Baba Farid University of Health Sciences

Ordinances & Syllabus

M.Sc. Medical Physiology

(2 Years' Degree Programme)

Faridkot -151203

Ordinances
M.Sc. Medical Physiology

1. Duration of Course:

Duration of Master of Science in Medical Physiology shall be of two years.

2. Eligibility for admission

a) This course shall be open to a candidate who have passed regular MBBS / BDS/ B.P.T. /BAMS/BHMS/ B.Sc. Allied Health Sciences / Emergency and Trauma Care Technology / Zoology / Nutrition awarded by any recognized University.

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

Note: Vice-Chancellor may permit acceptance of examination form and fee ten days before the commencement of examination with a late fee of Rs.2000/-. The fee structure is revisable by the University from time to time.

5. First year M.Sc. Medical Physiology

a) The First Year M.Sc. Medical Physiology 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 Physiology shall be conducted by the Head of the Department in the following subjects:-

Subject Code/ Paper	Paper	Max. Marks		Total
		Theory	Practical	
MSCMHP-01/ Paper-I	General and Nerve Muscular Physiology	50	100	200
MSCMHP-02/ Paper-II	Cardiovascular, Renal and Respiratory Physiology	50		

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 Physiology**

The Second Year M.Sc. Medical Physiology 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 Physiology 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 Physiology 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	
MSCMHP-01/ Paper-I	General and Nerve Muscular Physiology	80	80	120	**520**	200	80	**280**	**800**
MSCMHP-02/ Paper-II	Cardiovascular, Renal and Respiratory Physiology	80							
MSCMHP-03/ Paper-III	Nutrition, Metabolism, Gastrointestinal System, Endocrines/ Reproduction	80							
MSCMHP-04/ Paper-IV	Nervous system and Special Senses	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 & 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% in theory and practical 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 Physiology.

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SYLLABUS

M.Sc. Medical Physiology

Scope and Objective

The candidate qualifying for the award of M.Sc. (Physiology) should be able to:

1. demonstrate comprehensive understanding of physiology as well as that of the applied disciplines;
2. demonstrate adequate knowledge of the current developments in medical sciences as related to physiology;
3. teach undergraduates and postgraduates in physiology;
4. plan and conduct research;
5. plan educational programs in physiology utilizing modern methods of teaching and evaluation; and
6. organize and equip physiology laboratories.

Intermediate Objectives

The candidate qualifying for the award of M.Sc. (Physiology) should be able to:

1. demonstrate comprehensive understanding of the structure, function and development of the human body as related to physiology.
2. demonstrate elementary understanding of the clinical applications of physiology,
3. critically evaluate the impact of the recent information on the genesis of current concepts related to various topics of physiology;
4. recapitulate the information imparted to the undergraduate students in physiology;
5. perform and critically evaluate the practical exercises done by undergraduate students;
6. identify a research problem which could be basic, fundamental or applied in nature; define the objectives of the problem and give a fair assessment as to what is expected to be achieved at the completion of the project; design and carry out technical procedures required for the study; record accurately and systematically the observations and analyze them objectively; effectively use statistical methods for analyzing the data; interpret the observations in the light of existing knowledge and highlight in what way his observations have advanced scientific knowledge; write a scientific paper on the lines accepted by standard scientific journals;
7. design, fabricate and use indigenous gadgets for experimental purposes;
8. demonstrate familiarity with the principles of medical education including definitions of objectives, curriculum construction, merits and merits of various tools used in the teaching-learning process; use of learning aids and learning settings, and methods of evaluation;
9. share learning experiences with the undergraduate and postgraduate students using appropriate pedagogical skills and methods;
10. draw out meaningful curricula for teaching medical and paramedical courses; give lucid, interactive lectures, presenting the information in a logical, simple and comprehensive manner; generate interest and curiosity amongst the students during lectures; give practical demonstrations;
11. organize the laboratories for various practical exercises, substitute and fabricate some of the simpler equipment for teaching purposes; and
12. handle and order for stores, draw up lists of equipment required to equip physiology laboratories

SYLLABUS

M.Sc. Medical Physiology

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 8 questions of 5 marks each and total weight-age being 40 marks

