



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

**Syllabus for
Post Graduate
(Para - Clinical Subjects)**

2014 - 15
(Amended / Revised upto July 2019)



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 (Para-Clinical Subjects) – 2014-15" is revised upto July 2019 and hereby published.

- Modifications in Question Paper format of MD Pathology University examination vide Resolution No. BM-16(ix)-18, dated 21st July, 2018.
- Change in duration of MD Microbiology practical examination vide Resolution No. BM-10(ii)-19 dated, 12th April, 2019.
- Graduate Attributes, Programme Outcomes (POs), Course Outcomes (Cos) and gap analysis for all courses of UG and PG Programmes for Para-Clinical and Surgical Subjects vide Resolution No. BM-10(vii)-19 dated, 12th April, 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-10(viii) dated 12th April, 2019.

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




(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.
6. Web Master for uploading on Website.

**MAPPING OF PROGRAMME OUTCOMES [POs] AND COURSE
OUTCOMES [COs] OF PG PROGRAMMES**

No	
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

PHARMACOLOGY

Course Code	Course Title
PC05	MD Pharmacology

PROGRAMME OUTCOMES

Course 1 (Subject Code)

CO No.	At the end of the course, the learner should be able to:	Mapped Programme Outcomes
PC05.1	Acquire knowledge on generic drugs and prescriptions, rational use of drugs, prescription auditing, antimicrobial stewardship programs and strategies for containment of antibiotic resistance	PO1,PO2,PO3,PO4 , PO5, PO6, PO7, PO8, PO9
PC05.2	Demonstrate knowledge of basics of research methodology, research protocol development, conduct the study, record observations, analyze data, interpret results for dissertation writing and disseminate these results to have the potential ability to pursue further specializations and eventually be competent to guide students	PO1,PO2,PO3,PO4 , PO5, PO6,PO7,PO8, PO9
PC05.3	Describe the principles of teaching – learning technology towards application and take interactive classroom lectures, modules for problem based learning (PBL), case discussions, small group discussions, seminars, Journal club and research presentations	PO1,PO2,PO3, PO4, PO5, PO6,PO7,PO9
PC05.4	Demonstrate knowledge about computer assisted learning (CAL) softwares, mannequins and various instruments and ability to use them efficiently to promote learning	PO1,PO2,PO3, PO4, PO5, PO6,PO7,PO9
PC05.5	Acquire knowledge on animal toxicity studies, in vitro and in vivo animal experiments, ADR monitoring, legal and ethical issues involved in drug development and research	PO1,PO2,PO3,PO4 , PO5, PO6,PO7,PO8, PO9

CO No.	At the end of the course, the learner should be able to:	Mapped Programme Outcomes
PC05.6	Acquire knowledge on pharmacogenetics, pharmacogenomics, pharmacoeconomics, pharmacoepidemiology, pharmacovigilance & pharmacometrics	PO1,PO2,PO3, PO4, PO5, PO6,PO7, PO9
PC05.7	Demonstrate skills of presentation in the form of paper and poster at academic meetings, publications and writing research projects for funding agency, analyze and evaluate research paper	PO1,PO2,PO3, PO4,PO5, PO6,PO7, PO9
PC05.8	Complete two months of industrial internship posting to acquire hands-on knowledge of preparing investigator's brochure, report SAEs, perform causality assessment and report ADR as per PvPI, evaluate promotional drug literature, prepare drug information sheet and to prepare documents for regulatory bodies like DCGI, CDSCO, CPCSEA, FDA etc.	PO1,PO2,PO3, PO4, PO5, PO6,PO7, PO9



PHARMACOLOGY

PHARMACOLOGY

Goals

The overall goal of the course is to develop expertise in the field of pharmacology. A process of rational thinking and cogent action will be inculcated in an individual so that he/ she shall be competent to pursue various activities as demanded by the profession as pharmacologist.

- 1) To understand pharmacology in depth with understanding of the rational use of drugs, clinical pharmacology and to prepare good quality teachers.
- 2) Introducing the students to advances in teaching technology, computer aided learning, internet, patent laws and procedures etc.
- 3) To orient the students for research & development.

