2002, Mehta Publishers, Delhi.
7. Mackie and McCartney: *Practical Medical Microbiology* (14th Ed.) 1999, Churchill Livingstone, London.

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Group Discussions
3. Practical
5. Seminars
6. Assignments

Syllabus Structure:-

Prepared and Reviewed By:-

Prof. Altabet A. Altaher , PhD, (Virology&Mycology), Tel:- 00218913223677

Syllabus Structure: -ML636/ MLL636 Clinical Virology& Mycology (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Introduction to virology-** Classification, structure and general Properties of viruses.	**Laboratory diagnosis of viral infections-** Specimens collected, Processing of specimens, Different methods of diagnosis.
2	**Bacteriophage** – Phage typing.	
3	Orthomyxovirus, Paramyxovirus	**Microscopy, Demonstration of viral antigen**, Virus isolation,
4	**Hepatitis virus Hepatitis viruses A， B, C , D and E**	**Serology** e.g. ELISA, CFT,
5	**Retrovirus & Human Immunodeficiency virus**	Haemagglutination inhibition,
6	**Human Herpesvirus and Cancer Virus (HPV),** Athropod-borne and rodent-borne viral diease	**Neutralization, Western blotting, Agglutination,**
7	**Rabies virus, coronavirus, rubella virus & Prion**	**Precipitation, RIA, IFA**
8	**Midterm Exam I.**	**Midterm Exam I.**
9	**Introduction to mycology:** Classification, Structure and General properties of fungi, Classification of Mycoses,	**Needs for Starting a Medical Mycology Lab**, What are fungi, Structure differential between Moulds and yeasts
10	**Superficial cutaneous mycoses:** Malassezia infections, Tinea nigra.	**Collection, Transport and Processing of specimens & stains.**
11	**Superficial cutaneous Mycoses:** Dermatophytosis. Piedra,	**KOH preparation**
12	**Subcutaneous mycosis:** Sporortricosis, Chromoblastomycosis,	**Lacto Phenol Cotton Blue Mount**
13	**Systemic mycoses:** Histoplasmosis, Blastomycosis, Coccidioidomycosis,	**India ink preparation.**
14	**Opportunistic mycoses:** Candidiasis, Cryptococcosis, Aspergillosis.	**Germ tube test.**
15	Otomycosis, Mycotic Keratitis	**Fungal culture**: Preparation of culture media; Methods of culture and Study of colony characteristics.
16	***Midterm Exam II.**	***Midterm Exam II.**

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Second Year Fall Semester (6th)

LABORATORY (LAB)

LAB. MLL631Clinical Biochemistry (II)**(credit hour 1)**

MLS, Third Year, Sixth Semester
Chosen topics in Medicinal Laboratory(The Laboratory (NHS))

LAB. MLL634 Clinical Bacteriology **(credit hour 1)**

MLS, Third Year, Sixth Semester
Chosen topics in Medicinal Microbiology(The Laboratory (NHS))

LAB. MLL633Immunology and serology (II)**(credit hour 1)**

MLS, Third Year, Sixth Semester
Chosen topics in Medicinal Microbiology(The Laboratory (NHS))

LAB. MLL632Diagnostic Hematology**(credit hour 1)**

MLS, Third Year, Sixth Semester
Chosen topics in Medicinal Microbiology
(The Laboratory (NHS))

LAB. MLL635 Medical Parasitology (II) **(credit hour 1)**

MLS, Third Year, Sixth Semester
Chosen topics in Medicinal Microbiology
(The Laboratory (NHS))

LAB. MLL636Clinical Virology& Mycology**(credit hour 1)**

MLS, Third Year, Sixth Semester
Chosen topics in Medicinal Microbiology
(The Laboratory (NHS))

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Fourth YearSeventh Semester

Fourth Year (Senior)

Fall Semester (7th)

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
ML732	Diagnostic clinical chemistry	DR	3	ML631	-
MLL732	Diagnostic clinical chemistry lab				ML732
ML733	Diagnostic Medical Microbiology	DR	3	ML634& ML636	-
MLL733	Diagnostic Medical Microbiology lab				ML733
ML731	Immunohematology	DR	3	ML633	-
MLL731	Immunohematology lab				ML731
ML734	Diagnostic Molecular biology	DR	3	ML434	-
MLL734	Diagnostic Molecular biology lab				ML734
EL725	Infection control	EL	2	Senior	
EL726	Skills, presentations and research	EL	2	Senior	
Total Credits/hrs			16		

Syllabus Description :-

Course Number:	**ML732Diagnostic Clinical Chemistry** **MLL732 Diagnostic Clinical Chemistry Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Omar El-jerbi, PhD, (Diagnostic clinical chemistry), Tel.:- 00218925661019

(Email: om_eljerbi@yahoo.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Diagnostic clinical chemistry	ML631	None	**Theoretical:** 2hrs.
Diagnostic clinical chemistry Lab.	ML631	ML732	**Practical:**2 hr.
Semester: 7th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: Aims of this program to equip medical laboratory sciences graduates with skill in applied clinical diagnosis of human diseases using classical techniques and modern technology, this includes diagnostic evaluation. Laboratory and diagnostic tests are tools to gain additional information about the patient. By and of themselves, they are not therapeutic. However, when joined with a thorough history and a physical examination, these testes may confirm a diagnosis or may provide valuable information about a patient's status and response to therapy that may not be apparent from the history and physical examination alone. Generally, a tiered approach to test selections is used.

Reference Books:

1. Tietz Fundamentals of Clinical Chemistry, 6e (Fundamentals of Clinical Chemistry (Tietz))
2. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th Edition ... of Clinical Chemistry and Molecular Diagnostics.

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Practical
3. Clinical lab postings
4. Seminars
5. Assignments.

Syllabus Structure:-

Prepared andreviewedby: - Omer A. eljerbi, PhD, (Clinical Biochemistry), Tel.:- 00218925661019