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

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

Detailed Syllabus

MSCMPH -01 PAPER – I

GENERAL AND NERVE MUSCULAR PHYSIOLOGY

1. **General & Cellular Physiology**

- Cell as the living unit of the body
- The internal environment
- Homeostasis
- Control systems
- Organization of a cell
- Physical structure of a cell
- Transport across cell membranes
- Functional systems in the cells
- Genetic code, its expression, and regulation of gene expression
- Cell cycle and its regulation

2. **Hematology**
   - Erthocytes
     - Erythropoiesis
     - structure & function of RBCs
     - formation of hemoglobin
     - destruction & fate of RBCs
     - anemias
     - polycythemias
   - Leucocytes
     - general characteristics
     - genesis & life span of WBCs
     - classification & functions of each type of WBC
     - leucopenia
     - leukemias
   - Blood groups
     - Classification
     - Antigenicity
     - Agglutination
     - blood typing
     - principles of transfusion medicine
   - Hemostasis
     - components of hemostasis
     - mechanisms of coagulation
     - coagulation tests
     - anticoagulants
   - Immunity
     - Innate immunity
     - Acquired immunity
     - Allergy, hypersensitivity and immunodeficiency
     - Psychoneuroimmunology

3. **Nerve & Muscle Physiology**

- Resting membrane potential
- Action potential
- Classification of nerve fibres
- Nerve conduction
- Degeneration and regeneration in nerves
- Functional anatomy of skeletal muscle
- Neuro-muscular transmission and blockers
- Excitation-contraction coupling
- Mechanisms of muscle contraction
- Smooth muscle

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Detailed Syllabus

M.Sc. Medical Physiology
MSCMPH -02 PAPER – II

CARDIOVSCULAR, RENAL AND RESPIRTORY PHYSIOLOGY

1. Renal Physiology & Fluid Balance

- Body fluid compartments
- Water balance; regulation of fluid balance
- Urine formation
- Regulation of extracellular sodium & osmolarity
- Renal mechanisms for the control of blood volume, blood pressure & ionic composition
- Regulation of acid-base balance
- Micturition
- Diuretics
- Renal failure

2. Cardio-vascular Physiology

- Properties of cardiac muscle
- Cardiac cycle
- Heart as a pump
- Cardiac output
- Nutrition & metabolism of heart
- Specialized tissues of the heart
- Generation & conduction of cardiac impulse
- Control of excitation & conduction
- Electrocardiogram
- Arrhythmias
- Principles of Hemodynamics
- Neurohumoral regulation of cardiovascular function
- Microcirculation & lymphatic system
- Regional circulations
- Cardiac failure
- Circulatory shock

3. Respiration

- Functional anatomy of respiratory system
- Pulmonary ventilation
- Alveolar ventilation
- Mechanics of respiration
- Pulmonary circulation
- Pleural fluid
- Lung edema
- Principles of gas exchange
- Oxygen & carbon-dioxide transport
- Regulation of respiration
- Hypoxia
- Oxygen therapy & toxicity
- Artificial respiration

4. **Environmental Physiology**

- Physiology of hot environment
- Physiology of cold environment
- High altitude
- Aviation physiology
- Space physiology
- Deep sea diving & hyperbaric conditions

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Detailed Syllabus

M.Sc. Medical Physiology

MSCMPH -03 PAPER – III

NUTRITION, METABOLISM, GASTROITESTINAL SYSTEM, ENDOCRINES/REPRODUCTION

1. Nutrition & Metabolism

- Carbohydrates
- Fats
- Proteins
- Minerals
- Vitamins
- Dietary fibre
- Recommended Dietary Allowances
- Balanced diet
- Diet for infants, children, pregnant & lactating mothers, and the elderly
- Energy metabolism
- Obesity & Starvation

2. Gastro-intestinal System

- General principles of G-I function
- Mastication & swallowing
- Esophageal motility
- Salivary secretion
- Gastric mucosal barrier
- Pancreatic & billiary secretion
- Gastrointestinal motility
- Digestion & absorption
- Functions of Colon
- Pathophysiology of peptic ulcer and diarrheal disease
- Liver functions

3. Endocrines & Reproduction

- Classification of Hormones
- Mechanism of Hormone action
- Measurement of hormones in Blood
- Endocrine functions of the hypothalamus
- Pituitary
- Thyroid
- Adrenals
- The endocrine pancreas
- Pathophysiology of diabetes
- Parathyroid, calcitonin, Vit D & calcium metabolism
- Pineal gland
- Testosterone & male sex hromones
- Spermatogenesis
- Hyper & hypogonadism

