Baba Farid University of Health Sciences

Ordinances & Syllabus

M.Sc. Medical Laboratory Technology (Microbiology)

(2 Years Degree Programme)

Faridkot -151203

Ordinances
M.Sc. Medical Laboratory Technology (Microbiology)

1. Duration of Course:

Duration of Master of Science in Medical Laboratory Technology (Microbiology) shall be two years.

2. Eligibility for admission

a) This course shall be open to a candidate who have passed regular B.Sc.(MLT) degree with 50% or above marks from any recognized College/Institution affiliated to Baba Farid University of Health Sciences, Faridkot

OR

b) Any other examination recognized by the Board of Management of this University as an equivalent course / examination thereto, from time to time.

3. Medium of Instructions

The medium of instruction during the course and examinations shall be English.

4. Examination Schedule:

4.1 The examination shall be held twice a year in the months of May/June and November/December or on such other dates as may be decided by the Board of Management on the recommendation of Faculty of Medical Sciences and Academic Council.

4.2 Normally, the University shall conduct not more than two examinations in a year, for any subject, with an interval of not less than four and not more than six months between the two examinations.

4.3 The last date by which examination forms and fee must reach the Controller of Examinations/Registrar shall be as follows : -

Examinations	without late fee	with late fee of Rs.200/-	with late fee of Rs.500/-	with late fee of Rs.1500/-
May/June	March 1	March 15	March 31	April 15
Nov./Dec.	Sept. 15	Sept. 30	Oct. 15	Oct. 31

Vice-Chancellor may permit acceptance of examination form and fee ten days before the commencement of examination with a late fee of Rs.2000/-

5. First year M.Sc. Medical Laboratory Technology (Microbiology)

a) The First Year M.Sc. Medical Laboratory Technology (Microbiology) shall be open to a person who has been enrolled for one academic year preceding the examination in a Colleges/Institutions affiliated to this University.

b) The First Year M.Sc. Medical Laboratory Technology (Microbiology) shall be conducted by the Head of the Department in the following subjects:-

Subject Code/Paper	Subject	Theory				Practical			Grand Total
		Marks	Int. Assessment	Viva	Total	Marks	Int. Assessment	Total	
MSCMLTM-01/ Paper – I	General Principles of Microbiology & Immunology	100	100	100	**500**	200	100	**300**	**800**
MSCMLTM-02/ Paper – II	Bacteriology	100							
MSCMLTM-03/ Paper - III	Mycology	100							
	Total	300	100	100	500	200	100	300	800

Note: The awards will be retained by the Heads of the Department for the purpose of calculating Internal Assessment in the Second Year.

6. Thesis

i) Every candidate shall submit a thesis plan to the University within six months from the date of admission.

ii) Every candidate shall carry out work on an approved research project under the guidance of a recognized PG Teacher, the results of which shall be written up and submitted in the form of a thesis by the candidate.

iii) Thesis shall be submitted to the University six months before the commencement of the Second Year Theory examinations i.e. by 30th November of the preceding year for May/June examinations.

iv) The Vice-Chancellor may allow a candidate to submit the thesis within one month after the date fixed for the purpose with the prescribed late fee.

v) The thesis shall embody the results of the candidate's own research and/or experience and shall contain precise reference to the publications quoted, and must attain a good standard and shall be satisfactory in literary presentation and in other respects and should end with a summary embodying conclusions arrived at by the candidate. The thesis shall be typewritten on one side of the paper (size 11" x 8 ½") with margins of 1½" on each side, bound, indicating on the outside cover its title and the name of the candidate.

vi) The thesis shall be examined by a minimum of two examiners, one internal and one external examiner. Ordinarily, this examiner will not be appointed the External Examiner for theory and Clinical/Practical examination. The candidates who have submitted the thesis in University will be allowed to appear in the final

examination. However, the result shall be declared only on receipt of the thesis acceptance from both the examiners.

vii) The internal examiner shall send only report to the University after evaluation of thesis and the evaluated copy will be deposited in the college library for reference of the students. The external examiner shall also send copy of the thesis along with the report to the University. The University shall keep two copies in the University Library for reference of the students.