Syllabus Structure: -ML732/MLL732Diagnostic Clinical Biochemistry (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Hormones:-** definition of hormones , Types of hormones, The role of the hormones , the hormones and regulation of blood glucose levels , The opposing effects of the hormones on glycogen metabolism , Action of the hormones, Endocrine action. etc.	
2	**Luteinizing hormone assay**: Normal values,Background, Explanation of test.	Estimation Iron and TIBC
3	**Aldosterone hormone**assay: Normal values,Background, Explanation of test, Clinical implications, Increased aldosterone values. etc.	Estimation Amylase Concentration
4	**Follicle Stimulating hormone Assay**: Normal values,Background, Explanation of test, Clinical implications, Increased FSH values, Decreased FSH values,**Interfering factors. Manganese assay**.	Estimation Manganese Concentration
5	**Parathyroid Hormone Assay**:Normal values,Background,Explanation of test, Clinical implications, Increased PTH values, Decreased PTH values.	Estimation magnesium Concentration
6	**Hormones:-** Thyroid Stimulating Hormone assay: Normal values ,	Estimation copper concentration
7	**Hormones:-** Adrenocorticotropic Hormone assay : Normal values , Background , Explanation of test , Clinical implications etc..	Estimation Zinc concentration
8	**Midterm Exam I.**	**Midterm Exam I.**
9	Estrogen Hormone assay: Normal values,Background, Explanation of test, Clinical implications, Increased Estrogen values, Decreased Estrogen values Interfering factors.	Estimation Aldolase concentration
10	**Progesterone Hormone assay** : Normal values , Background , Explanation of test , Clinical implications , Increased Progesterone values , Decreased Progesterone values , Interfering factors	Estimation Cholinesterase concentration
11	**Aldosterone assay :** Normal values , Background , Explanation of test , Clinical implications , Increased Aldosterone values , etc	
12	**Testosterone assay :** Normal values , Background , Explanation of test , Clinical implications , Increased Testosterone values	
13	**Arginine Vasopressin Hormone**: Normal values,Background, Explanation of test, Clinical implications, Increased AVP values, Decreased AVP values, Interfering factors.	
14	**Prolactin Hormone assay** : Normal values , Background , Explanation of test Clinical implications , Increased Prolactin values ,	Estimation of Ceruloplasmin
15	**Tumor Markers assay** : PTH , Prolactin , ACTH , Thyroglobulin, Calcitonin , CA125 , CA15.3 , BHCG , AFP , PSA , AFP , CEA . Normal values,Background, Explanation of test, Clinical implications, Increased values, Decreased values, Interfering factors.	
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	**ML733Diagnostic Medical Microbiology** **MLL733 Diagnostic Medical Microbiology Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Prof. Masaoud A. Elyousfi, PhD (Microbiology), Tel.:- 00218925171560

(Email:masoud.elyousfi@yahoo.com), Department of MLS.

Program: **(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Diagnostic Medical Microbiology	ML634 & ML636	None	**Theoretical:** 2hrs.
Diagnostic Medical Microbiology Lab.	ML634 & ML636	ML733	**Practical:**2 hr.
Semester: 7th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: This course Diagnostic Medical Microbiology is concerned with the etiologic diagnosis of infection and provides an introduction to Diagnostic Microbiology for the Laboratory Sciences that is essential for a career as a medical laboratory technologist.

Course Description:-

This course focus on microorganisms most important in clinical practice, diagnostic laboratory testing necessary for the accurate and rapid diagnosis of common microbial diseases and explains basic laboratory procedures, such as specimen collection and handling, microscopic examination, different staining techniques, culture on various types of media, identification using biochemical, molecular, and serological tests, and antimicrobial susceptibility testing.

The last part of the course covers diagnostic medical mycology, including properties of medically important fungi, pathogenesis, and laboratory diagnosis, and covers diagnostic medical virology topics including major families of human pathogens, laboratory diagnosis, prevention and therapy. Also covers diagnostic clinical laboratory testing necessary for the accurate and rapid diagnosis of common helminthic parasitic diseases, prevention, and control of parasitic diseases.

Required Textbook

1. **Diagnostic Microbiology. 5th Edition by Connie R. Mahon MS MT(ASCP) CLS** (Author), Donald C. Lehman EdD MT(ASCP) SM(NRM) (Author), George Manuselis Jr. MA MT(ASCP) (Author).ISBN-13: 978-0323089890

2**. Koneman's Color Atlas and Textbook of Diagnostic Microbiology (Color Atlas & Textbook of Diagnostic** Microbiology) 7th Edition. By Gary W. Procop MD MS (Author), Elmer W. Koneman (Author). ISBN-13: 978-1451116595.

Teaching Learning Activities

The course content will be covered by:

1. Lectures
3. Practical
4. Demonstrations
5. Clinical lab postings
7. Seminars
8. Assignments.

Syllabus Structure:-

Prepared and Reviewed By:-

Prof. Masaoud A. Elyousfi, PhD (Microbiology), Tel.:- 00218925171560

Syllabus Structure: -ML733/MLL733 Diagnostic Medical Microbiology (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Introduction to diagnostic microbiology:** Reviews the microorganisms most important in clinical Practice. Normal and transient flora of the human body. The job of the clinical microbiology laboratory.	**General Concepts in Specimen -Collection and Handling:** Introduction to specimen cultures: Common used and Types of Specimen. Common pathogens commensal flora in medical specimen. - Pre specimen processing: Laboratory procedures for specimens processing Differentiate between microbial flora of the human body and the human pathogens.
2	**Specimen and**. **Specimen collection:** Rejection Criteria: General Concepts in Specimen -Collection and Handling. Methods of collection and handling of different medical specimens.	**General Concepts in Specimen** - Collection and Handling: Continue.
3	**Laboratory Methods of diagnosis**: The different methods and techniques applied for the diagnosis of pathogenic microorganisms isolated from different clinical specimens. Introduction to procedures and identification techniques used to isolate and identify bacteria. Morphological, etc.	**General Concepts in Specimen -Collection and Handling: Continue.**
4	**Laboratory Methods of diagnosis:continue:** immunologic assay (Latex agglutination, EIA, ELIZA, Western Blot etc.).	**Methods of diagnosis:**Microscopic Examination of Infected Materials: Direct examination of specimens: Macroscopic and Microscopic Examination of specimens.
5	**Laboratory Methods of diagnosis:Continue:** PCR method (DNA/DNA, DNA/RNA hybridization).	**Methods of diagnosis:Continue:** Culture on the specific media and incubation under the suitable laboratory environment.. etc..
6	**Urinary Tract Infections (UTI).** **Infections of the CNS.**	**Methods of diagnosis:Continue:** API System Test. Antibiotic sensitivity testing.
7	**Upper and Lower Respiratory tract Infections.** **Bacteremia.**	**Methods of diagnosis: Continue: immunological identification:** Detecting antibodies: Precipitation, Agglutination, Haemagglutination
8	**Midterm Exam I.**	**Midterm Exam I.**
9	**Anaerobes of Clinical Importance.** **Gastrointestinal Infections and Food Poisoning**.	**Methods of diagnosis:Continue:** immunological identification: Western Blot, latex particle agglutination (slides), direct agglutination(slides) conglutination, and enzyme-linked immunosorbent assay (ELISA).
10	**Sexually Transmitted Diseases.** **Ocular Infections.**	
11	**Diagnostic Parasitology: Intestinal Protozoa.** **Intestinal Helminthes: Cestodes, Nematodes, Tremotodes**.	**Methods of diagnosis:Continue:** Exercises for amoebae and flagellates Exercises for plasmodia
12	**Diagnostic Parasitology: continue**	**Methods of diagnosis:Continue:** Exercises for helminthes eggs - Exercises for microfilariae
13	**Diagnostic Mycology**: clinical features, epidemiology, pathogenesis and laboratory diagnosis of the superficial, subcutaneous and systemic mycoses	**Methods of diagnosis:Continue:** Hyphae, Stains, Culture media, Culture and Isolation of fungi Techniques.
14	**Diagnostic Virology:** Virus propagation in vitro in tissue culture samples.	**Methods of diagnosis:Continue:** Determine Specimens used for viral isolation, antigen detection and molecular diagnostic.
15	Revision	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	**ML731Immunohematology** **MLL731Immunohematology Lab.**	**(2:2-3)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Eman Ali Abdulwahed, MSc, (Hematology) Tel: 00218214623051

(Email:dr.alkout@gmail.com), Department of MLS.

