



TEHRAN UNIVERSITY  
— OF —  
MEDICAL SCIENCES

School of Allied Medical Sciences

# **Course Description Guide**

**Non-continuous Bachelor of Science in  
Medical Laboratory Sciences**

## **Program Name & Definition:**

Non-continuous 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 non-continuous bachelor's programs rarified by Medical Sciences Supreme Ccouncil of Planning.

Courses and number of credits:

Compensatory Courses:	2 credits
General Courses:	9 credits
Basic Courses:	8 credits
Special Courses:	36 credits
Field Internship:	12 credits
Total:	65 credits

## **Terms and Conditions of Admission to the Course**

- Holding an Associate degree in Medical Laboratory Sciences.

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

ROW	Title	No. of Credits	Course Hours			Prerequisite
			Theoretical	Practical	Total	
1	One Courses from among Theoretical Foundations of Islamic Courses*	4	68	-	68	-
2	One of the Islamic Revolution Courses*	2	34	-	34	-
3	One of the Courses on Islamic History & Civilization*	2	34	-	34	-
4	One of the Courses on the Introduction to Islamic Sources*	2	34	-	34	-
5	Physical Education (2)	1	-	34	34	8
	Population and Family Planning	2	34	-	34	-
	Total	22				

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

	Orientation	Course Code	Title	No. of Credits	Course Hours		
					Theoretical	Practical	Total
Islamic Education General Courses	1) Theoretical Foundations of Islam	011	Islamic Thought (1) (Origin & Resurrection)	2	34	-	34
		012	Islamic Thought (2) (Prophethood & Imammat)	2	34	-	34
		013	Human Beings in Islam	2	34	-	34
		014	Social & Political Rights in Islam	2	34	-	34
	2) Islamic Ethics	021	Philosophy of Ethics (Emphasis on Educative Issues)	2	34	-	34
		022	Islamic Ethics (Foundations & Concepts)	2	34	-	34
		023	Living Code of Ethics (Applied Ethics)	2	34	-	34
		024	Practical Mysticism of Islam	2	34	-	34
	3) Islamic Revolution	031	Islamic Revolution of Iran	2	34	-	34
		032	Introduction to the Constitution of the Islamic Republic of Iran	2	34	-	34
		033	Imam Khomeini's Political Thoughts	2	34	-	34
	4) Islamic History & Civilization	041	History of Islamic Culture & Civilization	2	34	-	34
		042	Analytic History of Early Islam	2	34	-	34
		043	History of Imammat	2	34	-	34
	5) Introduction to Islamic Sources	051	Thematic Interpretation of the Quran	2	34	-	34
		052	Thematic Interpretation of Nahj al-Balagha	2	34	-	34
Total number of such credits to be taken				12			

**Table B. Basic Courses in Non-Continuous Bachelor's Program in Laboratory Sciences**

Course Code	Title	No. of Credits	Course Hours			Prerequisite(s)
			Theoretical	Practical	Total	
6	Biophysics	2	34	-	34	-
7	Public Health & Epidemiology	2	34	-	34	-
8	Cellular & Molecular Biology	2	34	-	68	-
9	Biostatistics	2	34	-	34	-
Total		8	136	-	136	