7. Second Year M.Sc. Medical Laboratory Technology (Microbiology)

The Second Year M.Sc. Medical Laboratory Technology (Microbiology) shall be open to a person

a) who has been enrolled for two academic year preceding the examination in a Colleges/Institutions affiliated to this University.

b) has submitted his/her name to the Controller of Examination/Registrar by the Principal of the College/Institutions with the following certificates:-

i) of having attended separately in theory and practical/clinical not less than 75% percent of the lectures delivered and practicals conducted in each of the subjects prescribed for the examination provided that deficiency in the number of lectures delivered and practicals conducted may be condoned by the Principal to the extent of 10% of the lectures delivered.

ii) of having secured at least 35% marks of the total marks fixed for internal assessment in each subject, separately, in order to be eligible to appear in all University examinations.

iii) Must have submitted the thesis

iv) of good moral character.

Note: 1) Internal Assessment shall be submitted to the University at least two weeks before the commencement of theory examinations or within one week from the issuance of Roll Numbers by the University. All the colleges shall adopt uniform criteria for Internal Assessment as follows:-

a) Attendance above 90% to be acknowledged with 10% extra weightage for Internal Assessment.

b) At least two tests to be held in each year in addition to the pre-final (send up) examination. The Internal Assessment should be the average of all awards of these tests taken together.

c) **Criteria for calculation of Internal Assessment**

i)	House Examinations	- 80%
ii)	Attendance (above 90%)	- 10%
iii)	Subject assessment (candidate's conduct and extra curricular participation)	- 10%

d) Additional mandatory requirement for Internal Assessment to be observed by all colleges.

i) All test marks obtained by candidates will be displayed on Notice Boards of respective departments as and when they are awarded.

ii) All computations of Internal Assessment of the entire class made by the HOD of the department shall be displayed on the notice board of the department showing individual test marks, advantage of all tests, attendance advantage and subjective assessment and the total Internal Assessment thus derived for at

least one week before sending the awards to the Principal's office.

iii) Professor Incharge/HOD preparing Internal Assessment shall certify that the detailed assessment of the entire class has been displayed on the department Notice Board for at least one week prior to its being submitted for onward transmission to the University and that adequate opportunity has been given to all the students to file any objections and that the same have been addressed satisfactory.

iv) The Principal forwarding the Internal Assessment to the University shall countersign the above referred certificate of the HOD/Professor Incharge preparing the Internal Assessment.

e) The re-appear/fail students will be re-assessed every time for the purpose of Internal Assessment.

2) If a candidate fulfils the condition laid down in clause 7 above, he/ she may be allowed to take the examination.

3) Every candidate before appearing in Second Year Examination must have cleared House Examination securing at least 50 percent marks in both theory as well as practical separately.

c) The Second Year M.Sc. Medical Laboratory Technology (Microbiology) Annual Examination shall be held in May/June and the supplementary within six months of the Annual Examination.

d) The Second Year M.Sc. Medical Laboratory Technology (Microbiology) examination shall be held in the following subjects and candidate shall be required to pass all the subjects:-

Subject Code/Paper	Subject	Theory				Practical			Grand Total
		Marks	Int. Assessment	Viva	Total	Marks	Int. Assessment	Total	
MSCMLTM-04/ Paper – IV	Bacteriology	80	80	120	**520**	200	80	**280**	**800**
MSCMLTM-05/ Paper – V	Mycology	80							
MSCMLTM-06/ Paper – VI	Advanced and applied Microbiological Techniques	80							
MSCMLTM-07/ Paper-VII	Research Methodology and Recent Advances	80							

i) Each theory paper shall be of three hours duration.

ii) The minimum number of marks to pass the examination shall be 50% in theory and practical separately.

iii) The candidate who will absent himself/herself from the examination will be deemed to have been failed in the examination.

iv) The candidate who has completed his/her training of two years and has failed in the examination may appear again in a subsequent examination without further training and without submitting a new thesis.

v) The candidate must pass the examination in a maximum of three (1+2) attempts +1 (mercy chance on the discretion of Vice-Chancellor) failing which, he/ she will not be allowed to continue his studies.

8. **Number of Examinations**

The examination shall be conducted twice a year in May/June and November/December or on such dates as determined by the University from time to time.

9. **Grace Marks:**

There shall be no provision for grace marks.

10. Board of Examiners

i) There shall be four examiners – two internal and two external.

ii) Professor & Head of the Department shall be the Convener and first examiner. The second Internal Examiner will be appointed by annual rotation from amongst the Professors/Associate Professors/Assistant Professor who fulfills the criteria of PG teacher. In case of non-availability of Professors/Associate Professors/Assistant Professor in the department the teacher who fulfils the minimum requirements to be an examiner may be appointed as Internal Examiner.

iii) The examiners shall be appointed by the University from the teachers working in the Medical Colleges affiliated to it, preferably from the colleges where this course is being run, on the recommendations of the Board of Studies in Medical Sciences and Faculty of Medical Sciences.