Eida Mohamed Elmansorry, PhD, (Immunology& Serology) , Tel.: 00218214623051

(Email:aia_m2004@yahoo.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Immunohematology	ML633	None	**Theoretical: 2hrs.**
Immunohematology Lab.	ML633	**ML731**	**Practical:2hr.**
Semester: 7th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: The aim of this course is to provide Student with a knowledge and understanding scientific basis of blood transfusion service, the diagnostic tools within contemporary blood banks, and major aspects of blood donation.Also to be familiar with Hematopoietic stem cell transplantation and their adverse reactions.

Reference Book

Latest editions of the following books:

1. Essentials of Hematology by Haufbrand.
2. Practicals in Hematology by J.V. Dacie.
3. Medical Laboratory Technology by Lynch.
4. Wintrobe's clinical Hematology

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Group Discussions
3. Practical
4. Blood donation camps
7. Seminars
8. Assignments

Syllabus Structure:-

Prepared By: -Eman A. Abdulwahed, MSc, (Hematology), Tel:- Tel: 00218214623051

Reviewed By: -Eida Mohamed Elmansorry, PhD, (Immunology& Serology), Tel.: 00218214623051

Syllabus Structure: -ML731/MLL731Immunohematology(2:3-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Blood Components and plasma derivatives:** Types of blood components that can be transfused.. **Blood donation, collection and processing**	**Basic blood banking procedures** – -Collection of blood - Anticoagulants used in blood collection bags, its volume, temperatures for preservation ,expiry date etc.
2	**Red blood cell antigens and antibodies** - ABO blood group systems – Identification of surface membrane antigen –Serum antibodies of different blood group- Clinical significant of ABO system - methods of demonstration. - Other blood groups.	**Techniques for ABO grouping** - Slide technique, Tube technique (Forward and Reverse grouping, Microplate technique and column agglutination technology. -Testing for A1 and A2 subgroups
3	**Platelet antigens:-** Antigen shared with red cells **-** Antigens shared with white cells **-** Platelet specific antigen	**Platelets counting**
4	**Hemostasis overview:** Blood vessel wall, Blood platelets quantity and quality, coagulation factors, Fibrinolytic system Natural coagulation inhibitors (anticoagulants)	**-Bleeding time** **-Prothrombin time** **- Thromboplastine time** **-Thromboctytes function**
5	**Rh system: - Rh antigens, Clinical significance of Rh antibodies - Rh genetics - Rh Antigen frequency**	**Techniques for Rh typing.** Slide, Tube technique, Albumin technique, etc. **Direct and indirect Coomb's test (AHG)**
6	**Antibody titration** • Importance of titration • Application of titration	**Titration of antibodies** Different dilution of serum for antibody titer estimation
7	**Modified blood components**	
8	**Midterm Exam I.**	**Midterm Exam I.**
9	**Pre-transfusion testing** • Antibody screening and identification • Cross Matching (CM)/(XM)	**Antibody Screening technique** - Tube method, Column agglutination system, Solid phase technique - Interpretation of antibody screening test
10	**Rational use of blood components**	**Cross Matching:-** Saline agglutination test **-** Importance of adding albumin & papain enzyme **-** Low ionic strength saline (LISS) test **-** Antiglobulin test
11	**Hematopoietic stem cell transplantation:** **-Introduction – causes -** Types of transplants - Graft versus host reactions -Transfusion reactions: RBCs , Platelets, WBCs	
12	**Adverse effects of blood transfusion**	
13	**Blood transfusion in special situations:- -** Immune hemolytic anemia **-** Sickle cell disease **–** Thalassemias **-** Patients with IgA deficiency **-** Massive blood loss	
14	**Neonatal and pediatric transfusion**	
15	**Quality management in blood banks**	
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

Course Number:	ML734Diagnostic Molecular Biology MLL734Diagnostic Molecular Biology Lab.	(2:2-3)

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Abir Mabruk M. Benashur, MSc, (Molecular Biology) Tel.: 00218214623051

(Email:abirjori@gmail.com). Lecturer, Department of MLS.

Abdulwahab A. Al.Deib, PhD, *(*Molecular Biology) Tel.: 00218926428134

(Email:abdula1959@yahoo.com.br). Lecturer, Department of MLS.

Najla Amer Elyounsi, MSc,(Molecular Biology), Tel:-00218922767304

(Email:najla.elyounsi@yahoo.com), Department of MLS.

Program: **(MLS)**

Course:	**Prerequisite**	***Co requisite***	
Diagnostic Molecular Biology	ML434	None	**Theoretical:** 2hrs.
Diagnostic Molecular Biology Lab.	ML434	ML734	**Practical:**2 hr.
Semester: 7th	**Duration:** 16 Weeks		**Credit Hours**: 3

Course Main Aims: By the end of the course, students should be able to understand principle of molecular genetics. Secondly to Know methods and techniques in diagnostic & study of molecular biology.

Reference Book

1- **Watson, Baker, Bell, Gann, Levine, Losick. 2004**. Molecular biology of the Gene. 5th ed. Pears
2- Molecular Diagnostics: Fundamentals, Methods & Clinical applications **(2007). Lele Buckingham and Maribeth L. Flaw**
3- Molecular Diagnostics for the Clinical Laboratorian **2Ed. 2006, W.B. Coleman. Humana Press.**
4- Human Molecular Genetics by **Tom Strachan and Andrew Read (3rd edition, 2004, Garland Science)**

Teaching Learning Activities

The course content in Molecular Biology will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Practical
4. Demonstrations
5. Seminars
6. Assignments

Syllabus Structure:-

Prepared By: -Abir Mabruk M. Benashur, MSc, (Molecular Biology) Tel.: 00218214623051

Reviewed By: -Abdulwahab A. Al.Deib, PhD, *(*Molecular Biology) Tel.: 00218926428134

Syllabus Structure: -ML734/MLL734Diagnostic Molecular Biology (2:2-3)

