Dr. Rafiq Zakaria Campus
Maulana Azad Educational Trust
Y.B. Chavan College of Pharmacy
An ISO 9001:2008 Certified Institute
(B. Pharm., M. Pharm & Research Center)

COURSE MODULE

Program Title	B. Pharmacy
Department	Pharmaceutics
Course Title	Physical Pharmaceutics II

1. **NAME OF INSTITUTION** : Y. B. CHAVAN COLLEGE OF PHARMACY, AURANGABAD

2. **AFFILIATED UNIVERSITY** : DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

3. **DEPARTMENT** : PHARMACEUTICS

4. **PROGRAM TITLE** : B. PHARM

4.1. Program Outcomes (PO):

PO 01: Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO 02: Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO 03: Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO 04: Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 05: Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

PO 06: Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

PO 07: Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO 08: Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

PO 09: The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO 10: Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 11: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self assessment and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

5. COURSE SPECIFICATION :

5.1.Course Identification and General Information

a. Course Title:	Physical Pharmaceutics II	
b. Course Number/Code	BP403T	
c. Credit Hours	Theory	Practical
	45(3 Hrs/Week	60 (4Hrs. / Week)
d. Study level/semester at which this course is offered	Sem IV	
e. Pre-requisite	Physical Pharmaceutics I	
f. Co-requisite	N/A	
g. Program in which the course is offered	B Pharm	
h. Language of teaching the course	English	
i. Prepared by	Dr. M.N.CHISHTI	
j. Approved by HOD	Dr. S.R.LAHOTI	

5.2.Course Description:

Physical Pharmacy is the area of Pharmacy which deals with the quantitative and theoretical principles of science as they apply to the practice of pharmacy. Physical Pharmacy integrates the factual knowledge of pharmacy through the development of broad principles so as to aid pharmacists to predict solubility, stability, compatibility and biological action of drug products.

5.3. Course Objectives:

- Understand various physicochemical properties of drug molecules in the designing the dosage form
- Know the principles of chemical kinetics & to use them in assigning expiry date for Formulation
- Demonstrate use of physicochemical properties in evaluation of dosage forms.
- Appreciate physicochemical properties of drug molecules in formulation research and Development

6.0.Course Outcomes (CO): (Min. 4 and Max. 6)

Code	Course outcome
CO 403.01	**Demonstrate the knowledge of rheology, interfacial phenomenon and chemical kinetics**
CO 403.02	**Experiment with different laboratory instruments used in determination of viscosity, surface tension and critical micellar concentration**
CO 403.03	**Define fundamental principles, concepts in development of suspensions and emulsions**
CO 403.04	**Solving numerical related to viscosity, surface tension and order of reaction**
CO 403.05	**Applying the principles and concepts of colloidal chemistry in design of stable nano drug delivery system**
CO 403.06	**Apply the knowledge of accelerated stability studies in expiry dating of drug products**
CO 403.07	**Make use of fundamental principles in designing and evaluating dosage forms**

6.1. Knowledge and Understanding

(Alignment of POs to COs)

Course code (CO)	Program Outcome (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 403.01	**3**	**--**	**--**	**---**	**1**	**---**	**----**	**----**	**----**	**2**	**2**
CO 403.02	**3**	**--**	**3**	**3**	**---**	**---**	**1**	**2**	**----**	**2**	**3**
CO 403.03	**3**	**--**	**3**	**3**	**----**	**---**	**1**	**2**	**----**	**3**	**3**
CO 403.04	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**2**	**----**	**3**	**3**
CO 403.05	**3**	**--**	**3**	**3**	**--**	**--**	**--**	**--**	**1**	**3**	**1**
CO 403.06	**3**	**--**	**3**	**1**	**--**	**--**	**--**	**3**	**3**	**3**	**1**
CO 403.07	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**

Correlation levels 1, 2 or 3 as defined below:
1: Slight (Low); 2: Moderate (Medium); 3: Substantial (High); If there is no correlation, put '-'

6.2.Teaching and Assessment Methods for achieving learning outcome:

Teaching Strategies(methods)/Tools used	Methods of Assessment
Lectures (Constructivist learning) Collaborative learning (Discussion) Project based Learning Blended learning Inquiry based learning Flash cards Video Equipment models	Formative Assessment Case study Class test Multiple choice questions Assignments Seminar Viva Voce Synopsis Tutorials Summative Assessment

6.3.Tools for the Teaching and learning

Theory subjects	Practical Subjects
• PowerPoints presentation • Videos • Flash Card • Models • Software • Charts • Smart Boards • White boards • Online Platform	• White boards • Glassware • Chemicals • Instruments • Equipment • Software • Models • Plants/Crude Drugs • Animal

6.4.COURSE CONTENT

6.1. Theoretical Aspect:

Order	Topic list/units	Subtopics list	Number of Weeks	Contact Hours
01	**UNIT-I**	**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	**$3^{1/3}$**	**10**