11. **Paper setting and moderation of Question Papers:**

The University may get each paper set from External Examiner only. The moderation of question papers may be got done under the directions of the Vice-Chancellor, if necessary.

12. **Evaluation of Answer Books:**

The answer books shall be got evaluated by putting fictitious roll numbers thereon or spot evaluation (table marking) or any other method under the directions of the Vice-Chancellor.

11. **Declaration of Result and minimum pass marks:**

A candidate shall be declared successful only when his thesis has been accepted and the candidate has obtained a minimum of 50% marks in theory including Internal Assessment and Grand Viva and 50% marks in practical including Internal Assessment of separately.

A successful candidate on the basis of theory and practical marks taken together shall be classified as under: -

Second Class : A candidate obtaining 50% or more marks but less than 60% marks
First Class : A candidate obtaining 60% or more marks
First Class with Distinction : A candidate obtaining 80% or more marks

12. **Award of Degree**

Each successful candidate shall be awarded a degree of M.Sc. Medical Laboratory Technology (Microbiology).

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SYLLABUS

General Guidelines

M.Sc. Medical Laboratory Technology (Microbiology)

Preamble

The main aim of this course is to train students of medical laboratory technology {MLT}in the subject of medical microbiology. Theoretical and practical training is imparted to the candidates in the specialities viz Bacteriology, Serology, Immunology and Mycology so that they can participate in diagnostic patient care services in bacterial and fungal diseases in health care institutions and community. They are introduced to basic research methodology so that they can conduct fundamental research.

Aims and objectives

The main aim of the course is to impart training so as to enable the students to provide the technical training in clinical microbiology laboratory in a tertiary health care institution and in community in the fields of bacteriology, immunology and mycology.

At the end of the course the students should be able to:

- Do different steps for laboratory diagnosis of infectious diseases (bacterial and fungal) and classification of medically important bacteria and fungi
- The medically important bacteria and fungi from clinical specimens and environment, to identify them and perform drug sensitivity tests.
- Perform common serological techniques and to describe advanced molecular and serological techniques and
- Care of laboratory animals and instruments

Teaching Methods

During a period of two years, intensive theoretical and practical training will be imparted to the candidates as follows.

Cognitive

1. Attending didactic lectures; one lecture (followed by discussion) of 1 hour duration weekly
2. Seminar: one seminar (followed by discussion) of 1 hour duration weekly.
3. Journal club: for 1 hour weekly. Two speakers, a faculty member and a junior resident/PhD trainee present article of recent publication.
4. Journal club: for half an hour duration weekly. One speaker, an MSc/PhD trainee present an article of recent importance.
5. Tutorials/Group discussion/review clubs: One of 1 hour duration weekly.

Presentation skills

1. Seminars: M.Sc. trainees presents seminars under the moderation of faculty member. In two years each trainee presents a minimum of 6 seminars; at least two seminars in each of three subspecialties, viz bacteriology, serology and mycology.
2. Journal club: MSc trainee present at least 5 journal clubs in two years.

Practical Training

An MSc trainee will be posted to work in rotation in various sub-specialities in the departments of Medical Microbiology and will actively participate in routine diagnostic and research activities of the laboratories during daily working hours (40 hours a week) .They will also be put on emergency microbiology duties in independent processing of clinical specimens received in emergency lab. The following is break up of two year posting of an M.Sc trainee for practical training:

Part 1 [One year duration]

Bacteriology	5 months
Bacterial serology/immunology, STD pathogens and mycobacteria	3 months
Mycology	3 months
Dissertation	1 month

Part – II (One year duration)

Dissertation	2 months
Bacteriology	4 months
Mycology	3 months
Serology/STD pathogens/ mycobacteria	3 months

During the practical training an M.Sc trainee carries out practical exercises to the section as per syllabus, takes active part in routine diagnostic services, daily bench side discussion on topics with member of faculty.

Practical and Viva-voce Examination

The examination will be spread over 2/3 days, depending upon the numbers of candidates. Following exercises will be included:-

1. Isolation, identification and antibiotic susceptibility of pathogens from clinical sample.
2. Identification of bacteria from pure culture.
3. Animal experiment: Inoculation/ Autopsy/ Isolation and Identification of Pathogenic Micro organisms- one exercise.
4. Immunology/Bacterial Serology- one exercise.
5. Mycology- two exercise.
6. Spotting exercises including:-
   - smear showing bacteria, fungi, parasites, viruses.
   - equipments and material used in diagnostic and research microbiology laboratory.
7. Any other exercise desired by external/Internal examiners.