	Theoretical Content	Practical Content
Week	**General Objective**	
1+2	**General introduction of Molecular Biology and Review** a. Nucleic Acid & DNA Structure b. Chromosome Structure & Function c. Genome Organization: RNA & Protein Coding Genes d. Regulation of Gene Expression	**Overview of sterile techniques,** preventing contamination, use of pipetting, and DNA extraction.
3+4	**Genetic Tools for Molecular Diagnosis-I** a. Restriction Endonucleases; DNA Cloning b. DNA Amplification c. Polymerase Chain Reaction and types d. PCR cloning e. PCR primer design f. Genetic Markers	**Amplification of a specific genomic target by the polymerase chain reaction (PCR)** It will be amplifying a selected target region of the nuclear gene, Subsequently; it will use the PCR product as template in sequencing. For a PCR reaction, it need to combine, in the correct relative amounts: - DNA template - the 2 target-specific primer – buffer - dNTPs - *Taq* polymerase
5+6	**Genetic Tools for Molecular Diagnosis -I** a. DNA libraries b. DNA sequencing c. Nucleic Acid Hybridizations: Principles d. Nucleic Acid Hybridizations: Applications	**- PCR products Purification for Sequencing:-** Methods for purifying PCR products**:-** Ethanol precipitation **-** Column purification- Gel extraction (Qiagen kit) **Agarose gel analysis of purified PCR Prod.**
7	**Review**	**Review**
8	***Midterm Exam I.**	***Midterm Exam I.**
9+10	**Molecular Diagnostic Applications** a. Chromosomal studies b. Identification of specific DNA sequences c. Identification of gene expression d. Gene microarrays, DNA microarrays e. Genetic Mapping	**- Quantification of PCR products** a. Nanodrop quantitation of purified PCR product Accurately quantify the purified PCR product using the "Nanodrop" UV spectrophotometer
11+12	**Diagnosis of Inherited Diseases-I**	**Sequencher DNA sequencing assembly and analysis software:-** DNA sequence identification and analysis using online and local software tools The basic local alignment search tool (BLAST)
13+14	**Sex determinations:-** using genetic tools Identification of unknown human body by genetic tools	Revision
15	Revision	Revision
16	***Midterm Exam II.**	***Midterm Exam II.**

Syllabus Description :-

***Course Number:**	**EL725 Infection control** **ELL725 Infection control Lab.**	**(2:0-2)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,

Prof. Abdulhamid Al kout PhD, (Immunology & Serology), Tel.: 00218913753493

(Email:Dr.Alkout@gmail.com), Department of MLS.

Program:**(MLS)**

Course:	**Prerequisite**	***Co requisite***	
EL725 Infection control	Senior	None	**Theoretical:** 2hrs.
ELL725 Infection control Lab.	Senior	EL725	**Practical:-**
Semester: 8th	**Duration:** 16 Weeks		**Credit Hours**: 2

Course Main Aims: The main objective is to ensure that all student are aware and understanding of the highest standards of infection prevention and control, thus preventing the spread of infections to patients and medical staff.

Reference Book

1. Prevention of hospital acquired infections, apractical guide 2nd edition , world health organization.
2. Health and Safety at Work etc. Act 1974. (c. 37) 1974. Available from: http://www.legislation gov.uk/ukpga/1974/37/contents. *(Guideline Ref ID HSW1974)*
3. Centers for Disease Control and Prevention (CDC) Evaluation of safety devices for preventing percutaneous injuries among health-care workers during phlebotomy procedures--Minneapolis-St. Paul, New York City, and San Francisco, 1993–1995. MMWR - Morbidity & Mortality Weekly Report. 1997;46(2):21–25. *(Guideline Ref ID CDC1997)*

Teaching Learning Activities

The course content will be covered by:

1. Lectures
2. Group Discussions
3. Practical
4. Clinical lab postings
5. Blood donation camps
6. Seminars
7. Assignments

Syllabus Structure:-

Prepared By: -Prof. Abdulhamid Al kout PhD, (Immunology&Serology), Tel.: 00218913753493

Syllabus Structure:-

Prepared By: -Prof. Abdulhamid Al kout PhD, (Immunology&Serology), Tel.: 00218913753493

Syllabus Structure: EL725 / ELL725Infection control (2:0-2)

	Theoretical Content	Practical Content
Week	**General Objective**	
1	**Introduction and Definitions**	
2	**Standard Precaution** -Hand Hygiene - Personal Protective Equipment - Safe Handling and Disposal of Sharps - Waste Segregation - Decontamination of re-usable equipment - Management of a Clean, Clinical Environment	
3	**Hand Hygiene Procedure** The Importance of Hand Hygiene The microbiology of the hands Types of hand decontamination and Cleansing Agents - Facilities for hand washing	**Detection of microorganisms on hands of student**
4	**Cleaning and Disinfection Procedure: -** Cleaning Disinfection - Deep Clean Procedures - Management of Blood and Body Fluids Spillages	Soap, alcohol and detergent test
5	**Decontamination**:- Levels of decontamination Cleaning – Disinfection – Sterilisation - Appropriate method of decontamination - Environment and equipment requirements for the - decontamination process - Decontamination by manual cleaning	**Different Surface swabs for culture**
6	**Sharps and medical waste Management-** Needle and Syringe Management - Prevention of Inoculation Injury - Action to be taken following Contaminated Sharps injury - Management of Significant Exposures	**Discussion groups**
7	Uniform and Work wear Common to all Patient Facing Staff Uniformed Staff Non Uniformed Staff	**Discussion groups for impotent of uniforms**
8	*Midterm Exam I.	Midterm Exam I.
9	**Nosocomial infection I** Epidemiology of nosocomial infection	
10	**Nosocomial infection II** Infection control programmers	
11	**Outbreaks** Identifying and investigating an outbreak	**Cultures and colony characteristic of** Pseudomonas
12	**Prevention of common endemic nosocomial infections (I) -** Urinary infection - Surgical wound infections - Nosocomial respiratory infection	**Cultures and colony characteristic of Khalibsilla** spp - Cultures and colony characteristic of Acinetobacter
13	**Prevention of common endemic nosocomial infections (II)** Nosocomial respiratory infection Antimicrobial resistance	Cultures and colony characteristic of MRSA
14	**Preventing infection of staff (I)** Exposure to HIV , Hepatitis B and C virus Other blood borne disease	**Detection of HIV, Hepatitis,…… etc.,**
15	**Preventing infection of staff (II)** Exposure to Neisseria meningitides Exposure to Mycobacterium tuberculosis Other infection	**Selective test for *Neisseria meningitides*** and Mycobacterium tuberculosis
16	***Midterm Exam II.**	***Midterm Exam II.**

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Second Year Fall Semester (7th)

LABORATORY (LAB)

LAB. MLL732 Diagnostic clinical chemistry **(credit hour 1)**

MLS, Fourth Year, Seventh Semester
Chosen topics in Medicinal Microbiology (The Laboratory (NHS))

LAB. MLL733Diagnostic Medical Microbiology **(credit hour 1)**

MLS, Fourth Year, Seventh Semester
Chosen topics in Medicinal Microbiology (The Laboratory (NHS))

LAB. MLL731Immunohematology （credit hour 1）

MLS, Fourth Year, Seventh Semester
Chosen topics in Medicinal Microbiology (The Laboratory (NHS))

LAB. MLL734Diagnostic Molecular biology **(credit hour 1)**

MLS, Fourth Year, Seventh Semester
Chosen topics in Medicinal Microbiology (The Laboratory (NHS))

***LAB.**ETL725 Infection **Control (credit hour 1)**

MLS, Fourth Year, Seventh Semester
The course will betaken at
(The Laboratory (NHS))

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Fourth YearSecond Year Fall Semester (8th)

Fourth Year （Senior）

✳Spring Semester （8th）Clinical Practice

Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
ML841	Clinical biochemistry practice	DR	4	**ML732**	-
ML842	Clinical immunohematology practice	DR	4	**ML731**	-
ML843	Clinical hematology practice	DR	4	**ML632**	-
ML844	Clinical microbiology practice	DR	4	**ML733**	-
ML835	Student Project		3	**Senior**	-
Total Credits/hrs			**19**		

Syllabus Description :-

Course Number:	**ML835Student Project& research method**	**(0:8-8)**

Administrator Office:

Faculty of Medical Technology, Tripoli University, Department of MLS), Tel: 00218214623051

Contacts:

If you have questions about the course or its content contact the Course Coordinator,
Department of Medical Laboratories Sciences, Tel.: 00218214623051
(Email:westcost2022@gmsail.com), Department of MLS.