Order	Topic list/units	Subtopics list	Number of Weeks	Contact Hours
		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		
02	**UNIT-II**	**Rheology:** Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatants, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers **Deformation of solids:** Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus	**$3^{1/3}$**	**10**
03	**UNIT-III**	**Coarse dispersion:** Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Physical stability of emulsions, preservation of emulsions, rheological properties of emulsions, phase equilibria and emulsion formulation.	**$3^{1/3}$**	**10**
04	**UNIT-IV**	**Micromertics:** Particle size distribution, number and weight distribution, particle number, particle size determination, particle shape, specific surface area, methods of determining surface area, permeability, adsorption, derived properties of powders, packing arrangements, densities, porosity, bulkiness and flow properties	**$2^{2/3}$**	**8**
05	**UNIT-V**	**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	**$2^{1/3}$**	**7**

Order	Topic list/units	Subtopics list	Number of Weeks	Contact Hours
		of electrolytes, coacervation, peptization& protective action.		
	Total		**15**	**45**

6.1.Practical Aspects

Order	Tasks/Experiments	Number of Weeks
01	Determination of particle size determination by sieving method	**2**
02	Determination of particle size determination by microscopic method	**2**
03	Determination of bulk density, true density and porosity for given powder sample	**1**
04	Determination the angle of repose and influence of glidant concentration on angle of repose	**1**
05	Determination of viscosity of liquid using Ostwald's viscometer	**1**
06	Determination sedimentation volume with effect of different suspending agent	**1**
07	Determination sedimentation volume with effect of different concentration of single suspending agent	**1**
08	Determination of viscosity of semisolid by using Brookfield viscometer	**1**
09	Determination of reaction rate constant first order.	**2**
10	Determination of reaction rate constant second order	**2**
11	Accelerated stability studies	**1**
24	**Total**	**15**

7.0.ASSESSMENT MECHANISM :

Sr. No.	Assessment Mechanism	Week due	Marks	Proportion of Final Assessment
1	Assignments, Exercises & Home works	2nd week of every month	10	6%
2	Sessional (Internal Theory exam)	As per scheduled examination	15	10%
3	Continuous Practical Assessment	Weekly during	15	10%

Sr. No.	Assessment Mechanism	Week due	Marks	Proportion of Final Assessment
	(Sessional Practical exam)	practicals		
4	Final exam (theory)	As per University at end of course	75	50%
5	Final exam(practical)		35	24%
Total			150	**100%**

8.0.STUDENT SUPPORT:

Office hours/week	Other procedures
Two hours minimum	**marzuka.kazi@ybccpa.ac.in**

9.0.TEACHER'S AVAILABILITY FOR STUDENT SUPPORT:

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Time	2:00-3:00	12:00-1:00	12:00-1:00	12:00-1:00	12:00-1:00	12:00-1:00

10.0. LEARNING RESOURCES:

Sr. No.	Title of Learning Material	Details
01	Text books	**Physical Pharmacy by Alfred Martin, Sixth edition** **Experimental pharmaceutics by Eugene, Parott.** **Tutorial pharmacy by Cooper and Gunn.** **Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.** **Physical Pharmaceutics by Ramasamy C, and Manavalan R.**
02	Essential references (as per syllabus)	**Text book of Physical Pharmaceutics, CVS subramanyam** **Physical Pharmaceutics by Ashok Hajare** **Physical Pharmceutics by Rajesh Khanna**
03	Reference material	
04	E-materials and websites	
05	Other learning material	

11.0. FACILITIES REQUIRED:

Sr.No.	Particular of Facility Required

Sr.No.	Particular of Facility Required
1	Lecture Rooms (capacity for 60 students)
2	Laboratory (capacity for 20 students)
3	Computing resources: PC with latest version and hardware/software and utilization of open source and licensed application software
4	Other resources: Appropriate laboratory tools, Chemicals, Glass ware, Apparatus, Instrumentation

12.0. COURSE IMPROVEMENT PROCESSES:

12.1. Strategies for obtaining student feedback on effectiveness of teaching:

Course delivery evaluation by students using: Questionnaire forms and online questionnaires

12.2. Other strategies for evaluation of teaching by the instructor or by the department:

Periodic review by Academic Planning & Monitoring Committee and departmental review committee, Observations and assistance of colleagues, External assessments by advisors/ examiners and auditors.

12.3. Process for improvement of teaching:

Use of ICT tools, teaching aids, Simultaneous practical orientation and theory classes (SPOT), Adoption of reflective teaching.

12.4. Describe the planning procedures for periodically reviewing of course effectiveness and planning for improvement:

Periodic review by departmental meeting, Review of course delivery and outcome through assessment and feedback from all stake holders.

12.5. Course development plans:

Provide inputs for course improvement and update to University Course development Committees (Board of Studies)

13.0. INFORMATION ABOUT FACULTY MEMBER RESPONSIBLE FOR THE COURSE:

Name	Dr. M.N.CHISHTI
Location	Dr. M.N.Chishti., Third floor, F-4, M.Pharm. Pharmaceutics Lab.
Contact Detail (e-mail &cell no.)	9975145944, marzuka.kazi@ybccpa.ac.in
Office Hours	10:00 AM to 5:00 PM