



YENEPOYA UNIVERSITY

Deralakatte, Mangaluru -575018

**REGULATIONS AND CURRICULUM GOVERNING POST
GRADUATE PROGRAM
M.Sc. IN MEDICAL PHYSIOLOGY**

(CURRICULUM - EFFECTIVE FROM 2010-11)

ATTESTED

A handwritten signature in blue ink, appearing to be "G.S.", is written over the word "ATTESTED".

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Ref: No. YU/REG/ACA/3-ACM/2009

31.10.2009

NOTIFICATION

Sub: Starting of M.Sc. in pre & para clinical departments

Ref: Resolution of the Academic Council at its 3rd meeting held on 31.10.2009
vide agenda - 3

The Academic Council at its 3rd meeting and subsequently the Board of Management at its 9th meeting held on 31.10.2009 have resolved to approve the proposal to start following M.Sc. in pre & para clinical departments:-

1. M.Sc Medical Anatomy
2. M.Sc Medical Physiology
3. M.Sc Medical Biochemistry
4. M.Sc Medical Pharmacology
5. M.Sc Medical Microbiology

This notification is issued for implementation with effect from the academic year 2010-2011.

To:
The Principal - YMC

Copy to:

1. Controller of Examinations
2. File copy


I/c **REGISTRAR**
Registrar
YENEPOYA
(Deemed to be University)

M.Sc. Medical Physiology

Preamble

The prime concern of the Institute is to develop patterns of teaching in postgraduate medical education so as to demonstrate a high standard of medical education to all medical colleges and other allied institutions globally. This educational experience is imparted in an atmosphere of research.

Goals:

The goal of M.Sc. (Medical) degree course education shall be to produce a competent Medical teacher who is capable of the following.

1. Recognize the learning needs of the Medical, Dental and allied health science students.
2. Mastered most of the competencies pertaining to the specialty that is required to be practiced by training and research.
3. Create an awareness of contemporary advances and developments in the discipline concerned.
4. Build up a spirit of scientific enquiry and an orientation to the Principles of Basic Skills required in Teaching of Medical, Dental and Paramedical professionals.
5. An orientation to the Principles of Research Methodology.

Objectives:

At the end of the course a post graduate student in Physiology should be able to:

1. Demonstrate comprehensive knowledge and understanding of general and systemic Physiology
2. Comprehend and understand physiological basis of health and disease affecting various organ systems.
3. Select and use appropriate teaching techniques and resources.
4. Critically evaluate published Journal literature and to effectively use the library facilities including computer.
5. Carryout relevant research.
6. Function as an effective member of teaching team or research team.
7. Carryout professional obligations ethically.

CRITERIA (ELIGIBILITY) : For Admission to Medical M.Sc.

Criteria for admission:

The candidates must have passed B.Sc. with 50% marks and with one subject of Biological Sciences/BAMS/BHMS/BPT or B.Pharm or any other professional graduates from a recognized University in India. *(as amended at the 7th Academic Council Meeting, Agenda No.16)*

COURSES DURATION: 3 YEARS

First year : M.Sc. (Preliminary)

Second and third year : M.Sc. (Medical)

M.Sc. Preliminary

COURSE DURATION: One Academic year from August to June, teaching will be at I M.B.B.S. level with the syllabus of latest M.C.I. regulations

SUBJECTS: Physiology

COURSE DETAILS:

- The course will be conducted in accordance to annual exam system.
- Three internal assessment exams will be conducted in the duration of one year. Average of the best two will be considered as the final internal assessment.
- Course commences from 1st August every year and ends on 15th June following year.
The following will be the norms regarding duty hours and other disciplinary measures. (*as approved at the 7th Academic Council Meeting, Agenda No.16*)

1. The PG students shall be allowed to attend 01 National/State Level and Local Conference/ CME of their speciality in one academic year only subject to following conditions:

The PGs will have to present a poster or paper in the 2nd and 3rd year and in the first year they can attend without presenting a poster or paper and subject to prior sanction of the competent authority on the recommendation of the concerned Head of the Unit and HOD.

The days of the Conference shall be calculated towards the permissible shortage of 20% allowed in one academic year.

However the special attachments (external-ship program) required by the PG students in some departments shall be decided by the Principal/Dean on the recommendation of the concerned HOD. The period for such external ship shall not be counted towards 20% of absence by the PG from the course and shall be treated as on duty.

