

Program Name & Definition:

Associate 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:	13 credits
Basic Courses:	15 credits
Special Courses:	28 credits
Field Internship:	12 credits
Total:	68 credits

Table A. General Courses in Associate's Program in Medical Laboratory Sciences

Row	Title	No. of Credits	Course Hours			Prerequisite
			Theoretical	Practical	Total	
01	One Courses from among Theoretical Foundations of Divine Courses*	2	34	-	34	-
02	Divine Ethics	2	34	-	34	-
03	Persian Literature	3	51	-	51	-
04	General English	3	51	-	51	-
05	Physical Education (2)	1	-	34	34	-
06	Population and Family Planning	2	34	-	34	-
Total		13	204	34	238	

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

Orientation	Title	No. of Credits	Course Hours		
			Theoretical	Practical	Total
1) Theoretical Foundations of Divine Courses	Introduction to Divine Religions 1	2	34	-	34
	Introduction to Divine Religions 2	2	34	-	34
	Islamic Revolution	2	34	-	34
	Divine Context	2	34	-	34

Table B. Basic Courses in Associate's Program in Medical Laboratory Sciences

Course Code	Title	No. of Credits	Course Hours			Prerequisite(s)
			Theoretical	Practical	Total	
07	General Chemistry	2	34	-	34	-
08	General Chemistry Lab.	1	-	34	-	-
09	Basic Cellular & Molecular Biology	1	17	-	17	-
10	Anatomy	2	34	-	34	-
11	Physiology	2	34	-	34	09,10
12	General Biochemistry	2	34	-	34	07
13	General Biochemistry Lab.	1	-	34	34	-
14	Computer	2	17	34	51	-
15	General Physics	1	17	-	17	-
16	General Physics Lab.	1	-	34	34	-
Total		15				

Table C. Special Courses in Associate's Program in Medical Laboratory Sciences

Course Code	Title	No. of Credits	Course Hours			Prerequisite(s)
			Theoretical	Practical	Total	
17	Clinical Biochemistry 1	2	34	-	34	12
18	Clinical Biochemistry Lab. 1	2	-	68	68	13
19	Parasitology 1 (worms)	2	34	-	34	09
20	Parasitology Lab. 1	1	-	34	34	-
21	Medical Immunology	2	34	-	34	09
22	Medical Immunology Lab.	1	-	34	34	-
23	Medical Bacteriology	2	34	-	34	09
24	Medical Bacteriology Lab.	2	-	68	68	-
25	Medical Virology	1	17	-	17	09
26	General Pathology	2	34	-	34	10
27	General Pathology Lab.	1	-	34	34	-
28	Hematology 1	3	51	-	51	11
29	Hematology Lab. 1	1	-	34	34	-
30	Hematology 2	1	17	-	17	21
31	Hematology Lab. 2	1	-	34	34	-
32	Principles of Safety & Protection in Laboratory	1	17	-	17	23,21,15
33	Medical Mycology	1	17	-	17	09
34	Medical Mycology Lab.	1	-	34	34	-
35	English Texts & Medical Terminology	1	17	-	17	03
Total		28				

Table D. Field Internship in in Associate's Program in Medical Laboratory Sciences

Course Code	Title	No. of Credits	Hours
36	Field Internship	12	612
Total		12	

Title: General Chemistry **07**

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. **08**

Prerequisite: None

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: Cellular & Molecular Biology **09**

Prerequisite: None

No. of Credits: 1

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: Anatomy **10**

Prerequisite: None

No. of Credits: 2

Type of the Course: Theoretical

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: Physiology **11**

Prerequisite: Basic cellular & molecular biology - 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: General Biochemistry **12**

Prerequisite: General Chemistry

No. of Credits: 2

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. **13**

Prerequisite: None

No. of Credits: 1

Type of the Course: Practical

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

Title: Computer **14**

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: General Physics **15**

Prerequisite: None

No. of Credits: 1

Type of the Course: Theoretical

Main Objective: Learning the physical principles of machines, devices and instruments used in clinical laboratories.

Course Description: Basic physics of electricity and optics as well as physical principles of clinical laboratory instruments, devices and machines.

Title: General Physics Lab. **16**

Prerequisite: None

No. of Credits: 1

Type of the Course: Practical

Main Objective: To have knowledge in principle physics, basic maintenance and repair of clinical laboratory instruments.

Course Description: Training basic examination of electricity and lights, training different parts of medical laboratory instruments.

Title: Clinical Biochemistry 1 **17**

Prerequisite: General Physics

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: At the end of this course, students should be able to:

- a) Name the body's biochemical compounds and their properties.
- b) Describe the changes of these compounds in health and disease conditions.
- c) State the measurement value of each of these compounds in diagnosing various diseases.

Course Description: Considering the graduates' type of work in medical diagnostic laboratories, an important part of each laboratory's workload is allocated to clinical biochemistry. Therefore, these graduates should be able to perform routine clinical biochemistry tests in medical diagnostic laboratories, which would be effective in diagnosing various diseases.