SYLLABUS

M.Sc. Medical Laboratory Technology (Microbiology).

Instructions to Paper Setter

Note: 1) The question paper covering the entire course shall be divided into two sections. Each section to be attempted in a separate answer book and to be evaluated by separate examiners.

2) In each section there shall be 5 questions of 8 marks each and total weight-age being 40 marks

Section A **(Max. marks 40)**
Section B **(Max. marks 40)**

M.Sc. Medical Laboratory Technology (Microbiology)
Paper – I
General Principles of Microbiology & Immunology

General Microbiology

- History of Microbiology.
- Microscopy.
- Biosafety including universal precautions.
- Sterilization and disinfection.
  Morphology of bacteria and fungi.
- ection.
  Morphology of bacteria and fungi.
- Nomenclature and classification of bacteria and fungi.
- Normal flora of human body.
- Growth and nutrition of bacteria.
- Bacterial metabolism
- Bacterial toxins general properties.
- Bacteriocins
- Antibiotics and chemotherapeutic agents; basic concepts and mechanisms.

Immunology:

- Components of the immune system
- Innate and acquired immunity
- Antigens
  Immunoglobulins.
- s
  Immunoglobulins.
- Antigen and antibody reactions; agglutination. Precipitation and complement fixation reactions.
- Cells involved in immune system.

- system.
  - Complement.

SYLLABUS - First Year

M.Sc. Medical Laboratory Technology (Microbiology)

Paper – II

Bacteriology

Systemic Bacteriology

- Isolation and identification of bacteria.
- *Gram positive cocci of medical importance
- Enterobacteriaceae*

• iaceae*

- Mycobacteria general characters and classifications.

** knowledge of the above family/genus/species should include definition, prospective, classification, morphology, cultural characteristics, genetics molecular and antigenic structure, laboratory isolation and identification, tests for virulence and pathogenicity susceptibility, prevention including vaccines and recent development.

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SYLLABUS - First Year

M.Sc. Medical Laboratory Technology (Microbiology)

Paper – III

Mycology

Mycology:

- General characteristics and classification of fungi.
- Morphology and reproduction of fungi.
- Fungi causing superficial and subcutaneous and infections.
- Fungi causing mycetoma, keratomycosis and otomycosis.
- Rhinosporidium seeberi and Loboalaboi.
- Actinomyectes and Nocardia.
- Common laboratory contaminant .

** knowledge of the above family/genus/species should include definition perspective classification, morphology, culture, characteristics, genetics, molecular and antigenic structure. laboratory, isolation.

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SYLLABUS – Second Year

M.Sc. Medical Laboratory Technology (Microbiology)

Paper – I

Bacteriology

Systematic Bacteriology

- Isolation and identification of bacteria.
- Gram negative cocci of medical importance including Neisseria,Branhamella, Moraxella, Veillonella etc.
- Gram positive bacilli of medical importance including Lactobacillus, Coryneform organisms, Gardenella ,Bacillus, Actinomyces,Nocardia, Acinetobacillus and other Actinomycetales,
  Propionbacterium,Bifidobacterium,Eubacterium,Erysipelothrix,Listeria, lostridium and other spore bearing anaerobic bacilli.
- Gram negative bacilli of medical importance including vibrios,Aeromonas,Plesiomonas,Hemophilus,Borditella,Brucella,Pasteurella,Francisella, Legionella,Pseudomonas,Cardiobacterium,and other non-fermenters.Bacteriodes.
- Fusobacterium,Prevotella, Porphyromonas,Leptotrichia,Mobiluncus and other anaerobic gram negative bacilli.
- Helicobacter, Campylobacter and Spirillium.
- Mycobacteria
- Spirochaetes
- Mycoplasmas and Chlamydiae
- Rickettsiae including Bartonella, Coxiella etc.
- Knowledge of the above family/ genus/species should include definition, historical perspectives, classification, morphology, cultural characteristics, metabolism, genetics, molecular and antigenic structure,laboratory isolation and identification ,tests for virulence and pathogenicity, susceptibility, methods of preservation including vaccines and recent developments.

SYLLABUS – Second Year

M.Sc. Medical Laboratory Technology (Microbiology)

Paper – II

Mycology

MYCOLOGY

- Genetics of fungi.
- Fungi causing systemic infections.
- Pythium insidiosum.
- Prototheca.
- Pneumocyetis carionii.
- Mycotoxins
- Principles of in vitro antifungal susceptibility test.
- Knowledge of above family/genus/species/ should include definition, historical perspectives, classification, morphology, cultural characteristics, metabolism, genetics, molecular and antigenic structure,laboratory isolation and identification ,tests for virulence and pathogenicity, susceptibility, methods of preservation including vaccines and recent developments.