2. The total leave allowed to PG in one academic year shall in no case exceed 20 days and shall not exceed more than 3 days at a stretch, however HOD may consider a longer period but not exceeding 08 days on case to case basis and considering the urgency involved. The leave can only be taken with prior approval of the competent authority.
 3. Preparatory leave for third year PGs shall be allowed last 02 weeks before the starting date of the University Examination and these days shall be included while calculating the 20% permissible shortage of attendance.
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4. The HODs PGs may consider light day to day work to 3rd year PGs in the last 1½ month before examination with the strict provision they shall be attending the department daily at schedule time (08.00 AM) and attend all academic activities and other duties assigned by the HODs from time to time.
 5. The PGs shall always be in their white coats during their duties in the hospital including night duties and on Sundays without fail. In case of default PG shall be attracting a fine of Rs.500/- each time.
 6. The PGs shall not exchange their duties at their level unless the same has been agreed by the Head of the Unit/HOD and communicated to MS YMCH & RMO in writing.
 7. The HODs shall ensure that the PGs attend their routine duty in the department /hospital daily from 8.00 AM to 4.00 PM and the remaining duties of evening/night/Sundays and public holidays as per the roster/duties assigned to them by the concerned HOU/HOD under intimation to the MS YMCH & RMO/Casualty.

COURSE CONTENT

Theory

General Physiology and Biophysics

8 hrs.

- ❖ Mutual introduction of dramatis personae in the teaching learning process
- ❖ Know thy institute
- ❖ Physiology : what and why? Homeostasis : an evolutionary point of view
- ❖ Characteristics of control systems
- ❖ Looking back & forth
- ❖ Reading efficiently

Blood and lymph

15 hrs.

- ❖ Functions of plasma proteins
- ❖ Principles of hemopoiesis
- ❖ Regulation of erythropoiesis
- ❖ Destruction of red cells: Jaundice
- ❖ Anemia
- ❖ Regulation of WBC production
- ❖ Functions of WBC
- ❖ Functions of platelets
- ❖ Hemostasis
- ❖ Blood groups
- ❖ Physiological basis of transfusion medicine

Nerve and Muscle

8 hrs.

- ❖ Physicochemical properties of cell membrane
 - ❖ Cell membrane : permeability & transport
 - ❖ Principles of bioelectricity
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❖ Genesis of resting membrane potential	
❖ Action potential	
❖ Prosperities of nerve –fibres	
❖ Functional anatomy of neuromuscular junction	
❖ Neuromuscular transmission	
❖ Muscle proteins – (Biochemistry)	
❖ Injury & repair of nerves and muscles.	
❖ Energetic of nerve & muscle	
❖ Work Physiology	
Gastrointestinal tract	12 hrs.
❖ Introduction to G.I. Physiology : general organization of G.I. tract	
❖ Mastication and deglutition	
❖ Gastric secretion	
❖ Regulation of gastric secretion	
❖ Pathophysiology of peptic ulcer	
❖ Biliary and pancreatic secretions	
❖ Physiology of colon	
❖ Pathophysiology of diarrheal disease	
Renal System	10 hrs.
❖ Renal hemodynamics and glomerular filtration	
❖ Renal tubular function – I	
❖ Renal tubular function – II	
❖ Regulation of renal function	
❖ Physiological basis of renal function tests	
❖ Micturition	
Skin and Body temperature (Environment)	2 hrs.
❖ Introduction to environmental physiology	
❖ Body temperature regulation	
❖ Main in cold environment	
❖ Man in hot environment	
❖ Hypothermia and its clinical applications	
❖ Physiological responses to high attitude	
❖ Physiological responses to high atmospheric pressure	
Endocrine Glands	16 hrs.
Reproduction Male	3 hrs.
Female	8 hrs.
❖ Introduction to reproductive system	
❖ Male reproductive physiology	
❖ Female reproductive physiology	
❖ Hypothalamic – pituitary – gonadal axis	
❖ Puberty	
❖ Pregnancy	
❖ Parturition and lactation	
❖ Reproductive ageing	
Family Planning and Welfare	4 hrs.

Cardiovascular system

25 hrs.

