

UG Syllabus.

Pharmacology and Pharmacotherapeutics

1. Goal

The broad goal of teaching pharmacology to undergraduate students is to inculcate in them a rational and scientific basis of therapeutics.

2. Educational objectives

(a) Knowledge

At the end of the course, the student shall be able to-

- i. describe the pharmacokinetics and pharmacodynamics of essential and commonly used drugs
- ii. List the indications, contraindications, interactions and adverse reactions of commonly used drugs
- iii. Indicate the use of appropriate drug in a particular disease with consideration of its cost, efficacy and safety for individual needs, and
 - Mass therapy under national health programmes
 -
- iv describe the pharmacokinetic basis, clinical presentation, diagnosis and management of common poisonings
- v Integrate the list the drugs of addiction and recommend the management
- vi. Classify environmental and occupational pollutants and state the management issues
- vii. Explain pharmacological basis of prescribing drugs in special medical situations such as pregnancy, lactation, infancy and old age
- vii explain the concept of rational drug therapy in clinical pharmacology
- viii state the principles underlying the concept of "Essential Drugs"
- ix evaluate the ethics and modalities involved in the development and introduction of new drugs

(b) Skills

At the end of the course, the student shall be able to- i. prescribe drugs for common ailments

- ii. identify adverse reactions and interactions of commonly used drugs
- iii. interpret the data of experiments designed for the study of effects of drugs and bioassays which are observed during the study
- iv. scan information on common pharmaceutical preparations and critically evaluate drug formulations

- v. be well-conversant with the principles of pharmacy and dispense the medications giving proper instructions

(c) Integration

Practical knowledge of rational use of drugs in clinical practice will be acquired through integrated teaching vertically with pre-clinical & clinical subjects and horizontally with other para-clinical subjects.

3. Total duration of para-clinical teaching 3 Semesters

(III, IV, V)

Total 360 teaching days

Total number of teaching hours allotted to Pharmacology 300 hours

4. Syllabus

a. Learning methods

Lectures, tutorials, Practicals

Distribution of teaching hours

Theory

• lectures109±5 •
tutorials17±5
	Total 126 ± 10
B) Practicals120 ± 5
C) Revision & Evaluation (Internal Assessment)60

b. &c. Sequential organisation of contents & their division

INTRODUCTION: *Pharmacology -a foundation to clinical practice* (N=1)

A)
Development of the branch of pharmacology; Scope of the subject; role of drugs as one of the modalities to treat diseases,

definition of drug;

nature and sources of drugs;

subdivisions of pharmacology

rational pharmacotherapy

B) GENERAL PHARMACOLOGY: (N=7 ± 2)

Pharmacokinetics: Absorption, Distribution, Biotransformation, Elimination (n=3)

Pharmacodynamics: Principles of Drug Action, Mechanisms of drug action,

Receptors (Nature, Types, Theories, Principles, Regulation)	(n=1)
Application to pharmacotherapeutics: Relevance of Pharmacokinetics and dynamics in clinical practice, Sequale of repeated administration of drug	(n=2)
Adverse Drug Reactions	(n=1)
Adrenergic agonists	(n=1)
Adrenergic antagonists I:	
Adrenergic antagonists II:	
Cholinergic agonists	(n=1)
Anticholinesterases	(n=1)
Antimuscarinic drugs	(n=1)
Skeletal muscle relaxants	(n=1)

A) CARDIOVASCULAR SYSTEM INCLUDING DRUGS AFFECTING COAGULATION AND THOSE ACTING ON KIDNEYS: (N=14± 2)

General Considerations and Overview of antihypertensive therapy;

Diuretics	(n=2)
Angiotensin Converting Enzyme(ACE)inhibitors	(n=1)
Sympatholytics & vasodilators	(n=1)
<i>Management of hypertension</i>	
Antianginal: Nitrates & others	(n=1)
Calcium channel blockers	(n=1)

Pharmacotherapy of chest pain

Anticoagulants & Coagulants	
Thrombolytics & Antiplatelet Agents	(n=2)

Drugs for CCF: Digitalis glycosides, Others agents (n=2)

Management of CCF

Antiarrhythmic Agents (n=1)

Agents used for the management of shock (n=1)

Hypolipidaemic drugs (n=1)

