Zahedan univercity of medical sience

Faculty of Para medicine

Course Description Guide

Bachelor of Science in Medical Laboratory Sciences

Program Name & Definition:

Bachelor of Science in Medical Laboratory Sciences

Laboratory sciences is a branch of medical sciences dealing with the analysis of blood, body fluids, and tissues for the diagnosis of diseases, treatment follow-ups, and keeping people healthy.

Course length and structure:

The length of the course and its educational system is in accordance with the educational regulations of associate degree, continuous bachelor's, and discontinuous bachelor's programs rarified by Medical Sciences Supreme Council of Planning.

Courses and number of credits:

General Courses: 24 credits

Basic Courses: 27 credits

Special Courses: 63 credits

Field Internship: 16 credits

Total: 130 credits

Table A. General Courses in Continuous Bachelor's Program in Laboratory Sciences

Row	Title	No. of Credits	Course Hours			Prerequisite
			Theoretical	Practical	Total	
1	Two Courses from among Theoretical Foundations of Islam Courses*	4	68	-	68	-
2	One of the Islamic Ethics Courses*	2	34	-	34	-
3	One of the Islamic Revolution Courses*	2	34	-	34	-
4	One of the Courses on Islamic History & Civilization*	2	34	-	34	-
5	One of the Courses on the Introduction to Islamic Sources*	2	34	-	34	-

6	General Persian	3	51	-	51	-
7	General English	3	51	-	51	-
8	Physical Education (1)	1	-	34	34	-
9	Physical Education (2)	1	-	34	34	8
10	Population and Family Planning	2	34	-	34	-
11	History of culture and civilization of Islam and Iran	2	34	-	34	-
Total		24				

***Note: These courses should be taken from among the ones in the following table.**

	Orientation	Title	No. of Credits	Course Hours		
				Theoretical	Practical	Total
Islamic Education General Courses	1) Theoretical Foundations of Islam	Islamic Thought (1) (Origin & Resurrection) Islamic Thought (2) (Prophet hood & Imamate) Human Beings in Islam Social & Political Rights in Islam	2 2 2 2	34 34 34 34	- - - -	34 34 34 34
	2) Islamic Ethics	Philosophy of Ethics (Emphasis on Educative Issues) Islamic Ethics (Foundations & Concepts) Living Code of Ethics (Applied Ethics) Practical Mysticism of Islam	2 2 2 2	34 34 34 34	- - - -	34 34 34 34
	3) Islamic Revolution	Islamic Revolution of Iran Introduction to the Constitution of the Islamic Republic of Iran Imam Khomeini's Political Thoughts	2 2 2	34 34 34	- - - -	34 34 34
	4) Islamic History & Civilization	History of Islamic Culture & Civilization Analytic History of Early Islam History of Imamate	2 2 2	34 34 34	- - -	34 34 34
	5) Introduction to Islamic Sources	Thematic Interpretation of the Quran Thematic Interpretation of Nahj al-Balagha	2 2	34 34	- -	34 34
Total number of such credits to be taken			12			

B. Table of basic courses of continuous undergraduate course of laboratory sciences

Course Code	Title	No. of Credits		Course Hours			Prerequisite(s)
		Theoretical	Practical	Theoretical	Practical	Total	
01	General Chemistry	2	-	34	-----	34	-----
02	General Chemistry Lab.	-	1	-----	34	-----	Simultaneous with 01
03	Laboratory preparations	0/5	0/5	9	17	26	Simultaneous with 01
04	Theoretical Anatomy	1/5	0/5	26	17	43	
05	Theoretical Histology	1	-	17	-----	17	Simultaneous with 04
06	Histology Lab.	-	1	-----	34	34	Simultaneous with 05
07	General Biochemistry	3	-	51	-----	51	01
08	General Biochemistry Lab.	-	1	-----	34	34	Simultaneous with 07
09	Cellular & Molecular Biology	2	-	34	-----	34	Simultaneous with 07
10	Theoretical Physiology	2	-	34	-----	34	04
11	Physiology Lab.	-	1	-----	34	34	Simultaneous with 10
12	Biophysics	2	-	34	-----	34	07
13	Public Health & Epidemiology	1	-	17	-----	17	-----
14	General Psychology	2	-	34	-----	34	-----
15	Computer	1/5	0/5	26	17	43	-----
16	Biostatistics and research methods	2	-	34	-----	34	-----
17	medical emergency	0/75	0/25	13	8	21	-----
Total		27					