Objectives

To achieve these goals, the following objectives must be fulfilled. At the end of the course in pharmacology, the trained specialist shall be able to:

Cognitive domain:

- 1) Apply the basic principles of pharmacology and pharmacotherapeutics for rational use of existing drugs and the evaluation of new drugs.
- 2) Collect and analyse the experimental and clinical data related to drug kinetics or dynamics.
- 3) Interpret the analysed data with reasonable accuracy and derive logical conclusions.
- 4) Provide appropriate advice related to selection of drug, drug usage, desirable and undesirable effects, kinetics, interactions, precautions and measures to be taken during administration of drug and treating the ADRs in a given patient taking into consideration the physiological, psychological & pathological features.
- 5) Audit the drug utilization and drug related adverse events.
- 6) Assess the emergency situations while carrying out drug trials and institute emergency management till appropriate clinical assistance is available.

- 7) Develop the ability for continued self learning so as to update the knowledge of recent advances in the field of pharmacology and allied fields.
- 8) Be competent to teach and train undergraduate and future postgraduate medical students and junior doctors in pharmacology and pharmacotherapeutics as well as nurses and paramedical staff in medical colleges, institutions and other hospitals.
- 9) Plan and carry out both laboratory and clinical research with adherence to scientific methodology and GLP/GCP guidelines
- 10) Be aware of legal and ethical aspects of drug evaluation.
- 11) Communicate the findings, results and conclusions of scientific research, both verbally and in writing.
- 12) Be aware of regulatory procedures needed to be carried out prior to the marketing of a new drug in India.

Psychomotor domain:

- 1) Perform the common experimental techniques required for evaluation of new drugs with competence.
- 2) Perform the common clinical procedures required for evaluation of drugs in normal volunteers and patients with competence.
- 3) Organize and manage the administrative responsibilities for routine day-to-day work as well as new situations.
- 4) Carry out the necessary resuscitative measures in emergency situations arising during drug evaluation.
- 5) Use the teaching-learning media effectively.

Affective domain :

- 1) Appreciate the socio-psychological, cultural and environmental factors affecting the health and drug usage.
- 2) Appreciate the importance and implementation of national health programmes in the context to rational drug utilization.
- 3) Be aware of the importance of cost-effectiveness in patient management.
- 4) Be aware of the service activities which a pharmacologist can undertake viz. therapeutic drug monitoring, ADR monitoring, drug information services, poison control centre, drug auditing etc.

- 5) Adopt the ethical principles while conducting experimental and human research.
- 6) Develop the communication skills to interact with patients, peers and paramedical staff.
- 7) Realize the importance of teamwork.
- 8) Develop the attitudes required for professional responsibilities.

COURSE DETAILS

Duration of the course: 36 months [6 semesters]

First year:

1. Introduction to pharmacology and its branches
2. Selection of dissertation topic
3. Teaching duties

Second year:

1. Teaching duties
2. Extramural posting such as clinical posting
3. Dissertation work
4. Industrial posting

Third year:

1. Dissertation completion
2. Teaching duties

For this, following topics could be included in the theory /practicals of MD (pharmacology) course:

TEACHING - LEARNING OPPORTUNITIES

Teaching and learning opportunities will essentially be self - directed and will involve:

1. Experimental Pharmacology

Principles of:

- Animal experiments-ethics, limits, research insights, animal house.
- Screening methods for drug evaluations and experimental models-general and specific screening
- Drug assays
- Methods of assays
- Toxicological screening
- Pharmacokinetic experiments
- Biostatistics

- Analytical instrumentation
- Basics of computers in pharmacology, data base creation

2. Clinical Pharmacology

- Would include all aspects related to drug trials e.g., ICH –GCP guidelines, ICMR guidelines etc.
- Role of DCI/DCGI
- Protocol designing
- Basic statistics
- Laws related to drug research including ayurvedic /herbal drugs
- Taking informed consent
- Ethics
- ADR monitoring
- Therapeutic drug monitoring
- Pharmacoepidemiology, drug utilization studies
- Drug estimations in biological fluids
- Sources of drug information, data interpretations
- Advances in clinical pharmacology
- Essential drug listing

3. Teaching/academics/personality development related topics

- Microteaching/ TOS (Teachers' Orientation Sessions) teaching experiences: The candidate will be regularly involved in the teaching of undergraduate medical and nursing students
- Conducting mock workshops and conferences
- Presentation skills, Group discussions, Knowledge about patents, IPRS etc
- Computer Aided Learning (CAL)
- Web searching for medical literature
- Scientific paper writing etc

4. Clinical case discussions

Post - diagnosis discussions on 5 clinical cases. Documentation of these cases in the logbook.