Program: **(MLS)**

Course:	**Prerequisite**	***Co requisite***	
ML835 Student Project & research method	Senior	Senior	**Theoretical:-** **Practical:8 hr.**
Semester: 8th	**Duration:** 16 Weeks		**Credit Hours**

Syllabus Structure:-ML835Student Project&Research method(0:8-8)

Project work

MLS, Fourth Year, Eighth Semester

Contacts:

If you have questions about the course or its content contact the Course Coordinator,
Department of Medical Laboratories Sciences, Tel.: 00218214623051
(Email:westcost2022@gmsail.com), Department of MLS.

ML835 Student Project(Credit hours 3)

Prerequisite:Completion of Courses to end of Year 3 (Complete 6 Semesters) or approval of the Chair of the Department Allocated time of clinical hours will be spent by students *in* hospital laboratories, in order to acquire experience with the techniques and practice of medical laboratory technology. Specific training will include phlebotomy. *Students* will *rotate* through the different laboratories where their activities will be evaluated by academic and *training* supervisors.

THE CONTENT OF SYLLABUS

(B.Sc. MLS)

Second Year Fall Semester (8th)

LABORATORY (LAB)

MLS, Fourth Year, Eighth Semester
The course will be taken at the Laboratory (NHS)

BC323 Biochemistry I.

Prerequisite: **CH152;** *Co-requisite None*

Initially the course focuses on the structure and function of proteins, nucleic acids, carbohydrates and lipid, including the detailed structure of membranes, chromosomes and mitochondria. Mechanisms involved in protein synthesis, RNA maturation, enzyme activity, intermediary metabolism and oxidative phosphorylation are key topics.

BCL323 Biochemistry I. Laboratory

Prerequisite: **CHL152 Lab.** *Co-requisite* **BC323**

The emphasis will be on the application of biochemical knowledge to the diagnosis and treatment of disease following an introduction to the structure-function relationships of nucleic acids, proteins, carbohydrates and lipids. Applied topics will include action of chemotherapy agents, inherited diseases, diabetes, nerve and muscle wasting diseases.

MB334 General Microbiology

Prerequisite: **BI153**; *Co-requisite None*

This course serves as an introduction to microbiology, microbial physiology, metabolism and genetics, distribution and the impact of microorganisms on the health and well-being of humans, animals and plants.

MBL334 General Microbiology Laboratory

Prerequisite: **BIL153 lab.** ; *Co-requisite* **MB334**

Practical sessions will cover culturing of microorganisms from natural samples, isolation, identification, classification and staining techniques. Students will experience preparation of microbiological culture media, sterilization and antiseptic techniques and an antibiotic sensitivity test.

AN332 Anatomy

Prerequisite:**BI153,***Co-requisite None*

The course focuses on the fundamentals of human anatomy, with emphasis on anatomical aspects of respiration, circulation, neural and hormonal coordination, water balance, metabolism, thermoregulation and responses to special environments.

ANL332 Anatomy Laboratory

*Prerequisite***BIL153Lab.**, *Co-requisite* **AN332**

The practical course focuses on the structure of the different systems of the human body including the circulatory, nervous, digestive, urinary and endocrine systems and skeletal muscle.

PS336 Physiology

Prerequisite:**BI153,***Co-requisite None*

The course focuses on the fundamentals of human physiology, with emphasis on functional aspects of respiration, circulation, neural and hormonal coordination, water balance, metabolism, thermoregulation and responses to special environments.

PSL336 Physiology Laboratory

*Prerequisite***BIL153Lab.**, *Co-requisite* **PS336**

The practical course focuses on the function of the different systems of the human body including the circulatory, nervous, digestive, urinary and endocrine systems and skeletal muscle.

HS335 Histology

Prerequisite:**BI153,***Co-requisite None*

The course focuses on the fundamentals of

HSL335 Histology Laboratory

*Prerequisite***BIL153Lab.**, *Co-requisite* **HS335**

The practical course focuses on

ML331 Analytical Chemistry I.

Prerequisite: **CH152;** *Co-requisite None*

This course covers the theory and practice of gravimetric, volumetric, titrimetric and photometric techniques; with an introduction to electrochemistry and instrumental methods of quantitative analysis.

MLL331 Analytical Chemistry I. Laboratory

Prerequisite: **CH152 Lab;** *Co-requisite* **ML331**

Basic analytical methods gravimetric, titrimetric' electrometric and photometric methods.

Spring semester (4th)

BC433 Biochemistry II.

Prerequisite: **BC323;** *Co-requisite None*

This course is just a continuation to the course of **Biochemistry I**. By the end of this course, medical laboratory students should be able to define Biochemistry of enzymes and understand the bases of enzymology, the main lipids that have physiological and/or medical significance, bases of human and nutrition and digestion, main pathways of metabolism and production of chemical energy.

BCL433 Biochemistry II. Lab

Prerequisite: **BC323;** *Co-requisite* **BC433**

The emphasis will be on the application of biochemical knowledge to the diagnosis and treatment of disease following an introduction to the structure-function relationships of nucleic acids, proteins, carbohydrates, lipids and enzymes.

ML431 Analytical Chemistry II.

Prerequisite: ML331; *Co-requisite None*

The major objective of this course is to provide a rigorous background in those chemical principles that particularly important to analytical chemistry. A second aim is to introduce a wide range of techniques of modern analytical chemistry. A final goal is to teach those Laboratory skills, that will give students confidence in their ability to obtain high quality analytical data.

MLL431 Analytical Chemistry II. Lab.

Prerequisite: ML331; *Co-requisite* ML431

Basic analytical methods gravimetric, titrimetric' electrometric and photometric methods.

ML435 Molecular Biology

Prerequisite: BC323&BI153; *Co-requisite None*

This course will examine the molecular basis of cellular processes, with emphasis on gene structure and function, DNA replication, transcription and translation, gene expression and regulation, genetic engineering and genetic diseases that will be studied in theory and in the practical laboratory sessions.

MLL435 Molecular Biology Lab.

*Prerequisite*BC323&BI153; *Co-requisite* ML435

Here, students participate in doing basic experiments in molecular biology; this includes DNA transformation, plasmid

ML432 Histopathology I.

Prerequisite: HS335;*Co-requisite None*

This course provides the learner with an introduction to the basic knowledge and techniques necessary for the study of Histo-technology including the preparation and staining of tissue specimens.

MLL432 Histopathology I. Lab

Prerequisite: HS335; *Co-requisite* ML432

Laboratory sessions introduce the learner to the use of fixation, embedding, microtomy, and staining. The procedures introduced in this course will enable learners to perform histological specimen examinations used in the laboratory investigation and diagnosis of disorders of the body systems.