C. The table of specialized courses of the continuous undergraduate course of laboratory sciences

Course Code	Title	No. of Credits		Course Hours			Prerequisite(s)
		Theoretical	Practical	Theoretical	Practical	Total	
18	Clinical Biochemistry 1	2	-	34	-----	34	07
19	Clinical Biochemistry Lab. 1	-	1	-----	34	34	Simultaneous with 18
20	General Microbiology	2	-	34	-----	34	09
21	General Microbiology Lab.	-	1	-----	34	34	Simultaneous with 20
22	Parasitology 1 (worms)	2	-	34	-----	-----	09
23	Parasitology Lab. 1	-	1	-----	34	34	Simultaneous with 22

24	Medical Immunology1	2	-	34	-----	34	20
25	Medical Immunology Lab1	-	1	-----	34	34	Simultaneous with 24
26	Medical Virology	1/75	0/25	30	8	38	20
27	Hematology 1	3	-	51	-----	51	10
28	Hematology Lab. 1	-	2	-----	68	68	Simultaneous with 27
29	Clinical Biochemistry 2	3	-	51	-----	51	18
30	Clinical Biochemistry Lab. 2	-	1	-----	34	34	Simultaneous with 29
31	General Pathology	2	-	34	-----	34	05,27*
32	General Pathology Lab.	-	1	-----	34	34	Simultaneous with 31
33	Pharmacology & Toxicology	2	-	34	-----	34	31
34	Pharmacology &Toxicology Lab.	-	1	-----	34	34	Simultaneous with 33
35	Parasitology 2 (protozoans & insects)	2	-	34	-----	34	22
36	Parasitology Lab. 2	-	1	-----	34	34	Simultaneous with 35
37	Medical Immunology2	1	-	17	-----	17	24
38	Medical Immunology Lab.2	-	1	-----	34	34	Simultaneous with 37
39	English Texts & Medical Terminology	2	-	34	-----	34	General English
40	Technical Principles & Maintenance of Laboratory Equipment	1	-	17	-----	17	12 & 19
41	Hormonology	1/75	0/25	30	8	38	29
42	Hematology 2	2	-	34	-----	34	27
43	Hematology Lab. 2	-	1	-----	34	34	Simultaneous with 42
44	Medical Mycology	2	-	34	-----	34	20
45	Medical Mycology Lab.	-	1	-----	34	34	Simultaneous with 44
46	Immunohematology and blood transfusion	2	-	34	-----	34	27
47	Immunohematology and blood transfusion lab	-	1	-----	34	34	Simultaneous with 46
48	Medical Bacteriology	2	-	34	-----	34	20&24*
49	Medical Bacteriology Lab.	-	2	-----	68	68	21, Simultaneous with 48
50	Quality assurance in the laboratory	2	-	34	-----	34	29& 42
51	Laboratory Rules & Management Principles	1	-	17	-----	17	50
52	Principles of Safety & Protection in Laboratory	1	-	17	-----	17	26 *& 48
53	Introduction to Internal Medicine	2	-	34	-----	34	29 & 42
54	Medical Genetics	2	-	17	-----	17	09&29*
55	Molecular and advanced laboratory techniques	1/5	0/5	26	17	43	54
56	Seminar	1	-	17	-----	17	33 7 49
Total		63					

*If you attend the class and pass this course without a passing grade, you can get the unit at the same time.

Table D. Field Internship in Bachelor of Science in Medical Laboratory Sciences

Course Code	Title	No. of Credits	Hours	Prereq uisite
57	Internship1	2	102	Presented in Semester 3
58	Internship2	4	204	57 & Presentation in the last year of study
59	Internship Field	10	510	58
Total		16		

Title: General Chemistry 01

Prerequisite: None

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Becoming familiar with atomic structure and different organic and inorganic chemical compounds.

Course Description: Structure of chemicals, related reactions, reaction mechanisms, degrees and speed of reaction, etc.

