DPU

Dr. D. Y. PATIL VIDYAPEETH, PUNE
(Deemed to be University)

Syllabus for Post Graduate (Pre - Clinical Subjects)

2014 - 15
(Amended / Revised upto July 2019)

DPU

Dr. D.Y. PATIL VIDYAPEETH, PUNE
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.62 on a four point scale at 'A' Grade)
(An ISO 9001 : 2015 Certified University)

Dr. A. N. Suryakar
Registrar

Ref. No. : DPU/875-vii/2019
Date : 11/09/2019

NOTIFICATION

Whereas in pursuance of the following decisions taken by the Board of Management, it is hereby notified to all concerned that the **"Syllabus for Post Graduate (Pre-Clinical Subjects) – 2014-15"** is **revised upto July 2019** and hereby published.

- Changes in syllabus for UG and PG in Anatomy, Biochemistry, Community Medicine, vide **Resolution No. BM-07-(iii)-4 dated 28th January, 2014.**
- Introduction of Bioethical aspects in various chapters of all subjects vide **Resolution No. BM-26(xi)-15, dated 29th December, 2015.**
- Modifications in PG Practical examinations of Biochemistry Subject vide Resolution **No. BM-17(ii)-16, dated 22nd September, 2016.**
- Modifications in contents & titles of Theory Papers of Biochemistry PG programme **vide Resolution No.BM-17(iii)-16, dated 22nd September, 2016.**
- Interdisciplinary subjects of M.B.B.S, M.D./M.S. and Super-specialty (D.M./M.Ch.) Programs under the Faculty of Medicine **vide Resolution No. BM-10(viii) dated 12th April, 2019.**
- University Practical Examination Patten as per Competency Based Medical Education (**CBME**) curriculum of MCI vide Resolution **No. BM-27(i)-19, dated 30th July, 2019.**
- Graduate Attributes, Programme Outcomes (POs), Course Outcomes (Cos) outcome analysis of POs and COs and mapping with objectives for all courses of UG and PG Programmes of Pre-Clinical and Medicine Subjects under the Faculty of Medicine **vide Resolution No. BM-27(x)-19 dated 30th July, 2019.**
- Interdisciplinary subjects of M.B.B.S, M.D./M.S. and Super-specialty (D.M./M.Ch.) Programs under the Faculty of Medicine **vide Resolution No. BM-27(xi) dated 30th July, 2019.**

The **Syllabus for Post Graduate (Pre-Clinical Subjects) – 2014-15 Revised upto July 2019** will be useful to all the concerned. This will come into force with immediate effect.

Dr. D.Y. PATIL VIDYAPEETH PIMPRI, PUNE-18. Deemed to be University

(Dr. A. N. Suryakar)
Registrar

Copy to:
1. PS to Chancellor for kind information of Hon'ble Chancellor, Dr. D. Y. Patil Vidyapeeth, Pune.
2. PS to Vice Chancellor for kind information of Hon'ble Vice Chancellor, Dr. D. Y. Patil Vidyapeeth, Pune.
3. The Dean, Dr. D. Y. Patil Medical College Hospital & Research Centre, Pimpri, Pune
4. The Controller of Examinations, Dr. D. Y. Patil Vidyapeeth, Pune.
5. Director (IQAC), Dr. D. Y. Patil Vidyapeeth, Pune.
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MAPPING OF PROGRAMME OUTCOMES [POs] AND COURSE OUTCOMES [COs] OF PG PROGRAMMES

No.	By the end of the programme, the Postgraduate will have /be:
PO 1	Knowledge and Skills
PO 2	Planning and problem solving abilities
PO 3	Communication
PO 4	Research Aptitude
PO 5	Professionalism and Ethics
PO 6	Leadership
PO 7	Societal Responsibilities
PO 8	Environment and Sustainability
PO 9	Lifelong Learner

PHYSIOLOGY

Course Code	Course Title
PC02	MD Physiology

PROGRAMME OUTCOMES

Course 1 (PC02)

