Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Analysis I
Course Code	BP-102[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Foundation core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Understand the principles of volumetric and electro chemical analysis**(BL2-Understand)** **CO2-** To gain knowledge of sources of errors and minimizing techniques.**(BL1-Remember)** **CO3-** To analyze the techniques of volumetric, gravimetric and gas analysis.**(BL3-Apply)** **CO4-** To explain about accuracy, precision and significant figure error concepts.**(BL1-Remember)** **CO5-** To compute analytical results and understand the physiochemical concepts of analysis, theories of acids and bases, stoichiometry etc**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Pharmaceutical Analysis- Definition and scope, Different techniques of analysis , Methods of expressing concentration Primary and secondary standards. Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures Pharmacopoeia, Sources of impurities in medicinal agents, limit tests.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Acid base titration: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves Non aqueous titration: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride. Complexometric titration: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate. Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate. Basic Principles, methods and application of diazotisation titration.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Concepts of oxidation and reduction, Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromometry, Dichrometry, Titration with potassium iodate	Blended Learning	08
UNIT 5	Electrochemical methods of analysis Conductometry- Introduction, Conductivity cell, Conductometric titrations, applications. Potentiometry - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications. Polarography - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Making of differen buffers and its titration	Experiments	BL2-Understand	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. A.I. Vogel, Text Book of Quantitative Inorganic analysis 3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry 4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
Articles	https://www.orientjchem.org/vol36no1/a-review-article-on-pharmaceutical-analysis-of-pharmaceutical-industry-according-to-pharmacopoeias/
References Books	1. John H. Kennedy, Analytical chemistry principles 6. Indian Pharmacopoeia
MOOC Courses	https://nptel.ac.in/courses/104108363
Videos	You tube,

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	3	-	-	1	1	-	3	1	3	2	1
CO2	2	2	-	2	2	-	-	1	2	-	3	2	2	1	2
CO3	2	2	1	-	1	-	-	2	1	-	2	1	1	1	1
CO4	2	1	3	-	1	-	-	2	1	-	2	1	1	-	1
CO5	3	3	2	-	1	1	-	-	-	-	-	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Inorganic Chemistry
Course Code	BP-104[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand the history and concept of pharmacopoeia and its editions.**(BL2-Understand)** **CO2-** To know the sources of impurities and methods to determine the impurities in inorganic pharmaceuticals.**(BL1-Remember)** **CO3-** To gain knowledge on limit tests of different pharmaceutical inorganic compounds.**(BL1-Remember)** **CO4-** To understand the method to prepare inorganic pharmaceuticals**(BL2-Understand)** **CO5-** To justify the medicinal importance of acidifiers, antacids, cathartics and antimicrobial agents as gastrointestinal agents**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	General methods of preparation, assay for the compounds superscripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes	Lecture based learning, ICT, Peer Tutorial	10
UNIT 2	Acids, Bases and Buffers: Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity. Major extra and intracellular electrolytes: Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance. • Dental products: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.	Lecture based learning, ICT, Peer Tutorial	10
UNIT 3	Gastrointestinal agents Acidifiers: Ammonium chloride* and Dil. HCl Antacid: Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations	Lecture based learning, ICT, Peer Tutorial	10
UNIT 4	Miscellaneous compounds Expectorants: Potassium iodide, Ammonium chloride*. Emetics: Copper sulphate*, Sodium potassium tartarate Haematinics: Ferrous sulphate*, Ferrous gluconate Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite333 Astringents: Zinc Sulphate, Potash Alum	Lecture based learning, ICT, Peer Tutorial	08
UNIT 5	Radiopharmaceuticals: Radio activity, Measurement of radioactivity, Properties of α, β, γ radiations, Half-life, radio isotopes and study of radio isotopes - Sodium iodide I131, Storage conditions, precautions & pharmaceutical application of radioactive substances.	Lecture based learning, ICT, Peer Tutorial	07

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Limit test finding in water of ITM premises sample	Experiments	BL3-Apply	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	1. A.I. Vogel, Text Book of Quantitative Inorganic analysis 2. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition 3. M.L Schroff, Inorganic Pharmaceutical Chemistry 4. Bentley and Driver's Textbook of Pharmaceutical Chemistry 5. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
Articles	NA
References Books	1. Indian Pharmacopoeia
MOOC Courses	https://nptel.ac.in/courses
Videos	You tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	2	1	2	1	3	-	3	-	3	3	-
CO2	3	2	1	2	2	1	1	1	2	-	3	-	2	3	1
CO3	2	2	1	1	2	2	1	1	2	-	3	1	1	2	-
CO4	2	2	1	1	2	1	1	1	1	-	2	-	1	1	-
CO5	3	1	2	1	3	1	2	1	1	-	2	3	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Communication Skills *
Course Code	BP-105[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Non-graded Core Requirement							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation. **(BL2-Understand)** **CO2-** Communicate effectively (Verbal and Non-Verbal)**(BL3-Apply)** **CO3-** Effectively manage the team as a team player**(BL2-Understand)** **CO4-** To develop interview skills**(BL3-Apply)** **CO5-** To develop Leadership qualities and essentials.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment	Lecture based Learning, interactive classroom,	07
UNIT 2	Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication Communication Styles: Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style	Lecture based Learning, interactive classroom, Discussion	07
UNIT 3	Basic Listening Skills: Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations Effective Written Communication: Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication Writing Effectively: Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message	Lecture based Learning, interactive classroom, Discussion	07
UNIT 4	Interview Skills: Purpose of an interview, Do's and Dont's of an interview Giving Presentations: Dealing with Fears, planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery	Lecture based Learning, interactive classroom, Discussion	05
UNIT 5	• Group Discussion: Introduction, Communication skills in group discussion, Do's and Dont's of group discussion	Lecture based Learning, interactive classroom, Discussion, ABL (Mooc HR Round)	05

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	How to pitch yourself for HR Round	Seminar	BL5-Evaluate	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011 2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011 3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013 4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011 5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
Articles	https://www.helpguide.org/articles/relationships-communication/effective-communication.htm
References Books	1. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green Hall, 1st Edition Universe of Learning LTD, 2010 2. Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – PHI, 2011 3. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011 4. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning India Pvt. Ltd, 2011 5. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
MOOC Courses	https://nptel.ac.in/courses/102104061
Videos	https://www.youtube.com/watch?v=yRwglZSsR_Y

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	-	1	-	-	3	3	-	1	3
CO2	-	-	-	-	-	2	1	1	-	-	2	2	-	1	3
CO3	-	1	-	-	-	1	-	1	-	-	2	2	-	1	3
CO4	-	-	-	1	-	2	1	1	-	-	2	3	-	1	3
CO5	-	-	-	-	-	-	1	1	-	-	1	2	-	1	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Remedial Mathematics *
Course Code	BP-106RM[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Non-graded Core Requirement							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand the role of mathematics in pharmacy(**BL1-Remember)** **CO2-** Solve the different types of problems by applying theory(**BL2-Understand)** **CO3-** Appreciate the important application of mathematics in Pharmacy(**BL4-Analyze)** **CO4-** To adopt both conventional and creative techniques to the solutions of mathematical problems.(**BL4-Analyze)** **CO5-** Apply a range of techniques effectively to solve problems including theory deduction, approximation and simulation(**BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Partial fraction Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction , Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics Logarithms Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems. Function: Real Valued function, Classification of real valued functions, Limits and continuity : Introduction , Limit of a function, Definition of limit of a function (definition)	Lecture based learning, Peer Tutorial	06
UNIT 2	Matrices and Determinant: Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations	lecture based l, numericals, based problem, learning	06
UNIT 3	Calculus Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function , Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – Without Proof, Derivative of xn w.r.tx, where n is any rational number, Derivative of ex,, Derivative of loge x , Derivative of ax, Derivative of trigonometric functions from first principles (without Proof), Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application	lecture based learning	06
UNIT 4	Analytical Geometry Introduction: Signs of the Coordinates, Distance formula, Straight Line: Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line Integration: Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application	lecture based learning	06
UNIT 5	Differential Equations: Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, Application in solving Pharmacokinetic equations Laplace Transform: Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, Application in solving Chemical kinetics and Pharmacokinetics equations	lecture based learning	06

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Laplace Transform	Experiments	BL3-Apply	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	1. Differential Calculus by Shanthinarayan 2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
Articles	NA
References Books	1. Integral Calculus by Shanthinarayan 2. Higher Engineering Mathematics by Dr. B.S.Grewal
MOOC Courses	https://nptel.ac.in/courses/102101067 https://www.udemy.com/course/math-fundamentals-complete-course-on-fundamentals-
Videos	https://www.youtube.com/watch?v=d77qWQA4llw&list=PL7qxHC_-XSZmafOUewEGxTKsc7brHKti_

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	1	1	1	-	-	-	-	-	2	-	-	1	1
CO2	-	3	1	-	1	-	-	-	-	-	1	-	-	1	-
CO3	-	2	1	-	1	-	-	-	-	-	1	-	-	1	1
CO4	1	2	1	1	1	-	-	-	-	-	1	-	-	-	1
CO5	-	2	-	-	2	-	-	-	-	-	2	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Inorganic Chemistry
Course Code	BP-110[P]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To recall the sources of limit tests, preparation and identification of compounds**(BL1-Remember)** **CO2-** Understand the medicinal and pharmaceutical importance of inorganic compounds**(BL2-Understand)** **CO3-** To demonstrate the preparation of inorganic pharmaceuticals.**(BL3-Apply)** **CO4-** To analyze various inorganic pharmaceutical compounds and perform limit test**(BL4-Analyze)** **CO5-** To select suitable method for the preparation of inorganic pharmaceuticals**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Limit tests for following ions Limit test for Chlorides and Sulphates, Modified limit test for Chlorides and Sulphates, Limit test for Iron, Limit test for Heavy metals, Limit test for Lead, Limit test for Arsenic	Experiments	BL4-Analyze	10
2	Identification test Magnesium hydroxide Ferrous sulphate Sodium bicarbonate Calcium gluconate Copper sulphate	Experiments	BL4-Analyze	10
3	Test for purity Swelling power of Bentonite, Neutralizing capacity of aluminum hydroxide gel, Determination of potassium iodate and iodine in potassium Iodide	Experiments	BL3-Apply	10
4	Preparation of inorganic pharmaceuticals, Boric acid, Potash alum, Ferrous sulphate	Experiments	BL6-Create	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4th edition. 2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
Articles	https://asianjpr.com/HTMLPaper.aspx?Journal=Asian%20Journal%20of%20Pharmaceutical%20Research;PID=2017-7-1-6
References Books	6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry 7. Indian Pharmacopoeia
MOOC Courses	NA
Videos	https://www.youtube.com/watch?v=3ut36CX-YN0&list=PLQnNyE1lxfVL4np_23Y2f18QVelWUHvQM

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	1	-	-	-	2	2	2	-	2	-	3
CO2	2	1	1	3	2	-	-	-	1	1	3	-	2	-	1
CO3	3	2	1	1	2	-	-	-	-	-	3	-	3	1	2
CO4	3	2	1	3	2	-	-	-	1	-	2	-	1	1	1
CO5	3	3	-	1	1	-	-	-	-	1	2	-	3	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Communication Skills
Course Code	BP-111[P]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					0	0	1	1
Course Type	Soft skill							
Course Category	Non-graded Core Requirement							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation**(BL2-Understand)** **CO2-** To apply the practical skills to Communicate effectively (Verbal and Non-Verbal)**(BL3-Apply)** **CO3-** To take part in advanced learning on comprehension/direct and indirect speech.**(BL4-Analyze)** **CO4-** To develop the interview handling skills.**(BL5-Evaluate)** **CO5-** To improve in email etiquette.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Basic communication covering the following topics Meeting People Asking Questions Making Friends What did you do? Do's and Dont's	Role Play	BL3-Apply	2/ WEEK
2	Advanced Learning Listening Comprehension / Direct and Indirect Speech Figures of Speech Effective Communication Writing Skills Effective Writing Interview Handling Skills E-Mail etiquette Presentation Skills	Experiments	BL3-Apply	2/ WEEK
3	Pronunciations covering the following topics Pronunciation (Consonant Sounds) Pronunciation and Nouns Pronunciation (Vowel Sounds)	Experiments	BL3-Apply	2/ WEEK

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
25	13	15	8	10	5

Part E

Books	1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011 2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011 3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013
Articles	9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning India Pvt. Ltd, 2011
References Books	4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011 5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013 6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green Hall, 1st Edition Universe of Learning LTD, 2010
MOOC Courses	https://www.coursera.org/specializations/improve-english
Videos	https://www.youtube.com/watch?v=srn5jgr9TZo

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	-	-	1	3	3	1	3	1	1
CO2	-	-	-	-	-	2	-	1	-	3	2	1	2	1	1
CO3	-	-	-	-	-	2	-	1	1	2	2	3	2	2	1
CO4	-	-	-	-	-	1	-	-	1	2	2	2	2	2	1
CO5	-	-	-	-	-	1	-	-	1	1	2	1	2	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Fine art and Music-I *
Course Code	BP-113[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					1	0	0	1
Course Type	Theory only							
Course Category	Generic Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Drawing exercises are to learn accurate observation and skills of graphic presentation in free hand drawing exercises from objects and nature to study proportion, volume and visual perspective, suggestion of solidity by line, mass, value and texture; emphasis on variety of visual experiences**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
1	)Study of proportion, line, colour, form, tone, texture and graphic representation	Lecture based learning	10
2	Nature Drawing: study of various natural forms.	class out of classroom	08
3	Drawing from various man-made objects.	class out of classroom	07
4	d)Drawing from memory- to develop the sense of observation and the capacity to retain and recall images and their co-ordination.	active learning	05