Role of Nitric oxide and endothelin to be covered in CVS

.....DK

E) HEMATOLOGIC PHARMACOLOGY: ERYTHROPOIETIC FACTORS: (N=18 ± 2)

Agents used in the management of iron deficiency anaemia and megaloblastic anaemia
General Considerations
Erythropoietin,

GM-CSF (n=1)

Management of anaemia

F) NEUROPSYCHIATRIC PHARMACOLOGY INCLUDING INFLAMMATON, PAIN & SUBSTANCE ABUSE (N=15 ± 2)

General Considerations (n=1)

Sedative-Hypnotics (n=2)

Psychopharmacology: Antianxiety; Antipsychotics; Antidepressants (n=3)

Antiepileptics (n=2)

Therapy of neurodegenerative disorders:

Anti-Parkinsonian agents; cerebral vasodilators/nootropics (n=1)

Local anaesthetics (n=1)

Analgesics: Opioids; NSAIDs (n=3)

Pharmacotherapy of pain including migraine

Pharmacotherapy of rheumatoid arthritis and gout

Substance abuse: Management of opioid, alcohol and tobacco addictions (n=1)

G) MISCELLANEOUS TOPICS-I: (N=6 ± 2)

Autocoids (*to be covered before pain lectures*) (n=1)

Antiallergics: Antihistaminics (n=1)

Drugs used for bronchial asthma (n=1)

Pharmacotherapy of cough

Drugs acting on immune system:

Immunostimulants, Immunosuppressants; pharmacology of vaccines & sera (n=1)

Drugs acting on the uterus (n=1)

Antimicrobial agents: (n=7)

- Sulphonamides & Cotrimoxazole
-
- Quinoline derivatives
- Penicillins, Cephalosporins & Other Lactams
- Amino glycosides
-
- Macrolides
-
- Tetracyclines & Chloramphenicol

Pharmacotherapy of UTI

General principles of Antimicrobial use (n=1)

Antimycobacterial therapy: Anti-Kochs agents; Anti-leprotic agents (n=3)

Pharmacotherapy of tuberculosis

Antiprotozoal agents:

Antiamoebic, Antimalarials and Anti Kala azar (n=3)

Pharmacotherapy of malaria

Anthelmintics (n=1)

(against intestinal Nematodes and Cestodes; extra intestinal Nematodes and Trematodes)

Antifungal agents (n=1)

Antiviral agents including antiretroviral agents (n=2)

Pharmacotherapy of STDs (n=1)

Principles of cancer chemotherapy and their adverse drug reactions (n=1)

(individual agents and regimes need not be taught)

I) ENDOCRINOLOGY: (N=12 ± 2)

Introduction to endocrinology

(including Hypothalamic and Anterior Pituitary hormones) (n=1)

Steroids (n=2)

Glucocorticoids: Use and Misuse

Oestrogens & antagonists (n=1)
Progestins & antagonists (n=1) Oral
contraceptives & profertility agents (n=1)

TOCH MO THERAPY INCLUDING CANCER CHEMOTHERAPY: (N=22 ± 2)

Fertility control

G *General considerations*
Glycolic acid anti-thyroid agents

Agents affecting calcification (n=1)

Antidiabetic agents: Insulin; Oral Antidiabetic drugs (n=2)

Pharmacotherapy of Diabetes Mellitus

J) AGENTS USED IN GASTRO INTESTINAL DISORDERS: (N=2)

Pharmacotherapy of nausea & vomiting (n=1)

Pharmacotherapy of peptic ulcer (n=1)

Management of dyspepsia

Management of diarrhoea and constipation

K) PERIOPERATIVE MANAGEMENT: to be covered as a case study

Pre anaesthetic medication

Preparation of surgical site: antiseptics etc.

Local Anaesthetics

Skeletal muscle relaxants

Drugs used in post-operative period: analgesics, anti emetics etc.

L) MISCELLANEOUS TOPICS– II (N=5-7)

Drug-Drug Interactions (n=1)

Drug use at extremes of age, in pregnancy & in organ dysfunction (n=2)

Use of chelating agents in heavy metal poisonings; Environmental & occupational

Toxicants and principles of management (particularly cyanide and CO) (n=1)

Ocular pharmacology (n=1)

Dermatopharmacology (n=1)

General Anaesthetics...

