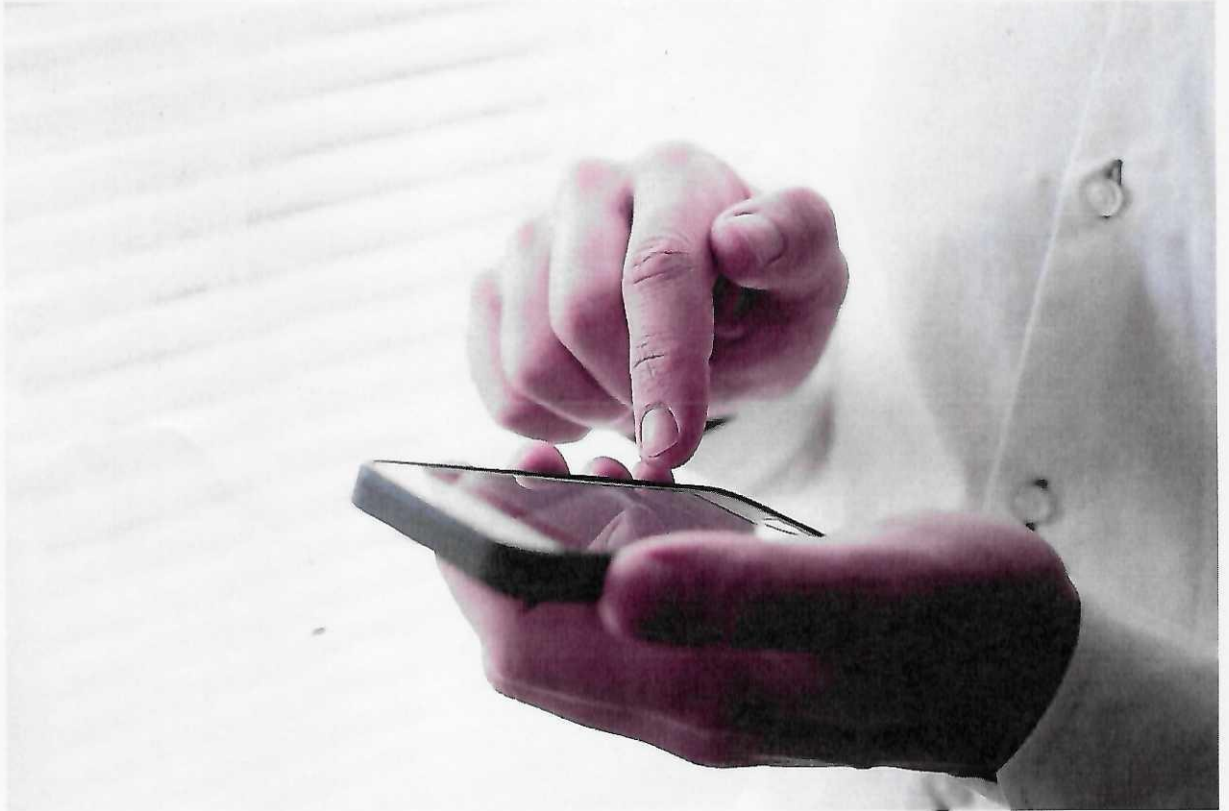


# Syllabus for MD (Physiology) Programme



**Guru Gobind Singh Indraprastha University**

A State University established by the Govt. of NCT of Delhi

**University School of Medicine and Allied Health Sciences**

## Objectives

- (a) Demonstrate comprehensive understanding of Physiology as well as that of allied disciplines.
- (b) Conduct clinical/ experimental research that would have a significant bearing on the human health and patient care.
- (c) Interact with the allied departments and render services in advanced laboratory investigations.
- (d) Acquire skills in conducting collaborative research in the field of physiology & allied sciences,
- (e) Demonstrate to the students how the knowledge of physiology can be used in a variety of clinical settings to solve diagnostic and therapeutic problems.
- (f) Organize and equip Physiology labs
- (g) Plan educational programmes in Physiology utilizing modern methods of teaching and evaluation.