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Nature drawings:1 Drawing from man-made object:1 Drawing from Memory-1 Free-hand sketching: 5	No. of assignments: 2	PBL	BL3-Apply	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Color and Light: A Guide for the Realist Painter (Volume 2) (James Gurney Art)
Articles	https://shepherd.com/best-books/art-references-for-drawing-the-human-figure
References Books	Let's Draw! Illustrating With Copic Book by Ran; KAOPPE; Kirishima Mutsuki (shelved 1 time as drawing-reference)
MOOC Courses	https://www.nifafinearts.com/course.php?id=29
Videos	https://www.youtube.com/results?search_query=drawing

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	1	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Instrumental Methods of Analysis
Course Code	BP-701T

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Understand selected instrumental analytical techniques (spectroscopic and chromatographic methods) and differentiate with volumetric analysis.**(BL2-Understand)** **CO2-** Gain knowledge on interaction of EMR with matter and to build the analytical understanding at the level of atom, group and molecular structure of organic and inorganic compounds with different functional groups and their applications in pharmacy.**(BL1-Remember)** **CO3-** Characterization and estimation of ions by spectroscopical techniques**(BL4-Analyze)** **CO4-** Simplify affinity of matter with stationary phase and mobile phase, physical and chemical properties of matter.**(BL2-Understand)** **CO5-** Categorize different organic and inorganic compounds using suitable spectroscopic and chromatographic techniques.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	UV Visible spectroscopy Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations. Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode. Applications - Spectrophotometric titrations, Single component and multi component analysis Fluorimetry Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations, Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications Flame Photometry-Principle, interferences, instrumentation and applications Atomic absorption spectroscopy- Principle, interferences, instrumentation and applications Nephelo-turbidometry- Principle, instrumentation and applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Introduction to chromatography Adsorption and partition column chromatography-Methodology, advantages, disadvantages and applications. Thin layer chromatography- Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications. Paper chromatography-Introduction, methodology, development techniques, advantages, disadvantages and applications Electrophoresis– Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications High performance liquid chromatography (HPLC)-Introduction, theory, instrumentation, advantages and applications.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	Ion exchange chromatography- Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications Gel chromatography- Introduction, theory, instrumentation and applications Affinity chromatography- Introduction, theory, instrumentation and applications	white board	07

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Modal making of Gel electrophoresis	Experiments	BL2-Understand	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1.Instrumental Methods of Chemical Analysis by B.K Sharma 2.Organic spectroscopy by Y.R Sharma 3.Textbook of Pharmaceutical Analysis by Kenneth A. Connors 4.Vogel's Textbook of Quantitative Chemical Analysis by A.I. Vogel
Articles	NA
References Books	1. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake 2. Organic Chemistry by I. L. Finar 3. Organic spectroscopy by William Kemp 4. Quantitative Analysis of Drugs by D. C. Garrett
MOOC Courses	https://nptel.ac.in/
Videos	you tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	1	2	-	-	-	-	3	-	1	2	1
CO2	2	3	-	2	-	-	-	-	-	-	3	-	1	1	1
CO3	2	2	-	1	-	-	-	-	-	-	3	-	1	1	2
CO4	2	2	-	-	-	-	-	-	-	-	2	-	1	2	1
CO5	2	2	-	-	-	-	-	-	-	-	2	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Human Anatomy and Physiology II
Course Code	BP201T

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Explain the gross morphology, structure and functions of various organs of the human body.**(BL1-Remember)** **CO2-** Describe the various homeostatic mechanisms and their imbalances**(BL2-Understand)** **CO3-** Identify the various tissues and organs of different systems of human body**(BL3-Apply)** **CO4-** Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.**(BL3-Apply)** **CO5-** Appreciate coordinated working pattern of different organs of each system**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Nervous system Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters. Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. Structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Digestive system Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT. • Energetics Formation and role of ATP, Creatinine Phosphate and BMR.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 3	Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods. Urinary system Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Endocrine system Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders	Peer tutorial	10
UNIT 5	Reproductive system Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition Introduction to genetics Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	09

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Create respiratory model using baloon and bottle	Experiments	BL3-Apply	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers' medical publishers, New Delhi. 2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
Articles	https://www.medicalnewstoday.com/articles/248743
References Books	1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA 2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A. 3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje, Academic Publishers Kolkata
MOOC Courses	https://www.edx.org/learn/human-anatomy
Videos	https://www.youtube.com/watch?v=uBGI2BujkPQ

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	1	-	-	3	-	3	-	2
CO2	1	-	-	1	-	1	-	1	-	-	3	-	3	-	2
CO3	3	-	-	1	1	1	-	-	-	-	3	-	2	-	2
CO4	1	-	-	1	1	1	-	2	-	-	2	-	2	-	2
CO5	1	-	-	2	1	1	1	1	-	-	2	-	2	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Biochemistry
Course Code	BP203T

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the properties, significance and metabolic reactions of carbohydrates, lipids, nucleic acids, proteins and amino acids**(BL1-Remember)** **CO2-** To understand the metabolism of carbohydrates and process of electron transport and ATP formation**(BL2-Understand)** **CO3-** To apply the concept of catalytic activity and enzyme inhibition in design of new drugs, diagnostic and therapeutic applications of enzyme**(BL3-Apply)** **CO4-** To distinguish the process of DNA replication, transcription and translation**(BL2-Understand)** **CO5-** To evaluate the causes, manifestations and diagnosis of metabolic disorders**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Biomolecules Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins. Bioenergetics Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 2	Carbohydrate metabolism Glycolysis – Pathway, energetics and significance Citric acid cycle- Pathway, energetics and significance HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus Biological oxidation Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate level phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Lipid metabolism β-Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosis De novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity. Amino acid metabolism General reactions of amino acid metabolism; Transamination, deamination & decarboxylation, urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Nucleic acid metabolism and genetic information transfer Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 5	Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes –Structure and biochemical functions	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	DNA MODEL MAKING	Simulation	BL2-Understand	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Textbook of Biochemistry by Rama Rao. 2. Textbook of Biochemistry by Deb.
Articles	https://www.mcgill.ca/biochemistry/about-us/information/biochemistry
References Books	1. Principles of Biochemistry by Lehninger. 2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell. 3. Biochemistry by Stryer.
MOOC Courses	https://www.edx.org/learn/biochemistry/harvard-university-principles-of-biochemistry?index=product&queryID=6f52c57d14373630030886d85bfd4dfc&position=1&linked_from=autocomplete&c=autocomplete
Videos	https://www.youtube.com/watch?v=GJAf85ckhyk&list=PLTUO2J9MZQt1bmOFMAaWB8Nxa2qslnWPe

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	1	-	-	-	-	3	-	2	1	3
CO2	2	1	-	-	1	-	-	-	-	-	3	-	2	1	2
CO3	2	2	-	-	-	-	-	-	-	-	3	-	2	1	1
CO4	3	2	-	1	1	-	1	-	-	-	2	-	1	-	1
CO5	3	1	-	1	1	-	-	-	-	-	2	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pathophysiology
Course Code	BP204T

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand the process of cell injury, morphology of cell injury and cellular adaptations.**(BL2-Understand)** **CO2-** To understand the etiopathogenesis of cardiovascular, respiratory and renal diseases mentioned.**(BL2-Understand)** **CO3-** To apply the principles of pathogenesis in understanding symptoms, signs and complications of disease states mentioned.**(BL3-Apply)** **CO4-** To explain the etiopathogenesis of hematologic, endocrine, nervous, gastrointestinal, muscular skeletal diseases and Immunopathogenesis of infectious diseases.**(BL1-Remember)** **CO5-** To evaluate the principles of physical, chemical and biologic carcinogenesis.**(BL5-Evaluate)**						
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Basic principles of Cell injury and Adaptation: Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage), Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia), Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis &Alkalosis, Electrolyte imbalance Basic mechanism involved in the process of inflammation and repair: Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Cardiovascular System: Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis) Respiratory system: Asthma, Chronic obstructive airways diseases. Renal system: Acute and chronic renal failure	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Haematological Diseases: Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones Nervous system: Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease. Gastrointestinal system: Peptic Ulcer	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease. Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout Principles of cancer: classification, etiology and pathogenesis of cancer Diseases of bones and joints: Rheumatoid Arthritis, Osteoporosis,Gout Principles of Cancer: Classification, etiology and pathogenesis of Cancer	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	Infectious diseases: Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections Sexually transmitted diseases: AIDS, Syphilis, Gonorrhea	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Different desease model making	Seminar	BL2-Understand	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins &Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014. 2. Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010. 3. Laurence B, Bruce C, Bjorn K.; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
Articles	1. The Journal of Pathology. ISSN: 1096-9896 (Online) 2. The American Journal of Pathology. ISSN: 0002-9440 3. Pathology. 1465-3931 (Online) 4. International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online)
References Books	1. William and Wilkins, Baltimore;1991 [1990 printing]. 2. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010. 3. Guyton A, John.E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010. 4. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014
MOOC Courses	https://www.coursera.org/courses?query=pathophysiology
Videos	https://www.youtube.com/@RhesusMedicine

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	1	-	-	3	-	3	-	3
CO2	3	2	-	-	-	1	-	1	-	-	3	-	2	-	2
CO3	2	-	-	-	-	1	-	1	-	-	3	-	2	-	2
CO4	2	2	-	1	1	-	-	-	-	-	3	-	2	-	2
CO5	3	1	-	1	-	-	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Computer Applications in Pharmacy *
Course Code	BP205T

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					3	0	0	3
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand different types of databases, applications of computers and databases in pharmacy.**(BL2-Understand)** **CO2-** To illustrate the concept of number system in computers.**(BL2-Understand)** **CO3-** Applications of web technologies such as HTML, XML, CSS, programming languages, Web servers and pharmacy drug database. **(BL3-Apply)** **CO4-** To evaluate the applications of computers in pharmacy such as drug information services, pharmacokinetics, mathematical model in drug design, hospital and clinical pharmacy etc.,**(BL5-Evaluate)** **CO5-** To explain about bioinformatics and its impact in vaccine discovery.**(BL1-Remember)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG5(Gender equality)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement, Two's complement method, binary multiplication, binary division Concept of Information Systems and Software: Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 2	Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 3	Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring. Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 4	Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 5	Computers as data analysis in Preclinical development: Chromatographic dada analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	CADD	Simulation	BL2-Understand	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
75	38	50	25	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330. 2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Wiley and Sons, INC., Publication, USA
Articles	https://copbela.org/downloads/2020/SELF%20LEARNING%20MATERIAL%20BPHARMA/semester%202/BP205T/MODULE%2003.PDF
References Books	1. Bioinformatics (Concept, Skills and Applications) – S.C. Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA) 2. Microsoft office Access - 2003, Application Development Using VBA, SQLServer, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002
MOOC Courses	https://www.edx.org/certificates/professional-certificate/harvardx-data-science?index=product&results_level=first-level-results&term=COMPUTER+PHARMACY%22&objectID=program-3c32e3e0-b6fe-4ee4-bd4f-210c6339e074&campaign=Data++Science&source=edx&product_category=professional-certificate&placement_url=https%3A%2F%2Fwww.edx.org%2Fsearch
Videos	https://www.youtube.com/watch?v=vRDswGc2wyM

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	-	1	1	-	1	-	-	3	2	1	1	1
CO2	-	1	-	-	1	1	-	1	-	-	2	2	1	1	1
CO3	-	1	-	-	1	1	-	1	-	-	2	1	1	1	1
CO4	-	1	-	1	1	-	-	-	-	-	3	1	-	-	-
CO5	-	-	-	1	-	1	-	-	-	-	1	1	-	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Human Anatomy and Physiology II
Course Code	BP207P

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To recall the physiology of special senses with the help of models, charts and specimens.**(BL1-Remember)** **CO2-** To develop the knowledge on coordinating working of organs of various systems with the help of models, charts and specimens.**(BL3-Apply)** **CO3-** To analyze the functions of cranial nerves by various sensory and motor functions.**(BL4-Analyze)** **CO4-** To evaluate body temperature and body mass index.**(BL5-Evaluate)** **CO5-** To determine tidal volume and vital capacity.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Nervous system Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters. Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. Structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)	Peer tutorial	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. To study the integumentary and special senses using specimen, models, etc., 2. To study the nervous system using specimen, models, etc., 3. To study the endocrine system using specimen, models, etc 4. To demonstrate the general neurological examination	Experiments	BL2-Understand	16
2	5. To demonstrate the function of olfactory nerve 6. To examine the different types of taste. 7. To demonstrate the visual acuity 8. To demonstrate the reflex activity	Experiments	BL3-Apply	16
3	9. Recording of body temperature 10. To demonstrate positive and negative feedback mechanism. 11. Determination of tidal volume and vital capacity. 12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens	Experiments	BL3-Apply	16
4	13. Recording of basal mass index . 14. Study of family planning devices and pregnancy diagnosis test. 15. Demonstration of total blood count by cell analyser 16. Permanent slides of vital organs and gonads.	Experiments	BL3-Apply	16

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi. 2. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi
Articles	NA
References Books	1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA 2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	1	1	-	-	-	-	3	-	3	-	1
CO2	2	1	-	-	1	1	-	-	-	-	2	-	3	-	1
CO3	2	1	-	-	1	1	-	-	-	-	2	-	2	-	1
CO4	3	-	-	-	-	1	-	-	-	-	3	-	2	-	2
CO5	2	-	1	1	1	-	-	-	-	-	3	-	2	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Organic Chemistry I
Course Code	BP208P