5. Computer simulated dog BP exercise & drug assays

Identification of unknown drug on computer simulated dog BP exercise.

6. Logbook write-ups:

(To be filled by the student as provided in the format)

- Main purpose of the log book should be to document the work done (Experimentations, journals, thesis work, seminars, workshops etc).
- The content of the log book work to be signed **ONLY** by the Guide/ PG teaching in charge /HOD.
- **Journal/ seminar presentations in the department :**
It should be taken care that each student presents a minimum of 12 seminars & 12 journal reporting sessions during the entire tenure covering all topics in the subject.

Desirables

- 1) **Drug level monitoring:**
Hands-on experience with HPLC, HPTLC, spectrophotometry etc.
- 2) **CRO/ Pharmaceutical industry / Medicine department visits:**
To be done by the student in fourth term for a period of 2 months in reputed CRO/ Pharmaceutical industry/ Medicine department (short listed by the university / department) to ensure the students have hands-on experience in pharmaceutical industry work.
- 3) **Inclusion of topics** such as Pharmacoeconomics, Pharmacovigilance, Pharmacogenetics, Pharmacoepidemiology, National health programmes and Chronopharmacology would be desirable.

Dissertation Objectives

1. To make the post graduate student aware of every aspect of research. This involves the aspects such as finding research topic, searching literature, research methodology, statistics, analysis, scientific writing etc.
2. The topic or project taken need not necessarily bring out /explore something very novel, very big or breakthrough in the medical science. The main aim is to train the post graduate students for taking up such challenges in the future and learn maximum about the research development during their curriculum.

Dissertation topic along with plan of work is to be allotted by the guide within one year. The study could be prospective or retrospective and has to be cleared by appropriate institutional ethics

committee. [Topics not to be repeated for three years]. The subject of dissertation selected by the postgraduate student and the head of department should be submitted to the university within one year of registration. If the topic is changed, it should be communicated to university within one and half year of registration. Dissertation presentation would be done two times, first presentation before protocol submission and last before final submission.

Four Copies of completed dissertation with appropriate certificates should be submitted at the end of fifth semester.

Four examiners will examine these dissertations and report acceptance or otherwise, [three out of four have to accept the dissertation for its final acceptance by the university]. If two examiners accept the dissertation, Chairman of the Board of Studies will take final decision. Non-acceptance should be justified with reasons thereof.

RECOMMENDED READING

Journals

1. Annual Review in Pharmacology
2. Annual Review in Medicine
3. British Journal of Clinical Pharmacology
4. British Journal of Pharmacology
5. Clinical Pharmacology & Therapeutics
6. Drugs
7. ICMR bulletin
8. Indian Journal of Experimental
9. Biology Indian Journal of Medical Research
10. Indian Journal of Pharmacology
11. Lancet
12. New England Journal of Medicine
13. Pharmacological Reviews
14. Trends in Pharmacological Sciences
15. WHO Reports & Bulletins

Books

1. Goodman and Gilman's The Pharmacological Basis of Therapeutics. Hardman JG & Limbird LE(Ed), Publisher: McGraw-Hill, New York.
2. Basic and Clinical Pharmacology. Katzung BG (Ed), Publisher: Prentice Hall International Ltd., London.
3. Avery's Drug Treatment. TM Speight & NHG Holford (Eds), Adis International.
4. Principles of Drug Action. The Basis of Pharmacology. WB Pratt and P Taylor (Eds), Churchill Livingstone, Edinburgh.
5. Pharmacology and Pharmcotherapeutics. Satoskar RS, Bhandarkar SD(Ed), Publisher: Popular Prakashan, Bombay.
6. Essentials of Medical Pharmacology. Tripathi KD (Ed), Jaypee Brothers, Publisher: Medical Publishers (P) Ltd.
7. Clinical Pharmacology. Laurence DR, Bennet PN, Brown MJ (Ed). Publisher: Churchill Livingstone
8. A Textbook of Clinical Pharmacology. Roger HJ, Spector RG, Trounce JR (Ed), Publisher : Hodder and Stoughton Publishers.
9. Harrison's Principles of Internal Medicine. AS Fauci, JB Martin, E Braunwald, DL Kasper, KJ Isselbacher, SL hauser, JD Wilson, DL Longo(Eds), McGraw Hill, New York.
10. Guide to Good Prescribing. TPGM de vries, RH Henning, HV Hogerzeil, DA Fresle, WHO Geneva.
11. Critical appraisal of epidemiological studies and clinical trials- Mark Elwood. Oxford Press.
12. Pharmacology. Rang HP, Dale M, Ritter JM. 4th ed. Edinburgh, Chuchill Livingstone, 1999.