CO No.	At the end of the course, the learner should be able to:	Mapped Programme Outcomes
PC02.1	Deal and understand all aspect of general and applied physiology and general principles of medical education.	PO1, PO2, PO3, PO5, PO7, PO8, PO9
PC02.2	Teach effectively the basic physiological mechanisms of human body with reference to their implications in the pathophysiology of diseases, their diagnosis, treatment and management.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9
PC02.3	Conduct clinical and experimental research and interpret relevant findings.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9
PC02.4	Acquire skills in conducting collaborative research with allied sciences, clinical sciences and biomedical engineering.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9
PC02.5	Acquire administrative skills to set up departmental laboratories and initiate purchase procedure.	PO1, PO2, PO3, PO5, PO6, PO7, PO8, PO9
PC02.6	Function as a member of a teaching, administrative or research team.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9
PC02.7	Carry out all human and animal experiments by computer assisted simulation models / facilities as permissible by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) guidelines.	PO1, PO2, PO3, PO4, PO5, PO9

PHYSIOLOGY

PHYSIOLOGY

(1) GOAL :

The aim of the course is to prepare PG students in the subject of Human Physiology to enable the successful students to be awarded the MD degree. The course will empower the MD degree holder to: -

1.1 Teach and train future under-graduate and post-graduate medical students in Human Physiology in Medical colleges and Research Institutions.

1.2 Undertake independent research and guide others in research and contribute to advancement of the subject.

1.3 Organize and manage administrative responsibilities for routine day-to-day departmental work.

(2) LEARNING OBJECTIVES :

2.1 COGNITIVE DOMAIN :

At the end of the training course the PG student should have a thorough knowledge of all organ systems of the body particularly about–

2.1.1 Historical aspects
2.1.2 Evolution and development
2.1.3 Comparative physiology
2.1.4 Structure – gross and electron microscopic and functions at cellular level.
2.1.5 Regulating mechanisms
2.1.6 Variation in physiological and pathological conditions.
2.1.7 Applied physiology
2.1.8 Recent advances.

2.2 PSYCHOMOTOR DOMAIN:

The P.G. students should be able to:–

2.2.1 Perform human experiments including those based on biophysical principles and study mammalian & amphibian experiments by simulation software (Expropharma)

2.2.2 Acquire history taking and clinical examination skills.

2.3 AFFECTIVE DOMAIN

The P.G. Students should develop communication skills to:-

2.3.1 Develop interaction with students, colleagues, superiors and other staff members.

2.3.2 Work as members of a team in teaching as well as research activities.

2.3.3 Nurture a positive attitude towards teaching as a profession.

(3) SELECTION OF CANDIDATES

3.1 Those who hold a MBBS degree recognized by MCI will be eligible to apply.

3.2 Selection shall be through CET conducted by the University.

3.3 Duration of course shall be of 3 years inclusive of examination.

(4) COURSE CONTENT AND DESCRIPTION

Since the students would be working in the department for 3 years, the time plan & division of course content will be the following. The lists given below are not exclusive and the PG guide and Head of Department may include any other new topic that they consider appropriate for the PG student to study.

(5) I - YEAR (I AND II TERMS) :-

5.1 THEORY : The PG student will : -

5.1.1 Attend all UG lectures in Physiology and study in detail all aspects of systemic Physiology.

5.1.2 Attend PG lectures at other PG Centers

5.1.3 Deliver seminars periodically on topics allotted by the PG guide.

5.2 Rotation and Posting: compulsory for MD Physiology students during their second year of study:

Medicine - 3 weeks
Biochemistry - 1 week
Blood Bank - 1 week
Reproductive health (OBGY) - 1 week
2D Echo - 1 week
Dialysis - 1 week
Neuro electrophysiology - 1 week
MRI/CT Scan / USG- 1 week

5.2 PRACTICALS

The PG student will:-

5.2.1 Attend all practicals and demonstrations taught by senior teachers to u. g. students.

5.2.2 learn basic techniques and instruments used for UG practical's.