Pharmacotherapy of glaucoma and conjunctivitis

M) RATIONAL PHARMACOTHERAPY: (N=4)

Prescription writing and P-drug concept

Rational Drug Use; Essential Drug List (EDL)

Criticism with reference to Fixed Drug Combinations (FDCs)

Use and misuse of commonly used preparations: vitamins, antioxidants ,enzymes etc.

d. Term-wise distribution

I term

Introduction

General pharmacology

Autonomic pharmacology

Drugs acting on cardiovascular system including drugs affecting coagulation and those acting on the kidneys

II term

Prescription writing and P-drug concept

Rational use of drugs; Essential drug list

Neuro-psychiatric pharmacology including inflammation, pain and substance abuse

Miscellaneous topics-I

Chemotherapy

Endocrinology

III term

Agents used in gastro-intestinal disorders

Peri operative management

Miscellaneous topics

Criticism with reference to FDCs

Use and misuse of commonly used preparations: vitamins, antioxidants ,enzymes etc.

e. Practicals: Total hours, number & contents

Total hours: 120

Number: 18

Contents:

I term practicals

(N=7)

Introduction to Practical Pharmacology, Prescription Writing, Pharmacokinetics I, Routes of Administration :Oral, Routes of Administration :Topical, Routes of Administration: Parenteral, Pharmacokinetics II: Applied Pharmacokinetics

II term practicals

(N=7)

Pharmacodynamics I (Isolated Tissue, Cat NM junction), Pharmacodynamics II (Dog: BP and Respiration), Screening Techniques for New Drugs, Adverse Drug Reactions, Rational Pharmacotherapy I, Rational Pharmacotherapy II, Sources of Drug Information including scrutiny of Promotional Literature

III term practicals

(N=4)

CaseStudy1, Case Study2

Revision Practicals (n=2)

f. Books recommended :

1. Basic & Clinical Pharmacology. Katzung BG (Ed), Publisher: Prentice Hall International Ltd., London.
2. Pharmacology & Pharmacotherapeutics. Satoskar RS, Bhandarkar SD (Ed), Publisher: Popular Prakashan, Bombay.
3. Essentials of Medical Pharmacology. Tripathi KD (Ed), Jaypee Brothers, publisher: Medical Publishers (P)Ltd.
4. Clinical Pharmacology. Laurence DR, Bennet PN, Brown MJ (Ed). Publisher: Churchill Livingstone

Reference books :

2. Goodman & Gilman's The Pharmacological Basis of Therapeutics. Hardman JG & Limbird LE (Ed), Publisher: McGraw-Hill, New York.
3. A Textbook of Clinical Pharmacology. Roger HJ, Spector RG, Trounce JR (Ed), Publisher: Hodder and Stoughton Publishers.

5. Evaluation

Methods

Theory, Practical & viva

b. Pattern of Theory Examination including Distribution of Marks, Questions & Time

Nature of Question Paper

Faculty with Year : SECOND MBBS

Subject : PHARMACOLOGY & THERAPEUTICS

Paper : I

Total Marks : 40 ***Time : 2 Hours***

Section "A" (8 Marks)

Instructions:-

1) Fill (dark) the appropriate empty circle below the question number once only..

2) Use **blue/black** ball point pen only.

3) Each question carries **one/ half mark**.

4) Students will not be allotted mark if he/she overwrites strikes or put white ink on the cross once marked.

5) Do not write anything on the blank portion of the question paper .If written anything, such type of act will be considered as an attempt to resort to unfair means.

Section "A" : MCQ (8marks)

Question No.	Question Description	Division of Marks	Total Marks
1.	Total MCQs : 16	16 X ½	08

Section "B" & "C" (32 Marks)

Instructions:-

1) All questions are compulsory.

2) The number to the right indicates full marks.

3) Draw diagrams wherever necessary.

4) Answer each section in the respective answer book only. Answers written in the inappropriate sectional answer books will not be assessed in any case.

5) Do not write anything on the blank portion of the question paper. If written anything, such type of act will be considered as an attempt to resort to unfair means.

Question No.	Question Description	Division of	Total Marks
3.	Attempt any two out of three: <i>Long answer question only</i>	2 X 6	12

Faculty with Year : SECOND MBBS

Subject : PHARMACOLOGY & THERAPEUTICS

Paper : II

Total Marks : 40

Time : 2 Hours

Section "A" (8 Marks)

Instructions:-

- 1) Fill (dark) the appropriate empty circle below the question number once only..
- 2) Use **blue/black** ball point pen only.
- 3) Each question carries **one/ half mark**.
- 4) **Students will not be allotted mark if he/she overwrites strikes or put white ink on the cross once marked.**
- 5) Do not write anything on the blank portion of the question paper. If written anything, such type of act will be considered as an attempt to resort to unfair means.