***EL436 Safety & Lab Management**

Prerequisite: None; *Co-requisite None*

Various methods covering the topics mentioned in Safety & Lab Management courses. Course presents the current organizational and management practices as they apply in the modern Laboratory services. , it will establish the basic safety principles for laboratory procedures, equipment and work practices. This course is designed to help reduce the possible incidence of chemical source illness and injuries.

***EL434 Medical Lab. Instrumentation**

*Prerequisite:***MP243;** *Co-requisite None*

Various methods covering the topics mentioned in Medical Lab. Instrumentation courses. The course will provide a good knowledge to students and create professional technicians to make full medical analysis in the lab.

Fall Semester (5th)

ML531 Clinical Chemistry 1.

*Prerequisite:*BC433; *Co-requisite None*

It is hoped that it will particularly to students training in clinical pathology, to hospital biochemists, and to laboratory technicians.

MLL531 Clinical Chemistry 1. Laboratory

Prerequisite: BC433 ; *Co-requisite* ML531

On completion of this course, the successful student will have a good knowledge and understanding of the routine tests undertaken by clinical chemistry laboratory and more importantly, the clinical significance of such testes.

ML535 Clinical Microbiology

Prerequisite: MB334; *Co-requisite None*

The course aims to place the study of infectious disease in a clinically relevant context. Students will study systemic infection, covering diagnostic procedures used in clinical specimens from patients according to human organ systems. Procedures for diagnosis of infectious agents including viruses, fungi, parasites and bacteria will be studied.

MLL535 Clinical Microbiology Lab.

Prerequisite: MB334; *Co-requisite* ML535

The emphasis of the lab will be on isolation and identification of infectious agents of human diseases including pathogenic bacteria, fungi, parasites and viruses according to body systems. General investigations will be carried out for urine, stool and body fluids i.e. spinal, synovial, pleural, pericardial, abdominal and seminal fluids.

ML534 Immunology and Serology I.

*Prerequisite:*MB334; *Co-requisite None*

Introduction to the basic concepts of immunology, types of immunity, the immune response, the immune system, structure and function of antigens and antibodies, immunopathology and clinical applications of the immunological techniques in the modern diagnostic Serology laboratory.

MLL534 Immunology and Serology I. Lab.

Prerequisite: MB334; *Co-requisite* ML534

Apply for diagnostic serologic techniques that aid in the identification of causative agent(s) in the clinical lab including agglutination (including latex) and precipitation (liquid and gel). Tissue culture and testing of immunity status are also discussed.

ML532 General Hematology

Prerequisite: PS336; *Co-requisite None*

This course provides the learner with an introduction to the basic knowledge and techniques necessary for the study of Hematology including the morphology of blood cells and the preparation, staining, and examination of peripheral blood films.

MLL532 General Hematology Lab

*Prerequisite:*PS336; *Co-requisite* **ML532**

Laboratory sessions introduce the learner to the use of the microscope, blood film preparation, staining and identification of blood cells. The procedures introduced in this course will enable learners to perform hematological specimen examinations used in the laboratory investigation and diagnosis of disease.

ML536 Medical Parasitology I.

Prerequisite: MB334; *Co-requisite None*

Introduction and Protozoa, general characteristic; morphology, blood and intestinal parasite will cover the medically and economically important of parasites and classification of medically important protozoa.

MLL536 Medical Parasitology I. Lab

Prerequisite: MB334; *Co-requisite* ML536

Introducing the skills of proper lab procedures for identifying, collecting, handling examining and diagnosing of parasitic infections.

ML533 Histopathology II.

Prerequisite: ML432; *Co-requisite None*

A course that includes a series of lectures and demonstrations on cell biology, a review of normal histology of various human organs, Students will be able to prepare staining reagent and perform tissue processing, section cutting, stain tissue section, handle frozen section and museum sample

MLL533 Histopathology II. Lab.

*Prerequisite:*ML432; *Co-requisite* ML533

Laboratory handling Practical aspect of laboratory management hazards and safety in histopathological laboratory techniques.

Spring Semester (6th)

ML631 Clinical Biochemistry II.

Prerequisite: ML531; *Co-requisite None*

Analysis of body fluids is described and the analytical findings related to disease condition. Techniques used to identify systemic disease of pancreas; liver and cancer are explained. Investigation of the endocrine systems focuses on growth disorders, thyroid and adrenal problems and gonad functions.

MLL631 Clinical Biochemistry II. Lab

Prerequisite: ML531; *Co-requisite* ML631

This is a continuation of Clinical Chemistry Laboratory 1 with emphasis on moreinvolved and intricate biochemical testing procedures. An in depth study and testing of carbohydrate imbalance, lipid profile, acid-base balance, electrolytes, cardiac enzymes, hormones, therapeutic drugs, toxicology, and instrumentation will be covered-

ML634 Clinical Bacteriology

Prerequisite: ML535; *Co-requisite None*

Introduction to prokaryotic cells, criteria used in differentiation and classification of bacteria, medical and economic importance of bacterial to man and the environment with emphasis on the bacteria that cause human disease and the methods used for diagnosis of such bacterial disease.

MLL634 Clinical Bacteriology Lab

*Prerequisite:*ML535; *Co-requisite* ML634

Practical sessions will cover methods of isolation and identification of pathogenic bacteria that cause human diseases by using rich, selective and differential culture media. Other bio-chemical and serological methods for diagnosis.

ML633 Immunology and serology II.

Prerequisite: ML534; *Co-requisite None*

Study of Components of the immune system Innate and Adaptive immunity, Humoral immune response, Cellular immune response, Role of immune responses against intra- and extra-cellular pathogens, and make knowledge about harmful immune responses.

MLL633 Immunology and serology II.Lab

Prerequisite: ML534; *Co-requisite* ML633

Upon successful completion of this course, the student should be able to State the principle of the routine serologic procedures performed in the clinical laboratory. ; evaluate laboratory test outcomes and determine the validity of the test results obtained and maintain a safe laboratory environment by proper handling, use and disposal of samples, reagents and equipment.

ML632 Diagnostic Hematology

Prerequisite: ML532; *Co-requisite None*;

The course will provide the student with knowledge and understanding of hematological diseases and the key diagnostic methodologies used in their investigation.

MLL632 Diagnostic Hematology Lab.

Prerequisite: ML532; *Co-requisite* ML632

Lecture and laboratory course integrates theory with application of hematology and hemostasis diagnostic procedures, interpretation, problem solving and correlation of laboratory findings with disease states.

ML635 Medical Parasitology II.

Prerequisite: ML536; *Co-requisite None*

Discuss the various types of parasites and hosts. Explain the relationship between a parasite and the host and their effects, discuss in detail the classification of medically important parasites; explain the difference between the Cestodes, Nematodes; Trematodes and protozoa.

MLL635 Medical Parasitology II. Lab

Prerequisite: MT01636 *Co-requisite* ML635

This course is designed to provide students with knowledge of the biology of Helminthes parasites & practice the basic skills and techniques as well as the quality control of stool examination.