5.2.3 Animal experiment:
Interpretation of recorded graphs only for mammalian and amphibian experiments (in view of ban on animal experiments since June 2012)

5.2.4 Human experiments: Following will be added:
- Record of autonomic function test on polyrite
- Record of EMG

5.3 RESEARCH

The PG student will:-

5.3.1 Decide upon a research topic for thesis and communicate it to the university within three months of registration. The topic should have the approval of institutional ethics committee.

5.3.2 Attend and present Journal club.

5.3.3 Visit the library to get acquainted with scientific journals.

5.3.4 Review the literature for the thesis in the 2nd half of 1st year.

5.3.5 Get acquainted with the basic concepts of biostatistics.

5.4 MEDICAL EDUCATION TECHNOLOGY

The PG student will: -

5.4.1 Familiarize himself / herself with concepts of medical education technology.

5.4.2 Understand evaluation techniques.

5.4.3 Attend a medical education technology workshop.

(6) 2nd YEAR (IIIrd and IVth Terms): -

THEORY

The PG student will:-

6.1.1 Study details of systemic physiology, comparative physiology and recent advances in all topics given below

6.1.2 Attend PG lectures and seminars at other PG centers.

6.1.3 Deliver seminars periodically on topics allotted by the PG guide.

PRACTICALS

The PG student will:-

6.2.1 Perform human experiments including those based on biophysical principles and study mammalian and amphibian experiments by simulation software (Expro pharma)

6.2.2 Undertake a biochemistry posting in the IIIrd term and a clinical posting in the IVth term to acquaint with recent advances in both these fields.

RESEARCH

The PG student will:-

6.2.3 Carry out research work related to the thesis.

6.3.2 Attend local and national conferences of professional bodies to understand how research work is presented.

6.4 MEDICAL EDUCATION TECHNOLOGY

The PG student will:-

6.4.1 learn in detail the teaching learning methods and the methods of the evaluation in practicals and theory.

6.4.2 Undertake small group teaching in practicals, demonstrations and tutorials.

6.4.3 learn to use audiovisual aids.

6.4.4 Undertake micro-teaching sessions for practicals and theory under supervision.

Pg Student Will Attend Medicine Wards For Three Months and Study Different Type Of Case and Physiological Basis of Treatment.

(7) 3rd YEAR (V and VI Terms) : -

7.1 RESEARCH

The PG student will:-

7.1.1 Complete & submit thesis to the University at least 6 months before the commencement of the university examination.

7.1.2 Begin writing articles for publication.

7.2 TEACHING

The PG student will:-

7.2.1 Teach all practicals to UG students.

7.2.2 Conduct microteaching sessions for 1st year PG students.

7.2.3 Teach theory topics in small groups for UG students.

7.3 PRACTICALS

The PG student will carry out animal experiments independently.

(8) DETAILED SYLLABUS

In Addition to the UG syllabus the PG student is expected to study in detail the following: -

8.1 GENERAL PHYSIOLOGY

8.1.1 Biological membranes with details of membrane receptors.

8.1.2 Physiology of growth and aging.

8.1.3 Principles & applications – genetics.

8.2 ENVIRONMENTAL PHYSIOLOGY

8.2.1 Physiology of deep sea diving.

8.2.2 Space physiology

8.2.3 High altitude physiology

8.2.4 Temp regulation – Hypothermia, hyperthermia.

8.2.5 Pollution – air, noise.

8.3 NERVE

8.3.1 Experimental techniques to study bioelectrical phenomena (voltage clamp technique, cathode ray oscilloscope, S. D. curve, nerve conduction studies)