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**	Minimum 5 unknown organic compounds to be analysed systematically.			
Course Outcomes & Bloom's Level	**CO1-** To explain the qualitative analysis and preparation of pharmaceutical organic compounds.**(BL1-Remember)** **CO2-** To identify the extra elements, present in the pharmaceutical organic compounds.**(BL2-Understand)** **CO3-** To analyze the presence of several functional groups in pharmaceutical compounds.**(BL4-Analyze)** **CO4-** To appraise the rules concerned with reactivity and orientation of organic compounds.**(BL5-Evaluate)** **CO5-** To analyze unknown pharmaceutical organic compounds by determining their melting point/boiling point.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.	Experiments	BL3-Apply	4
2	2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test	Experiments	BL4-Analyze	4
3	3. Solubility test	Experiments	BL3-Apply	4
4	4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides	Experiments	BL3-Apply	4
5	5. Melting point/Boiling point of organic compounds	Experiments	BL4-Analyze	4
6	6. Identification of the unknown compound from the literature using melting point/ boiling point.	Experiments	BL4-Analyze	4
7	7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point	Experiments	BL6-Create	4
8	8. Minimum 5 unknown organic compounds to be analysed systematically. 1. Preparation of suitable solid derivatives from organic compounds 2. Construction of molecular models	Experiments	BL4-Analyze	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1. Practical Organic Chemistry by Mann and Saunders. 2. Vogel's text book of Practical Organic Chemistry
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	3	-	2	3	1
CO2	3	2	-	-	2	-	-	1	-	-	3	-	3	2	1
CO3	2	1	-	-	1	-	-	-	-	-	3	-	2	2	2
CO4	2	2	-	-	1	-	1	-	-	-	2	-	2	1	1
CO5	3	1	-	-	1	1	-	-	-	-	2	-	2	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Biochemistry
Course Code	BP209P

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the qualitative analysis of carbohydrates and proteins**(BL1-Remember)** **CO2-** To understand the principle and clinical significance of blood glucose**(BL2-Understand)** **CO3-** To identify the amount of reducing sugars by DNSA method**(BL3-Apply)** **CO4-** To examine and evaluate the constituents present in Urine and their clinical significance**(BL5-Evaluate)** **CO5-** To determine the effect of temperature and substrate concentration on salivary amylase activity**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch) 2. Identification tests for Proteins (albumin and Casein) 3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method) 4. Qualitative analysis of urine for abnormal constituents	Experiments	BL2-Understand	16
2	5. Determination of blood creatinine 6. Determination of blood sugar 7. Determination of serum total cholesterol 8. Preparation of buffer solution and measurement of pH	Experiments	BL3-Apply	16
3	9. Study of enzymatic hydrolysis of starch 10. Determination of Salivary amylase activity 11. Study the effect of Temperature on Salivary amylase activity. 12. Study the effect of substrate concentration on salivary amylase activity.	Experiments	BL3-Apply	16

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1. Outlines of Biochemistry by Conn and Stumpf 2. Practical Biochemistry by R.C. Gupta and S. Bhargavan
Articles	NA
References Books	1. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition) 2. Practical Biochemistry for Medical Students by Rajagopal and Ramakrishna. 3. Practical Biochemistry by Harold Varley
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	3	-	2	-	-	-	-	3	-	3	1	2
CO2	2	1	-	2	1	-	-	-	-	-	3	-	1	1	2
CO3	3	3	-	2	-	1	-	-	-	-	3	-	3	1	2
CO4	2	2	-	2	-	-	-	-	-	-	3	-	1	-	3
CO5	2	2	-	1	-	-	-	-	-	-	2	-	2	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2023-2024

BPharm

Title of the Course	Computer Applications in Pharmacy *
Course Code	BP210P

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					0	0	1	1
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To demonstrate and make use of MS Office, MS Word, MS Excel, MS Access and MS Power point.**(BL1-Remember)** **CO2-** To understand the paradigms of program languages and be exposed to at least one language from each model, C and SQL.**(BL2-Understand)** **CO3-** To summarize the report and printing the report from patient database**(BL2-Understand)** **CO4-** To design a questionnaire using a word processing package to gather information about a particular disease.**(BL3-Apply)** **CO5-** To create HTML web page to show personal information**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Design a questionnaire using a word processing package to gather information about a particular disease	Experiments	BL2-Understand	4
2	Create a HTML web page to show personal information.	Experiments	BL2-Understand	4
3	Retrieve the information of a drug and its adverse effects using online tools	Experiments	BL2-Understand	4
4	Creating mailing labels Using Label Wizard, generating label in MS WORD	Experiments	BL2-Understand	4
5	Create a database in MS Access to store the patient information with the required fields Using access	Experiments	BL6-Create	4
6	Design a form in MS Access to view, add, delete and modify the patient record in the database	Experiments	BL2-Understand	4
7	Generating report and printing the report from patient database	Experiments	BL3-Apply	4
8	Creating invoice table using – MS Access	Experiments	BL3-Apply	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
25	13	15	8	10	5

Part E

Books	1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
Articles	NA
References Books	1. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	-	1	-	-	-	-	1	2	-	1	1	1
CO2	-	1	-	-	1	-	-	-	-	-	1	-	1	1	1
CO3	-	1	-	-	2	-	-	-	-	-	1	-	1	1	1
CO4	-	1	-	-	1	1	-	-	-	-	2	-	1	2	-
CO5	-	1	-	-	2	-	-	-	-	-	2	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Organic Chemistry II
Course Code	BP301T

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand about aromaticity, chemistry and reactions of benzene.**(BL1-Remember)** **CO2-** To understand the concept of hydrolysis, hydrogenation, saponification and rancidity of oils**(BL2-Understand)** **CO3-** To Account for reactivity/stability of compounds**(BL3-Apply)** **CO4-** To gain knowledge on chemistry of phenols, aromatic amines and aromatic acids.**(BL4-Analyze)** **CO5-** To gain knowledge on structure and medicinal uses of pharmaceutical organic compounds.**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours
UNIT-I	Benzene and its derivatives A. Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule B. Reactions of benzene - nitration, sulphonation, halogenation- reactivity, Friedelcrafts alkylation- reactivity, limitations, Friedelcrafts acylation. C. Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction D. Structure and uses of DDT, Saccharin, BHC and Chloramine	Lecure based leraning, Peer tutorial	10
UNIT-II	Phenols* - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols Aromatic Amines* - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts Aromatic Acids* –Acidity, effect of substituents on acidity and important reactions of benzoic acid	Lecure based leraning, Peer tutorial	10
UNIT-III	Fats and Oils a. Fatty acids – reactions. b. Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils. c. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination	Lecure based leraning, Peer tutorial	10
UNIT-IV	Polynuclear hydrocarbons: a. Synthesis, reactions b. Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives	Lecure based leraning, Peer tutorial	8
UNIT-V	Cyclo alkanes* Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only	Lecure based leraning, Peer tutorial	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	synthesis and medicinal uses of Napthelene,Phenanthrene	Experiments	BL2-Understand	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Organic Chemistry by Morrison and Boyd 2. Organic Chemistry by I.L. Finar, Volume-I 3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl
Articles	NA
References Books	1 Organic Chemistry by P.L.Soni 2 Practical Organic Chemistry by Mann and Saunders. 3 Vogel's text book of Practical Organic Chemistry 4 Advanced Practical organic chemistry by N.K.Vishnoi. 5 Introduction to Organic Laboratory techniques by Pavia, Lampman
MOOC Courses	https://nptel.ac.in/
Videos	youtube and other free resource

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	2	-	1	-	1	-	3	-	3	-	2
CO2	3	1	-	-	1	-	-	-	-	-	3	-	2	-	2
CO3	2	-	-	-	1	-	1	-	1	-	2	-	3	-	3
CO4	2	1	-	-	1	-	-	-	-	-	2	-	2	1	1
CO5	2	-	-	-	2	-	-	-	-	-	2	-	1	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Physical Pharmaceutics I
Course Code	BP302T

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					03	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To recollect the states of matter and understand the applications of various physiochemical properties to design dosage forms**(BL2-Understand)** **CO2-** To gain knowledge of pH and buffers and their use in the stabilization of pharmaceutical formulations.**(BL3-Apply)** **CO3-** To understand the principle of interfacial tension and the applications of surface active agents in drug solubilization.**(BL2-Understand)** **CO4-** To elaborate the significance of physical properties of drug molecules in design and stability of dosage forms.**(BL1-Remember)** **CO5-** To describe the principles of diffusion in biological systems and the the concepts of complexation and protein binding in pharmacy.**(BL1-Remember)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT-I	Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-II	States of Matter and properties of matter: State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid-crystalline, amorphous & polymorphism. Physicochemical properties of drug molecules: Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-III	Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT-IV	Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT-V	pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
UNIT-V	Guest lecture by industry expert	Seminar	BL2-Understand	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Physical Pharmacy by Alfred Martin 2. Experimental Pharmaceutics by Eugene, Parott. 3. Tutorial Pharmacy by Cooper and Gunn
Articles	
References Books	1. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia. 2. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc. 3. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc. 4. Physical Pharmaceutics by Ramasamy C and ManavalanR.
MOOC Courses	https://nptel.ac.in/
Videos	You tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	-	2	-	-	-	-	-	3	-	3	-	1
CO2	2	3	2	-	1	-	-	-	-	-	3	-	2	-	2
CO3	2	2	3	-	2	-	-	-	-	-	3	-	1	2	3
CO4	2	1	3	-	2	1	-	-	-	-	3	-	1	1	3
CO5	1	2	3	-	1	-	-	-	-	-	3	-	3	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Microbiology
Course Code	BP303T

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	basic understanding of cell and biology			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Understand methods of identification, cultivation and preservation of various microorganisms**(BL2-Understand)** **CO2-** To understand the importance and implementation of sterlization in pharmaceutical processing and industry**(BL2-Understand)** **CO3-** To Learn sterility testing of pharmaceutical products**(BL3-Apply)** **CO4-** Carried out microbiological standardization of Pharmaceuticals**(BL4-Analyze)** **CO5-** Understand the cell culture technology and its applications in pharmaceutical industries**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT-I	Introduction, history of microbiology, its branches, scope and its importance. Introduction to Prokaryotes and Eukaryotes Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count). Study of different types of phase contrast microscopy, dark field microscopy and electron microscopy.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-II	Identification of bacteria using staining techniques (simple, Gram's & Acid -fast staining) and biochemical tests (IMViC). Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous, radiation and mechanical method of sterilization. Evaluation of the efficiency of sterilization methods.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board/PPT	10
UNIT-III	Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses. Classification and mode of action of disinfectants Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions Evaluation of bactericidal & Bacteriostatic. Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-IV	Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification. Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids. Assessment of a new antibiotic.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT-V	Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage. Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations. Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures. Application of cell cultures in pharmaceutical industry and research	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

M

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Microbiological visit of Pharma industry	Virtual Labs	BL3-Apply	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London. 2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi. 3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn. 4. Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai
Articles	https://byjus.com/biology/microbiology/
References Books	1. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology. 2. Rose: Industrial Microbiology. 3. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan 4. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution. 5. Peppler: Microbial Technology. 6. I.P., B.P., U.S.P.- latest editions.
MOOC Courses	https://nptel.ac.in/
Videos	https://www.youtube.com/watch?v=liqpUJ4j_bs&list=PLQnNyE1lxfVlVXt55hag4kapfWhPNjjfT

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	1	2	-	-	-	-	-	3	-	3	-	3
CO2	3	2	-	1	2	-	-	-	-	-	3	-	2	-	2
CO3	2	1	-	-	1	1	-	-	-	-	3	-	2	-	2
CO4	2	2	-	-	2	-	-	-	-	-	3	-	2	-	2
CO5	2	1	-	-	1	-	-	-	-	-	3	-	1	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Engineering
Course Code	BP304T

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To know various unit operations used in pharmaceutical industries**(BL1-Remember)** **CO2-** To understand the material handling techniques**(BL2-Understand)** **CO3-** To perform various processes involved in pharmaceutical manufacturing process**(BL3-Apply)** **CO4-** To carry out various test to prevent environmental pollution**(BL3-Apply)** **CO5-** To appreciate the various preventive methods used for corrosion control in pharmaceutical industries.**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT-I	Flow of fluids: Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer. Size Reduction: Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill. Size Separation: Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Heat Transfer: Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers. Evaporation: Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator. Distillation: Basic Principles and methodology of simple distillation, flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Drying: Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer. Mixing: Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Peer tutorial	10
UNIT 4	Filtration: Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter. Centrifugation: Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Peer tutorial	08
UNIT 5	Materials of pharmaceutical plant construction, Corrosion and its prevention: Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and there prevention. Ferrous and nonferrous metals, inorganic and organic non-metals, basic of material handling systems.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To understand the basics principle of distillation	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition. 2. Remington practice of pharmacy- Martin, Latest edition. 3. Theory and practice of industrial pharmacy by Lachmann., Latest edition
Articles	NA
References Books	1.Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition. 2. Unit operation of chemical engineering – Mcabe Smith, Latest edition 3. Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.
MOOC Courses	https://nptel.ac.in/
Videos	https://www.youtube.com/watch?v=Ey9M1neDgx0&list=PLNiSYvRcckSxtpOvMxwzQlnhwmXt8tzpU