- ❖ Introduction to CVS
- ❖ Properties of cardiac muscle
- ❖ Action potential and spread of impulse in the heart
- ❖ E-C coupling in the myocardium
- ❖ ECG
- ❖ Pressure changes in the heart. Cardiac cycle
- ❖ Functional basis of heart sounds and murmurs
- ❖ Neural regulation of cardiac activity
- ❖ Regulation of heart rate
- ❖ Intrinsic regulation of heart's action. Cardiac output
- ❖ Cardiac output: measurement and regulation
- ❖ Nutrition and metabolism of heart
- ❖ Exercise physiology
- ❖ General principles of hemodynamics
- ❖ Cardiovascular reflexes
- ❖ Neural control of circulation
- ❖ Special feature of cerebral circulation
- ❖ Special features of circulation in skeletal muscles and skin

Respiratory System

15 hrs.

- ❖ Introduction to respiratory system
- ❖ Lung volumes and capacities
- ❖ Mechanics of respiration – I
- ❖ Mechanics of respiration – II
- ❖ Composition of respired air: pulmonary ventilation
- ❖ Exchange of gases in the lungs
- ❖ Ventilation –perfusion ratio
- ❖ O₂ carriage, O₂ – dissociation curve
- ❖ CO₂ carriage, CO₂ – dissociation curve
- ❖ Neural regulation of respiration
- ❖ Chemical regulation of respiration
- ❖ Hypoxia, cyanosis and dyspnoea
- ❖ Special feature of pulmonary circulation
- ❖ Artificial respiration
- ❖ Therapeutic use of oxygen.

Central Nervous System

30 hrs.

- ❖ Introduction to neurophysiology I
 - ❖ Introduction to neurophysiology II
 - ❖ CSF
 - ❖ Neuroglial cells
 - ❖ Synaptic transmission
 - ❖ Properties of synaptic transmission
 - ❖ Neurotransmitters
 - Sensory system
 - ❖ Coding of sensory information
 - ❖ Functional organization of ascending sensory pathways
 - ❖ Thalamus
 - ❖ Sensory cortex
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- ❖ Perception of sensory stimuli
 - ❖ Physiology of pain
 - Motor system
 - ❖ Characteristics and properties of reflexes
 - ❖ Functional organization of motor system – I
 - ❖ Functional organization of motor system – II
 - ❖ Brain stem reflexes, stretch reflexes and tendon reflexes
 - ❖ Basal ganglia
 - ❖ Cerebellum
 - ❖ Vestibular neck reflexes : maintenance of equilibrium
 - ❖ Localizing the level of lesion in neurological disease
 - Visceral and motivational system
 - ❖ Autonomic nervous system
 - ❖ Hypothalamus
 - ❖ Limbic system and emotions

EEG, Sleep and higher nervous functions

- ❖ Electroencephalography
- ❖ Sleep and wakefulness
- ❖ Learning and memory – I
- ❖ – II
- ❖ Speech

Special Senses

10 hrs.

- ❖ Functional anatomy of eye
- ❖ Functions of retina; photoreception
- ❖ Functions of retina ; colour vision and electroretinography
- ❖ Central mechanisms of vision and visual perception
- ❖ Functional anatomy of ear; impedance matching
- ❖ Organ of corti; peripheral auditory mechanism
- ❖ Auditory pathway
- ❖ Central auditory mechanism and auditory perception
- ❖ Olfaction
- ❖ Physiology of taste

Biomedical Waste

4 hrs

Practical (Physiology)

i) Blood

- ❖ Preparation and examination of peripheral blood smear and determination of differential leucocyte count.
 - ❖ Determination of total red blood cell count
 - ❖ Determination of total leucocyte count
 - ❖ Determination of eosinophil count
 - ❖ Determination of erythrocyte sedimentation rate, packed cell volume and calculation of the absolute values
 - ❖ Determination of hemoglobin concentration of blood
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- ❖ Determination of ABO and Rh blood groups
 - ❖ Determination of bleeding time, clotting time and plasma prothrombin time
 - ❖ Examination of bone marrow smear
 - ❖ Estimation of blood volume by dye dilution technique

ii) Human Experiments

- ❖ Study of Fatigue, Mosso's Ergography
- ❖ Recoding BP, effect of Posture and exercise
- ❖ Stethography
- ❖ Spirometry
- ❖ PFT, MVV, Dyspnoic index, FEV₁
- ❖ Peak Expiratory Flow Rate (PEFR)
- ❖ CVS fitness test / bicycle ergometer / 2 m. walk
- ❖ Perimetry (Visual Field)
- ❖ BMI
- ❖ ECG in lead II
- ❖ Test of Autonomic Functions.