8.4 MUSCLE

8.4.1 E.M.G.

8.4.2 Smooth muscle.

8.4.3 Pathophysiology of muscle disorders.

8.5 BLOOD :

8.5.1 Immunity – details .

8.5.2 Plasmin system

8.5.3 Tissue typing.

8.5.4 Blood transfusion and its applied aspects

8.6 CARDIOVASCULAR SYSTEM:

8.6.1 Echocardiography and vector cardiography .

8.6.2 Electrocardiography & Stress test.

8.6.3 Cardiac catheterization and other invasive procedures.

8.6.4 Flowmeters.

8.7 RESPIRATORY SYSTEM :

8.7.1 Lung function tests – details.

8.7.2 Blood gas analysis.

8.7.3 Hyperbaric oxygen

8.7.4 Artificial respiration/Cardiopulmonary resuscitation

8.8 ENDOCRINES

8.8.1 Radio-Immuno Assay

8.9 REPRODUCTIVE SYSTEM

8.9.1 In vitro Fertilization

8.9.2 Contraceptives – details

8.9.3 Neonatal and Foetal Physiology

8.10 ALIMENTARY SYSTEM

8.10.1 Gastrointestinal hormones – details

8.10.2 Gastrointestinal motility – details

8.10.3 Absorption of nutrients

8.10.4 Obesity

8.10.5 Metabolism in starvation

8.11 RENAL PHYSIOLOGY

8.11.1 Artificial Kidney

8.11.2 Acid-base balance – details

8.11.3 Cystometry

8.11.4 Water and electrolyte balance

8.12 CENTRAL NERVOUS SYSTEM

8.12.1 Higher functions (Speech, memory, learning, thought and consciousness, behavioral physiology, sleep and wakefulness)

8.12.2 Voluntary movements

8.12.3 Details of the following topics covering physiological anatomy, connections, methods of study of functions, diagnostic techniques, functions and physiological basis of manifestation of diseases -

(i) Cerebral Cortex
(ii) Basal ganglia
(iii) Cerebellum
(iv) Reticular formation
(v) Thalamus
(vi) Hypothalamus
(vii) A.N.S.

(viii) Limbic System
(ix) Electroencephalogram, MRI
(x) Neurotransmitters

8.13 SPECIAL SENSES

8.13.1 Audiometry

8.13.2 Retinoscopy, fundoscopy, Computerised perimetry, phakoscopy

8.13.3 Electrophysiology of retina, chochlea

8.14 EXERCISE PHYSIOLOGY

8.14.1 Concept of health fitness

8.14.2 Physical fitness, its components and evaluation

8.14.3 Physical conditioning and anaerobic threshold

8.15 NUTRITION

8.15.1 Relationship of diet & disease

8.16 STRESS RELAXATION TECHNIQUE:

Principles of various stages of yoga, breathing exercise, meditation and Others

8.17 APPLIED BIOCHEMISTRY, BIOSTATISTICS AND BIOPHYSICS

8.18 PRACTICALS

AMPHIBIAN EXPERIMENT:-

In addition to U.G. Syllabus, the P.G. student will study and interpret the graphs recorded during various amphibian experiments by Animal simulation software.

8.18.1 CARDIAC MUSCLE EXPERIMENTS

Properties of cardiac muscle, nervous regulation of heart, effect of drugs, & effects of ions on isolated frog's heart.

SKELETAL MUSCLE EXPERIMENTS

Effect of various strength of stimuli, effect of load, genesis of tetanus and phenomenon of fatigue, velocity of nerve impulse and effect of temperature.

MAMMALIAN EXPERIMENT:-

8.18.2 Study and interpret the recorded graph for perfusion of mammalian heart.
(i) Effects of various factors (Ions and Drugs)

8.18.3 Study of graphs recorded for smooth muscle activities and effects of various factors

HUMAN EXPERIMENTS:-

8.18.4 In addition to UG Experiment following things to be added in PG Practical
i) To record autonomic function test on Polyrite D instrument

ii) To record EMG.

CLINICAL:-

8.18.5 To examine the subject for various system.

HAEMATOLOGY:-

8.18.6 In addition to U. G. Practicals Platelet count and reticulocyte count to be conducted.

8.18.7 Interpretation of Biochemical reports

8.19 TEACHING LEARNING METHODS

The teaching learning activities would consist of

8.19.1 Attending UG lectures.

8.19.2 Attending PG lectures.

8.19.3 Microteaching sessions

8.19.4 Journal clubs moderated by teachers.

8.19.5 Seminars, symposia, panel discussion of suitable topics moderated by teachers.

8.19.6 Lectures and Practicals prepared and presented by students under supervision

8.19.7 Attend and participates in conferences, workshops and share knowledge and experiences with others.

8.19.8 Visit to various clinical departments to gain the knowledge of various techniques used to study the functions of various system for 2 and 1/2 month, of them 3 weeks Medicine posting and 1 week posting in each department mentioned hereafter - Reproductive health, Bio-chemistry, Electrophysiology, Dialysis, 2DEcho, Radiology, Blood Bank.