Title: General Chemistry Lab. 02

Prerequisite: Simultaneous with General Chemistry

No. of Credits: 1

Type of the Course: Practical

Main Objective: Getting to know about materials, equipment and some of the properties of organic and inorganic chemical compounds.

Course Description: Recognition of laboratory devices and instruments and identification of elements and factors in organic compounds or solutions.

Title: Laboratory preparations 03

Prerequisite: Simultaneous with General Chemistry

No. of Credits: 1

Type of the Course: Theoretical & Practical

Main Objective: Familiarity with clinical laboratory equipment and preparations

Course Description: In this course, the student will get acquainted with the various parts of the clinical laboratory, with laboratory equipment and how to use them.

Title: Theoretical Anatomy 04
Prerequisite: None

No. of Credits: 2

Type of the Course: 1.5 Theoretical & 0.5 Practical

Main Objective: Becoming familiar with macroscopic anatomy of human body systems.

Course Description: Familiarity with the anatomy of body structures to the extent that it is necessary for bachelors of laboratory sciences.

Title: Theoretical Histology 05

Prerequisite: Theoretical Anatomy

No. of Credits: 1

Type of the Course: Theoretical

Main Objective: Learning the microscopic anatomy of human body structures in health and disease states to the extent that it is necessary for a lab technician.

Course Description: Since one of the pillars of clinical diagnosis is based on microscopic detection of diseased tissues, learning natural microscopic anatomy prepares an appropriate context for the diagnosis of different diseases.

Title: Histology Lab. 06

Prerequisite: Theoretical

Histology

No. of Credits: 1

Type of the Course: Practical

Main Objective: Basic familiarity with the microscopic structure of human body tissues in health and disease states.

Course Description: Microscopic teaching of anatomy and cells that form human body tissues in health and disease states, and learning the methods of producing pathology slides.

Title: General Biochemistry 07

Prerequisite: General Chemistry

No. of Credits: 3

Type of the Course: Theoretical

Main Objective: Identification of vital materials and their chemical properties.

Course Description: Teaching general biochemistry topics to the extent that a laboratory technician will have the knowledge and capability to understand biochemical concepts and their importance as related to the body.

Title: General Biochemistry Lab. 08

Prerequisite: Simultaneous with General Biochemistry

No. of Credits: 1

Type of the Course: Practical

Main Objective: Identification of vital materials and their chemical properties.

Course Description: Teaching the basics of practical biochemistry and methods of diagnosing certain biochemical compounds of body fluids.

Title: Cellular & Molecular Biology 09

Prerequisite: General Biochemistry

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Since cellular and molecular biology has progressed considerably over the past two decades and has become the main area of dramatic progress in different dimensions, students of laboratory sciences should have sufficient knowledge about the structure and function of cells, and become familiar with different study methods about cells and molecules.

Course Description: Teaching the structure of cells and their various parts, the performance of each organelle in the synthesis of matters, the molecular communications of cells, genetic engineering and its application in medicine, and familiarity with advanced cellular and molecular methods.

Title: Theoretical Physiology 10

Prerequisite: Theoretical Anatomy

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Becoming familiar with the physiology of respiratory and cardiovascular systems, and learning an overview of the physiology of nervous, urinary, muscular, gastrointestinal, and endocrine glands systems.

Course Description: Recognition of the natural performance of body systems can enable laboratory sciences students to compare it with the disease conditions so that they can have a deeper perception of the disease and its process.

Title: Physiology Lab. 11

Prerequisite: Simultaneous with Theoretical Physiology

No. of Credits: 1

Type of the Course: Practical

Main Objective: Becoming familiar with practical physiology tests to understand physiologic insufficiencies of human body systems compared with the healthy state of body.

Course Description: Through physiologic tests in this course, the performance of cells and different body systems including cardiovascular, respiratory, nervous, urinary, gastrointestinal, endocrine glands, etc. are discussed.

Title: Biophysics 12

Prerequisite: General Biochemistry

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Learning the application of physical concepts in biology and clinical laboratory studies

Course Description: In this lesson, the student gets to know the application of scientific rules and principles in the study of living systems in the form of practical techniques in laboratory science.