Section "A" : MCQ (8marks)

Question No.	Question Description	Division of Marks	Total Marks
1.	Total MCQs : 16	16 X ½	08

Section "B" & "C" (32 Marks)

Instructions:-

- 1) All questions are compulsory.
- 2) The number to the right indicates full marks.
- 3) Draw diagrams wherever necessary.
- 4) **Answer each section in the respective answer book only. Answers written in the inappropriate sectional answer books will not be assessed in any case.**
- 5) Do not write anything on the blank portion of the question paper. If written anything, such type of act will be considered as an attempt to resort to unfair means.

Section "B":BAQ(20Marks)

Question No.	Question Description	Division of Marks	Total Marks
3.	Attempt any two out of three: <i>Long answer question only</i>	2 X 6	12

c. Topic distribution

A) **PHARMACOLOGY PAPER –I** includes General Pharmacology including drug- drug interactions; Autonomic Nervous System, Cardiovascular System including drugs affecting Coagulation and those acting on the Kidneys; Haematinics; Agents used in Gastro-Intestinal Disorders; Ocular pharmacology; Drug use at extremes of age, in pregnancy & in organ dysfunction; Diagnostic & Chelating agents; Environmental & Occupational Pollutants; Vitamins

B) **PHARMACOLOGY PAPER-II** includes Neuro-Psychiatric Pharmacology including Anti inflammatory-Analgesics and Addiction & its management; Pharmacology in Surgery (particularly peri-operative management); Chemotherapy including Cancer Chemotherapy; Endocrinology; Dermatology; Miscellaneous Topics I (Lipid-derived autacoids; Nitric Oxide; Allergy – Histaminics & Antihistaminics including anti-vertigo; Anti Asthmatics; Anti- tussive agents; Immuno modulators; Vaccines & sera; Drugs acting on the uterus)

d. Marking scheme

Each paper of 40 marks as shown in the above table.

e. Nature of practicals and duration

Practical Heads	Marks 26
Prescription writing	5
• Long	(3)
• Short	(2)
Criticism	8
• Prescription & rewriting	(4)
• Fixed dose formulation	(4)

Clinical Pharmacy

(Dosage forms, routes of administration, label information and instructions)

i. Spots**8**

- a Experimental Pharmacology–Graphs, Models for evaluation, Identification of a drug, Interpretation of data (2)
- b Human Pharmacodynamics-Drug Identification–urine analysis, eye chart,- Subjective/ objective effects of a drug (2)
- c Therapeutic problems based on pharmaceutical factors - Outdated tablet, Bioavailability, Dosage form, Ethics and Sources of drug information (2)
- d Recognition of ADRs & interaction of commonly used drugs (2)

For each of the 4 groups (a, b, c & d) 2 spot questions each of 1 mark to be asked.

Time distribution:

For prescription and criticism the time given will be ½ hour.

For clinical pharmacy practical viva will be taken on pre-formed preparations and/or marketed formulations. The students may be asked to write labels and instructions to be given to the patients or demonstrate how specific dosage forms are administered and state the precautions to be taken/explained to the patients while using them. The time for this will be 5 min.

For spots 20 min will be given (2 min per spot).

Thus the total time for the practical examination will be 1 hour.

f. Viva: duration and topic distribution

Viva 14 marks

Duration 10 mins

Four examiners 5 mins with each candidate

Two examiners for topics of paper I- systems to be distributed
Two examiners for topics of paper II-systems to be distributed
At each table marks will be given out of 7.

g. Plan for internal assessment

The time-table for internal assessment will be as follows:

For the batches which have joined before June 2001

I term

1st mid term: After 60 teaching days (MCQs, and SAQs)

1st term ending: After 120 teaching days(Theory and Pharmacy Practicals)

II term

2nd midterm: After 60 days of 2nd term (MCQs and SAQs)

2nd term ending: At the end of 2nd term (Theory and Practicals: Exptal/Clinical Pharmacy)

III term

Prelims examination on the basis of University pattern-Theory, Practicals and Viva

(Minimum 4 weeks gap mandatory between Preliminary and University examinations)

For each mid-term examination 40 MCQs(each worth 1/2 mark) will be administered to the students along with 5 SAQs(each of 2 marks with an option of 5 out of 6). The total time will be 1 hour and the total marks will be 30.