(9) RECOMMENDED READING

9.1 TEXTBOOKS OF PHYSIOLOGY

9.1.1 Guyton – Textbook of medical Physiology

9.1.2 Best & Taylor – Physiology basis of Medical Practice

9.1.3 Samson Wright's Applied Physiology

9.1.4 Ganong – Review of Physiology

9.1.5 Berne and Levy – Physiology

9.1.6 Vander's human Physiology

9.1.7 Prosser & Brown Comparative Physiology-

9.1.8 Indu Khurana Textbook of Medical Physiology

9.1.9 Biostatistics

9.1.10 Medical education Technology

9.1.11 Patton and fuchs - Text book of Physiology

9.2 JOURNALS

9.2.1 Physiological Review

9.2.2 Indian Journal of Physiology and Pharmacology

9.2.3 Journal of applied Physiology

9.2.4 Actaphysiological Scandinavica

(10) EVALUATION OF STUDENT FOR PG DEGREE (M.D.)

To consider the internal assessment pattern for PG students of Various departments during their 1ST, 2nd, 3rd year of training

The evaluation of students for award of M.D. will consist of written examination Practical's, viva and thesis work.

10.1 DISTRIBUTION OF MARKS

Written examination - 400 marks
Viva & thesis - 100 marks
Practicals - - 300 marks

10.2 Marks allotment at the practical examination will be as follow as-

Interpret the Mammalian recorded graph only for mammalian and amphibian experiments (in the view of ban on animal experiments since June 2012)	50 marks
Interpret the Amphibian recorded graph –	40 marks
Clinical Examination	40 marks
Haematology	50 marks
Human experiments & interpretation of clinical data	40 marks
Oration and Microteaching	40 marks
Biochemistry test reports	40 marks
Grand Viva	100 marks
Total marks	400 marks
Grand Total marks (Theory + Practical)	800 marks

10.3 FORMATIVE

The student will be assessed throughout the course on following lines.

1) Attendance
2) Knowledge as tested by written, practical and viva examination
3) Presentations in seminars
4) Relationship with colleagues, superiors, students and staff members.
5) Maintenance of student's logbook

The 5 – point scale will be used	**Points**
Unsatisfactory	1
Satisfactory but needs improvement	2
Satisfactory	3
Good	4
Outstanding	5

Regular feedback will be to the P.G. students noting their strength, weaknesses and measures to improve.

10.4 SUMMATIVE

10.4.1 WRITTEN EXAMINATION

This will consist of four papers of three hours duration and 100 marks eachThere will be two questions of 25 marks each and five short answer questions of10 marks each.

Paper I – General and cellular physiology, applied biochemistry, biophysics and Biostatistics, History and Comparative Physiology

Paper II – Blood, Cardiovascular System, Respiratory system, Alimentary system and Excretory system.

Paper III – Endocrines, Special Senses, Nerve muscle physiology; nervous system and reproductive system.

Paper IV- Recent advances, Exercise physiology, Nutrition, Applied physiology, stress relaxation medical education Technology Medical ethics

Instruction regarding weightage given to each system will be communicated to paper setters and examiners.

10.4.2 PRACTICAL EXAMINATION –

Interpretation of mammalian and amphibian graphs, case discussion for applied physiology.
Human experiments and clinical examination.
Haematology experiment.

10.4.3 VIVA VOCE EXAMINATION

General viva
Viva thesis
Oration

10.5 HEADS OF PASSING –

A candidate will be declared successful only if 50% marksin written examination, viva voce and thesis and practical are obtained separately. The candidate should also obtain at least 50% marks out of the aggregate of 800 marks to be declared successful.