Title: Public Health & Epidemiology 13

Prerequisite: None

No. of Credits: 1
Type of the Course: Theoretical

Main Objective: Getting familiar with general hygiene and epidemiology, and with the methods of preventing and encountering infectious epidemic diseases common in Iran.

Course Description: In this course, the student will get to know the definitions of health and epidemiology and their role in promoting health and public health and control and prevention of infectious diseases.

Title: General Psychology 14

Prerequisite: None

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Getting to know the history of psychology, various concepts and evaluation methods in psychology, and factors affecting behavior.

Course Description: While strengthening mental capabilities and helping students understand other courses, the content of this course includes basic theoretical concepts to be used in their future professional environment.

Title: Computer 15

Prerequisite: None

No. of Credits: 2

Type of the Course: Theoretical- Practical

Main Objective: Getting familiar with general principles of computer hardware and software and operating systems to the extent that students can use computers in laboratory machines and instruments, the search for information sources, and scientific researches.

Course Description: Due to the ever-expanding application of computers in different fields, it is necessary for laboratory sciences technicians to be sufficiently familiar with how to use them in their professional domain.

Title: Biostatistics 16

Prerequisite: None

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Familiarizing the student with the basics of research methods and developing a research plan, different sampling methods and statistical tests.

Course Description: In this course, the student should be able to prepare a research proposal while choosing the research topic and, considering the important place of statistics in research, get to know different sampling methods and statistical tests.

Title: medical emergency 17

Prerequisite: None

No. of Credits: 1

Type of the Course: Theoretical & Practical

Main Objective: Familiarizing the student with the principles and basic measures of helping the injured and emergencies before transferring to medical centers

Course Description: In this lesson, the student gets acquainted with the principle of basic actions in the type of injuries and accidents and acquires the necessary ability to deal with the injured in emergencies and perform basic life support measures.

Title: Clinical Biochemistry1 18

Prerequisite: General Biochemistry

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Familiarity with the chemical composition of body fluids

Course Description: Graduates should be able to describe the biochemical composition of the body, especially body fluids, the changes of these compounds in the state of health and disease and the value of their measurement.

Title: Clinical Biochemistry Lab.1 19

Prerequisite: Simultaneous with Clinical Biochemistry 1

No. of Credits: 1

Type of the Course: Practical

Main Objective: Familiarity with new laboratory methods of biochemical tests of body fluids

Course Description: Graduates should be able to perform routine clinical biochemistry tests in medical diagnostic laboratories, which are effective in diagnosing various diseases.

Title: General Microbiology 20

Prerequisite: Cellular and Molecular

Biology

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Learning bacterial classification, morphology, structure, metabolism, growth and genetics, different microbes, and methods of identifying and separating them from each other.

Course Description: Classification of bacteria and naming them, bacterial structure, bacterial metabolism, growth and genetics, antimicrobial compounds, the effect of physical and chemical agents on bacteria, sterilization techniques of different microbes, staining methods and direct examination of bacteria, kinds of bacterial culture media, bacterial sensitivity to antimicrobial compounds (anti biogram), the relationship between a host and a pathogen, and normal body flora.

Title: General Microbiology Lab. 21

Prerequisite: Simultaneous with General Microbiology

No. of Credits: 1

Type of the Course: Practical

Main Objective: Learning practical microbiology and its application in medical microbiology

Course Description: Preparation of cultivation environments and equipment sterilization
The study of bacterial shape and morphology, working with a variety of microscopes, bacteria staining, preparation of culture media and sterilization of instruments and culture media, isolation of bacteria from clinical samples, and susceptibility of bacteria to antibacterial compounds.

Title: Parasitology 1 (Helminthology) 22

Prerequisite: Cellular and Molecular Biology

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Getting to know the features and characteristics of worm parasites

Course Description: Learn the biological and morphological characteristics of different types of helminth parasites and the course of evolution and pathogenesis, diagnosis and treatment, and ways of transmission of helminth parasitic disease.

Title: Parasitology Lab. 1 (Helminthology) 23

Prerequisite: Simultaneous with Parasitology 1 (Helminthology)

No. of Credits: 1

Type of the Course: Practical

Main Objective: Getting to know the different methods of identifying humans' pathogenic parasites and their carriers.