- Menstrual cycle
- Female sex hormones
- Pregnancy & Lactation
- Functions of Placenta
- Parturition
- Lactation

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Detailed Syllabus

M.Sc. Medical Physiology

MSCMPH -04 PAPER – IV

NERVOUS SYSTEM AND SPECIAL SENSES

1. General, Sensory & Motor Physiology

- General design of nervous system
- Interneuronal communication
- Classification of somatic senses
- Sensory receptors
- Sensory transduction
- Information processing
- Dorsal column & medial lemniscal system
- Thalamus
- Somatosensory cortex
- Somatosensory association areas
- Pain
- Organization of spinal cord for motor function
- Reflexes & reflex arc
- Brain stem & cortical control of motor function
- Cerebellum
- Basal ganglia
- Maintenance of posture and equilibrium
- Motor cortex

2. Special Senses

- Optics of vision
- Receptors & neural functions of retina
- Colour vision
- Perimetry
- Visual pathways
- Cortical visual function
- Functions of external and middle ear
- Cochlea
- Semicircular canals
- Auditory pathways
- Cortical auditory function
- Deafness & hearing aids
- Primary taste sensations
- Taste buds
- Transduction & transmission of taste signals
- Perception of taste
- Peripheral olfactory mechanisms
- Olfactory pathways
- Olfactory perception

3. Limbic System and Higher Nervous System

- Autonomic nervous system
- Limbic system and hypothalamus
- EEG
- Sleep
- Emotions & Behaviour
- Learning & Memory
- Yoga

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MSc Medical Physiology

Practical Syllabus

A. Haematology

1. Construction of Price Jones curve.
2. Arneth count: Sex differences in neutrophil.
3. Absolute eosinophil count.
4. Reticulocyte count.
5. Platelet count.
6. Laboratory tests for haemostasis; Bleeding time, Clotting time, Prothrombin time, clot retraction.

I Amphibian Experiments.

A. Muscle Nerve.

1. Common electrical and mechanical appliances.
2. Muscle –curve.
3. Simple muscle curve.
4. Effect of two successive stimuli on skeletal muscle contraction.
5. Effect of varying temperature on simple muscle contraction.
6. Effect of fatigue on muscle nerve preparation. Demonstration of neuromuscular transmission.
7. Determination of velocity of nerve conduction of sciatic nerve in frog.
8. The effect of load on the simple muscle curve.
9. Genesis of tetanus and clonus.
10. Recording of isometric contraction.
11. Effects of various agents on the contraction of smooth muscles of frog's rectum.

B. Cardiovascular system.

1. Recording of normal cardiogram of frog's heart.
2. Effect of cold and warm saline on sinus venosus and ventricle of frog's heart.
3. Effect of 1st and 2n determination of BMR Stannius ligatures on frog's heart.
4. Demonstration of all or none phenomena, treppe and summation of subliminal stimuli in quiescent frog's heart (properties of CM)
5. Refractory period in a beating heart.
6. Demonstration of the effect of stimulation of vagus and white crescentric line on frog's heart.
7. Fixation of autonomic pathway to the frog's heart.
8. Perfusion of isolated frog's heart, study of the effect of ions and drugs.

II MAMMALIAN EXPERIMENTS

A. Isolated organ bath/perfusion studies:

1. To study the inotropic and chronotropic functions in isolated perfused rabbit's Heart.
2. Intestinal motility (rat/rabbit); effects of various agents on the contraction of smooth muscles of intestine.

III HUMAN EXPERIMENTS

A. **Muscle Nerve**

1. Electromyography and its recording
2. Genesis of fatigue using Mosso's ergograph

B. **Energy balance, metabolism, nutrition**

1. Determination of BMR

C. **Central Nervous system**

1. Clinical examination of nervous system, including cranial nerves.

PRACTICAL DEMONSTRATION

A. **Central Nervous system**

1. Preparation of spinal frog and study of properties of reflexes
2. Audiometry

B. **Energy balance, metabolism, nutrition**

1. Mechanical efficiency at different grades of exercise.

C. **Reproductive system**

1. Pregnancy diagnostic tests (Immunological test)
2. Determination of sperm count, motility and morphology in a sample of human semen.

D. **Miscellaneous. Principles of radio-immuno assay (RIA)**

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