## Specific Objectives

A candidate upon successfully qualifying in the MD (Physiology) examinations, should be able to:

1. Demonstrate comprehensive understanding of the structure, function and development of the human body as related to physiology, all the factors which might disturb these, mechanisms, of such disturbances and the disorders of structure and function, which may result from the disturbances.
2. Critically evaluate the impact of the recent information on the genesis of current concepts related to various topics of physiology.
3. Recapitulate the information imparted to the undergraduate students in physiology
4. Perform and critically evaluate the practical exercises done by undergraduate students
5. 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
6. Design, fabricate and use indigenous gadgets for experiments purposes.
7. Demonstrate familiarity with the principles of medical education including definitions of objectives, curriculum construction, merits and demerits of various tools used in the teaching-learning process; use of learning aids and learning settings, and methods of evaluation;
8. Share learning experiences with the undergraduate and postgraduate students using appropriate pedagogical skills and methods;

9. 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;
10. Organize the laboratories for various practical exercises, substitute and fabricate some of the simpler equipment for teaching purposes; and
11. Handle and order for stores, draw up lists of equipment required to equip physiology laboratories

### Departmental resources:

#### Laboratories & departmental library

The department should develop following laboratories. The facilities outlined under each laboratory are only the minimal requirements. In addition to the facilities, the laboratory should be involved in active research in one or the other defined fields.

- **Clinical Neurophysiology Laboratory**
  - (i) Electroencephalography
  - (ii) Evoked potential recording
  - (iii) Electromyography
  - (iv) Nerve-conduction studies
  - (v) Audiometry
  
- **Cardio-Respiratory Laboratory**
  - (i) Electrocardiography and Holter
  - (ii) Pulse plethysmograph
  - (iii) GSR recorder
  - (iv) Blood-gas Analyzer
  - (v) Equipment for measuring pulmonary diffusion capacity and FRC besides usual Spirometric measurements.
  - (vi) Whole-body plethysmograph
  - (vii) Treadmill machine
  - (viii) Appropriate software related to equipment
  - (ix) 16 channel (or more) multiparameter recorder with transducers
  - (x) Computerized lung function machine
  - (xi) Phonocardiograph

*Handwritten signature*

- **Metabolic/ Endocrinology/ Reproductive Bio-medicine laboratory**

This laboratory will perform various tests pertaining to Gastrointestinal, Renal, Metabolic Physiology

- (i) Spectrophotometer
- (ii) GI manometer

- **Autonomic function lab**

- (i) Tilt table
- (ii) Equipment for BP and HR variability analysis software
- (iii) Statistical analysis software – SPSS
- (iv) Computerized polyrite

**Departmental library:** should be equipped with general facilities like, computer with printer, internet access, books and journals, especially those related to its field of research.

### **Post Graduate Training**

The above objectives will be achieved in three years by the following structured programme

#### **Semester 1**

1. Orientation to the department
2. Choosing the subject of thesis and guide.
3. Writing the protocol.
4. Recapitulation of undergraduate physiology through attending UG lectures.

#### **Semester 2**

1. Physiology: theory & practical
2. Thesis work
3. Recapitulation of undergraduate physiology through attending UG lectures.

#### **Semester 3**

1. Physiology: theory & practical
2. Thesis work

#### **Semester 4**

1. Physiology: theory & practical
2. Thesis work

#### **Semester 5**

1. Physiology: theory & practical
2. Submission of thesis



## 1. Clinical posting

**Note : Each semester to be followed by an end semester exam**

**Internal assessment will be based on**

- (a) Marks of end semester exams ( theory and practical)
- (b) No. of UG lectures attended
- (c) Participation in:

### Seminars/Symposia

The seminars should be on a topic belonging to a system scheduled for the semester. The topic should be presented in depth appropriate for postgraduates by one of the MD students (more than one for symposia) and to be moderated by a faculty member with following aims

- (a) Introduction to the system
- (b) Tuning the students to the system
- (c) Covering the recent advances
- (d) Giving students practice in the art of oral presentation

### Journal clubs

The journal clubs should be on the article belonging to a system scheduled for the semester. The article will be presented by an MD student and moderated by a faculty member with following aims

- (a) Highlighting the recent advances
- (b) Discussion of classical papers
- (c) Inculcating the faculty of critical appreciation of a research article
- (d) Giving students practice in the art of oral presentation

### Practicals

About 8-10 practical exercises should be conducted every semester exclusively for MD students on systems scheduled for the semester. The results obtained in these exercises may be presented in the department.