SYLLABUS – Second Year

M.Sc. Medical Laboratory Technology (Microbiology)

Paper – III

Advanced and applied microbiological techniques

Applied Microbiology

- Physical and biological containment.
- Principles of antimicrobial susceptibility testing
- Antibiotic assay.
- Biological standardisation relevant medical microbiology.
- Microbiology of air ,milk and water.
- Micobiology of hospital environment.
- Management of infectious waste.
- Methods of surveillance of hospital acquired infections.
- Investigations of an infectious outbreak and methods of infectious disease control.
- Molecular genetic techniques revalant to medical microbiology.
- Bacterial and bacteriophage genetics: basic principles and mechanisms. variations, mutations, recombitation, transposition etc.
- Quality assurance in microbiology
- Accreditation of laboratories.
- Vaccinology: principles, methods of prepration
- Information technology (computer) in microbiology
- Automation in microbiology
- New technologies relevant to the field of medical microbiology and theory.

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M.Sc. MLT(Microbiology)

MSCMLTM-04 PAPER – IV
Research Methodology and Recent Advances

Objectives

To enable the students to :

understand the importance of Research.
learn about the various applications of statistics in the research.
familiarize on writing the project report.

UNIT-I

Meaning of research, Types of research, Objectives of research. Collection of Data - Methods of collecting data. Primary and Secondary data - Sources of Primary and Secondary data, Editing the data and precautions used in the use of data. Different types of research tools for collecting research data, defining and determining a problem.

UNIT-II

Sampling Design - Census and sampling survey, Methods of sampling - Probability and non-probability sampling methods size of the sample, Merits & Demerits of each sampling method, Sampling errors and methods of Reducing the error.

UNIT-III

Classification and Tabulation of Data - Meaning, Objective, Types of Classification, Formation of frequency distribution, Tabulation of data - Schemes general rules, Types of tables and preparation of tabular forms. Representation of data - Diagramatic and Graphic significance, Types of diagrams, Types of graphs.

UNIT-IV

Measures of central tendency - Mean, Median, Mode, their relative advantages and disadvantages. Measures of dispersion - mean deviation, standard deviation, Quartile deviation, Co-efficient of variation, percentile, Association of attributes, Contingency table, correlation - coefficient of correlation and its interpretation, Rank correlation, Regression equation and predictions.

UNIT-V

Probability - Theorems, Simple Problems, Distributions - Binomial Poisson distribution, normal distribution, their properties and simple problems. Testing of significance - Large and Small sample tests - 't' test, Chi square test, and 'F' test - simple problems. Writing a research report - format of thesis writing with eg.

M.Sc. MLT (Microbiology)

PRACTICAL - MSCMLTM-04 PAPER – IV
Research Methodology and Recent Advances

1. Collection of Primary and Secondary data
   - i. Direct personal Interview - schedule
   - ii. Drafting questionnaire
   - iii. Pilot study for validating
2. Sampling Techniques
   - i. Judgement Sampling
   - ii. Quota Sampling
   - iii. Convenience Sampling
   - iv. Random Sampling
   - v. Stratified Sampling
3. Classification of data
4. Formation of frequency distribution
5. Tabulation of data - Types of Tables (eg)
6. Diagrammatic Representation of data
   - i. Graphs - Different types
   - ii. Bar diagrammes
   - iii. Pie diagram
   - iv. Histogram
7. Calculation of Mean, Median, Mode and SD
8. Correlation Analysis
9. 't' test and chi-square test

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Subject: **Copy of paras of the Minutes of the 45th meeting of the Board of Management held on 14.10.2016 at 02:30 pm in the Committee Room, State Institute of Health & Family Welfare Complex, SAS Nagar (Mohali)**

~~14.~~ 19. Considered the recommendations of the Academic Council made in its 25th meeting held on 30.08.2016 vide para-15 and after some discussion it was **RESOLVED**: To approve that Guide: Student Ratio for PG Paramedical Courses i.e. M.Sc./ Master in Hospital & Healthcare Administration (MHHA), etc. will be 1:3 under the Faculty of Medical Sciences. It was informed by Vice-Chancellor that the recommendations are within the prerogative of the University and no approval is required from the Central Council/body(s).