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	2	-	-	-	-	-	3	-	2	-	1
CO2	2	2	1	-	-	2	-	-	-	-	3	-	2	-	2
CO3	2	3	-	-	1	2	-	-	-	-	2	-	2	-	1
CO4	3	2	2	-	-	2	-	-	-	-	2	-	1	1	1
CO5	2	1	-	1	1	2	-	-	-	-	1	-	1	-	1
CO6	-	-	-	--	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Organic Chemistry II
Course Code	BP305P

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					0	0	4	4
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To gain the knowledge on different recrystalization and steam distillation techniques.**(BL2-Understand)** **CO2-** To remember and recall the different laboratory techniques used in pharmaceutical chemistry.**(BL1-Remember)** **CO3-** To identify the purity of fats and oils by acid value, saponification value and iodine value and perform various reaction like diazotization, oxidation reactions.**(BL3-Apply)** **CO4-** To analyze named reactions like perkin and claisen schmidt reactions by using carbonyl compounds**(BL4-Analyze)** **CO5-** To test the knowledge on different electrophilic aromatic substitutions reactions like bromination, nitration in monosubstituted aromatic compounds**(BL5-Evaluate)**						
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	I Experiments involving laboratory techniques • Recrystallization • Steam distillation	Experiments	BL3-Apply	8
2	II Determination of following oil values (including standardization of reagents) • Acid value • Saponification value • Iodine value	Experiments	BL5-Evaluate	8
3	III Preparation of compounds • Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.	Experiments	BL3-Apply	8
4	2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/ • Acetanilide by halogenation (Bromination) reaction. • 5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction	Experiments	BL3-Apply	8
5	Benzoic acid from Benzyl chloride by oxidation reaction. • Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction. • 1-Phenyl azo-2-napthol from Aniline by diazotization and coupling reactions.	Experiments	BL3-Apply	8
6	Benzil from Benzoin by oxidation reaction. • Dibenzal acetone from Benzaldehyde by Claison Schmidt reaction • Cinnammic acid from Benzaldehyde by Perkin reaction • P-Iodo benzoic acid from P-amino benzoic acid	Experiments	BL4-Analyze	

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1. Practical Organic Chemistry by Mann and Saunders. 2. Vogel's text book of Practical Organic Chemistry
Articles	NA
References Books	1. Advanced Practical organic chemistry by N.K.Vishnoi. 2. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz
MOOC Courses	NA
Videos	You tube, simulation

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	1	-	-	-	-	-	3	-	1	-	3
CO2	2	3	-	2	1	-	-	-	-	-	2	-	2	-	3
CO3	3	1	-	-	2	-	-	2	-	-	2	-	1	1	1
CO4	2	2	-	1	-	-	-	-	-	-	3	-	1	1	1
CO5	3	1	-	1	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ITM UNIVERSITY
CELEBRATING DREAMS

Syllabus-2023-2024

BPharm

Title of the Course	Physical Pharmaceutics I
Course Code	BP306P

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					0	0	4	4
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand the significance of physical properties such as solubility, surface tension, partition coefficient and pKa in the design of dosage forms**(BL2-Understand)** **CO2-** To explain adsorption isotherms and determine Freundlich-Langmuir constant using activated charcoal.**(BL2-Understand)** **CO3-** To apply Henderson – Hasselbalch equation for interpretation of pKa value of drugs**(BL3-Apply)** **CO4-** To determine the surface tension of sample liquids by drop count and drop weight methods and deduce the HLB value and critical micellar concentration of a surfactant**(BL4-Analyze)** **CO5-** To estimate the stability constants of complexes by solubility and pH titration methods and **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)					

Part B

Modules	**Contents**	**Pedagogy**	**Hours**

Part C

Modules	**Title**	**Indicative-ABCA/PBL/ Experiments/Field work/ Internships**	**Bloom's Level**	**Hours**
1	1. Determination the solubility of drug at room temperature 4 Hrs/week 2. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.	Experiments	BL3-Apply	8
2	3. Determination of Partition co- efficient of benzoic acid in benzene and water 4. Determination of Partition co- efficient of Iodine in CCl4 and water	Experiments	BL4-Analyze	8
3	5. Determination of % composition of NaCl in a solution using phenol-water system by CST method 6. Determination of surface tension of given liquids by drop count and drop weight method	Experiments	BL4-Analyze	8
4	7. Determination of HLB number of a surfactant by saponification method 8. Determination of Freundlich and Langmuir constants using activated char coal	Experiments	BL4-Analyze	8
5	9. Determination of critical micellar concentration of surfactants 10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method	Experiments	BL4-Analyze	4
6	11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method	Experiments	BL4-Analyze	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	35	18	15	8
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
Articles	NA
References Books	1. Physical Pharmaceutics by Ramasamy C and ManavalanR.
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	1	-	-	-	-	-	3	-	2	2	3
CO2	3	2	1	-	1	-	-	-	-	-	3	-	2	1	1
CO3	2	1	1	1	2	-	-	-	1	-	1	-	-	1	2
CO4	2	2	2	-	1	-	-	-	1	-	2	-	1	1	1
CO5	1	1	3	1	-	-	1	-	-	-	2	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Engineering
Course Code	BP308P

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					0	0	4	4
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To know various unit operations used in pharmaceutical industries**(BL2-Understand)** **CO2-** To demonstrate and explain about the construction, working and applications of pharmaceutical equipments such as colloid mill, planetary mixer, fluidized bed dryer and freeze dryer.**(BL3-Apply)** **CO3-** To experiment with the process variables of filtration, evaporation and infer the same**(BL3-Apply)** **CO4-** To determine overall heat transfer coefficient by heat exchanger and calculate the efficiency of steam distillation**(BL4-Analyze)** **CO5-** To estimate moisture content, loss on drying and construct drying curves for calcium carbonate and starch**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	I. Determination of radiation constant of brass, iron, unpainted and painted glass	Experiments	BL2-Understand	6
2	II. Steam distillation – To calculate the efficiency of steam distillation	Experiments	BL3-Apply	6
3	III. To determine the overall heat transfer coefficient by heat exchanger. IV. Construction of drying curves (for calcium carbonate and starch).	Experiments	BL2-Understand	6
4	V. Determination of moisture content and loss on drying. VI. Determination of humidity of air – i) From wet and dry bulb temperatures – use of Dew point method	Experiments	BL3-Apply	6
5	VII. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier. VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic and logarithmic probability plots	Experiments	BL3-Apply	6
6	IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill. X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment	Experiments	BL3-Apply	6
7	XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity XII. To study the effect of time on the Rate of Crystallization	Experiments	BL3-Apply	6
8	XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.	Experiments	BL3-Apply	6

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition. 2. Remington practice of pharmacy- Martin, Latest edition.
Articles	NA
References Books	1. Theory and practice of industrial pharmacy by Lachmann., Latest edition. 2. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	1	1	-	-	-	-	-	3	-	2	-	2
CO2	2	3	2	2	2	-	-	-	-	-	3	-	2	-	2
CO3	3	2	1	1	1	-	-	-	-	-	2	-	1	-	3
CO4	2	2	1	1	2	-	-	-	-	-	2	-	3	1	2
CO5	3	1	1	-	1	-	-	-	-	-	1	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Medicinal Chemistry I
Course Code	BP402T

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To recall the various classes of medicinal compounds**(BL1-Remember)** **CO2-** To explain the physicochemical properties, steric aspects of drugs and their metabolic pathways**(BL2-Understand)** **CO3-** To identify the structural requirements of drugs to elicit biological response**(BL4-Analyze)** **CO4-** To categorize the drugs based on their mechanism of action and clinical uses**(BL2-Understand)** **CO5-** To design and create the synthetic routes for medicinal compounds.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT-I	Introduction to Medicinal Chemistry History and development of medicinal chemistry Physicochemical properties in relation to biological action Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Biososterism, Optical and Geometrical isomerism. Drug metabolism Drug metabolism principles- Phase I and Phase II. Factors affecting drug metabolism including stereo chemical aspects	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-II	Drugs acting on Autonomic Nervous System Adrenergic Neurotransmitters: Biosynthesis and catabolism of catecholamine. Adrenergic receptors (Alpha & Beta) and their distribution. Sympathomimetic agents: SAR of Sympathomimetic agents Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine, Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline. • Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine. • Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine. • Agents with mixed mechanism: Ephedrine, Metaraminol Adrenergic Antagonists: Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide. Beta adrenergic blockers: SAR of beta blockers, Propranolol*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-III	Cholinergic neurotransmitters: Biosynthesis and catabolism of acetylcholine. Cholinergic receptors (Muscarinic & Nicotinic) and their distribution. Parasympathomimetic agents: SAR of Parasympathomimetic agents Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine. Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isofluorphate, Echothiophate iodide, Parathione, Malathion. Cholinesterase reactivator: Pralidoxime chloride. Cholinergic Blocking agents: SAR of cholinolytic agents Solanaceous alkaloids and analogues: Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*. Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide, Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-IV	Drugs acting on Central Nervous System A. Sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem Barbiturtes: SAR of barbiturates, Barbital*, Phenobarbital, Mephobarbital, Amobarbital, Butabarbital, Pentobarbital, Secobarbital Miscelleneous: Amides & imides: Glutethmide. Alcohol & their carbamate derivatives: Meprobomate, Ethchlorvynol. Aldehyde & their derivatives: Triclofos sodium, Paraldehyde. B. Antipsychotics Phenothiazeines: SAR of Phenothiazeines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Triflupromazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride. Ring Analogues of Phenothiazeines: Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine. Fluro buterophenones: Haloperidol, Droperidol, Risperidone. Beta amino ketones: Molindone hydrochloride. Benzamides: Sulpieride. C. Anticonvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action Barbiturates: Phenobarbitone, Methabarbital. Hydantoins: Phenytoin*, Mephenytoin, Ethotoin Oxazolidine diones: Trimethadione, Paramethadione Succinimides: Phensuximide, Methsuximide, Ethosuximide* Urea and monoacylureas: Phenacemide, Carbamazepine* Benzodiazepines: Clonazepam Miscellaneous: Primidone, Valproic acid, Gabapentin, Felbamate	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-V	Drugs acting on Central Nervous System General anesthetics: Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane. Ultra short acting barbitutrates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium. Dissociative anesthetics: Ketamine hydrochloride.*	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Receptor binding of drug simulation	Simulation	BL2-Understand	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	
Articles	NA
References Books	1. Introduction to principles of drug design- Smith and Williams. 2. Remington's Pharmaceutical Sciences. 3. Martindale's extra pharmacopoeia 4. Indian Pharmacopoeia
MOOC Courses	https://nptel.ac.in/
Videos	You tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	-	1	-	-	-	2	-	3	-	2	-	3
CO2	2	2	2	-	2	-	-	-	1	-	2	-	2	-	2
CO3	3	1	1	-	1	-	-	-	1	-	2	-	3	-	3
CO4	3	-	-	-	1	-	-	-	1	-	2	-	2	-	2
CO5	3	-	-	-	2	-	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Physical Pharmaceutics II
Course Code	BP407P

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					0	0	4	4
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Lab safety manual			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To choose a good suspending agent to formulate a stable suspension.**(BL5-Evaluate)** **CO2-** To interpret the shelf life of a given formulation by accelerated stability studies.**(BL5-Evaluate)** **CO3-** To make use of derived and flow properties of powders to ensure a stable solid formulation.**(BL3-Apply)** **CO4-** To distinguish the rate constants as per the chemical reaction.**(BL2-Understand)** **CO5-** To determine the viscosity using Ostwald's and Brookfield's viscometer.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Determination of particle size, particle size distribution using sieving method 2. Determination of particle size, particle size distribution using Microscopic method	Experiments	BL2-Understand	8
2	3. Determination of bulk density, true density and porosity 4. Determine the angle of repose and influence of lubricant on angle of repose	Experiments	BL3-Apply	8
3	5. Determination of viscosity of liquid using Ostwald's viscometer 6. Determination sedimentation volume with effect of different suspending agent	Experiments	BL4-Analyze	8
4	7. Determination sedimentation volume with effect of different concentration of single suspending agent 8. Determination of viscosity of semisolid by using Brookfield viscometer	Experiments	BL4-Analyze	8
5	9. Determination of reaction rate constant first order. 10. Determination of reaction rate constant second order	Experiments	BL3-Apply	8
6	11. Accelerated stability studies	Experiments	BL3-Apply	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	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
Articles	https://benthamscience.com/public/journal/172
References Books	1. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc. 2. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc. 3.Physical Pharmaceutics by Ramasamy C, and Manavalan R.
MOOC Courses	https://swayam.gov.in/nc_details/NPTEL https://onlinecourses.nptel.ac.in/
Videos	https://www.youtube.com/results?search_query=kcl+channel

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	1	-	-	-	2	-	2	-	1	1	1
CO2	2	1	2	-	2	-	-	-	1	-	2	-	2	2	2
CO3	3	1	-	-	3	-	-	-	1	-	2	-	3	1	3
CO4	2	1	-	-	2	-	-	-	2	-	3	-	1	1	1
CO5	3	1	-	-	1	-	-	-	1	-	2	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Fine art and Music IV/ online certification course *
Course Code	BP410T

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					0	0	1	1
Course Type	Theory only							
Course Category	Generic Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To accquire knowledge about the clinical data mangement and its skills**(BL2-Understand)** **CO2-** To understand about CRF processing, and documentation forms**(BL2-Understand)** **CO3-** To develop skills to accquire Job oppurtunities**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
25		20	10	5	2
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	
Articles	
References Books	
MOOC Courses	https://www.coursera.org/learn/clinical-data-management
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	1	-	-	-	-	-	-	2	-	1	-	-
CO2	1	1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO3	1	1	-	-	-	-	-	-	-	-	1	-	-	-	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Industrial Pharmacy I
Course Code	BP502T