Course Description: Teaching sampling methods, preparing slides to recognize different parasites, and studying the morphological characteristics of different kinds of helminths.

Title: Medical Immunology1 24

Prerequisite: Theoretical General Microbiology

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Familiarity with cells and immune system organs, and immune responses to the extent that laboratory sciences bachelors have sufficient knowledge to perform immunology tests.

Course Description: Teaching the principles and basics of immunology, components of the immune system, humoral and cellular immune responses

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Title: Medical Immunology Lab.1. 25

Prerequisite: Simultaneous with Medical Immunology1 **No. of Credits:** 1

Type of the Course: Practical

Main Objective: Familiarity with laboratory diagnosis methods of immunology and serology and their interpretation to the extent that as an expert alone she is able to perform immunology and serology tests correctly.

Course Description: Teaching and performing different methods of routine practical immunology including: active and passive agglutination and precipitation tests and their application to diagnose diseases

Title: Medical Virology 26

Prerequisite: Theoretical General Microbiology

No. of Credits: 2

Type of the Course: Theoretical & Practical

Main Objective: Familiarity with the classification of various pathogenic viruses, pathogenesis mechanism of common viral diseases in Iran and common methods to diagnose them in laboratory.

Course Description: In this course, students get familiar with categorization and different groups of pathogenic viruses, gain information on how viruses are related to cancer and pathogenesis, and learn about diagnosis and treatment of viral diseases.

Title: Hematology 1 27

Prerequisite: Theoretical

Physiology **No. of Credits:** 3

Type of the Course: Theoretical

Main Objective: Knowing the science of hematology and gaining knowledge and understanding general concepts about blood diseases to the extent that the laboratory expert can perform the laboratory diagnostic methods of these diseases.

Course Description: Getting to know the formation, development and differentiation of blood cells and the morphological changes of these cells in anemias and non-malignant disorders of white blood cells.

Title: Hematology Lab. 1 28

Prerequisite: Simultaneous with Hematology 1

No. of Credits: 2

Type of the Course: Practical

Main Objective: Students' familiarity with routine hematology tests.

Course Description: Teaching the principles of blood sampling, counting blood cells, preparing, expanding staining and studying normal blood cells and their morphological changes in blood diseases.

Title: Clinical Biochemistry 2 29

Prerequisite: Clinical Biochemistry 1

No. of Credits: 3

Type of the Course: Theoretical

Main Objective: Getting to know the biochemical compounds of the body and their properties
And the changes of these compounds in the state of health and disease
The methods of measuring each of these compounds in the diagnosis of different diseases.

Course Description: Teaching clinical biochemistry topics so that a laboratory technician will have the necessary knowledge and capability to understand biochemical concepts as well as doing and interpreting biochemical tests.

Title: Clinical Biochemistry Lab. 2 30

Prerequisite: Simultaneous with Clinical Biochemistry 2

No. of Credits: 1

Type of the Course: Practical

Main Objective: Express the measurement value of each of these biochemical compounds in the diagnosis of different diseases.

Course Description: Teaching different chromatographic methods, types of electrophoresis, measurement of trace elements using atomic absorption method and, in general, specific biochemical tests).

Title: General Pathology 31

Prerequisite: Theoretical Histology & Hematology 1

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Learning the microscopic anatomy of a diseased human body to the extent that it is needed by a laboratory sciences technician.

Course Description: Since the microscopic diagnosis of diseased tissues is one of the pillars of medical diagnosis, learning the microscopic anatomy will help gain a deeper understanding of the course.

Title: General Pathology Lab. 32

Prerequisite: Simultaneous with General

Pathology **No. of Credits:** 1

Type of the Course: Practical

Main Objective: Getting to know pathology techniques and learning how to prepare a slide of aspirated fluids and tissues.

Course Description: Learning different working procedures in pathology laboratories including preparation of a cytology spread, tissue incision, fixation, routine and specific staining, and immuno- histochemical staining.

Title: Pharmacology & Toxicology 33

Prerequisite: General Pathology
No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Getting familiar with the function and fate of drugs in human body.