### Clinical postings

During their last semester, M.D. students may be posted for two weeks each in the Department of Medicine, respiratory medicine, Cardiology, Gastroenterology, Neurology, Endocrinology and Nephrology and ophthalmology. In these postings, the students can attend ward rounds and also observe the work going on in clinical physiology laboratories associated with these departments, e.g. the pulmonary function tests lab, cardiac catheterization lab and radioimmunoassay lab. These postings will aim at :

- (a) Providing the students concrete living examples of the application of physiology in diagnosis and management of disease.
- (b) Illustrating through some living examples how knowledge of physiology may grow through observations made on patients.

**PAPER (Theory)**

**Total Marks: 400**

**Paper- I: Basic sciences (General & Cellular Physiology including Genetics, applied biochemistry, environmental physiology, biophysics and history of physiology) MM: 100**

1. Physiology of cell; various cellular mechanisms. Genetic control mechanisms.
2. Various principles involved in physiological phenomenon, e.g. haemodynamics, bio-electrical potentials, body fluids, methods of measurements.
3. Interaction of human body in ambient environment including high altitude, deep sea, exposure to hot and cold environment and space physiology.
4. Sports physiology
5. History of physiology

**Paper - II : Systemic Physiology I (Systems providing Transport, Nutrition & Energy) MM: 100**

1. Blood & Immunity
2. Cardio Vascular System
3. Respiratory system
4. Gastro Intestinal Tract & Dietary requirement
5. Excretion, pH & water & Electrolyte balance
6. Comparative physiology

**Paper - III : Systemic Physiology II (Systems concerned with procreation, regulation & neural control) MM: 100**

1. Reproduction & family planning/foetal & Neonatal physiology
2. Nerve-Muscle Physiology
3. Endocrine physiology including growth & development and Physiology of ageing
4. Central Nervous System
5. Special Senses

**Paper - IV : (Applied Physiology including Recent advances) MM: 100**

1. Patho-physiology pertaining to systemic physiology
2. Physiological basis of relevant evaluation tests
3. Statistics
4. Recent advances

## Practical Examination

Total marks : 300

Should be spread over 2 days and include the following components:

1. Problem solving exercises pertaining to clinical physiology (clinical case)
2. Performing and reporting two special investigations (1 – haematology, 1- human e.g PFT, EEG, ECG, etc)
3. Animal experiments, illustrating mechanisms, physiological concepts and their applications to humans (1- frog & 1- small mammal)
4. Micro-teaching session for assessing communication skills.
5. Viva-voce : Grand viva including thesis evaluation

**Internal assessment and marks distribution** : if the committee approves then

1. (a) 250 (150 theory & 100 practicals) marks may be included in internal assessment of the candidate.  
(b) Candidate must obtain minimum of 50% of the internal assessment in theory and practical
2. Theory : 400 marks
3. Practicals: 300 marks (includes lab work and practical manual, clinical postings and all presentations)
4. Grand Viva for final exam : 50 marks

**Grand total : 1000 marks**

## Syllabus for practical training

**Note : Candidate should acquire expertise in all undergraduate practicals**

### 1. ANIMAL EXPERIMENTS

- (a) Amphibian ( frog )
  - (i) Free load and after load
  - (ii) Effect of repeated stimulation (study of phenomenon of Fatigue)
  - (iii) Determining conduction velocity of sciatic nerve in frog
  - (iv) Properties of cardiac muscle – Long refractory period, all or none law.
  - (v) Extra-systole and compensatory pause, Beneficial effect.
  - (vi) Regulation of heart, vagus dissection and effect of vagal stimulation.
  - (vii) Actions of acetylene choline, adrenaline and nicotine on heart.
  - (viii) Perfusion of isolated frog's heart-role of Sodium, Potassium, Calcium ions
  - (ix) General management of amphibian experiments
  - (x) Demonstration of reflexes ( decerebrate animal and spinal shock)

H<sub>2</sub>

- (b) Mammalian Experiments (rabbit / guinea pig)
- (i) General management of mammalian experiments
  - (ii) Perfusion of isolated heart of rabbit by Langendorff's method
  - (iii) Study of intestinal movement and tone
  - (iv) Effect of drugs and ions on mammalian intestine
  - (v) Effect of drugs on mammalian uterine contraction.
  - (vi) Effect of adrenaline on intestinal movement and Tone.
  - (vii) Effect of occlusion of carotid arteries on blood pressure and respiration