The term ending examination will be of 80 marks and the nature of questions will be as per University exam.

This will be followed by practical (total time 1½ hours).

To familiarize the students with the viva-vocé, the marks for the practical may be kept at only 20, while 20 marks be reserved for viva on theory topics (total 40 marks).

For the batches joining in June 2001 and later

I term

1st term ending: After 120 teaching days (Theory and Pharmacy Practicals)

II term

2nd term ending: At the end of the 2nd term (Theory and Practicals :Exptal /Clinical Pharmacy)

III term

Prelims examination on the basis of University pattern-Theory, Practicals and Viva

(Minimum 4 weeks gap mandatory between Preliminary and University examinations)

For the terminal theory examination students will be evaluated by a combination of 28

MCQs (each worth 1/2 mark), 10 SAQs (each of 2 marks with an option of 10 out of 12) and 2 LAQs (option of 2 out of 3 each worth 8 marks). The total time allotted for this 50 marks paper will be 2 hours 30 minutes.

This will be followed by practicals (total time 1½ hours).

To familiarize the students with the viva-vocé, the marks for the practical may be kept at only 20, while 20 marks be reserved for viva on theory topics (total 40 marks).

Prelim pattern will be as per the University exam with 2 papers in theory, each of 2 hours duration.

PG Syllabus

Passed by Academic Council (Resolution No. 365/2006) dtd. 28/06/2006, subject to Uniformity in the Examination pattern.

Maharashtra University of Health Sciences Nashik

Postgraduate curriculum in MD
(Pharmacology and Therapeutics)

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

Goals:

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

Objectives: To achieve this goal, the following objectives must be fulfilled. At the end of course in Pharmacology and Therapeutics, the trained specialist shall be able to

Cognitive domain:

- 1) Apply basic principles of pharmacology and therapeutics to practice rational use of existing drugs and evaluation of new drugs.
- 2) Collect and analyse experimental and clinical data related to drug kinetics or dynamics
- 3) Interpret the analyzed 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 physiological, psychological & Pathological features
- 5) Audit drug utilization and drug related adverse events
- 6) Assess emergency situations while carrying out drug trials and institute exergency management till appropriate assistance from clinical side 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 Therapeutics 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 writings
- 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 common experimental techniques required for evaluation of new drug with competence
- 2) Perform common clinical procedures required for evaluation of drug in normal volunteers and patients with competence
- 3) Organize and manage administrative responsibilities for routine day to day work as well as new situations
- 4) Carry out necessary resuscitative measures in emergency situations arising during drug evaluation
- 5) Use teaching-learning media effectively.

Affective domain :

- 1) Appreciate socio-psychological, cultural and environmental factors affecting health and drug usage.
- 2) Appreciate the importance and implementation of National health programmes in context to rational drug utilization
- 3) Be aware of the importance of cost-effectiveness in patient management
- 4) Be aware of service activities which a pharmacologist can undertake viz. therapeutic drug monitoring, ADR monitoring, drug information services, poison control centre, drug auditing etc.
- 5) Adopt ethical principles while conducting experimental and human research
- 6) Develop communication skills to interact with patients, peers and paramedical staff
- 7) Realize the importance of team work
- 8) Develop 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. Rotation in labs
4. Teaching duties

Second year

1. Teaching duties
2. Extra mural posting like clinical posting
3. Dissertation work
4. Rotation in labs

Third year

1. Dissertation completion
2. Teaching duties
3. Rotation in labs

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

TEACHING LEARNING OPPORTUNITIES

Learning and teaching opportunities will essentially be self directed and will involve

1. Experimental Pharmacology

- 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
- Pharmacokinetics experiments
- Biostatistics
- Principles of analytical instrumentation
- Basics of Computers in pharmacology, data base creation

