

<b>INSTITUTE</b>	<b>FACULTY OF PHARMACY</b>
<b>PROGRAM</b>	<b>BACHELOR OF PHARMACY</b>
<b>SEMESTER</b>	<b>4</b>
<b>COURSE TITLE</b>	<b>PHYSICAL PHARMACEUTICS-II</b>
<b>COURSE CODE</b>	<b>13PH0403</b>
<b>COURSE CREDITS</b>	<b>6</b>

**Objective:**

- 1 The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

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

- 1 Understand various physicochemical properties of drug molecules in the designing the dosage forms
- 2 Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
- 3 Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms

**Pre-requisite of course:**The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
3	1	4	75	15	10	35	15

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Colloidal dispersions:</b> Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization & protective action	

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
2	<b>Rheology:</b> Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers Deformation of solids: Plastic and elastic deformation, Hooke's equation, Stress, Strain, Elastic Modulus	
3	<b>Coarse dispersion:</b> Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method	
4	<b>Micromeritics:</b> Micromeritics: Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.	
5	<b>Drug stability</b> Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention.	
<b>Total Hours</b>		

**Suggested List of Experiments:**

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Lab</b> Experiment no.1 , Experiment no.2, Experiment no.3, Experiment no.4, Experiment no.5, Experiment no.6, Experiment no.7, Experiment no.8, Experiment no.9, Experiment no.10, Experiment no.11, Experiment no.12, Experiment no.13, Experiment no.14, Experiment no.15	

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
2	<b>Workshop</b> Workshop no.1, Workshop no.2, Workshop no.3, Workshop no.4, Workshop no.5, Workshop no.6, Workshop no.7, Workshop no.8, Workshop no.9, Workshop no.10, Workshop no.11, Workshop no.12, Workshop no.13, Workshop no.14, Workshop no.15	
<b>Total Hours</b>		

### Textbook :

- 1 Textbook of physical pharmaceutics C V S Subrahmanyam, Subrahmanyam, Delhi Valabh publication, 2015

### References:

- 1 Physical Pharmacy by Alfred Martin, Sixth edition
- 2 Experimental pharmaceutics by Eugene, Parott.
- 3 Tutorial pharmacy by Cooper and Gunn.
- 4 Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
- 5 Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
- 6 Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
- 7 Physical Pharmaceutics by Ramasamy C, and Manavalan R.

### 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
30.00	25.00	20.00	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 blackboard 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.