FACULTY OF LIFE SCIENCES

SYLLABUS

FOR

Interdisciplinary Course in Pharmaceutical Sciences (PG)

Examinations: 2019-20

GURU NANAK DEV UNIVERSITY AMRITSAR

Interdisciplinary Course in Pharmaceuticals Sciences (PG)

COURSE SCHEME

Sr. No.	Course Code	Subject	Lecture (L)	Tutorial (T)	Practical (P)	Credit
1.	PHL-051	Drug Design and Drug Development	3	1	0	4
2.	PHL052	Pharmacokinetics & Biopharmaceutics	3	1	0	4
3.	PHL053	Basic and Fundamental Pharmacology	3	1	0	4
4.	PHL054	Basics of Herbal Drug Development	3	1	0	4

Interdisciplinary Course in Pharmaceuticals Sciences (PG)

Odd Semester
PHL-051 Drug Design and Drug Development

4 Credits (3-1-0)
Time: 3 Hrs. **Max. Marks : 100**
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Drug Designing: Objectives and Economic aspects of drug designing. Procedures followed in drug designing. Lead based Method: lead discovery, De novo drug designing, Structure based drug designing. Drug Development- Dissection of drug molecules into biofunctional moieties, biosteric replacement, lead optimization, QSAR and use of various molecular descriptors. Computer aided drug design-Molecular mechanics, designing of ligands for known and unknown receptors, various forces involved in drug receptor interactions, stereo chemical aspects of drug receptors interaction.

Section B

Introduction to dosage forms, classification, selection of route of administration. Preparation, evaluation and quality control tests for tablets, Hard& Soft gelatin capsules and parenteral dosage forms. Method and design for bioavailability study.

Section C

Natural sources of drugs: Plants, animals, microbes, mineral, marine and plant tissue cultures as sources of biomedicinals.

An introduction to active constituents of natural drugs: Their classification, properties, general methods of extraction and isolation.

Natural Products as leads for new pharmaceuticals.

Section D

Principles of Experimental Pharmacology: Basic principles of pharmacological evaluation of new chemical entity, animal models in pharmacological research, some standard techniques used in laboratory animals, euthanasia of experimental animals.Regulations for ethical treatment to laboratory animals. Alternatives to animals. Preclinical, safety and clinical evaluation of new drug.

Reading Material Recommended:

1. Manfred E Wolff, (ed), Burger's Medicinal Chemistry and Drug Discovery, Vol – I Principles and Practice, 5th Ed., Join Wiley and Sons, 1995.
2. J. G Vinter and Mark Gardner, (Eds.) Molecular Modelling and Drug Design, The Macmillan Press Ltd., London, U.K., 1994.
3. Comprehensive Medicinal Chemistry, Pcrgamon press, 1990, Vol. 4.
4. Lachman et. al. Theory and Practice of industrial Pharmacy. Varghese Publishing house. Hind rajasthan Building, Bombay-400014.
5. Trease and Evans Pharmacognosy, Ed. W.C. Evans, 14th Edn, Gopsons Papers Ltd.,Noida, India, 1997.
6. Plant Drug Analysis, H. Wagner, S. Bladt and E.M. Zgainski, Springer Verlag, NewYork, (Latest edition)
7. Pharmacopoeia of India, Govt. of India, Ministry of health and family welfare, Delhi, 1996.
8. Tyler, V.C.Brady, L.R. and Robers, J.E. Pharmacognosy. Lea and Febiger, Philadelphia.
9. Shah, C.S. and Quadry, J.S. Textbook of Pharmacognosy, B.S.Shah Publishers, Ahmedabad.
10. Wilson & Gisvold's Text Book of organic Medicinal and Pharmaceutical chemistry, 10th edition. J. B. Lippincott Co, Philadelphia, USA.
11. W.C. Foye, Principle of Medicinal Chemistry, Lea & Febiger, Philadelphia, USA. (Latest Edition)
12. H.G. Vogel and W.H. Vogel Drug Discovery and Drug Evaluation. Pharmacologicalassays. 2nd edition Springer Verlag, Berlin, Germany,1997.
13. M.N. Ghosh, Fundamentals of Experimental Pharmacology,2nd edition, Scientific Book agency, Kolkota, India, 1984.
14. D.R. Laurence and A.L. Bacharach (eds.), Evaluation of Drug Activities: Pharmacometrics Vol.I and I I, Academic Press London, U.K., 1964.

Interdisciplinary Course in Pharmaceuticals Sciences (PG)

Even Semester

PHL052-Pharmacokinetics & Biopharmaceutics

4 Credits (3-1-0)

Time: 3 Hrs. **Max. Marks : 100**

Mid Semester Marks : 20

End Semester Marks : 80

Mid Semester Examination: 20% weightage

End Semester Examination: 80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction to Pharmacokinetics and Biopharmaceutics, various terms used, Absorption, distribution, metabolism and excretion of drugs. Biological half life, Apparent volume of distribution

Fluid compartments, circulatory system and protein binding.

Compartment models

Section B

One Compartment Open Model: Pharmacokinetics of single dose administration as applied to intravenous (rapid) and oral administration, Intravenous transfusion, Multiple intravenous and oral administration.

Two Compartment Open Model: Pharmacokinetics of single and multiple dose administration, Intravenous transfusion.

Curve fitting- area under blood level curves

Urinary excretion studies, Sigma minus plot

Section C

Pharmacokinetic basis of sustained release formulations

Clinical Pharmacokinetics

Hepatic elimination of drugs, Drug metabolism and its kinetics using one compartment and two compartment models. Liver extraction ratio and its relationship with absolute availability, Relationship between blood flow, Intrinsic clearance and hepatic clearance.