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To outline the objectives and applications of pre-formulation studies in the development and stability of dosage forms.**(BL3-Apply)** **CO2-** To discuss the formulation, manufacturing, coating and quality control tests of tablets.**(BL2-Understand)** **CO3-** To review the formulation and manufacturing considerations of liquid orals.**(BL4-Analyze)** **CO4-** To illustrate the pharmaceutical aspects of capsules and pellets.**(BL2-Understand)** **CO5-** To describe the preparation and quality control of parenterals and ophthalmic preparations.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances. a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization BCS classification of drugs & its significant Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07
Unit-2	Tablets: a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling. b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating. c. Quality control tests: In process and finished product tests Liquid orals: Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit-3	Capsules: a. Hard gelatin capsules: Introduction, Production of hard gelatin capsule shells. size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects. In process and final product quality control tests for capsules. b. Soft gelatin capsules: Nature of shell and capsule content, size of capsules, importance of base adsorption and minim/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules and their applications. Pellets: Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
Unit-4	Parenteral Products: a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity b. Production procedure, production facilities and controls, aseptic processing c. Formulation of injections, sterile powders, large volume parenterals and lyophilized products. d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests of parenteral products. Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit-5	Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens. Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies. Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests. Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens. Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies. Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests. Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens. Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies. Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Unit-1	cosmetic preparations from commnely used herbs	Experiments	BL2-Understand	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman & J.B.Schwartz 2. Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman 3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman 4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
Articles	https://www.fip.org/industrial-pharmacy
References Books	1. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS) 2. Theory and Practice of Industrial Pharmacy by Liberman & Lachman 3. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill Livingstone, Latest edition 4. Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger, Philadelphia, 5thedition, 2005
MOOC Courses	https://nptel.ac.in/
Videos	https://www.youtube.com/watch?v=JKr6mtSEbEU&list=PLFpCrsN3l3fAHUyhDdQ39rGDKux3MvOtg

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	1	-	-	-	1	-	3	-	3	1	2
CO2	3	2	2	3	-	-	-	-	1	-	3	-	2	2	2
CO3	3	1	2	3	1	-	-	-	-	-	3	-	2	2	3
CO4	3	2	3	-	-	-	-	-	1	-	3	-	-	-	-
CO5	2	1	3	1	1	-	-	-	-	-	3	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmacognosy and Phytochemistry II
Course Code	BP504T

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To outline the metabolic pathway in higher plants and their biogenetic studies.**(BL1-Remember)** **CO2-** To the pharmacognistic study of secondary metabolites like alkaloids, glycosides, tannins, volatile oils etc.**(BL2-Understand)** **CO3-** To demonstrate the different types and steps involved in isolation, identification and analysis of Phytoconstituents like terpenoids, glycosides, alkaloids and resins.**(BL2-Understand)** **CO4-** To plan the industrial production, estimation and utilization of Phytoconstituents.**(BL6-Create)** **CO5-** To assess the crude drug by modern methods of extraction, spectroscopy, chromatography, isolation and purification.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Metabolic pathways in higher plants and their determination a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway. b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7
2	General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites: Alkaloids: Vinca, Rauwolfia, Belladonna, Opium, Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander, Tannins: Catechu, Pterocarpus Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony Glycosides: Senna, Aloes, Bitter Almond Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	14
3	Isolation, Identification and Analysis of Phytoconstituents a) Terpenoids: Menthol, Citral, Artemisin b) Glycosides: Glycyrhetinic acid & Rutin c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine d) Resins: Podophyllotoxin, Curcumin	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	6
4	Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
5	Basics of Phytochemistry Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Extraction method of Given drugs	PBL	BL2-Understand	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi. 2 Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
Articles	https://www.phytojournal.com/
References Books	1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009. 2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers& Distribution, New Delhi.
MOOC Courses	https://nptel.ac.in/
Videos	https://www.youtube.com/watch?v=v1vqV7YHKWg&list=PLtEqsPSBZlXtxeljdkyrwrPiMHidHO7G6

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	1	-	-	-	3	-	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	3	-	2	1	2
CO3	3	2	-	-	-	-	-	-	-	-	2	-	1	1	1
CO4	2	1	1	-	-	-	1	-	-	-	2	-	-	-	1
CO5	2	-	-	-	-	-	-	-	-	-	1	-	1	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Industrial Pharmacy I
Course Code	BP506P

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					0	0	4	4
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To interpret the pre-formulation studies on drugs.**(BL2-Understand)** **CO2-** To explain the preparation, evaluation and coating of tablets.**(BL2-Understand)** **CO3-** To design parenteral and ophthalmic products.**(BL6-Create)** **CO4-** To illustrate the formulation and evaluation of capsules.**(BL5-Evaluate)** **CO5-** To evaluate glass containers as per pharmacopeial specifications.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)					

Part B

Modules	**Contents**	**Pedagogy**	**Hours**

Part C

Modules	**Title**	**Indicative-ABCA/PBL/ Experiments/Field work/ Internships**	**Bloom's Level**	**Hours**
1	1. Preformulation studies on paracetamol/aspirin/or any other drug 2. Preparation and evaluation of Paracetamol tablets	Experiments	BL3-Apply	8
2	3. Preparation and evaluation of Aspirin tablets 4. Coating of tablets- film coating of tables/granules	Experiments	BL4-Analyze	8
3	5. Preparation and evaluation of Tetracycline capsules 6. Preparation of Calcium Gluconate injection	Experiments	BL3-Apply	8
4	7. Preparation of Ascorbic Acid injection 8. Quality control test of (as per IP) marketed tablets and capsules	Experiments	BL3-Apply	8
5	9. Preparation of Eye drops/ and Eye ointments 10. Preparation of Creams (cold / vanishing cream)	Experiments	BL3-Apply	8
6	11. Evaluation of Glass containers (as per IP)	Experiments	BL5-Evaluate	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman 4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition 5. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
Articles	NA
References Books	1. Theory and Practice of Industrial Pharmacy by Liberman & Lachman 2. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill Livingstone, Latest edition
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	-	-	-	-	-	-	3	-	1	3	3
CO2	2	2	3	1	-	-	-	-	-	-	3	-	1	2	3
CO3	3	1	3	-	-	-	-	-	-	-	3	-	3	-	2
CO4	3	1	1	1	-	-	-	-	-	-	3	-	2	-	2
CO5	3	1	2	1	-	-	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmacology II
Course Code	BP507P

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To learn the importance of physiological salt solutions and to identify the effect of various drugs on isolated frog heart, blood pressure and heart rate of dog.**(BL1-Remember)** **CO2-** To illustrate the diuretic activity of drugs in mice/rats**(BL3-Apply)** **CO3-** To identify the dose response relationship, effect of drugs on DRC and to construct the drug concentrations by various bioassay methods using animal simulator software.**(BL4-Analyze)** **CO4-** To categorize the PA2 and PD2 value of drugs using rat anococcygeus muscle and guinea pig ileum.**(BL2-Understand)** **CO5-** To interpret the effect of spasmogens and spasmolytics using rabbit jejunum.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Introduction to in-vitro pharmacology and physiological salt solutions. 2. Effect of drugs on isolated frog heart	Experiments	BL3-Apply	8
2	3. Effect of drugs on blood pressure and heart rate of dog. 4. Study of diuretic activity of drugs using rats/mice	Experiments	BL5-Evaluate	8
4	5. DRC of acetylcholine using frog rectus abdominis muscle. 6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.	Experiments	BL3-Apply	8
5	7. Bioassay of histamine using guinea pig ileum by matching method. 8. Bioassay of oxytocin using rat uterine horn by interpolation method.	Experiments	BL3-Apply	8
6	9. Bioassay of serotonin using rat fundus strip by three-point bioassay. 10. Bioassay of acetylcholine using rat ileum/colon by four-point bioassay	Experiments	BL4-Analyze	8
7	11. Determination of PA2 value of prazosin using rat anococcygeus muscle (by Schilds plot method). 12. Determination of PD2 value using guinea pig ileum	Experiments	BL3-Apply	8
8	13. Effect of spasmogens and spasmolytics using rabbit jejunum. 14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.	Experiments	BL3-Apply	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata. 2. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan
Articles	NA
References Books	1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier 2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-	2	3	-	--	-	-	3	-	1	2	3
CO2	2	1	-	-	1	3	-	-	-	-	3	-	1	2	2
CO3	3	2	-	-	3	3	-	-	-	-	3	-	-	-	2
CO4	2	-	-	-	2	2	-	-	-	-	3	-	-	-	2
CO5	3	-	-	-	2	2	-	-	-	-	2	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmacognosy and Phytochemistry II
Course Code	BP508P

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the wide variety of the crude drugs and their sources by morphological characteristics.**(BL1-Remember)** **CO2-** To identify the powder mixture and to report the types of adulterants and substituents present.**(BL4-Analyze)** **CO3-** To analyze and evaluate the powdered crude drug samples by morphological and microscopical characteristics.**(BL4-Analyze)** **CO4-** To isolate the drug from the given crude drug sample.**(BL6-Create)** **CO5-** To predict the crude drug by performing chromatographic techniques.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander	Experiments	BL2-Understand	8
3	3. Separation of sugars by Paper chromatography	Experiments	BL2-Understand	8
4	4. TLC of herbal extract	Experiments	BL3-Apply	8
5	5. Distillation of volatile oils and detection of phytoconstituents by TLC	Experiments	BL5-Evaluate	8
6	6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh	PBL		8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1.W.C. Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009. 2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers& Distribution, New Delhi. 3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi. 4. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4204033/#:~:text=Pharmacognosy%20deals%20with%20the%20natural,model%20molecules%20in%20drug%20discovery.
References Books	5. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007 6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi. 7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
MOOC Courses	NA
Videos	kcl tutorial

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	1	-	-	-	3	-	2	2	1
CO2	2	-	-	-	-	-	1	-	-	-	3	-	1	2	2
CO3	3	-	-	-	-	-	1	-	-	-	3	-	-	-	2
CO4	2	-	-	-	-	-	-	-	-	-	3	-	2	-	1
CO5	2	-	-	-	-	-	1	-	-	-	2	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	International Regulatory Requirements for Good Manufacturing Practices
Course Code	BP510ET

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					1	0	0	1
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Understand the different quality level for global regulatory agency **(BL2-Understand)** **CO2-** To apply the knowldge of Qulaity management guidelines in real scenario**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consuption and production) SDG16(Peace Justice and strong institutions)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Overview on Product Life cycle Management , Good Manufacturing Practices and its Regulations , Functions of pharmaceutical and healthcare industries (Quality, Production, RA, R&	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Good Documentation Practices, Data Integrity Assurance, Qualification and Validation, Change Control, Deviation Management, Out of specifications, Data Integrity Assurance	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	CAPA & QRM, Complaint Handling & Product Recall, GMP requirements in Medical Devices, GMP Requirements in Pharmaceutical Drug substances and products, GMP for Biologics products and guidelines for injectable products	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	https://iris.who.int/bitstream/handle/10665/64465/WHO_VSQ_97.01-eng.pdf?sequence=1&isAllowed=y
Articles	https://www.fda.gov/drugs/pharmaceutical-quality-resources/current-good-manufacturing-practice-cgmp-regulations, CDER-OPQ-Inquiries@fda.hhs.gov
References Books	https://iris.who.int/bitstream/handle/10665/64465/WHO_VSQ_97.01-eng.pdf?sequence=1&isAllowed=y
MOOC Courses	https://www.itsligo.ie/courses/higher-certificate-in-science-in-good-manufacturing-practice-gmp/
Videos	https://www.youtube.com/watch?v=mFwA2KTiPwIhttps://www.youtube.com/watch?v=mFwA2KTiPwI

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	3	1	1	1	1
CO2	2	1	1	1	1	-	-	-	-	-	2	1	1	1	1
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Product Development
Course Code	BP511ET

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To recall the formulation development of different types of dosage forms**(BL1-Remember)** **CO2-** To outline the role of different pharmaceutical excipients in product development**(BL2-Understand)** **CO3-** To select the excipients for a specific drug product**(BL5-Evaluate)** **CO4-** To classify different of packaging for the drug product and materials used for primary and secondary packaging.**(BL3-Apply)** **CO5-** To choose optimization technique in the development of pharmaceutical drug product.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Introduction to pharmaceutical product development, objectives, regulations related to preformulation, formulation development, stability assessment, manufacturing and quality control testing of different types of dosage forms	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT4	Optimization techniques in pharmaceutical product development. A study of various optimization techniques for pharmaceutical product development with specific examples. Optimization by factorial designs and their applications. A study of QbD and its application in pharmaceutical product development.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	Selection and quality control testing of packaging materials for pharmaceutical product development- regulatory considerations.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Evaluation of suspending and emulsifying agent	Experiments		

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Pharmaceutical Statistics Practical and Clinical Applications by Stanford Bolton, Charles Bon; Marcel Dekker Inc.
Articles	https://www.ema.europa.eu/en/documents/scientific-guideline/note-guidance-pharmaceutical-development_en.pdf
References Books	3. Pharmaceutical Dosage Forms – Tablets Vol 1 to 3, A. Liberman, Leon Lachman andJoseph B. Schwartz
MOOC Courses	https://www.coursera.org/courses?query=pharmaceutical
Videos	https://www.youtube.com/watch?v=sesDthMPRC0&list=PLkxD16eG21tVre8GBj-LbjfUUuq1qghVM

