



Gyanmanjari
Innovative University

Course Syllabus

Gyanmanjari Pharmacy College

Semester-7 (B. Pharm)

Subject: Novel Drug Delivery Systems (BPHBP17332)

Type of course: Major

Prerequisite: B. Pharmacy

Rationale: This subject is designed to impart basic knowledge on the area of novel drug delivery systems.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks					Total Marks
CI	T	P		Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
3	1	-	4	75	25	-	-	50	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Chapter No.	Course content	Hrs	% Weightage
1.	Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design-controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations Polymers: Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.	10	25
2.	Microencapsulation:	10	25



	<p>Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications</p> <p>Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems</p> <p>Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implants and osmotic pump</p>		
3.	<p>Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches</p> <p>Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high-density systems, inflatable and gastroadhesive systems and their applications</p> <p>Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers</p>	10	25
4.	<p>Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications</p>	08	15
5.	<p>Ocular Drug Delivery Systems: Introduction, intra ocular barriers and methods to overcome – Preliminary study, ocular formulations and ocuserts</p> <p>Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications</p>	07	10



Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1.	<p>Microencapsulation Technique Report Faculty member will assign each student the task of selecting any one microencapsulation technique from the syllabus. Students will independently study the assigned technique and prepare a detailed report explaining its principle, method of preparation, labeled diagram, advantages, limitations, and pharmaceutical applications. The completed report shall be submitted through the GMIU Web Portal within the stipulated deadline.</p>	10
2.	<p>Mucoadhesive Drug Delivery Design Faculty member will assign students the task of designing a buccal or mucosal drug delivery system based on the concepts covered in the course. Students will prepare a design that includes the selection of a suitable drug, formulation components, mechanism of mucoadhesion, method of drug release, advantages, and potential therapeutic applications. Students are expected to justify their formulation design with appropriate scientific rationale and present the information in a systematic format. The completed activity shall be submitted through the GMIU Web Portal within the prescribed timeline.</p>	10
3.	<p>Transdermal Patch Design Activity The faculty member will assign students the task of designing a transdermal patch for a given drug. Students will prepare a detailed design that includes the selection of the drug, structure and layers of the transdermal patch, formulation components, role of each component, mechanism of drug permeation through the skin, and the advantages of the designed system. Students should present it in a well-organized format. The completed activity shall be submitted through the GMIU Web Portal within the specified deadline.</p>	10
4.	<p>Polymer Selection Activity The faculty member will assign students the task of selecting appropriate polymers for different drug delivery systems based on their physicochemical properties and pharmaceutical applications. Students will analyze the characteristics of various natural, semi-synthetic, and synthetic polymers and justify their selection for specific dosage forms such as controlled release, transdermal, mucoadhesive, gastroprotective, ocular, or targeted drug delivery systems. Students are expected to provide a scientific rationale for their choices. The completed activity shall be submitted through the GMIU Web Portal within the prescribed timeline.</p>	10
5.	<p>Targeted Drug Delivery Case Study</p>	



The faculty member will assign students the task of analyzing one targeted drug delivery system, students will prepare a case study describing the principle of targeted drug delivery, working mechanism, formulation characteristics, advantages, limitations, therapeutic significance, and clinical applications of the selected system. The completed activity shall be submitted through the GMIU Web Portal within the prescribed timeline.	10
Total	50

Suggested Specification table with Marks

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	25%	20%	10%	05%	05%

Course Outcome:

After learning the course, the students should be able to:	
CO1	Understand principles of controlled drug delivery systems and polymers.
CO2	Explain microencapsulation, mucosal and implantable drug delivery systems.
CO3	Describe transdermal, Gastroretentive and Nasopulmonary drug delivery systems.
CO4	Analyze targeted drug delivery systems like liposomes and nanoparticles.
CO5	Apply concepts of ocular and intrauterine drug delivery systems.

Instructional Method:

The course delivery method will depend upon the requirement of content and the need of students. The teacher, in addition to the conventional teaching method by blackboard, may also use any of the tools such as demonstration, role play, quiz, brainstorming, MOOCs, etc.

From the content, 10% topics are suggested for flipped mode instruction. Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory.

The internal evaluation will be done on the basis of Active Learning Assignment. Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

Novel Drug Delivery Systems (BPHBP17332)



- [1] Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992
- [2] Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
- [3] Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
- [4] N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
- [5] S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.

Journals:

- [6] Indian Journal of Pharmaceutical Sciences (IPA)
- [7] Indian Drugs (IDMA)
- [8] Journal of Controlled Release (Elsevier Sciences)
- [9] Drug Development and Industrial Pharmacy (Marcel & Decker)
- [10] International Journal of Pharmaceutics (Elsevier Sciences)