Title: Clinical Biochemistry Lab.1 **20**

Prerequisite: General Biochemistry

No. of Credits: 2

Type of the Course: Practical

Main Objective: At the end of this course, students should be able to:

- a) Express the measurement value of each of these biochemical compounds in the diagnosis of different diseases.
- b) Perform various biochemical tests of body fluids using routine and new laboratory methods.

Course Description: Considering the graduates' type of work in medical diagnostic laboratories, an important part of each laboratory's workload is allocated to clinical biochemistry. Therefore, these graduates should be able to perform routine clinical biochemistry tests in medical diagnostic laboratories, which would be effective in diagnosing various diseases.

Title: Parasitology 1 (Helminthology) **19**

Prerequisite: Basic Cellular and Molecular Biology

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: Learning the definition of parasites, getting to know and classifying different intestinal and cutaneous parasites, and studying their evolution, pathogenicity, diagnosis, treatment, and transmission of parasitic diseases.

Course Description: Teaching morphologic and biologic characteristics of different intestinal and tissue parasites that are pathogenic to humans.

Title: Parasitology Lab. 1 **20**

Prerequisite: None

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 Immunology **21**

Prerequisite: Basic Cellular and Molecular Biology

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: Introducing and teaching immunology, parts of immune system, and responses to this system.

Title: Medical Immunology Lab. **22**

Prerequisite: None

No. of Credits: 1

Type of the Course: Practical

Main Objective: Students' familiarity with different immunology tests to the extent that they can do routine and specific immunology tests correctly by themselves after graduation.

Course Description: Teaching different immunological methods including electrophoresis, immunofluorescence, diffusion gel, flow cytometry, etc.

Title: Medical Bacteriology 23

Prerequisite: Basic Cellular and Molecular Biology

No. of Credits: 2

Type of the Course: Theoretical

Main Objective: To become familiar with pathogenic bacteria, learn isolation methods, and determine their identity from different body samples.

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.

Title: Medical Bacteriology Lab. 24

Prerequisite: None

No. of Credits: 2

Type of the Course: Practical

Main Objective: Isolation and identification of bacteria in clinical samples.

Course Description: Ways of collecting clinical samples (urine, blood, CSF, throat secretions, genital tract secretions, and wounds), methods of direct microscopic examination of clinical specimens, culturing clinical samples considering sample type and sampling site, use of selective and enriched culture media, 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).

Title: Medical Virology 25

Prerequisite: Basic Cellular and Molecular Biology

No. of Credits: 1

Type of the Course: Theoretical

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: General Pathology **26**

Prerequisite: Anatomy

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. **27**

Prerequisite: None

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: Hematology 1 **28**

Prerequisite: Physiology

No. of Credits: 3

Type of the Course: Theoretical

Main Objective: Learning about hematology to the extent that a bachelor holder can perform common hematologic diagnostic tests.

Course Description: Students become familiar with the formation and differentiation of blood cells, and with morphological changes of blood diseases, hemostasis, and hereditary and acquired coagulation disorders.

Title: Hematology Lab. 1 **29**

Prerequisite: None

No. of Credits: 2

Type of the Course: Practical

Main Objective: Students' familiarity with routine hematology tests.

Course Description: Teaching the principles of blood taking and blood cell counting, providing blood smear and staining, and studying normal blood cells and their morphological changes in hematological disorders.

Title: Hematology 2 **30**

Prerequisite: Medical Immunology

No. of Credits: 1

Type of the Course: Theoretical

Main Objective: Teaching the science of hematology to the extent that a laboratory technician can perform diagnostic methods relying on scientific principles and help diagnose blood diseases.

Course Description: Becoming familiar with the formation, evolution, and distinction of blood cells, structure and mechanisms of hematopoietic tissues, maturation, kinetics, mechanism of action and metabolism of blood cells, identification of etiology, pathogenicity, and morphological abnormalities in blood disorders.

Title: Hematology Lab. 2 **31**

Prerequisite: None

No. of Credits: 1

Type of the Course: Practical

Main Objective: To teach various hematology laboratory methods in a way that laboratory sciences technicians would be able to identify blood cells and perform different related hematology experiments independently.

Course Description: Becoming familiar with morphological identification and review principles of blood cells in pathological conditions, automatic and manual counting of blood cells, making sure about the obtained data, and doing hemolytic and coagulation tests.

Title: Principles of Safety & Protection in Laboratory **32**

Prerequisite: Medical Bacteriology - Medical Immunology – General Physics

No. of Credits: 1

Type of the Course: Theoretical

Main Objective: Learning about protection and safety principles in laboratories in a way that no harm comes to technicians, colleagues or the patients while performing tests.

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 disposal.

Title: Medical Mycology **33**

Prerequisite: Basic Cellular and Molecular Biology

No. of Credits: 1

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: This course introduces human pathogenic fungi in terms of clinical symptoms, macroscopic and microscopic features, the study of their features on culture medium and with an emphasis on methods of identifying and isolating them from their surrounding environment (space, soil, devices and instruments, etc.), their differentiation, and the way of reporting.

Title: Medical Mycology Lab. **34**

Prerequisite: None

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.

Title: Medical Terminology & English Texts **35**

Prerequisite: Persian Literature

No. of Credits: 1

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.