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	1	1	-	-	-	-	-	3	-	2	1	1
CO2	2	2	1	1	1	-	-	-	-	-	1	-	1	1	1
CO3	3	1	2	1	1	-	-	-	-	-	3	-	2	2	2
CO4	2	1	2	1	1	-	-	-	-	-	1	-	1	1	1
CO5	1	1	2	2	1	-	-	-	-	-	3	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Purification of Pharmaceutical Compounds
Course Code	BP512ET

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					1	0	0	1
Course Type	Theory only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand the basics of impurites in pharmaceuticals**(BL2-Understand)** **CO2-** To gain the knowledge of techniques to purify the compounds and remove the impuriteis the basics of impurites in pharmaceuticals**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	https://crescent.education/wp-content/uploads/2021/06/Pharmaceutical-Organic-Chemistry.pdf
Articles	https://www.mdpi.com/books/reprint/8083-extraction-and-purification-of-bioactive-compounds
References Books	https://crescent.education/wp-content/uploads/2021/06/Pharmaceutical-Organic-Chemistry.pdf
MOOC Courses	NA
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	-	3	-	1	1	1
CO2	2	2	2	1	-	-	-	-	-	-	3	2	-	1	1
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Introduction to intellectual property rights
Course Code	BP513ET

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To create awareness of IPR among pharmacy students.**(BL2-Understand)** **CO2-** To make the pharmacy students aware about the pharmaceutical R & D and the activities therein.**(BL2-Understand)** **CO3-** Develop the understanding of the Intellectual Property Rights necessary for research activities in the pharmaceutical industry.**(BL3-Apply)** **CO4-** To know the database of intellectual property and TKDL**(BL2-Understand)** **CO5-** To apply the Knowledge of IPR in drafting and filing of IPR**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	The pharmaceutical business and The pharmaceutical R & D	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Module 3 – Intellectual Property Rights: Introduction about patents, copyright, trademark, Industrial Designs,Geographical Indications, Trade Secrets, Module 4 – IPR: With specific reference to pharma	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	IPR: Indian patent scenario and Patent commercialization and licensing	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Patent drafting and Patent searches, patent filing, registration, granting World Intellectual Property Organization (WIPO) and its functions	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	IP in Traditional Knowledge, TKDL database in medicinal plants, INDIAN WEB-PORTALS FOR PATENTS AND TECHNOLOGIES	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	patent drafting and filing	Case Study	BL3-Apply	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Cockburn IM. Intellectual property rights and pharmaceuticals: challenges and opportunities for economic research. The economics of intellectual property. 2009 Jan:150.
Articles	Savale SK, Savale VK. Intellectual property rights (IPR). World J Pharm Pharm Sci. 2016 Apr 22;5:2559-92.
References Books	Prabu SL, Tnk S, editors. Intellectual property rights. BoD–Books on Demand; 2017 Jun 21.
MOOC Courses	NEPTEL
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	1	-	-	-	3	-	2	3	-	1	1	1
CO2	-	1	-	-	-	-	-	3	-	-	2	-	1	-	1
CO3	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Medicinal Chemistry III
Course Code	BP601T

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Understand the importance of drug design and different techniques of drug design.**(BL2-Understand)** **CO2-** Understand the chemistry of drugs with respect to their biological activity.**(BL2-Understand)** **CO3-** To recall the classification and nomenclature of drugs of natural and synthetic origin**(BL1-Remember)** **CO4-** To Know the importance of SAR of drugs.**(BL1-Remember)** **CO5-** To discuss the approaches in drug design including QSAR, pharmacophore modeling, docking and combinatorial chemistry**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes. β-Lactam antibiotics: Penicillin, Cepholosporins, β- Lactamase inhibitors, Monobactams Aminoglycosides: Streptomycin, Neomycin, Kanamycin Tetracyclines: Tetracycline,Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2	Antibiotics Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes. Macrolide: Erythromycin Clarithromycin, Azithromycin. Miscellaneous: Chloramphenicol*, Clindamycin. Prodrugs: Basic concepts and application of prodrugs design. Antimalarials: Etiology of malaria. Quinolines: SAR, Quinine sulphate, Chloroquine*, Amodiaquine, Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine. Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil. Miscellaneous: Pyrimethamine, Artesunete, Artemether, Atovoquone.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3	Anti-tubercular Agents Synthetic anti tubercular agents: Isoniozid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.* Anti-tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycine, Capreomycin sulphate. Urinary tract anti-infective agents Quinolones: SAR of quinolones, Nalidixic Acid,Norfloxacin, Enoxacin, Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine. Antiviral agents: Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirding, Ribavirin, Saquinavir, Indinavir, Ritonavir.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	Antifungal agents: Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin. Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconozole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*. Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine. Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*, Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.Sulphonamides and Sulfones Historical development, chemistry, classification and SAR of Sulfonamides: Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide*, Sulphapyridine, Sulfamethoxaole*, Sulphadiazine, Mefenide acetate, Sulfasalazine. Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole. Sulfones: Dapsone*.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	Introduction to Drug Design Various approaches used in drug design. Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammet's electronic parameter, Taffs steric parameter and Hansch analysis. Pharmacophore modeling and docking techniques. Combinatorial Chemistry: Concept and applications of combinatorial chemistry: solid phase and solution phase synthesis.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Pharmacophore modeling and docking	Experiments	BL2-Understand	6

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry. 2. Foye's Principles of Medicinal Chemistry. 3. Burger's Medicinal Chemistry, Vol I to IV.
Articles	https://pubs.acs.org/journal/jmcmar
References Books	1. Introduction to principles of drug design- Smith and Williams. 2. Remington's Pharmaceutical Sciences. 3. Martindale's extra pharmacopoeia
MOOC Courses	https://nptel.ac.in/
Videos	kcl tutorial

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	-	-	-	-	-	3	-	1	2	3-
CO2	2	3	-	-	1	-	-	-	-	-	2	-	1	2	3
CO3	3	2	-	-	2	-	-	-	-	-	2	-	1	2	3
CO4	3	2	-	1	2	-	-	-	-	1	3	1	1	1	1
CO5	2	2	-	1	1	-	-	-	-	1	1	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Herbal Drug Technology
Course Code	BP603T

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To Understand raw material as source of herbal drugs from cultivation to herbal drug product**(BL2-Understand)** **CO2-** To Know the WHO and ICH guidelines for evaluation of herbal drugs**(BL1-Remember)** **CO3-** To know the herbal cosmetics, natural sweeteners, nutraceuticals**(BL2-Understand)** **CO4-** To Appreciate patenting of herbal drugs, GMP**(BL2-Understand)** **CO5-** To illustrate the scope and future prospects of the herbal drug industry**(BL1-Remember)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Herbs as raw materials Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation Source of Herbs Selection, identification and authentication of herbal materials Processing of herbal raw material Biodynamic Agriculture Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides. Indian Systems of Medicine a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika,Churna, Lehya and Bhasma.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	11
2	Nutraceuticals General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases. Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7
3	Herbal Cosmetics Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products. Herbal excipients: Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes. Herbal formulations: Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs. Patenting and Regulatory requirements of natural products: a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem. Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
5	General Introduction to Herbal Industry Herbal drugs industry: Present scope and future prospects. A brief account of plant-based industries and institutions involved in work on medicinal and aromatic plants in India. Schedule T – Good Manufacturing Practice of Indian systems of medicine Components of GMP (Schedule – T) and its objectives Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preparation and standardization of Ayurvedic formulations	Research Paper Presentation	BL2-Understand	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Textbook of Pharmacognosy by Trease &Evans. 2. Textbook of Pharmacognosy byTyler, Brady & Robber.
Articles	https://www.researchgate.net/publication/8914668_Herbal_medicine_Current_status_and_the_future
References Books	3. Pharmacognosy by Kokate, Purohit and Gokhale 4. Essential of Pharmacognosy by Dr.S.H.Ansari 5. Pharmacognosy & Phytochemistry by V.D.Rangari 6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
MOOC Courses	https://nptel.ac.in/
Videos	kcl tutorial

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	2	-	-	-	3	-	1	2	2
CO2	3	2	-	-	-	-	2	-	-	-	3	-	1	2	2
CO3	1	2	-	-	-	-	2	-	-	-	3	-	1	2	2
CO4	2	2	-	-	-	-	1	-	-	-	2	-	2	-	1
CO5	3	2	-	-	-	-	1	-	-	-	2	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Biopharmaceutics and Pharmacokinetics
Course Code	BP604T

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.**(BL3-Apply)** **CO2-** To Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.**(BL2-Understand)** **CO3-** To understand the concepts of bioavailability and bioequivalence of drug products and their significance.**(BL2-Understand)** **CO4-** To Understand various pharmacokinetic parameters, their significance & applications.**(BL2-Understand)** **CO5-** To analyze the bioavailability of a drug and to compare the bioequivalence between drug products.**(BL4-Analyze)**						
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Biopharmaceutics Absorption; Mechanisms of drug absorption through GIT, factors influencing drug absorption though GIT, absorption of drug from Non per oral extra-vascular routes, Distribution Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, plasma and tissue protein binding of drugs, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drugs	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2	Elimination: Drug metabolism and basic understanding metabolic pathways renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs Bioavailability and Bioequivalence: Definition and Objectives of bioavailability, absolute and relative bioavailability, measurement of bioavailability, in-vitro drug dissolution models, in-vitro-in-vivo correlations, bioequivalence studies, methods to enhance the dissolution rates and bioavailability of poorly soluble drugs.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3	Pharmacokinetics: Definition and introduction to Pharmacokinetics, Compartment models, Non compartment models, physiological models, One compartment open model. (a). Intravenous Injection (Bolus) (b). Intravenous infusion and (c) Extra vascular administrations. Pharmacokinetics parameters - KE ,t1/2,Vd,AUC,Ka, Clt and CLR- definitions methods of eliminations, understanding of their significance and application	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	Multicompartment models: Two compartment open model. IV bolus Kinetics of multiple dosing, steady state drug levels, calculation of loading and maintenance doses and their significance in clinical settings.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity. a. Michaelis-menton method of estimating parameters, Explanation with example of drugs.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	in-vitro drug dissolution models,	PBL	BL2-Understand	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi. 2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
Articles	https://onlinelibrary.wiley.com/journal/1099081x
References Books	3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition, Prentice-Hall International edition. USA 4. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B.Jaiswal, Vallabh Prakashan Pitampura, Delhi 5. Pharmacokinetics: By Milo Glbaldi Donald, R. Mercel Dekker Inc.
MOOC Courses	https://nptel.ac.in/
Videos	kcl tutorial

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	-	-	-	-	-	3	-	3	2	3
CO2	3	2	2	1	2	-	-	-	-	-	3	-	1	-	3
CO3	2	2	1	-	2	-	-	-	-	-	3	-	1	2	-
CO4	2	3	1	1	2	-	-	-	-	-	3	-	1	1	1
CO5	3	1	2	1	2	-	-	-	-	-	2	1	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Biotechnology
Course Code	BP605T

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Understanding the importance of Immobilized enzymes in Pharmaceutical Industries**(BL2-Understand)** **CO2-** To understand the Genetic engineering applications in relation to production of pharmaceuticals**(BL2-Understand)** **CO3-** To know the Importance of Monoclonal antibodies in Industries**(BL1-Remember)** **CO4-** To Appreciate the use of microorganisms in fermentation technology**(BL1-Remember)** **CO5-** To elaborate on microbial genetics, biotransformation and various immunological products.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences. b) Enzyme Biotechnology- Methods of enzyme immobilization and applications. c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries. d) Brief introduction to Protein Engineering. e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase. f) Basic principles of genetic engineering.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2	a) Study of cloning vectors, restriction endonucleases and DNA ligase. b) Recombinant DNA technology. Application of genetic engineering in medicine. c) Application of r DNA technology and genetic engineering in the production of: i) Interferon ii) Vaccines- hepatitis- B iii) Hormones-Insulin. d) Brief introduction to PCR	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3	Types of immunity- humoral immunity, cellular immunity a) Structure of Immunoglobulins b) Structure and Function of MHC c) Hypersensitivity reactions, Immune stimulation and Immune suppressions. d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity. e) Storage conditions and stability of official vaccines f) Hybridoma technology- Production, Purification and Applications g) Blood products and Plasma Substitutes.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting. b) Genetic organization of Eukaryotes and Prokaryotes c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons. d) Introduction to Microbial biotransformation and applications. e) Mutation: Types of mutation/mutants.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	a) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring. b) Large scale production fermenter design and its various controls. c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin, d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substituties	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	DNA ISOLATION FROM ONION	Experiments	BL2-Understand	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of Recombinant DNA: ASM Press Washington D.C. 2. RA Goldshy et. al., Kuby Immunology.
Articles	https://pdf.sciencedirectassets.com/272281/1-s2.0-S1369702101X80012/1
References Books	3. J.W. Goding: Monoclonal Antibodies. 4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal Society of Chemistry.
MOOC Courses	https://nptel.ac.in/
Videos	kcl tutorial

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	3	-	1	2	2
CO2	2	2	-	1	-	-	-	-	-	-	3	-	1	2	2
CO3	2	2	-	-	-	-	-	-	-	-	2	-	1	2	2
CO4	3	1	-	-	-	-	-	-	-	-	3	-	1	1	2
CO5	3	2	-	1	-	1	-	-	-	-	2	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Quality Assurance
Course Code	BP606T