**Table C. Special Courses in Non-Continuous Bachelor's Program in Laboratory Sciences**

Course Code	Title	No. of Credits	Course Hours			Prerequisite(s)
			Theoretical	Practical	Total	
10	Clinical Biochemistry (2)	2	34	-----	34	-
11	Clinical Biochemistry Lab. (2)	2	-----	68	68	-
12	Medical Bacteriology (2)	2	34	-	34	-
13	Medical Bacteriology Lab. (2)	2	-----	68	68	-
14	Parasitology & Entomology (2)	2	34	-	34	-
15	Parasitology & Entomology Lab. (2)	1	-	34	34	-
16	Medical Mycology (2)	1	17	-	17	-
17	Medical Mycology Lab.	1	-	34	34	-
18	Medical Immunology	2	34	-	34	-
19	Medical Immunology Lab.	1	-	34	34	-
20	Medical Virology	1	17	-	17	-
21	Medical Virology Lab.	0.5	-	17	17	-
22	Hematology 2	3	51	-	51	-
23	Hematology Lab. 2	1.5	-	51	51	-
24	blood bank	1	17	-	17	-
25	blood bank Lab.	1	-	34	34	-
26	Hormonology	1	17	-	17	-
27	Hormonology Lab.	1	-	34	34	-
28	Pharmacology & Toxicology	1	17	-	17	-
29	Pharmacology & Toxicology Lab.	1	-	34	34	-
30	Medical Terminology	2	34	-	34	-
31	Medical Genetics	1	17	-	17	-
32	Technical Principles & Maintenance of Laboratory Equipment	1	17	-	17	-
33	Laboratory Rules & Management Principles	1	17	-	17	-
34	Quality Control Methods in Clinical Laboratories	1	17	-	17	-
35	Pathology Techniques	1	-	34	34	-
36	Seminar	1	17	-	17	-
Total		36	391	442	843	

**Table D. Field Internship in Bachelor of Science in Anesthesiology**

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

Title: Biophysics **06**

**Prerequisite:** -

**No. of Credits:** 2

**Type of the Course:** Theoretical

**Main Objective:** Becoming familiar with and understanding the principles of creation and living creatures' mechanisms using physics, biology and chemistry.

**Course Description:** In this course, students become familiar with different types of physical, chemical and biological forces present in the structure of human body's different organs.

Title: Public Health & Epidemiology **07**

**Prerequisite:** -

**No. of Credits:** 2

**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:** Definitions, hygiene and epidemiology, public health, environmental health, health instruction, disease and prevention from an epidemiologic point of view.

Title: Cellular & Molecular Biology **08**

**Prerequisite:** -

**No. of Credits:** 2

**Type of the Course:** Theoretical & Practical

**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: Biostatistics 09

**Prerequisite:** -

**No. of Credits:** 2

**Type of the Course:** Theoretical

**Main Objective:** Making students familiar with different sampling methods of and their application in medical sciences researches, using general probability distributions, estimating important social parameters, performing simple statistical tests, and getting to know important health indices and how to compute and compare them.

**Course Description:** Due to the importance of statistics in research studies, it is necessary for laboratory sciences technicians to be familiar with the principles of the discipline so that they can develop quality control and laboratory data registry system, and can use them in scientific research studies.

Title: Clinical Biochemistry 2 10

**Prerequisite:** -

**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:** 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 **11**

**Prerequisite:** -

**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:** Teaching different chromatographic methods, types of electrophoresis, measurement of trace elements using atomic absorption method and, in general, specific biochemical tests (ion exchange chromatography – thin layer chromatography).

Title: Medical Bacteriology **12**

**Prerequisite:** -

**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. **13**

**Prerequisite:** -

**No. of Credits:** 2

**Type of the Course:** Theoretical

**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: Parasitology & Entomology (2) **14**

**Prerequisite:** -

**No. of Credits:** 2

**Type of the Course:** Theoretical

**Main Objective:** Learning about human pathogenic parasitic, diagnosis, treatment, prevention, control and epidemiology features of them.

**Course Description:** study of the parasites: type of worms, Protozoans and Human pathogens.

Title: Parasitology & Entomology Lab. (2) **15**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Practical

**Main Objective:** Student familiarity with ways of diagnosing all the parasitic agents of human pathogens.

**Course Description:** Tutorials on sampling, separation and preparation of parasites lam and coloring them in order to distinguish different type of parasites. Learning about Morphological features of parasites and human pathogens.

Title: Medical Mycology **16**

**Prerequisite:** -

**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. **17**

**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.

Title: Medical Immunology **18**

**Prerequisite:** -

**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. **19**

**Prerequisite:** -

**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 Virology **20**

**Prerequisite:** -

**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: Medical Virology Lab. **21**

**Prerequisite:** -

**No. of Credits:** 0.5

**Type of the Course:** Practical

**Main Objective:** Familiarity with virology laboratory and common methods of laboratory diagnosis of viruses.

**Course Description:** In this course, students get familiar with the basics of working in virology laboratory, and learn different methods including, cell culture, serologic tests, immunologic tests, cytopathologic tests, and PCR.

Title: Hematology 2 **22**

**Prerequisite:** -

**No. of Credits:** 3

**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 **23**

**Prerequisite:** -

**No. of Credits:** 1.5

**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.

Title: Blood Bank 2 **24**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Theoretical

**Main Objective:** Familiarity with primary and secondary blood groups and also principles and criteria of transfusion, and all types of cellular and blood plasma products.

**Course Description:** Principles of biochemical, genetics and inheritance of primary and secondary blood groups, preparation of blood and all types of cellular and blood plasma products, and blood transfusion complications.

Title: Blood Bank Lab. 2 **25**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Practical

**Main Objective:** Familiarity with direct and indirect ways to detect primary and secondary blood groups and learning about Compatibility tests before blood transfusion, so that the students be able to distinguish between all the blood types

**Course Description:** Learning practical methods in detecting types of primary and secondary blood groups and Compatibility tests before blood transfusion and using them in medical centers and Medical diagnostic laboratories.

Title: Hormonology **26**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Theoretical

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

- a) Name the body's hormonal 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 the diagnosis of various diseases.

**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: Hormonology Lab. **27**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Practical

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

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

**Course Description:** Teaching the methods of sampling and measurement of hormones present in blood and urine.

Title: Pharmacology & Toxicology **28**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Theoretical

**Main Objective:** Getting familiar with the function and fate of drugs in human body and with the absorption, dispersion, use, and metabolism of toxic materials.

**Course Description:** In this course, the general pharmacology and a brief description of the drugs used to treat different diseases and their interactions with laboratory tests and also general toxicology, toxic level of drugs, and toxic chemical substances will be taught.

Title: Pharmacology & Toxicology Lab. **29**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Practical

**Main Objective:** : Learning about the methods of identifying and recognizing drugs and toxic substances in human body fluids.

**Course Description:** Teaching the methods of measuring elements, toxins, gases, drugs, and substances leading to poisoning in human body.

Title: Medical Terminology **30**

**Prerequisite:** -

**No. of Credits:** 2

**Type of the Course:** Theoretical

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

**Course Description:** In this course, students learn the topics taught by their instructor, and they solve their all the problems they may have with properly understanding English texts.

Title: Medical Genetics **31**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Theoretical

**Main Objective:** To become familiar with the pattern of inheritance, common genetic disorders in Iran, and the ways to prevent them.

**Course Description:** Learning the structure and function of genes and chromosomes, the human gene map, cytogenetic and molecular-biochemical bases of sexual and non- sexual genetic disorders.

Title: Technical Principles and Maintenance of Laboratory Instruments **32**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Theoretical

**Main Objective:** Identification of different mechanisms and practicalities of laboratory devices and the right maintenance of such instruments.

**Course Description:** Technical principles, standard operating procedures and maintenance of laboratory devices including: microscopes, centrifuges, pH meters, Spector photo meters, flame photo meters, cell counters, flow cytometers, biochemical auto analyzers.

Title: Laboratory Rules and Management Principles **33**

**Prerequisite:** -

**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 become familiar with the overview, elements, management tasks, and professional rules of clinical laboratories.

Title: Quality Control Methods in Clinical Laboratories **34**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Theoretical

**Main Objective:** At the end of this course, clinical laboratory technicians should be able to use different quality control methods to exercise supervision and be assured of the accuracy and precision of clinical laboratory tests.

**Course Description:** Becoming familiar with definitions, terms, and errors, and applying various internal and external quality control procedures.

Title: Pathology Techniques **35**

**Prerequisite:** -

**No. of Credits:** 1

**Type of the Course:** Practical



**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: Seminar **36**

**Prerequisite:** Medical Biochemistry 2 - Hematology 2

**No. of Credits:** 1

**Type of the Course:** Theoretical

**Main Objective:** Learning how to collect scientific materials, write articles, and present them in a conference room.

**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: Field Internship 2 **37**

**No. of Credits:** 12

**Type of the Course:** Field Internship

**Number of Hours:** 612

**Clinical laboratory departments that a student should visit:** sampling, urine analysis, parasitology and mycology, biochemistry, hematology, blood bank, immunology and serology, microbiology.

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