iii) Clinical Examination

- ❖ Examination of Radial pulse,
- ❖ Clinical examination of CVS
- ❖ Clinical examination of Respiratory System
- ❖ Examination of cranial nerves
- ❖ Examination of sensory system
- ❖ Examination of motor system
- ❖ Examination of reflex.

iv) Interpretation of Charts, Problems and Case Histories

v) List of demonstration experiments

- ❖ Haematology; Haematocrit, reticulocyte count, platelet count, Osmotic fragility
- ❖ Nerve; Muscle Physiology –EMG
- ❖ CVS ; ECG, Demonstration of sinus arrhythmias.
- ❖ Recoding of Arterial Pulse Tracing
- ❖ Respiratory system: Spirogram & PFT by computerized spirometry.
- ❖ Reproductive System : Sperm Motility and Sperm count, special senses, Audiometry, Purkinje – Samson images, Ophthalmoscopy, retinoscopy, examination of fundus.
- ❖ Nervous System Autonomic function tests
- ❖ Amphibian Practical : Muscle nerve and Heart – experiments may be demonstrated if possible for academic interest only and not for practical examination as graphs on amphibian experiments are deleted.
- ❖ Electro encephalogram (EEG)

SCHEME OF EXAMINATION

Internal assessment (Theory): 20 marks

UNIVERSITY EXAMINATION:

1. The preliminary examinations shall be taken at the end of 1 year.
2. Preliminary examination pattern (Common to all specialty subjects)

THEORY:

There shall be a separate paper in each of the three subjects, namely Anatomy, Physiology and Biochemistry.

PRACTICAL:

There will be no practical examinations for the preliminary.

Theory: One paper of 80 marks

Examination marks distribution:

	Anatomy	Physiology	Biochemistry
Final examination (3 hour duration)	80 marks	80 marks	80 marks
Internal assessment	20 marks	20 marks	20 marks
Total	100 marks	100 marks	100 marks

Type of Questions in each section:

Long essay	=	2x10 = 20
Short essay	=	8x5 = 40
Short Answers	=	10x2 = 20

Total marks = 100 marks

- In case the candidate fails to obtain 50% minimum in the internal assessment he/she needs to repeat the semester.
- 75% attendance is a minimum requirement for appearing in the University examinations at the end of the year.

TEACHING HOURS & METHODS:

TOTAL NUMBER OF TEACHING HOURS IS APPROXIMATELY 480.

The general pattern of teaching methodology followed by all the faculty members and teaching staff in the department is:

1. Didactic Lectures: discussing the topic in detail in one hour lecture time.
2. Followed by practicals / demonstrations

SCHEME OF TEACHING HOURS FOR THEORY AND PRACTICALS

Topics	Hours
Didactic Lectures	160
Non Lecture Teaching	80
Practical / Demonstrations	240
TOTAL	480

FINAL M.Sc. (MEDICAL) COURSE

M.Sc. (MEDICAL) PHYSIOLOGY

AIMS AND OBJECTIVES:

THEORY:

1. A thorough knowledge of Medical Undergraduate syllabus in the subject by conducting **tutorials, practicals for small group students**
2. **Self study from standard text books**
3. **Prepare seminars on topics suggested by the HOD and present the same to the faculty members**
4. **Presenting Journal Clubs for updating the recent advances**
5. **Referring old books/journals for history the subject**

PRACTICALS:

1. **Learn to handle all equipment in the department both routine and sophisticated**
2. **Learn to use Audio-Visual Aids, Power points for teaching purpose**
3. **Learn to record and interpret**
4. **Perform all undergraduate practicals and demonstrations**
5. **Maintain Practical Record**

DISSERTATION:

The Candidate should draw a plan of the dissertation duly approved by the guiding teacher and submit it to the University within 12 months from the date of registration

Four copies of Final Dissertation should be submitted to the University three months prior to the examination

SCHEME OF FINAL M.Sc. DEGREE EXAMINATION AND EVALUATION

1. Examination to be held at the three year period will have theory written papers, practicals and viva voce
2. Acceptance of the dissertation is the pre-requisite for appearing for the examination
3. Number of the question paper setters and examiners 2 (Internal & External)
4. Senior Internal Examiner is the convener