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Understand the cGMP aspects in a pharmaceutical industry appreciate the importance of documentation**(BL2-Understand)** **CO2-** Understand the scope of quality certifications applicable to pharmaceutical industries such as ISO, NABL and QbD concepts in pharmaceutical industry.**(BL3-Apply)** **CO3-** Understand the responsibilities of QA & QC departments**(BL2-Understand)** **CO4-** To evaluate the complaints and documents maintenance in industry with required regulatory guidelines**(BL5-Evaluate)** **CO5-** To elaborate the calibration, validation procedures and good warehousing practices**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours
1	Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMP Total Quality Management (TQM): Definition, elements, philosophies ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines Quality by design (QbD): Definition, overview, elements of QbD program, tools ISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registration NABL accreditation: Principles and procedures	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2	Organization and personnel: Personnel responsibilities, training, hygiene and personal records. Premises: Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination. Equipment and raw materials: Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3	Quality Control: Quality control test for containers, rubber closures and secondary packing materials. Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal. Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	Calibration and Validation: Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation. Warehousing: Good warehousing practice, materials management	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Calibration of pH meter	Experiments	BL2-Understand	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	15	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Quality Assurance Guide by organization of Pharmaceutical Products of India. 2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69. 3. Quality Assurance of Pharmaceuticals- A compendium of Guide lines and Related materials Vol I WHO Publications
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3088954/
References Books	4. A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh 5. How to Practice GMP's – P P Sharma. 6. ISO 9000 and Total Quality Management – Sadhank G Ghosh 7. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
MOOC Courses	https://nptel.ac.in/
Videos	kcl tutorial

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	1	2	-	-	-	-	-	3	-	1	2	1
CO2	1	2	-	1	2	-	-	-	-	-	3	-	1	2	1
CO3	2	2	-	1	2	-	-	-	-	-	3	-	1	-1	3
CO4	3	1	-	1	2	-	-	-	-	-	3	-	1	-	2
CO5	2	1	-	1	1	-	-	-	-	-	2	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Medicinal Chemistry III
Course Code	BP607P

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	I Preparation of drugs and intermediates 1 Sulphanilamide 2 7-Hydroxy, 4-methyl coumarin 3 Chlorobutanol 4 Triphenyl imidazole 5 Tolbutamide 6 Hexamine	Experiments	BL3-Apply	9
2	II Assay of drugs 1 Isonicotinic acid hydrazide 2 Chloroquine 3 Metronidazole 4 Dapsone 5 Chlorpheniramine maleate 6 Benzyl penicillin	Experiments	BL6-Create	8
3	III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique	Experiments	BL3-Apply	8
4	IV Drawing structures and reactions using chem draw®	Experiments	BL4-Analyze	8
5	V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies ROS)	Experiments	BL5-Evaluate	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry. 2. Foye's Principles of Medicinal Chemistry. 3. Burger's Medicinal Chemistry, Vol I to IV.
Articles	https://pubs.acs.org/journal/jmcmar
References Books	1. Introduction to principles of drug design- Smith and Williams. 2. Remington's Pharmaceutical Sciences. 3. Martindale's extra pharmacopoeia.
MOOC Courses	https://nptel.ac.in/
Videos	Pharmacy India

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	1	-	-	-	-	-	3	-	1	2	1
CO2	3	2	-	3	1	-	-	-	-	-	2	-	1	2	2
CO3	2	1	-	2	2	-	-	-	-	-	3	-	1	2	2
CO4	2	2	-	1	1	-	-	-	-	-	2	-	-	-	2
CO5	3	1	-	1	1	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmacology III
Course Code	BP608P

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To recall the dose calculations in pharmacological experiments, and to relate the antiallergic activity / anti-ulcer activity in rat models**(BL1-Remember)** **CO2-** To demonstrate of effect of drugs on gastrointestinal motility and the effect of agonist/antagonists on guinea pig ileum**(BL3-Apply)** **CO3-** o analyze effect of saline purgative on frog intestine, insulin hypoglycemic effect and test for pyrogens using rabbit method**(BL4-Analyze)** **CO4-** To evaluate acute oral toxicity (LD50), acute skin irritation / corrosion and acute eye irritation / corrosion of a test substance**(BL5-Evaluate)** **CO5-** To predict the pharmacokinetic parameters and adapt the biostatistics methods in experimental pharmacology.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Dose calculation in pharmacological experiments 2. Antiallergic activity by mast cell stabilization assay	Experiments	BL2-Understand	8
2	3. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model. 4. Study of effect of drugs on gastrointestinal motility	Experiments	BL4-Analyze	8
3	5. Effect of agonist and antagonists on guinea pig ileum 6. Estimation of serum biochemical parameters by using semi- autoanalyzer	Experiments	BL2-Understand	8
4	7. Effect of saline purgative on frog intestine 8. Insulin hypoglycemic effect in rabbit	Experiments	BL3-Apply	8
5	9. Test for pyrogens (rabbit method) 10. Determination of acute oral toxicity (LD50) of a drug from a given data	Experiments	BL3-Apply	8
6	11. Determination of acute skin irritation / corrosion of a test substance 12. Determination of acute eye irritation / corrosion of a test substance	Experiments	BL2-Understand	8
7	13. Calculation of pharmacokinetic parameters from a given data 14. Biostatistics methods in experimental pharmacology (student's t test, ANOVA)	Experiments	BL3-Apply	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier 2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
Articles	https://www.sciencedirect.com/science/article/abs/pii/S0163725804001718
References Books	1.Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point Lippincott Williams & Wilkins 2. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology
MOOC Courses	https://nptel.ac.in/
Videos	Pharmacy india

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	3	-	-	-	-	2	-	1	2	2
CO2	3	1	-	-	-	3	-	-	-	-	3	-	1	2	1
CO3	3	2	-	-	-	2	-	-	-	-	3	-	1	2	1
CO4	2	1	-	-	-	2	-	-	-	-	2	-	-	-	1
CO5	3	2	-	-	-	2	-	-	-	-	1	-	1	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Herbal Drug Technology
Course Code	BP609P

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember different preliminary phytochemical screening of crude drugs**(BL2-Understand)** **CO2-** To evaluate the various herbal formulations**(BL4-Analyze)** **CO3-** To apply monographic analysis of herbal drugs as per pharmacopoeias**(BL3-Apply)** **CO4-** To evaluate parameters such as aldehyde and phenol contents**(BL5-Evaluate)** **CO5-** To assess the total alkaloid and other content**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. To perform preliminary phytochemical screening of crude drugs. 2. Determination of the alcohol content of Asava and Arista	Experiments	BL3-Apply	12
2	3. Evaluation of excipients of natural origin 4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.	Experiments	BL5-Evaluate	12
3	5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements. 6. Monograph analysis of herbal drugs from recent Pharmacopoeias	Experiments	BL5-Evaluate	12
4	7. Determination of Aldehyde content 8. Determination of Phenol content 9. Determination of total alkaloids	Experiments	BL4-Analyze	12

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8

Part E

Books	1. Textbook of Pharmacognosy by Trease &Evans. 2. Textbook of Pharmacognosy byTyler, Brady & Robber. 3. Pharmacognosy by Kokate, Purohit and Gokhale
Articles	https://www.researchgate.net/publication/8914668_Herbal_medicine_Current_status_and_the_future
References Books	5. Pharmacognosy & Phytochemistry by V.D.Rangari 6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy) 7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
MOOC Courses	https://nptel.ac.in/
Videos	Pharmacy India

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	-	-	-	-	-	-	1	2	-
CO2	1	2	1	-	-	-	-	-	-	-	-	-	1	-	1
CO3	1	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	1	2	1
CO5	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Online certified courses related to Pharmacy II *
Course Code	BP610T

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					1	0	0	1
Course Type	Online course							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Explore the clinical trial process, the basics of good clinical practice, and the history of regulatory frameworks for medical treatment and testing.**(BL2-Understand)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	In Module One you'll learn the basics of what a clinical trial is. You'll hear from investigators, patients, and sponsors about the benefits of clinical trials, and you'll learn about the drug discovery process.	online	10
2	In Module Two we'll focus on some important rules and regulations. You'll find out why good clinical practice matters and learn about the history of regulatory frameworks for medical treatment and testing. We'll also explore some clinical trial definitions, look at informed consent, talk about risk, and discuss data integrity.	online	10
3	In Module Three we'll explore how research in clinical trials makes a difference. We'll also walk you through what medical teams and patients must do to become involved. You'll learn about the importance of diversity in clinical trials, inclusion and exclusion criteria, and we'll hear from some patients who'll tell us how they experienced the trial process.	online	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Foundamental of good clinical practices	Internships	BL2-Understand	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
25	13	25	13		
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	World Health Organization. Handbook for good clinical research practice (GCP): guidance for implementation.
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3097692/
References Books	Guideline IH. Guideline for good clinical practice. J Postgrad Med. 2001;47(3):199-203.
MOOC Courses	https://nptel.ac.in/
Videos	kcl tutorial

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	1	3	-	-	-	-	3	-	1	2	3
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Artificial intelligence in Pharmaceutical
Course Code	BP611ET

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Acquire an in-depth comprehension of AI applications in pharmaceutical domain.**(BL2-Understand)** **CO2-** Recognize and counter prevalent myths associated with AI.**(BL2-Understand)** **CO3-** Implement AI in real-life pharmaceutical use cases without the need for coding.**(BL3-Apply)** **CO4-** To gain the knowlege of AI and how to implement in healthcare**(BL3-Apply)** **CO5-** AbiliTo apply time-series forecasting for healthcare applications**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Harrer S, Menard J, Rivers M, Green DV, Karpiak J, Jeliazkov JR, Shapovalov MV, del Alamo D, Sternke MC. Artificial intelligence drives the digital transformation of pharma. InArtificial Intelligence in Clinical Practice 2024 Jan 1 (pp. 345-372). Academic Press.
Articles	Patel J, Patel D, Meshram D. Artificial Intelligence in Pharma Industry-A Rising Concept. Journal of Advancement in Pharmacognosy. 2021;1(2).
References Books	Bhupathyraaj M, Rani KR, Essa MM, editors. Artificial Intelligence in Pharmaceutical Sciences. CRC Press; 2023 Nov 23.
MOOC Courses	Udemy, coursera, NEPTEL
Videos	YOU TUBE

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	2	3	-	-	-	-	-	3	-	1	1	2
CO2	2	2	1	-	1	-	-	-	-	-	2	2	1	1	1
CO3	2	3	1	1	1	-	-	-	-	-	1	1	1	1	1
CO4	1	2	1	1	1	-	-	-	-	-	1	1	1	1	1
CO5	1	1	1	1	-	-	-	-	-	-	-	1	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Good Manufacturing in Pharma
Course Code	BP612ET

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					1	0	0	1
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To be able to understand the basics of Good Manufacturing Practice for medicinal products for human use and the current legal regulations and guidelines**(BL1-Remember)** **CO2-** To have the confidence to outline the main GMP requirements related to premises, storage facilities and personnel;**(BL2-Understand)** **CO3-** To get familiar with the principles of the GMP quality system and quality control and the important procedures when dealing with complaints and recalls**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Introduction What is Good Manufacturing Practice? Why is GMP important? Official GMP Directives. the basic requirements of Good Manufacturing Practice., Pharmaceutical Quality System Principle and overview of the Pharmaceutical Quality System. Major updates. Development, content and implementation of PQS.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT 2	Personnel Key personnel. Background and duties of the Qualified person. Duties of the Head of production department. Duties of the Head of quality control. Person releasing the batch. Consultants. Personnel training and hygiene, Premises and Equipment Production area. Storage area. Quality control areas. Ancillary areas. Equipment.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT 3	Documentation Premises. Generation and control of documentation. Types of documents and specifications. Manufacturing formula and processing instructions. Packaging instructions. Procedures and records., Production General principles. Prevention of cross-contamination in production. Guidelines for starting materials. Processing operations. Packaging materials and operations. Guidelines for finished products.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT 4	Quality Control General principles. Main tasks of the Quality control department. Technical transfer of testing methods. Transfer protocol., Complaints and Recalls GMP Guidelines related to complaints. Classification of defects. Product Recalls.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Karmacharya JB. Good manufacturing practices (GMP) for medicinal products. Promising Pharmaceuticals. 2014;101.
Articles	Patel KT, Chotai NP. Pharmaceutical GMP: past, present, and future–a review. Die Pharmazie-An International Journal of Pharmaceutical Sciences. 2008 Apr 1;63(4):251-5.
References Books	Durivage MA, editor. The Certified Pharmaceutical GMP Professional Handbook. Quality Press; 2016 May 23.
MOOC Courses	UDEMY, COURSERA, PHARMASTATE ACADEMY
Videos	You tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	1	2	-	2	2	1	-	3	-	1	1	1
CO2	2	2	-	1	3	-	2	1	1	-	2	-	1	1	1
CO3	1	1	-	1	1	-	1	1	1	-	1	-	1	1	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Healthcare Marketplace Capstone
Course Code	BP613ET

Part A

					L	T	P	C
Year	3rd	**Semester**	6th	**Credits**	1	0	0	1
Course Type	Theory only							
Course Category	Ability Enhancement Courses							
Pre-Requisite/s	This course is offered by the University of Minnesota on the Coursera platform. students are requested to enroll the programme and follow the instructions given by institute			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Learn new concepts from industry experts**(BL2-Understand)** **CO2-** Gain a foundational understanding of a subject or tool, Develop job-relevant skills with hands-on projects**(BL3-Apply)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)					