Course Description: In this course, general pharmacology and a brief description of the drugs used in the treatment of various diseases and their interference with laboratory tests, as well as the measurement of the serum concentration of drugs and their metabolites and toxic chemicals and its importance from the point of view of forensic medicine, are taught.

Title: Pharmacology & Toxicology Lab 34

Prerequisite: Simultaneous with Pharmacology&

Toxicology Lab

No. of Credits: 1

Type of the Course: Practical

Main Objective: Getting to know the methods of identification and diagnosis of drugs and different toxic substances in human body fluids

Course Description: Teaching the methods of measuring the elements of poisons, gases, drugs and substances that lead to poisoning in humans (according to its application in forensic medicine)
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Title: Parasitology 2 (Protozoology & Entomology) 35

Prerequisite: Parasitology 1 (Helminthology)

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Learning all human pathogenic parasites including wide-, limited- and rare-distribution parasites and getting familiar with their biological characteristics, pathogenicity, diagnosis, treatment, prevention, control and epidemiology.

Course Description: Teaching different types of parasites including intestinal, blood and tissue

protozoa, and pathogenic insects.

Title: Parasitology Lab. 2 (Protozoology & Entomology) 36

Prerequisite: Simultaneous with Parasitology 2 (Protozoology & Entomology)

No. of Credits: 1

Type of the Course: Practical

Main Objective: Students' familiarity with the way to recognize all protozoa, parasites, and pathogenic insects.

Course Description: Teaching sampling methods, isolation, slide preparation, staining to identify different parasites, and learning morphological characteristics of various parasites and pathogenic insects.

Title: Medical Immunology2 37

Prerequisite: Medical Immunology1

No. of Credits: 1

Type of the Course: Theoretical

Main Objective: Acquaintance of the undergraduate student of laboratory sciences with the activity of the immune system in diseases and types of immunological disorders, the role of the immune system in the prevention and treatment of some diseases

Course Description: Teaching the mechanism of the body's immune system responses to antigens and how to remove them from the body. Description of the function of the immune system in autoimmune diseases and organ transplantation.

Title: Medical Immunology Lab.2. 38

Prerequisite: Simultaneous with Medical Immunology2

No. of Credits: 1

Type of the Course: Practical

Main Objective: Familiarity with laboratory diagnosis methods of immunology and their interpretation to the extent that as an expert alone she is able to perform immunology tests correctly.

Course Description: Teaching and performing various advanced immunology methods including: enzyme immunoassay, fluoro immunoassay, examination and measurement of the complement system, HLA, familiarity with the principles and application of chemi luminescence , turbido metry, and....

Title: Medical Terminology & English Texts 39

Prerequisite: General English

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Getting familiar with medical terminology in laboratory sciences texts and, in general, the teaching of English language to the extent that learners can read technical books and laboratory guidelines, and use them in their profession.

Course Description: In this course, learning the topics taught by their instructor, students solve with his help the problems they may have to properly understand English texts.

Title: Technical Principles and Maintenance of Laboratory Instruments 40

Prerequisite: Biophysics, Clinical Biochemistry lab1

No. of Credits: 1

Type of the Course: Theoretical

Main Objective: Acquaintance with the technical principles of working and using laboratory devices

Course Description: Technical principles and mechanism of operation of various components of laboratory devices, how to properly operate and care for them.

Title: Hormonology 41

Prerequisite: Clinical Biochemistry 2

No. of Credits: 2

Type of the Course: Theoretical & Practical

Main Objective: Knowing the hormonal compounds of the body and their properties and the changes of these compounds in the state of health and disease and the methods of measuring hormones

Course Description: Teaching hormonology topics to the extent that a laboratory technician will have the necessary knowledge and capability to perform hormonal tests and the points related to clinical changes.

Title: Hematology 2 42

Prerequisite: Hematology 1

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Training of malignant diseases and hemostasis to the extent that the laboratory expert can perform diagnostic methods based on scientific principles and help to diagnose leukemias and coagulation diseases.
Course Description: Pathogenicity and morphological changes of dyscrasia leukemias and familiarity with hemostasis and hereditary and acquired coagulation diseases.