THEORY

Three Question Papers of 3 hours duration, each paper will be of 100 marks

Physiology Paper I

1. General Physiology -10 marks
2. Blood- 20 marks
3. Cardiovascular system -50 marks
4. Renal, skin & body temperature regulation -20 marks

Physiology Paper II

1. Nervous system- 50 marks
2. Muscle nerve physiology- 10 marks
3. Special senses – 20 marks
4. Respiration -20 marks

Physiology Paper III

1. Endocrine – 50 marks
2. Reproduction & family planning-20 marks
3. Gastrointestinal tract – 20 marks
4. Recent advances in physiology – 10 marks

QUESTION PAPER PATTERN

Long essay question 2x20 = 40 marks

Short essay question 6x10 = 60 marks

100 marks

ELIGIBILITY FOR PASS: 50% in each Theory and Practical

No part examination for failed candidates.

MARKS DISTRIBUTIONS

Theory marks:

Theory written : 300 marks

Theory viva : 50 marks

Theory Internal marks : 25 marks (eligible for 40% of 25 marks)

Total : 375 marks

Practical marks

Practical :100 marks

Internal marks :25 marks

Total :125 marks

Theory and practical total marks: 500

OTHERS:

1. Age limit for admission 30 years
2. Attendance 80% each in Theory and Practicals, Seminars, Journal Clubs
3. Fees Rs.1,00,000+Miscellaneous/annum

RECOMMENDED TEXT, REFERENCE BOOKS AND JOURNALS

1. Keele, Samson & Wright's Applied Physiology
 2. J.B. West, Best & Taylor, Physiological basis of Medical Practice
 3. Guvton, Text Book of Medical Physiology
 4. Ganong, Review of Medical Physiology
 5. Campbell, Clinical Physiology
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6. B.D.S., Text Book of Physiology & Biochemistry
 7. John Bullock, Joseph Boyle, III Michael B. Wang, NMS Physiology 3rd Edn.
 8. H.E.De. Wardener, The Kidney
 9. Sir, John V. Dacie S.M. Lewis, Practical Hematology
 10. P.F. Baker, Recent Advances in Physiology
 11. Donald Englie-Smiter, Colin R. Paterson, Thomas Ccatchend, Nicholas, W. Read, Test book of Physiology
 12. Vernion B. Mount Castly, Medical Physiology, Vol. I & II
 13. Mathew N. Levy, Physiology
 14. Card J. Wiggers, Physiology in health and disease
 15. Williams, text book of Endocrinology
 16. Peters dort, Adams, Braunwald, Issel Bacher, Matir, Wilson, Harrison's principles of INTERNAL medicine
 17. West & Todd, Test Books of Biochemistry & Physiology
 18. Harper, Biochemistry
 19. John Field, HW Magou, Hand Book of Neurophysiology
 20. Wallance O Ferm, Hand Book of respiratory Physiology
 21. Carpenter, neurophysiology
 22. Prosser, Experimental Physiology
 23. Prosser, Comparative animal Physiology Mammal
 24. Wintrobe, Clinical Hematology
 25. Johnson, Gastrointestinal Physiology
 26. Holmes, Human Neurophysiology – A Student Text Book
 27. Cherniack, Pulmonary Function Testing
 28. Hand Book of Adaption Physiology
 29. Kelmen, Applied Cardiovascular Physiology
 30. William D. Willis Jr. Robert G. Grossment, Medical Neurobiology
 31. Brown, Cell Signaling: Biology & Medicine of Signal Transudation
 32. Byrne, Introduction of Membrane Transport and Bioelectricity
 33. Sudarsky, Pathophysiology of the Nervous System
 34. Kathryn LMc. Cance Sue E. Huether, Text Book of Pathophysiology, The Biologic basis for disease in adults and children – 2nd edition

Journals

1. By American Physiological Society, Journal of Applied Physiology
2. By American Physiological Society, Physiological Reviews
3. By American Physiological Society, Annual Review of Physiology
4. By American Physiological Society, Advances in Physiology Education
5. By American Physiological Society, Recent advances in Physiology
6. British Publication, Journal of Physiology
7. By Association of Physiologists & Pharmacologist of India, Indian Journal of Physiology and Pharmacology