ML636 Clinical Virology & Mycology

Prerequisite: ML535; *Co-requisite None*

The course introduces the basic principles of virology - definition, structure, nomenclature and classification of viruses - modes of viral infections, viral diseases and viral vaccines. The course will cover the different kinds and types of fungi (yeast and mold). Additionally, discusses their disease spectrum mode of infection, gross requirements.

MLL636 Clinical Virology & Mycology Lab

Prerequisite: ML535; *Co-requisite* ML636

The lab will cover methods of isolation of viruses in tissue culture, chick embryo and lab animals. Other methods of viral identification will be used including FA technique, ELISA, PCR and serological methods. Furthermore, cultural and non-cultural methods of identifications as well as antifungal drugs and susceptibility testing of fungi.

*Fall Semester (7th)

ML732 Diagnostic Clinical Chemistry

Prerequisite: ML631; *Co-requisite None*

This program to equip medical laboratory sciences graduates with skill in applied clinical diagnosis of human diseases using classical techniques and modern technology, this includes diagnostic evaluation.

MLL732 Diagnostic Clinical Chemistry lab

Prerequisite: ML631; *Co-requisite* ML732
Basically, laboratory and diagnostic tests are tools to gain additional information about the patient. By and of themselves, they are not therapeutic.Course deals with different laboratory investigations for hormones and evaluates different techniques in diagnosis.

ML733 Diagnostic Medical Microbiology

*Prerequisite:*ML636&ML634; *Co-requisite None*
This course Diagnostic Medical Microbiology is concerned with the etiologic diagnosis of infection and provides an introduction to Diagnostic Microbiology for the Laboratory Sciences that is essential for a career as a medical laboratory technologist. This course focus on microorganisms most important in clinical practice, diagnostic laboratory testing necessary for the accurate and rapid diagnosis of common microbial diseases and explains basic laboratory procedures.

MLL733 Diagnostic Medical Microbiology Lab

*Prerequisite:*ML636&ML634; *Co-requisite* ML733
Laboratory diagnosis, prevention and therapy. Also covers diagnostic clinical laboratory testing necessary for the accurate and rapid diagnosis of common helminthic parasitic diseases, prevention, and control of parasitic diseases.

ML731 Immunohematology

Prerequisite: ML633; *Co-requisite None*
A course that consists of lectures in basic immunology, including types of immune responses, cells of the immune response, antigens, antibodies, and complement system, as well as basic principles in blood banking and transfusion medicine.

MLL731 ImmunohematologyLab

Prerequisite: ML633; *Co-requisite* ML731
Several of laboratory techniques that used in a number of tests, such as routine blood transfusion, cross match, Rh and HIV; HBV and HCV.

ML734 Diagnostic Molecular biology

Prerequisite: ML434*; Co-requisite None*
Introduction and understand principle of molecular genetics. Further, to expand student knowledge in new methods and techniques in diagnostic & study of molecular biology.

MLL734 Diagnostic Molecular biology Lab

*Prerequisite:*ML434; *Co-requisite* ML734
The lecturers of the Department allocated time of clinical hours will be spent by students in hospital laboratories, in order to acquire experience with the techniques.

ML725 Infection Control

*Prerequisite:*Senior; *Co-requisite None*
The main objective is to ensure that all students are aware and understanding of the highest standards of infection prevention and control, thus preventing the spread of infections to patients and medical staff.

MLL725 Infection Control Lab

*Prerequisite:*Senior; *Co-requisite* MT01856
Practice on the application of infection control at the hospital and /or laboratory. Uses of manual for procedures of infection control.

Spring Semester 8th

ML841 Clinical biochemistry Practice

***Prerequisite*:**MLL732; *Co-requisite* none

ML842 Clinical Immunohematology Practice

***Prerequisite*:**MLL731; *Co-requisite* none

ML844 Clinical Microbiology Practice

***Prerequisite*:**MLL733; *Co-requisite* none

ML835 Student Project

*Prerequisite:*Senior; *Co-requisite* Senior
Research project carried out independently by the student usually in a clinical laboratory environment, which has been used for the Clinical Practice studies. A member of department who will then serve as supervisor in cooperation with clinical hospital at the laboratory will approve research topic.

REFERENCES

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2. **VEER NARMAD SOUTH GUJARAT UNIVERSITY**, SURAT-7 Syllabus of F.Y. B.Sc. Medical Technology(As per CBCS) Effective from June – 2014.

3. **Vidyasagar University** (Syllabus in semester system of M.Sc. in Bio-Medical Laboratory Science and Management (http://www.vidyasagar.ac.in/Downloads/ShowPdf.aspx?file=/pg_syllabus/bmls.pdf).

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5. **Science Laboratory Technology**, National Diploma (ND) Curriculum and Course Specifications NATIONAL BOARD FOR TECHNICAL EDUCATION Federal Republic of Nigeria UNESCO – Nigeria Project 2004.

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7. **CURRICULUM POKHARA UNIVERSITY 2006**, Bachelor of Science in Medical Laboratory Technology (B.Sc. MLT).

8. **STATE MEDICAL FACULTY OF WEST BENGAL**, REVISED COURSE SYLLABUS (2012): DMLT [TECH] COURSE EFFECTIVE FROM THE ACADEMIC SESSION 2013.

9. **Sudan International University** Faculty of Medical Laboratory Sciences B.Sc. Medical Laboratories Sciences Course Description Semester Three 2012/2013.

10. **TRIPURA UNIVERSITY**, FULL TIME D I P L O M A COURSE IN MEDICAL LAB TECHNOLOGY (3RD – 6TH SEMESTER)CURRICULAR STRUCTURE AND SYL LABITRIPURA UNIVERSITY.

11. **Vidya Vikas Education Society's Vikas Night College of Arts, Science** and Commerce Kannamwar Nagar-2, Vikhroli (East), Mumbai 400083 Bachelor of Vocation (Medical Laboratory Technology) B.Voc. (MLT) Syllabus.

12. **Punjab Technical University**, B.Sc. Medical Laboratory Sciences, Batch 2011.

13. **Berhanu Seyoum, Haramaya University,**In collaboration with the Ethiopia Public Health Training Initiative, The Carter Center, the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education December 2006.

14. University of Sharjah (CATALOG), 2004 – 2005, Sharjah, United Arab Emirates.

15. **HUMAN PHYSIOLOGY -** BIO 3200 (001) COURSE SYLLABUS – SPRING/SUMMER 2020
WAYNE STATE UNIVERSITY.

16. **Syllabus for Biology 231 (Crowther) Spring 2020 , Biology 231:** Human Anatomy – Syllabus for Spring 2020.