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Title: Hematology Lab. 2 43

Prerequisite: Simultaneous with Hematology 2

No. of Credits: 1

Type of the Course: Practical

Main Objective: Teaching all types of hematology laboratory methods so that laboratory science experts are able to identify blood cells and perform various related hematology tests independently, to help diagnose leukemias and coagulation diseases.

Course Description: Familiarity with morphological identification and examination of the principles of blood cells in pathological conditions, automatic and manual counting of blood cells, ensuring the obtained data and diagnosing leukemias and conducting tests and coagulation.

Title: Medical Mycology 44

Prerequisite: General Microbiology

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Recognizing and classifying saprophytic and pathogenic fungi, learning to know them through laboratory methods, and getting familiar with research methods to confirm the existence of opportunistic mycosis diseases.

Course Description: In this lesson, the student got acquainted with the classification and nutritional

requirements of mushrooms and the agents of human pathogenic fungi in terms of clinical symptoms, macroscopic and microscopic characteristics, investigating their characteristics in the culture environment and emphasizing the methods of identifying and isolating them from The surrounding environment (space, soil, devices and tools, etc.), distinguishing them and how to report them.

Title: Medical Mycology Lab. 45

Prerequisite: Simultaneous with Medical Mycology

No. of Credits: 1

Type of the Course: Practical

Main Objective: At the end of this course, students should have the skill to take correct samples from patients and environment in terms of fungal infections, and isolate the effects of pathogenic and saprophytic fungi and report them.

Course Description: Acquaintance with the tools and environments of mushroom culture, how to prepare solutions and dyes, how to prepare slides from mushrooms and prepare culture slides, culture samples of different types of mushrooms, how to test hair piercing by dermatophytes, how to preserve and maintain mushroom cultures and their slides How to take samples from patients and body fluids

Title: Immunohematology 46

Prerequisite: Hematology 1

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Getting to know the main and minor blood groups, as well as the principles and rules of blood donation, the preparation and consumption of various cellular and plasma blood products, the complications of blood transfusion and hemo vigilance.

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Course Description: Biochemical, genetic principles, inheritance of main and secondary blood groups, production and maintenance and consumption of cellular and plasma blood products and complications of blood transfusion, blood transfusion care system

.

Title: Immunohematology Lab. 47

Prerequisite: Simultaneous with Immunohematology

No. of Credits: 1

Type of the Course: Practical

Main Objective: Students' familiarity with direct and indirect methods of determining major and minor blood groups and also with compatibility tests prior to blood transfusion so that they would be able to determine major and minor blood group types, provide proper blood units for patients, and remove the related problems.

Course Description: Principles and practical methods of determining major and minor blood groups and also compatibility tests prior to blood transfusion and their application in healthcare centers and clinical laboratories.

Title: Medical Bacteriology 48

Prerequisite: General Microbiology & Medical Immunology1

No. of Credits:2

Type of the Course: Theoretical

Main Objective: To become familiar with pathogenic bacteria

Course Description: The study of different pathogenic bacteria and normal flora of human body including biochemical, antigenic, and morphologic features, factors affecting virulence and pathogenesis, clinical manifestations, epidemiology, and laboratory diagnosis prevention, control and treatment

.

Title: Medical Bacteriology Lab. 49

Prerequisite: Simultaneous with Medical Bacteriology

No. of Credits: 2

Type of the Course: Practical

Main Objective: Isolation and identification of bacteria in clinical samples and determining their identity from different clinical samples

Course Description: In this course, the student will acquire the necessary competence in each of the following cases: methods of collecting clinical samples (urine, blood, CSF, throat secretions, genital tract secretions and wounds), methods of direct microscopic examination of clinical samples, cultures Clinical samples taking into account the type of sample and sampling location, the use of

selective and enriched culture media, the use of differential media, checking biochemical and serological characteristics to isolate and determine the type and species of bacteria in clinical samples and determine Sensitivity to antimicrobial compounds (antibiogram) and how to report clinical samples.

Title: Quality assurance in the laboratory 50

Prerequisite: Medical Biochemistry 2 - Hematology 2

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Understanding the principles of quality assurance systems and its components, including internal quality control, external quality control, standardization in the clinical laboratory.

Course Description: After completing this course, the student will be able to use the principles of quality assurance, which includes internal and external quality control, standardization, etc. To ensure the safety and rights of the patient in order to maintain the health of the society and to play a significant role in the establishment of the quality management system in the clinical laboratory.

Title: Laboratory Rules and Management Principles 51

Prerequisite: Quality Control Methods in Clinical Laboratories

No. of Credits: 1

Type of the Course: Theoretical

Main Objective: Laboratory technicians' familiarity with management principles and rules governing laboratories.

Course Description: In this course, students get acquainted with the overview, elements, managerial and supervisory duties and professional rules of their guild, so that after graduation, they can analyze management issues and their practical methods.

Title: Principles of Safety & Protection in Laboratory 52

Prerequisite: Medical Virology - Medical Bacteriology

No. of Credits: 1

Type of the Course: Theoretical

Main Objective: Learning the principles of safety and protection in laboratories so that there is no danger to experts, colleagues and patients during the experiment.

Course Description: The topics covered in this course are protection and safety, teaching operational instructions and regulations for protection and safety including physical environment, working with devices and machines, infectious agents, chemical agents, radioactive agents, flammable substances, and principles of garbage and waste disposa

Title: Introduction to Internal Medicine 53

Prerequisite: Medical Biochemistry 2 - Hematology 2

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: To make laboratory sciences bachelor students familiar with the overview of internal medicine so that they will have a better understanding of diseases after graduation and provide the laboratory services needed by physicians.

Course Description: In this course, an overview of internal medicine is presented to students at a level that laboratory technicians need to coordinate with doctors for the correct interpretation of tests.

Title: Medical Genetics 54

Prerequisite: Cellular and Molecular Biology- Medical Biochemistry 2

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Familiarizing students with human genetics and its application in society

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Course Description: introducing the principles of genetic science and genetic diseases, the function of genes and chromosomes, cytogenetics and molecular diagnosis methods of genetic diseases.

Title: Molecular and advanced experimental techniques 55

Prerequisite: Medical Genetics

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Familiarization of students with molecular and advanced techniques that are used in the medical diagnosis laboratory

Course Description: In this course, the student, while fully familiar with the principles of some molecular techniques and their application in laboratory diagnosis methods, will briefly learn about other techniques and the design and construction of diagnostic kits.

Title: Seminar 56

Prerequisite: Presentation in the last year of study
No. of Credits: 1

Type of the Course: Theoretical

Main Objective: Familiarizing students with how to collect scientific and specialized materials in the field of writing and presenting them in the form of a conference

Course Description: In this course, based on his/her interests and after consultation with one of the faculty members, each student chooses a specific topic in one of the branches of clinical laboratory sciences. Then, he gathers the latest scientific information from books and articles and presents it to the professor. Finally, he/she will present the approved paper orally in a session in which other students are also present.

Title: Internship1 57

Prerequisite: Presentation in semester 3

No. of Credits: 2
Type of the Course: Internship
Number of Hours: 102
Main Objective: Preliminary familiarization with different departments of the medical diagnosis laboratory
Course Description: In this lesson, the student will get acquainted with the different departments of the laboratory and the reception and sampling departments

- Each student should work six hours one day in a course of 17 weeks in different departments of the laboratories of teaching hospitals.

Title: Internship2 58
Prerequisite: Internship1- Presentation in the last year of study
No. of Credits: 4
Type of the Course: Internship
Number of Hours: 204
Main Objective: Familiarity with routine laboratory tests in different parts of the laboratory

Course Description: In this lesson, the student must acquire the skill of performing routine laboratory tests and be able to perform them alone.

- Each student should work six hours two day in a course of 17 weeks in different departments of the laboratories of teaching hospitals.

Title: Field Internship 59

Prerequisite: Internship2

No. of Credits: 10

Type of the Course: Field Internship

Number of Hours: 510

Main Objective: Acquaintance and performing all laboratory activities from accepting the patient to providing the correct answer to the tests

Course Description: In this course, while performing routine tests in different departments, the student should be able to perform specific tests on her own and acquire the skill of interpreting the results of routine and specialized tests as well as the quality control of the methods.

- Each student should work six hours daily in a course of 17 weeks in different departments of the laboratories of teaching hospitals.