Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2019-2020
Course Handout Part II

Date: 18-07-2019

In-addition to Part – I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No : **PHA G617**
Course Title : Advanced Drug Delivery Systems
Instructor-in-charge : Prof. Swati Biswas

1. Course Description

Study on understanding the strategies to develop nano-formulations. Various delivery routes of advanced drug delivery systems, including oral, mucosal, nasal, buccal, ocular will be discussed. Understand the challenges and strategies for the delivery of protein, peptide and other biological products. Intervention of various diseases, including cancer, ocular diseases, diabetes, and infectious diseases by nano-formulations will be discussed. Targeted, and stimuli-sensitive drug delivery systems will be discussed.

2. Scope and objective of the course :

The scope of the course is to provide understanding on various advanced drug delivery systems (ADDS), the process of development, techniques for their characterizations and the utility of the ADDS in the biological systems.
The prime objective of this course is to impart knowledge of design, development and evaluation of novel drug delivery systems (NDDS). The primary focus would be to understand the biopharmaceutical, physicochemical and physiological parameters affecting the design and development of NDDS. Nano-therapeutic intervention of various diseases, and design and development of targeted and stimuli-sensitive nanocarriers will be discussed.

3. Learning Outcome:

- Endowment with the knowledge of advanced drug delivery systems,
- Ability to design and develop nano-formulations of any conventional therapy suitable for certain disease conditions.
- Ability to perform physico-chemical characterization of nano-formulations
- Thorough idea about the polymers, surfactants used to develop advanced drug delivery systems.

4. Text Book:

Tyle, P. Specialized Drug Delivery Systems- Manufacturing and Production Technology, Marcel Dekker, New York, 1990

5. Reference Book:

i. Prescott, L.F., and Nimmo, W.S. Novel Drug Delivery, John Wiley & Sons, Chichester, 1989.
ii. McNally, E. J. Protein Formulation and Delivery, Marcel Dekker, New York, 2000.
iii. Frokjaer, S., and Hovgaard, L. Pharmaceutical Formulation Development of Peptides and Proteins, Taylor and Francis, London, 2000.

6. Course Plan:

Lect. No.	**Learning Objectives**	**Topics to Covered**	**Ref. Chap/Sc # (Book)**
1-2	Overview of NDDS, Opportunities and challenges	General Introduction	T.1 CH.1
3-8	Various aspects affecting design, development and selection of NDDS	Physicochemical, Biopharmaceutical and Physiological factors important for design of NDDS	R.3 CH. 2 &7
9-14	Techniques used for development of NDDS (in general) and their characterization	Various Techniques involved in development of NDDS, characterization technique, including particle size distribution, zeta potential, IR, XRD, DSC, etc.	R.3 CH. 2 &7
15-20	Targeted Drug delivery	Various drug delivery systems for site specific targeting	R.3 CH.9,25,&32
21-26	Stimuli-sensitive drug delivery	Micro-environment sensitive, thermo, light and ultra-sound sensitive systems	Class-notes
27-30	Drug delivery of proteins and peptides	Basic considerations in the design of Protein/Peptide based delivery systems	T.1 CH.6, R.1 CH.29, R.2 CH.5
31-33	Advanced drug delivery systems for GIT-related diseases	Drug delivery to stomach, small, and large intestines	These are advanced topics and will be covered using journal articles. Federal guidelines keep on changing so latest
34-36	Advanced drug delivery systems for ocular diseases	Drug delivery for various disease conditions, including infections, glaucoma, choroidal neovascularization	
37-42	Lipid Based Drug Delivery Systems, including liposomes, neosomes, transferosomes, solid lipid nanoparticles, nanostructured	Design of lipid drug delivery systems. Characterization and evaluation	

	lipid carriers		guidelines would be covered.

7. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Remarks
Mid Semester test	90 min	25	30/9, 9:00 – 10:30 AM	CB
Seminars/ Assignment	20 min	20		OB
Literature surveys/day to day lab sessions* Quiz (Compre)	Continuous	15+5		OB+CB (5 %)
Comprehensive Exam	180 min	25+10	04/12 FN	CB+OB

*: Lab sessions will involve 3 contact hours per week for each student. Topics, mode of evaluation and number will be announced in the regular class or lab sessions. CB – closed book and OB – open book

8. **Mid-semester evaluation:** Will be announced after the 2nd test.

9. **Attendance**: Regularity in attendance will be one of the criteria in deciding the borderline cases at the time of final grading.

10. Grading Procedure:

a) It is not necessary that all the five grades (i.e. A to E) would be awarded.
b) In borderline cases subjective judgment will be exercised for pull-up's (max. 2%). Basic guiding factors will be regularity, consistency in performance (above average) or/and steady improvement throughout the semester.

11. **Make-up:** Make-up will be given only for **genuine** reasons. It is expected that students shall avoid misuse of this feature.

12. **Chamber consultation hours:** To be announced in the class.

13. **Notices:** Notices pertaining to this course will be displayed **only on Pharmacy Department Notice Board.**

14. **Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
PHA G617