2. Clinical Pharmacology:

- Would include all aspects related with drug trials....ICH –GCP guidelines ,ICMR guidelines ,
- Role of DCI/DCGI,
- protocol designing ,
- basic statistics,
- laws related to drug research including ayurvedic /herbal drugs,
- Taking informed consent etc.
- Ethics
- ADR Monitor
- Therapeutic Drug monitoring
- Pharmacoepidemiology, utilization studies
- Drug estimations in biological fluids
- Sources of drug information, DATA INTERPRETATIONS
- Advances in clinical pharmacology
- Essential drug listing

3. Drug store management

- Functions of drug store,
- Role of pharmacist in drug store ,
- ABC/VED classification of drugs,
- Use of computers in drug store, routine administration,

4. Teaching/Academics/personality development related topics:

- Microteaching/ TOS (teachers oriented sessions)
Teaching experiences: The candidate will be regularly involved in the teaching of undergraduate medical and nursing students
- Conducting mock workshop/s and conference/s.
- Presentation skills /group discussions.
- Knowledge about patents , IPRS etc
- Computer aided learning (CAL) .
- Web searching for medical literature.
- Scientific paper writing etc.

5. Clinical case discussions:

Post diagnosis discussions on 5cases from clinical side.

Documentation of these cases in logbook.

6. Computer simulated dog BP exercise:

Identification of unknown drug on Computer simulated dog BP exercise.

7. Log book write-ups: (To be filled by 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 department :*
It should be taken care that each student presents 10 -12 seminars during the entire tenure and topics could be divided as per the following format

Year	Topics
1 st	General pharmacology (2) Systemic pharmacology (2)
2 nd	Systemic/clinical /experimental pharmacology (4)
3 rd	Recent pharmacology (4)

- *Evaluation of the journal /seminar* should be done by teachers on 5 points

- . Eg presentation, completeness, A-V aids use, understanding, overall performance.
The purpose of this exercise should be to make the student aware of his progress.
- Experimental evaluation system (to be evaluated by guide , signed and pasted in the log book)

Example of evaluation sheet format given below.

Headings	Comments			
Assembly				
cleanliness				
Instruments used				
Technique				
Results/interpretation				
Discussion: Theory				
Discussion: Practical				
Overall remarks	Excellent	Good	Fair	Poor

Desirables:

1) Drug level monitoring

Hands on experience with HPLC, HPTLC , spectrophotometry .

- 2) CRO visits:** to be done by the student in fourth term for 1-2 months in reputed CRO (short listed by university / department) to make the students to have hands on experience in pharmaceutical industry work.

Incase this is not possible then **10 -15 days workshop on clinical pharmacology** in reputed institutes would be desirable.

- 3) Inclusion of topics** like Pharmacoeconomics, Pharmacovigilance, Pharmacogenetics. Pharmacoepidemiology. National health programmes and chronopharmacology would be desirable.

Dissertation Objectives:

1. To make aware the post graduate student about every aspect of research this involves finding research topic, searching literature, research methodology, Statistics, analysis, scientific writing and many other aspects involved.

2. The topic or project taken need not necessarily bring out /explore something very novel, very big or breakthrough in medical science. the main aim is to train 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 to be cleared by appropriate ethic committee.[Topics not be repeated for three years]. The subject of dissertation countered by the postgraduate student and head of the dept of the institute 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 BOS will take final decision. Non acceptance should be justified with reasons thereof.

Examination Pattern:

(As per Direction No. 01/2008 dtd. 26/05/2008)

RECOMMENDED READING

Journals

Annual review in Pharmacology Annual Review in Medicine
British Journal of Clinical Pharmacology
British Journal of Pharmacology
Clinical Pharmacology & Therapeutics
Drugs
ICMR bulletin
Indian Journal of Experimental Biology
Indian Journal of Medical research
Indian Journal of Pharmacology
Lancet
New England Journal of Medicine
Pharmacological Reviews
Trends in Pharmacological Sciences
WHO Reports & Bulletin

Books

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics. Hardman JG & Limbird LE(Ed), Publisher: McGraw-Hill, New York.
2. Basic & 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 & P Taylor (Eds), Churchill Livingstone, Edinburgh.
5. Pharmacology & 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 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 & UG Kamat.
Kothari Book Depot,
Mumbai.
3. Fundamentals of
Experimental
Pharmacology. MN
Ghosh (Ed), Scientific
Book Agency,
Calcutta.

Pertaining to Biostatistics

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

**Electives link--- Training on ADR
monitoring & reporting for 4
weeks.**

Sr.No	Name of Student	Date & time	Signature