Pertaining to the evaluation of drugs:

1. Evaluation of Drug Activities: Pharmacometrics. DR Laurence & AL Bacharach (Eds), Academic Press, London.
2. Selected Topics in Experimental Pharmacology: UK Sheth, NK Dadkar and UG Kamat. Kothari Book Depot, Mumbai.
3. Fundamentals of Experimental Pharmacology: MN Ghosh (Ed), Scientific Book Agency, Kolkata.

Pertaining to Biostatistics:

1. Introductory Medical Statistics. Mould RF (Ed), Adam Hilger, Bristol and Philadelphia, 1989.

EXAMINATION PATTERN**A. Theory Examination**

Paper No.	Title of the paper	Contents of the paper
Paper I	General Pharmacology including Biostatistics	General Pharmacology, Experimental & Clinical Pharmacology, Various Assays (Principles Of Spectrophotometer, HPLC, Colorimeter), Bioassay, Clinical Trials, Biostatistics, Structure Activity Relationship, Toxicology Studies
Paper II	Systemic Pharmacology	Systemic pharmacology and related advances
Paper III	Pharmacotherapeutics	Pharmacotherapy & related recent advances
Paper IV	Recent Advances	Entire syllabus

Four theory papers (I, II, III & IV) each of 100 marks - total 400 marks.

All 4 papers will have following pattern:

2 LAQ of 25 marks each - 50 marks	100 marks.
5 SAQ of 10 mark each- 50 marks	

Final marking system of theory examination:

- The candidate should score minimum 40 marks in each paper & 50% in aggregate.

B. Practical Examination

Sr. No.	Name of the exercise	Marks	
1	Assay methods	100	
2	Clinical Pharmacology	100	
3	Microteaching	25	100
	Journal article OR Abstract writing	25	
	Instruments	50	
	Grand viva	100	
Total		400	

1) Assay methods

(Chemical, Biological, Microbiological): Total – 100 Marks

Using:

a. Spectrophotometer	50 Marks	
b. ELISA		
c. Colorimetry		
d. HPLC		
e. Microbiological assay		
f. Bioassay	25 Marks	Computer simulated testing model
g. Dog B.P.	25 Marks	

2) Clinical pharmacology – Total - 100 marks

- a) Protocol writing of – Antihypertensives, Hypoglycemics, Hypolipidemics, Hepatoprotectives, Diuretics, Analgesics, Drugs used in glaucoma
 - Bioavailability/Bioequivalence (BA/BE) studies
- b) Informed Consent Form (ICF) designing
- c) Case Record Form (CRF) designing
- d) Log book writing for a protocol/ clinical trial
- e) Statistical analysis of given data
- f) Product information Leaflet (PIL) writing of established drugs

3) a. Microteaching : 25 Marks

b. Journal article (presentation & criticism) : 25 Marks

OR

Abstract writing of a scientific article : 25 Marks

c. Instruments: Total 50 Marks

- 1) Set up & estimation using glucometer, pH meter, ECG, Visual analogue score, Disintegration time, Dissolution time, Peak flow meter, Microdosing (Dose calculation): 25 Marks
- 2) Set up & evaluation (Skeletal muscle relaxants, Convulsiometer, Actophotometer, Plethysmograph, Hot plate analgesiometer, Tail flick analgesiometer, Computer simulated experiment of mydriatics and miotics, Intra ocular tension & Light reflex): 25 Marks

4) Grand viva : Total 100 Marks

1. Theory viva: 75 Marks
2. Dissertation viva: 25 Marks