17. Program of Medical Laboratory Sciences PART I. version 2016/2017, Jamal M. El khoga. 2017.

Study Plan for the
B.Sc. Degree In Medical Laboratory Sciences, (B.Sc. MLS)

CURRICULUM STRUCTURE AND TOTAL CREDIT HRS (106)

	Code No.	Course Title	Type	Credits/hrs	Prerequisite	Co requisite
Fall Semester (3rd)	BC323	Biochemistry I.	FR	2	CH152	-
	BCL323	Biochemistry I. Lab.				**BC323**
	MB334	General Microbiology	FR	3	**BI153**	-
	MBL334	General Microbiology Lab.				**MB334**
	HS335	Histology	FR	3	**BI153**	-
	HSL335	histology Lab.				**HS335**
	ML331	Analytical Chemistry I.	DR	3	**CH152**	-
	MLL331	Analytical Chemistry I. Lab.				**ML331**
	PS336	Physiology	FR	3	**BI153**	-
	PSL336	PhysiologyLab.			-	**PS336**
	AN332	Anatomy	FR	3	**BI153**	-
	ANL332	Anatomy Lab.				**AN332**
	Total Credits/hrs (17)					
Spring Semester (4th)	BC433	Biochemistry II.	FR	3	**BC323**	-
	BCL433	Biochemistry II. Lab.				**BC433**
	EL436	Safety & Lab Management	EL	3	-	-
	ELL436	Safety & Lab Management Lab.				**EL436**
	EL434	Medical Lab. Instrumentation	EL	3	**MP243**	-
	ELL434	Medical Lab. Instrumentation				**EL434**
	ML431	Analytical Chemistry II.	DR	3	**ML331**	-
	MLL431	Analytical Chemistry II. Lab.				**ML431**
	ML435	Molecular Biology	DR	3	**BC323 & BI153**	-
	MLL435	Molecular Biology Lab.				**ML435**
	ML432	Histopathology I.	DR	3	**HS335**	-
	MLL432	Histopathology I. Lab.				**ML432**
	Total Credits/hrs (18)					
Fall Semester (5th)	ML531	Clinical Biochemistry I.	DR	3	**BC433**	-
	MLL531	Clinical Biochemistry I. Lab.				**ML531**
	ML535	Clinical Microbiology	DR	3	**MB334**	-
	MLL535	Clinical Microbiology Lab.				**ML535**
	ML534	Immunology & Serology I.	DR	3	**MB334**	-
	MLL534	Immunology & Serology I. Lab.				**ML534**
	ML532	General Hematology	DR	3	**PS336**	-
	MLL532	General Hematology Lab.				**ML532**
	ML536	Medical Parasitology I.	DR	3	**MB334**	-
	MLL536	Medical Parasitology I. Lab.				**ML536**
	ML533	Histopathology II.	DR	3	**ML432**	-
	MLL533	Histopathology II. Lab.				**ML533**
	Total Credits/hrs (18)					
Spring Semester (6th)	ML631	Clinical Biochemistry II.	DR	3	**ML531**	-
	MLL631	Clinical Biochemistry II. Lab.				**ML631**
	ML634	Clinical Bacteriology	DR	3	**ML535**	-
	MLL634	Clinical Bacteriology Lab.				**ML634**
	ML633	Immunology and serology II.	DR	3	**ML534**	-
	MLL633	Immunology and serology II. Lab.				**ML633**
	ML632	Diagnostic Hematology	DR	3	**ML532**	-
	MLL632	Diagnostic Hematology Lab.				**ML632**
	ML635	Medical Parasitology II.	DR	3	**ML536**	-
	MLL635	Medical Parasitology II. Lab.				**ML635**
	ML636	Clinical Virology & Mycology	DR	3	**ML535**	-
	MLL636	Clinical Virology & Mycology Lab				**ML636**
	Total Credits/hrs (18)					
Fall Semester (7th)	ML732	Diagnostic clinical chemistry	DR	3	**ML631**	-
	MLL732	Diagnostic clinical chemistry lab				**ML732**
	ML733	Diagnostic Medical Microbiology	DR	3	**ML634& ML636**	-
	MLL733	Diagnostic Medical Microbiology lab				**ML733**
	ML731	Immunohematology	DR	3	**ML633**	-
	MLL731	Immunohematology lab				**ML731**
	ML734	Diagnostic Molecular biology	DR	3	**ML434**	-
	MLL734	Diagnostic Molecular biology lab				**ML734**
	EL725	Infection control	EL	2	**Senior**	
	EL726	Skills, presentations and research	EL	2	**Senior**	
	Total Credits/hrs (16)					
Spring Semester (8th)	ML841	Clinical biochemistry practice	DR	4	**ML732**	-
	ML842	Clinical immunohematology practice	DR	4	**ML731**	-
	ML843	Clinical hematology practice	DR	4	**ML632**	-
	ML844	Clinical microbiology practice	DR	4	**ML733**	-
	ML835	Student Project	FR	3	**Senior**	-
	Total Credits/hrs (19)					

Total Credits/hrs / (B.Sc. MLS)**(FR + DR)**	**106**
Total Credits/hrs (UR)	**28**
Total Credits/hrs	**134**

FORM 1

Tripoli University/ Faculty of Medical Technology
Department of Medical Laboratories Sciences

Schedule of Study Plane Schedule of Study Plane for B.Sc. Medical Laboratories Sciences

Program: **Medical Laboratories Sciences (MLS)**	Code:	Credit Hours:
Course:	Pre-requisite:	Theoretical:
Semester:		Practical:
Course Main Aim/Goal:		

	Theoretical Content	**Practical Content**
Week	**General Objective**	
1		
2		
3		
4		
5		
6		
7		
8	*Midterm Exam I.	
9		
10		
11		
12		
13		
14		
15		
16	*Mid term Exam II.	

Assessment Criteria	Course Test 20%	Practical 10%	Final Pract. Exam: 20%	Final Theo. Examination: 50%

Lecturer Name:-
Scientific degree:-
Date: 2023

FORM 2

University of Tripoli Faculty of Medical Technology
Department of Medical Laboratories Sciences

Schedule of Study Plane for B.Sc. Medical Laboratories Sciences

Program: **Medical Laboratories Sciences (MLSc.)**	Code:	Credit Hours:
Course:	Pre-requisite:	Theoretical:
Semester:		Practical:

Course Main Aim/Goal:

	Theoretical Content			**Practical Content**		
Week	**General Objective 1.**					
	Specific Learning Outcomes	Lecturer Activity	Resources	Specific Learning Outcomes	Lecturer Activity	Resources

	General Objective 2.					
Week	Specific Learning Outcomes	Lecturer Activity	Resources	Specific Learning Outcomes	Lecturer Activity	Resources

FORM 3

University of Tripoli Faculty of Medical Technology
Department of Medical Laboratories Sciences

Schedule of Study Plane for B.Sc. Medical Laboratories Sciences

Program:(MLS)	Code:	Cr. Hours:
Course:	Pre-requisite:	Theoretical:
Semester:		Practical:

Theoretical Content			
Week	**General Objectives**		**Lecturer**
1			
2			
3			
4			
5			
6			
7			
8		Midterm Exam I.	
9			
10			
11			
12			
13			
14			
15			
16		Midterm Exam II.	
Practical Content			
Week	General Objectives		**Lecturer**
1			
2			
3			
4			
5			
6			
7			
8		Midterm Exam I.	
9			
10			
11			
12			
13			
14			
15			
16		Midterm Exam II.	

Approved By :

Lecturer Name:- signature

Meeting: Date: