



TEHRAN UNIVERSITY  
OF  
MEDICAL SCIENCES

School of Allied Medical Sciences

# **Course Description Guide**

**Bachelor of Science in Medical Laboratory Sciences**

## Contents

Program Name & Definition .....	<b>Error! Bookmark not defined.</b>
General Physics <b>01</b> .....	8
General Physics Lab. <b>02</b> .....	8
General Chemistry <b>03</b> .....	8
General Chemistry Lab. <b>04</b> .....	9
General Biochemistry <b>05</b> .....	9
General Biochemistry Lab. <b>06</b> .....	9
Cellular and Molecular Biology <b>07</b> .....	10
Theoretical Anatomy <b>08</b> .....	10
Practical Anatomy <b>09</b> .....	10
Theoretical Physiology <b>10</b> .....	11
Physiology Lab. <b>11</b> .....	11
Biophysics <b>12</b> .....	11
Theoretical Histology <b>13</b> .....	12
Histology Lab. <b>14</b> .....	12
Public Health and Epidemiology <b>15</b> .....	12
General Psychology <b>16</b> .....	13
Computer <b>17</b> .....	13
Biostatistics <b>18</b> .....	13
Clinical Biochemistry 1 <b>19</b> .....	14
Clinical Biochemistry Lab.1 <b>20</b> .....	14
General Microbiology <b>21</b> .....	15
General Microbiology Lab. <b>22</b> .....	15
Parasitology 1 (Helminthology) <b>23</b> .....	16
Parasitology Lab. 1 (Helminthology) <b>24</b> .....	16
Medical Immunology <b>25</b> .....	17
Medical Immunology Lab. <b>26</b> .....	17
Medical Virology <b>27</b> .....	17
Medical Virology Lab. <b>28</b> .....	18
Parasitology 2 (Protozoology and Entomology) <b>29</b> .....	18
Parasitology Lab. 2 (Protozoology and Entomology) <b>30</b> .....	19

General Pathology <b>31</b> .....	19
General Pathology Lab. <b>32</b> .....	19
Clinical Biochemistry 2 <b>33</b> .....	20
Clinical Biochemistry Lab. 2 <b>34</b> .....	20
Pharmacology <b>35</b> .....	21
Toxicology <b>36</b> .....	21
Toxicology Lab. <b>37</b> .....	21
Medical Terminology and English Texts <b>38</b> .....	22
Principles of Safety and Protection in Laboratory <b>39</b> .....	22
Hematology 1 <b>40</b> .....	23
Hematology Lab. 1 <b>41</b> .....	23
Technical Principles and Maintenance of Laboratory Instruments <b>42</b> .....	24
Immunohematology <b>43</b> .....	24
Immunohematology Lab. <b>44</b> .....	25
Hormonology <b>45</b> .....	25
Hormonology Lab. <b>46</b> .....	26
Medical Mycology <b>47</b> .....	26
Medical Mycology Lab. <b>48</b> .....	26
Hematology 2 <b>49</b> .....	27
Hematology Lab. 2 <b>50</b> .....	27
Laboratory Rules and Management Principles <b>51</b> .....	27
Quality Control Methods in Clinical Laboratories <b>52</b> .....	28
Medical Bacteriology <b>53</b> .....	28
Medical Bacteriology Lab. <b>54</b> .....	28
Introduction to Internal Medicine <b>55</b> .....	29
Medical Genetics <b>56</b> .....	29
Seminar <b>57</b> .....	30
Field Internship <b>58</b> .....	30

## 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 Ccouncil of Planning.

### Courses and number of credits:

General Courses:	22 credits
Basic Courses:	31 credits
Special Courses:	61 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	Persian Literature	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	-
Total		22				

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

Islamic Education General Courses	Orientation	Course Code	Title	No. of Credits	Course Hours		
					Theoretical	Practical	Total
1) Theoretical Foundations of Islam		011	Islamic Thought (1) (Origin & Resurrection)	2	34	-	34
		012	Islamic Thought (2) (Prophethood & Imamah)	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 Imamah	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 Continuous Bachelor's Program in Laboratory Sciences**

Course Code	Title	No. of Credits	Course Hours			Prerequisite(s)
			Theoretical	Practical	Total	
01	General Physics	2	34	-----	34	-----
02	General Physics Lab.	1	-----	34	34	Simultaneous with 01
03	General Chemistry	2	34	-----	34	-----
04	General Chemistry Lab.	1	-----	34	-----	Simultaneous with 03
05	General Biochemistry	3	51	-----	51	03
06	General Biochemistry Lab.	1	-----	34	34	Simultaneous with 05
07	Cellular & Molecular Biology	3	34	34	68	-----
08	Theoretical Anatomy	2	34	-----	34	-----
09	Practical Anatomy	1	-----	34	34	Simultaneous with 08

10	Theoretical Physiology	2	34	----	34	07
11	Physiology Lab.	1	----	34	34	Simultaneous with 10
12	Biophysics	2	34	----	34	01
13	Theoretical Histology	1	17	----	17	08
14	Histology Lab.	1	----	34	34	Simultaneous with 13
15	Public Health & Epidemiology	2	34	----	34	----
16	General Psychology	2	34	----	34	----
17	Computer	2	34	----	34	----
18	Biostatistics	2	34	----	34	----
Total		31				

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

Course Code	Title	No. of Credits	Course Hours			Prerequisite(s)
			Theoretical	Practical	Total	
19	Clinical Biochemistry 1	3	51	----	51	05
20	Clinical Biochemistry Lab. 1	1	----	34	34	Simultaneous with 19
21	General Microbiology	2	34	----	34	07
22	General Microbiology Lab.	1	----	34	34	Simultaneous with 22
23	Parasitology 1 (worms)	2	34	----	----	07
24	Parasitology Lab. 1	1	----	34	34	Simultaneous with 23
25	Medical Immunology	3	51	----	51	10
26	Medical Immunology Lab.	2	----	8	68	Simultaneous with 25
27	Medical Virology	2	34	----	34	21
28	Medical Virology Lab.	1	----	34	34	Simultaneous with 27
29	Parasitology 2 (protozoans & insects)	2	34	----	34	23
30	Parasitology Lab. 2	1	----	34	34	Simultaneous with 29
31	General Pathology	2	34	----	34	12
32	General Pathology Lab.	1	----	34	34	Simultaneous with 31
33	Clinical Biochemistry 2	2	34	----	34	----
34	Clinical Biochemistry Lab. 2	1	----	34	34	Simultaneous with 33
35	Pharmacology	2	34	----	34	----
36	Toxicology	1	17	----	17	35
37	Toxicology Lab.	1	----	34	34	Simultaneous with 36
38	English Texts & Medical Terminology	2	34	----	34	----
39	Principles of Safety & Protection in Laboratory	1	17	----	17	25 & 27
40	Hematology 1	3	51	----	51	10
41	Hematology Lab. 1	2	----	68	68	Simultaneous with 40
42	Technical Principles & Maintenance of Laboratory Equipment	1	17	----	17	12 & 32

43	Immunohematology	2	34	-----	34	25
44	Immunohematology Lab.	1	-----	34	34	Simultaneous with 43
45	Hormonology	1	17	-----	17	33
46	Hormonology Lab.	1	-----	34	34	Simultaneous with 45
47	Medical Mycology	2	32	-----	34	21
48	Medical Mycology Lab.	1	-----	34	34	Simultaneous with 47
49	Hematology 2	2	34	-----	34	40
50	Hematology Lab. 2	1	-----	34	34	Simultaneous with 49
51	Laboratory Rules & Management Principles	1	17	-----	17	39
52	Quality Control Methods in Clinical Laboratories	1	17	-----	17	33 & 49
53	Medical Bacteriology	3	51	-----	51	21
54	Medical Bacteriology Lab.	1	-----	34	34	Simultaneous with 53
55	Introduction to Internal Medicine	2	34	-----	34	19 & 49
56	Medical Genetics	1	17	-----	17	07
57	Seminar	1	17	-----	17	33 7 49
Total		61				

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

Course Code	Title	No. of Credits	Hours
58	Field Internship	16	816
Total		16	

Title: General Physics **01**

**Prerequisite:** None

**No. of Credits:** 2

**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. **02**

**Prerequisite:** Simultaneous with General Physics

**No. of Credits:** 1

**Type of the Course:** Practical

**Main Objective:** Becoming familiar with physical principles and observing the internal parts of clinical laboratory devices and machines as well as learning the basics of maintenance, repair and change of simple parts such as fuses, lights, lamps, coal, etc.

**Course Description:** Conducting basic experiments of light and electricity, opening laboratory machines and devices in students' presence, and teaching the internal parts and how to change small.

Title: General Chemistry **03**

**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. **04**

**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: General Biochemistry **05**

**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. **06**

**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 **07**

**Prerequisite:** None

**No. of Credits:** 3

**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: Theoretical Anatomy **08**

**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: Practical Anatomy **09**

**Prerequisite:** Simultaneous with Theoretical Anatomy

**No. of Credits:** 1

**Type of the Course:** Practical

**Main Objective:** Familiarity with macroscopic anatomy of human body systems.

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

Title: Theoretical Physiology **10**

**Prerequisite:** None

**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 Physics

**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: Theoretical Histology **13**

**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. **14**

**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: Public Health & Epidemiology **15**

**Prerequisite:** None

**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: General Psychology **16**

**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 **17**

**Prerequisite:** None

**No. of Credits:** 2

**Type of the Course:** Theoretical

**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 **18**

**Prerequisite:** None

**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 1 **19**

**Prerequisite:** General Biochemistry

**No. of Credits:** 3

**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:** Simultaneous with Clinical Biochemistry è

**No. of Credits:** 1

**Type of the Course:** Theoretical

**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: General Microbiology **21**

**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 (antibiogram), the relationship between a host and a pathogen, and normal body flora.

Title: General Microbiology Lab. **22**

**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:** 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) **23**

**Prerequisite:** 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 (Helminthology) **24**

**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 Immunology **25**

**Prerequisite:** Theoretical Physiology

**No. of Credits:** 3

**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. **26**

**Prerequisite:** Simultaneous with Medical Immunology

**No. of Credits:** 2

**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 **27**

**Prerequisite:** General Microbiology

**No. of Credits:** 2

**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. **28**

**Prerequisite:** Simultaneous with Medical Virology

**No. of Credits:** 1

**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: Parasitology 2 (Protozoology & Entomology) **29**

**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) **30**

**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: General Pathology **31**

**Prerequisite:** Theoretical Histology

**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: Clinical Biochemistry 2 **33**

**Prerequisite:** Clinical Biochemistry 1

**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 **34**

**Prerequisite:** Simultaneous with Clinical Biochemistry 2

**No. of Credits:** 1

**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: Pharmacology **35**

**Prerequisite:** Clinical Biochemistry 1, Theoretical Physiology

**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, the general pharmacology and a brief description of the drugs used to treat different diseases and their interactions with laboratory tests will follow.

Title: Toxicology **36**

**Prerequisite:** Pharmacology

**No. of Credits:** 1

**Type of the Course:** Theoretical

**Main Objective:** Becoming familiar with the absorption, dispersion, use, and metabolism of toxic materials.

**Course Description:** In this course, general toxicology, toxic level of drugs, and toxic chemical substances will be taught.

Title: Toxicology Lab. **37**

**Prerequisite:** Simultaneous with Toxicology

**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 & English Texts **38**

**Prerequisite:** None

**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: Principles of Safety & Protection in Laboratory **39**

**Prerequisite:** Medical Virology - Medical Immunology

**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: Hematology 1 **40**

**Prerequisite:** Theoretical 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 **41**

**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 taking and blood cell counting, providing blood smear and staining, and studying normal blood cells and their morphological changes in hematological disorders.

Title: Technical Principles and Maintenance of Laboratory Instruments **42**

**Prerequisite:** Biophysics, Clinical Biochemistry 2

**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: Immunohematology **43**

**Prerequisite:** Medical Immunology

**No. of Credits:** 2

**Type of the Course:** Theoretical

**Main Objective:** To introduce blood groups as well as principles and rules of blood donation, cellular and plasma blood products.

**Course Description:** Biochemical, genetic, and inheritance of blood groups, production and storage of cellular and plasma blood products, and adverse reaction of blood transfusion.



Title: Immunohematology Lab. **44**

**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: Hormonology **45**

**Prerequisite:** Clinical Biochemistry 2

**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. **46**

**Prerequisite:** Simultaneous with Hormonology

**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: Medical Mycology **47**

**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:** 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. **48**

**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: Hematology 2 **49**

**Prerequisite:** Hematology 1

**No. of Credits:** 2

**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 **50**

**Prerequisite:** Simultaneous with Hematology 2

**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: Laboratory Rules and Management Principles **51**

**Prerequisite:** Principles of Safety and Protection in Laboratory

**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 **52**

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

**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: Medical Bacteriology **53**

**Prerequisite:** General Microbiology

**No. of Credits:** 3

**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. **54**

**Prerequisite:** Simultaneous with Medical Bacteriology

**No. of Credits:** 1

**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: Introduction to Internal Medicine **55**

**Prerequisite:** Medical Biochemistry 1 - 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 **56**

**Prerequisite:** Cellular and Molecular Biology

**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: Seminar **57**

**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 **58**

**No. of Credits:** 16

**Type of the Course:** Field Internship

**Number of Hours:** 816

**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.