INSTITUTE	**FACULTY OF PHARMACY**
PROGRAM	**BACHELOR OF PHARMACY**
SEMESTER	**7**
COURSE TITLE	**NOVEL DRUG DELIVERY SYSTEMS**
COURSE CODE	**13PH0704**
COURSE CREDITS	**4**

Objective:

1 This subject is designed to impart basic knowledge in the area of novel drug delivery systems.

Course Outcomes: After completion of this course, student will be able to:

1 To understand various approaches for the development of novel drug delivery systems.

2 To understand the criteria for the selection of drugs and polymers for the development of novel drug delivery systems, their formulation and evaluation.

Pre-requisite of course: This subject is designed to impart basic knowledge in the area of novel drug delivery systems.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	0	75	15	10	0	0

Contents : Unit	Topics	Contact Hours
1	**Controlled drug delivery systems** 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 the formulation of controlled release drug delivery systems.	10

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Contents : Unit	Topics	Contact Hours
2	**Microencapsulation** Microencapsulation: Definition, advantages and disadvantages, microspheres/ microcapsules, microparticles, methods of microencapsulation, applications. Mucosal Drug Delivery system: Introduction, Principles of bioadhesion/ mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems. Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, the concept of implants and osmotic pump.	10
3	**Transdermal Drug Delivery Systems** Transdermal Drug Delivery Systems: Introduction, Permeation through the skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches. Gastro retentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high-density systems, inflatable and gastroadhesive systems and their applications. Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers.	10
4	**Targeted drug Delivery** Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications.	8
5	**Ocular Drug Delivery Systems** Ocular Drug Delivery Systems: Introduction, intraocular barriers and methods to overcome – Preliminary study, ocular formulations and ocuserts Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intrauterine devices (IUDs) and applications.	7
Total Hours		**45**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Tutorials will be based on the above syllabus.** Tutorial-1, Tutorial-2, Tutorial-3, Tutorial-4, Tutorial-5, Tutorial-6, Tutorial-7, Tutorial-8, Tutorial-9, Tutorial-10, Tutorial-11, Tutorial-12, Tutorial-13, Tutorial-14, Tutorial-15	15
Total Hours		**15**

Textbook :

1 Novel Drug Delivery Systems, Y. W. Chien, Marcel Dekker, 1992

References:

1 Drug Delivery Systems, Drug Delivery Systems, Robinson, J. R., Lee V. H. L, Marcel Dekke, 1992

References:

2 Drug Delivery Systems, Drug Delivery Systems, Edith Mathiowitz,, Wiley Interscience Publication, 1999

3 Drug Delivery Systems, Drug Delivery Systems, N.K. Jain, CBS PUBLISHERS AND DISTRIBUTORS, 2011

4 Drug Delivery Systems, Drug Delivery Systems, S.P. Vyas and R.K. Khar, , Vallabh Prakashan, 2002

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	20.00	25.00	15.00	10.00	0.00

Instructional Method:

1 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 the black board may also use any tools such as demonstration, role play, quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done based on continuous evaluation of students in the laboratory and classroom.

3 Students will use supplementary resources such as online videos, NPTEL videos, MOOCs/ e-courses, virtual laboratories.

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