Dosing of drugs in infants, elderly and obese patients.

Dosage regimen adjustment in patients with and without renal failure. Dosage adjustments in uremic patients

Section D

Bioavailability and Bioequivalence: Definitions, Terminology, Clinical significance and factors affecting biological performance of drugs. Methods of determination of bioavailability using blood level and urinary excretion data, Parameters used to evaluate bioequivalence.

Non linear Pharmacokinetics: Concepts, Reasons for non-linear behaviour and methods to ascertain non-linear kinetics.

BOOKS RECOMMENDED:

1. M. Gibaldi and D. Perrier (Eds), Pharmacokinetics 2nd Edition, Marcel Dekker Inc., New York, U.S.A., 1984.
2. L.Shargel and A.B.C.Yu. (Eds) Applied Biopharmaceutics and Pharmacokinetics, 5th Edition, Prentice Hall International, London, U.K.
3. R, E.Notari (Ed) Biopharmaceutics and Clinical Pharmacokinetics: an Introduction,4th Edition, Marcel Dekker Inc., New York,USA,2005(Indian Reprint).

Interdisciplinary Course in Pharmaceuticals Sciences (PG)

Even Semester

PHL 053- Basic and Fundamental Pharmacology

4 Credits (3-1-0)

Time: 3 Hrs. **Max. Marks : 100**

Mid Semester Marks : 20

End Semester Marks : 80

Mid Semester Examination: 20% weightage

End Semester Examination: 80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

I. Definition and scope of Pharmacology

1. General Principles of Pharmacology

Pharmacokinetics: Routes of drug administration, Physicochemical factors in transfer of drugs across membranes, Absorption, Distribution, Metabolism of drugs, Excretion of drugs
Pharmacodynamics: Mechanisms of drug action and relationship between drug concentration and effect, Types of receptor

Section B

2. Clinical Pharmacology

Pharmaceutical, pharmacokinetic and pharmacodynamic factors affecting drug response
Patient Compliance
Drug therapy in pediatric, geriatric and pregnant patients
Pharmacogenology: Preclinical studies, phase I, phase II, phase III and phase IV clinical trials

Section C

3. Basics of preclinical pharmacology

CPSCEA guidelines, Commonly used species in experimental animals, Basic principles of bioassays

Section D

4. Drug interactions, Adverse Drug Reactions: Dose-related and non-dose related ADRs Toxicology: Heavy metals and heavy metal antagonists, Non- metallic environmental toxicants, Clinical management of drug poisoning

Books recommended:

1. J.G.Hardman and L.E.Limbird (Eds.), Goodman and Gilman's The Pharmacological
2. Basis of Therapeutics, 11th Edition, Mc Graw Hill, NewYork, U.S.A.
3. C.R. Craig and R.E. Stitzel, Modern Pharmacology, 6th Edition, Little Brown and Company, New York, U.S.A.
4. K.D.Tripathi, Essentials of Medical Pharmacology, 6th Edition, Jaypee Brothers New Delhi, India.
5. M.N. Ghosh, Fundamentals of Experimental Pharmacology, 2nd Edition, Scientific Books Agency, Calcutta, India, 1984.
6. D.G. Grahame-Smith and J.K. Aronson, The Oxford Text Book of Clinical Pharmacology and Drug Therapy. Oxford University Press, Oxford, U.K.

Interdisciplinary Course in Pharmaceuticals Sciences (PG)

Even Semester

PHL054- Basics of Herbal Drug Development

4 Credits (3-1-0)

Time: 3 Hrs. **Max. Marks : 100**

Mid Semester Marks : 20

End Semester Marks : 80

Mid Semester Examination: 20% weightage

End Semester Examination: 80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Natural Products as Drugs: Historical background, present status and future scope of natural products in drug discovery.

Recent developments in natural products.

Section B

Scope of plant drug cultivation. Problems of cultivation and processing of medicinal and aromatic plants

Plant tissue culture, types of cultures, nutritional requirements, growth and their maintenance. Applications of plant tissue culture in developing therapeutic agents.

Section C

An introduction to active constituents of drugs: Their extraction, classification and identification tests.

General methods of extraction of plant drugs

Section D

Quality control of crude drugs: Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods of evaluation.

Herbs as cosmetics and nutraceuticals

Recommended Reading Material (Latest editions unless specified):

1. Trease and Evans, Pharmacognosy, Ed., W.C. Evans, Gopsons Papers Ltd., Noida, India.

2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia.

3. Phytochemical Methods: J. B. Harborne.
4. Herbal Drug Industry: R. D. Chuddhary, Eastern Publishers, New Delhi.

5. Grabley S. and Thiericke R. Eds. Drug Discovery form Nature. Springer-Verlag, Berlin Heidelberg.Latest Edition.

6. Vogel HG and Vogel WH. Drug Discovery and Evaluation. Springer-Verlag, Berlin. Latest Edition.

7. Kaufman PB, Warber CS, Duke JA and Brielmann HL. Eds. Natural Products from Plants. CRC Press, Florida. Latest Edition.

Suggested Books:

1. Kokate, C.K., Purohit, A.P. and Gokhale, S.B. Pharmacognosy (Degree). NiraliPrakashan, Pune.

2. Atal, C.K. and Kapur, B.M. Cultivation and Utilization of Medicinal Plants. R.R.L, Jammu