## 2. HUMAN PHYSIOLOGY

### (a) Clinical Physiology

- (i) Elementary principles of clinical examination
- (ii) Methods of Inspection/ Palpation/ Percussion/ auscultation
- (iii) Plan of conduction and scheme of recording
- (iv) General examination
- (v) Clinical examination of cardiovascular system - circulatory system.
- (vi) Examination of peripheral pulses, measurement of blood pressure, examination of precordium
- (vii) Examination of respiratory system
- (viii) Examination of abdomen
- (ix) Examination of central nervous system
- (x) Examination of higher mental functions.
- (xi) Examination of Cranial Nerves.
- (xii) Sensory functions
- (xiii) Motor functions
- (xiv) Reflex functions
- (xv) Clinical examination of the eye including fundoscopy

### (b) Laboratory Procedures

#### Haematology

- (i) Determination of RBC count, WBC count, Platelet count, Reticulocyte count, Eosionphil count in normal and diseased states.
- (ii) Differential count of WBC
- (iii) Haemoglobinometry – Spectrophotometry
- (iv) Blood grouping and Cross matching
- (v) Determination of Bleeding time and Clotting time
- (vi) Osmotic fragility tests.

AB



### Cardiovascular system

- (i) Electrocardiography – Principles, method of recording and interpretation, calculation of heart rate and mean electrical axis of the heart.

### Respiratory system

- (i) Pulmonary function tests
- (ii) Stethography
- (iii) CPR

### Exercise tests

- (i) Tests for physical fitness.
- (ii) Lab Harvard step test
- (iii) Bicycle Ergometry
- (iv) Treadmill tests
- (v) Determination of  $VO_2$  max
- (vi) Cardio respiratory response to whole body exercise.

### Reproductive system

- (i) Pregnancy tests
- (ii) Sperm count.

### Nervous system / Nerve muscle physiology

- (i) Mosso's ergography
- (ii) Recording of EMG – nerve conduction both sensory and motor
- (iii) Evoked potential (somatosensory, visual, auditory, motor)
- (iv) EEG
- (v) Autonomic function testing

### Special senses

- (i) Tests for Visual acuity and Color vision
- (ii) Perimetry and mapping the blind spot
- (iii) Hearing tests

### 3. Others

- (i) Preparation of dietary chart for growing children, hypertensive patients, & Diabetes Mellitus patients.

**Note:** A PG practical manual (recording the practical done in a given semester) should be included. A log book where the minutes devoted to each practical, seminars, symposia, journal clubs, ward rounds may be maintained which should be presented at the time of final examination as internal assessment.

## RECOMMENDED READING

- **Text books –**

1. Keele, Samson and Wright's applied physiology
2. Best and Taylor – Physiological Basis for medical practice
3. Guyton – Text book of medical physiology
4. Ganong – Review of medical physiology
5. Berne and Levy- Physiology

- **Reference books –**

1. Cambell, Clinical physiology
2. P.F. Backer – Recent advances in physiology
3. Vernon – B Mount Castle, Medical Physiology Vol – I & Vol - II
4. Carl J. Wiggers – Physiology in health and disease
5. William's Textbook of Endocrinology
6. West and Todd Text book of Biochemistry and physiology
7. Harper's Biochemistry
8. Duncon – Diseases of Metabolism
9. Joh Field – H.W. Magou – Hand book of Neuro Physiology
10. Carpenter – Neuro Physiology
11. Wallance–O–Fen Handbook of Respiratory Physiology
12. Prosser – Experimental Physiology
13. Prosser – Comparative Animal physiology manual
14. Wintrobe's - clinical Haematology
15. Kelmen – applied cardio Vascular Physiology
16. Brown – Cell Singaling, Biology and medicine of signal trasudation
17. Byrne – Introduction of Memberane Transport and Bioelectricity
18. Sudarasky - Patho physiology of the nervous system
19. Knut Schmidt Neilson – Animal Physiology
20. Roit's - Immunology
21. Pathophysiology

- **Journals**

1. Physiological reviews
2. American Journal of Applied Physiology
3. Annual Review of Physiology
4. Advances in Physiological education and recent advances in physiology.
5. Hand Book of Physiology (American Physiological Society)
6. Journal of Physiology (British publication)
7. Indian of Journal of Physiology and Pharmacology
8. Journal of Experimental Physiology
9. Indian Journal of Medical Research
10. Acta Physiologica Scandinavia

- **Other Journals**

1. Nature
2. Science
3. Pain
4. Neurology
5. British Medical Journal
6. New England Journal of Medicine

H<sub>2</sub>