Part B

Modules	Contents	Pedagogy	Hours
1	What is your Health Marketplace Innovation? In this Milestone you will describe a new medical innovation in the context of what makes it extraordinary for investment or use in a community. Your final project for this capstone will feature 4 critical milestone components for an assessment of new innovation. Once completed, hope is that you have a body of illustrate your critical thinking to advance your career or switch careers into the healthcare market.		
2	What is the Voice of the Healthcare Provider For the second milestone you will complete an analysis of what the key customer - the medical provider - will required of the new technology or innovation to want to use it. This will require you to ask medical providers that you encounter about the nature of the technology and whether would find it of value. Remember to always tell provider that you are a student not a sales agent. The health care delivery course provides great insight into how care is delivered and will provide the context and background for your brief 2-3 page memo resulting from this milestone		
3	Regulatory and IP Status of the Innovation, How will the Innovation Generate Revenue, A great innovation needs a solid revenue model for survival-ability. In this milestone you will be asked to use parts of the prior three capstones to generate your own market report. Identifying the innovation's market space, voice of the customer, IP and regulatory path and final path roof reimbursement are critical components for identifying whether a medical innovation should advance and be sustained commercially		
4	Submitting the Final Project		

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
25	20	5	5	0	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	
Articles	
References Books	
MOOC Courses	https://www.coursera.org/learn/healthcare-marketplace-capstone
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	1	-	-	-	-	-	3	1	1	1	1
CO2	2	1	1	-	1	1	-	-	1	-	2	1	1	1	1
CO3	1	1	1	1	1	-	-	-	-	-	1	1	1	1	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Industrial Pharmacy II
Course Code	BP702T

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	1	-1	3
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To explains pilot plant, scale up techniques and SUPAC guidelines.**(BL1-Remember)** **CO2-** To outline various aspects of technology transfer involved from R & D to productions **(BL2-Understand)** **CO3-** To choose and to apply various responsibilities and regulatory requirements for drug approval **(BL3-Apply)** **CO4-** To analyze and study various quality management systems in pharmacy field.**(BL4-Analyze)** **CO5-** To determine the requirements and approval procedures for new drugs by Indian Regulatory**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Technology development and transfer: WHO guidelines for Technology Transfer(TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipment, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MOUs, legal issues	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals Regulatory requirements for drug approval: Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Blended Learning	10
UNIT 4	Quality management systems: Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT 5	Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Case Based Learning	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Regulatory requirements and approval	Case Study	BL3-Apply	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php 2. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
Articles	5. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http,//en.wikipedia.org/wiki/Regulatory_ Affairs. 6. International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php
References Books	3. International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php 4.Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
MOOC Courses	https://nptel.ac.in/ https://www.udemy.com/course/certificate-course-in-drug-regulatory-affairs-dra/?--=&utm_source=adwords&utm_medium=udemyads&utm_campaign=LongTail_la.EN_cc.INDIA&utm_content=deal4584&utm_term=_._ag_118445032537_._ad_618853564450_._kw_._de_c_._dm_._pl_._ti_dsa-1212271230479_._li_1007795_._pd_._&matchtype=&gad_source=1&gclid=CjwKCAjwt-OwBhBnEiwAgwzrUvsaJSSOVDqVcWySo7cw5sJ-Zb7x2lEpdRy076MNp3jNtdJKlIZ7ORoCu2YQAvD_BwE&couponCode=IND21PM
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	-	-	-	-	-	-	-	3	-	3	2	1
CO2	3	3	1	-	-	-	-	-	-	-	3	-	3	2	1
CO3	2	2	1	1	-	-	2	-	-	-	3	-	3	2	1
CO4	3	1	1	-	-	-	-	-	-	-	2	-	3	2	1
CO5	2	3	3	-	-	-	-	-	-	-	2	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmacy Practice
Course Code	BP703T

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To acquire the knowledge on organization of hospitals, various methods of distribution and hospital formulary in hospitals and apply it in the practice of pharmacy.**(BL1-Remember)** **CO2-** To outline the organization and structure of community pharmacy and to build ability to design and run own community pharmacy.**(BL1-Remember)** **CO3-** To demonstrate the knowledge of therapeutic drug monitoring, patient medication history interview and to apply the knowledge on assessment of drug related problems.**(BL2-Understand)** **CO4-** categorize and evaluate the role of hospital pharmacist in pharmacy and therapeutic committee, drug information services, patient counseling, education and training programmes in hospitals.**(BL1-Remember)** **CO5-** To interpret clinical laboratory tests of specific disease states to provide better patient centered service.**(BL4-Analyze)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✓ Gender ✓ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	a) Hospital and it's organization Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions. b) Hospital pharmacy and its organization Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists. c) Adverse drug reaction Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management. d) Community Pharmacy Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	a) Drug distribution system in a hospital Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs. b) Hospital formulary Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary. c) Therapeutic drug monitoring Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring. d) Medication adherence Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence. e) Patient medication history interview Need for the patient medication history interview, medication interview forms. f) Community pharmacy management Financial, materials, staff, and infrastructure requirements.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	a) Pharmacy and therapeutic committee Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation. b) Drug information services Drug and Poison information center, Sources of drug information, Computerized services, and storage and retrieval of information. Patient counseling Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist c) Education and training program in the hospital Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education. d) Prescribed medication order and communication skills Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	preparation and implementation Budget preparation and implementation b) Clinical Pharmacy Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care. Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern. c) Over the counter (OTC) sales Introduction and sale of over the counter, and Rational use of common over the counter medications.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	a) Drug store management and inventory control Organization of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure b) Investigational use of drugs Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Visit of ITM Hospital	Internships	BL2-Understand	3
2	Visit of ITM Hospital	Field work	BL2-Understand	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1.Merchant S.H. and Dr. J.S.Quadry. A textbook of hospital pharmacy, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001. 2.Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. A textbook of Clinical Pharmacy Practice- essential concepts and skills, 1st ed. Chennai: Orient Longman Private Limited; 2004.
Articles	6. Therapeutic drug monitoring. ISSN: 0163-4356 7. Journal of pharmacy practice. ISSN: 0974-8326 8. American journal of health system pharmacy. ISSN: 1535-2900 (online) 9.Pharmacy times (Monthly magazine)
References Books	3. Tipnis Bajaj. Hospital Pharmacy, 1st ed. Maharashtra: Career Publications; 2008. 4. Scott LT. Basic skills in interpreting laboratory data, 4thed. American Society of Health System Pharmacists Inc; 2009. 5. Parmar N.S. Health Education and Community Pharmacy, 18th ed. India: CBS Publishers & Distributers; 2008.
MOOC Courses	https://nptel.ac.in/, https://www.udemy.com/
Videos	You tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	2	-	-	-	-	3	-	1	2	1
CO2	3	1	-	1	-	2	-	-	-	-	3	-	1	1	1
CO3	2	2	-	-	-	1	-	-	-	-	3	-	1	1	1
CO4	3	1	-	1	-	2	-	-	-	-	2	-	1	1	1
CO5	2	1	-	1	-	1	1	-	-	-	2	-	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Novel Drug Delivery System
Course Code	BP704T

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand and rationalize fundamentals and polymers used in the design of controlled drug delivery systems**(BL2-Understand)** **CO2-** To outline the concepts of formulation and evaluation of oral, mucosal and implantable drug delivery system.**(BL1-Remember)** **CO3-** To develop and study oral, mucosal, dermal, pulmonary and Nasa l drug delivery systems over conventional dosage forms for prolonged action.**(BL3-Apply)** **CO4-** To illustrate the principles and fundamentals of drug targeting in the design of site-specific drug delivery system.**(BL2-Understand)** **CO5-** To predict the rate and maximize therapeutic compliance of site-specific drug delivery systems by modifying conventional dosage forms**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit 2	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, concept of implants and osmotic pump	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit 3	Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches Gastroretentive 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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit 4	Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
Unit 5	Ocular Drug Delivery Systems: Introduction, intra ocular 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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To make model of disintegration	Simulation	BL3-Apply	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001). 2. S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.
Articles	1.Indian Journal of Pharmaceutical Sciences (IPA) 2.Indian Drugs (IDMA) 3. Journal of Controlled Release (Elsevier Sciences) 4. Drug Development and Industrial Pharmacy (Marcel & Decker) 5. International Journal of Pharmaceutics (Elsevier Sciences
References Books	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
MOOC Courses	https://nptel.ac.in/
Videos	you tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	-	3	-	-	-	-	-	3	-	2	1	1
CO2	2	1	2	-	2	-	-	-	-	-	3	-	2	2	2
CO3	3	2	2	1	2	-	-	-	-	-	3	-	2	1	1
CO4	2	1	3	-	2	-	-	-	-	-	3	-	1	1	1
CO5	2	1	1	1	1	-	-	-	-	-	2	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Instrumental Methods of Analysis
Course Code	BP705P

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	Theory of Respective Experiments			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)				

Part B

Modules	**Contents**	**Pedagogy**	**Hours**

Part C

Modules	**Title**	**Indicative-ABCA/PBL/ Experiments/Field work/ Internships**	**Bloom's Level**	**Hours**
1	1 Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds 2 Estimation of dextrose by colorimetry	Experiments	BL2-Understand	8
2	3 Estimation of sulfanilamide by colorimetry 4 Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy	Experiments	BL4-Analyze	8
3	5 Assay of paracetamol by UV- Spectrophotometry 6 Estimation of quinine sulfate by fluorimetry	Experiments	BL4-Analyze	8
4	7 Study of quenching of fluorescence 8 Determination of sodium by flame photometry	Experiments	BL4-Analyze	8
5	9 Determination of potassium by flame photometry 10 Determination of chlorides and sulphates by nephelo-turbidometry	Experiments	BL4-Analyze	8
6	11 Separation of amino acids by paper chromatography 12 Separation of sugars by thin layer chromatography	Experiments	BL3-Apply	8
7	13 Separation of plant pigments by column chromatography 14 Demonstration experiment on HPLC	Experiments	BL3-Apply	8
8	15 Demonstration experiment on Gas Chromatography	PBL	BL3-Apply	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1.Vogel's Textbook of Quantitative Chemical Analysis by A.I. Vogel 2. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
Articles	NA
References Books	1. Organic Chemistry by I. L. Finar 2. Organic spectroscopy by William Kemp 3. Quantitative Analysis of Drugs by D. C. Garrett
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	1	1	-	1	-	-	-	3	-	1	1	1
CO2	3	1	2	1	1	-	1	-	-	-	3	-	1	1	1
CO3	2	2	2	1	1	-	1	-	-	-	3	-	1	1	1
CO4	2	1	3	1	1	-	1	-	-	-	2	-	1	2	1
CO5	2	1	1	2	1	-	-	-	-	-	3	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Practice School *
Course Code	BP706PS

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					0	0	6	6
Course Type	Project							
Course Category	Discipline Core							
Pre-Requisite/s	In the VII semester, every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt for any one of the domains for practice school declared by the program committee from time to time.			**Co-Requisite/s**	every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at the college level and grade points shall be awarded.			
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professonal Ethics ✕ Gender ✓ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	**Contents**	**Pedagogy**	**Hours**

Part C

Modules	**Title**	**Indicative-ABCA/PBL/ Experiments/Field work/ Internships**	**Bloom's Level**	**Hours**
1	Practice School	Field work		5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0	0			
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
150	75	100	50	50	25

Part E

Books	Please refer Library and Internet
Articles	Refer to the Library and Internet
References Books	Please refer Library and Internet
MOOC Courses	NA
Videos	Refer Library and Internet, NPTEL, YOU TUBE

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	2	1	1	1	2	2	-	-	3	-	2	1	1
CO2	2	-	1	1	-	-	-	-	-	-	2	-	1	1	1
CO3	1	-	1	-	1	-	-	-	-	-	2	-	-	1	1
CO4	1	1	1	1	1	-	-	-	-	-	3	-	-	1	1
CO5	3	-	1	1	-	-	-	-	1	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Biostatistics and Research Methodology
Course Code	BP801T

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	hands on practical of MS Excel and SPSS	Simulation	BL2-Understand	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork. 2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
Articles	datatab.net https://www.ijdrt.com/articles/biostatistics--research-methodology-with-an-overview-on-clinical-research.pdf
References Books	1. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam, 2. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery
MOOC Courses	https://nptel.ac.in/ datatab.net
Videos	You tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	3	1	-	-	-	-	2	-	2	1	1
CO2	2	1	1	2	3	1	-	-	-	-	2	-	1	1	1
CO3	3	1	1	1	3	1	-	-	-	-	2	-	1	1	1
CO4	2	1	1	1	3	1	-	-	-	-	1	-	-	1	2
CO5	2	1	1	2	3	1	-	-	-	-	1	-	1	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Social and Preventive Pharmacy
Course Code	BP802T

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professonal Ethics ✓ Gender ✓ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG10(Reduced inequalities) SDG12(Responsible consuption and production) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Nukkad Natak Program on Awareness of woman hygiene	Field work	BL3-Apply	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications 2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
Articles	Research in Social and Administrative Pharmacy, Elsevier, Ireland
References Books	1. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications 2. Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS. 3. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad
MOOC Courses	https://nptel.ac.in/
Videos	https://www.youtube.com/watch?v=pF8zYdLAeKM

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	3	3	1	-	1	-	1	3	1
CO2	2	-	-	-	-	3	3	3	1	-	1	-	1	2	1
CO3	3	-	-	-	-	3	2	3	1	-	1	-	1	3	1
CO4	2	1	-	-	-	3	2	2	-	-	2	-	1	2	1
CO5	2	-	-	1	-	3	2	1	-	-	-	-	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharma Marketing Management
Course Code	BP803ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Market survey about drugs, OTC, Antibiotic etc	PBL	BL5-Evaluate	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1.Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi 2.Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata MC Graw Hill, New Delhi.
Articles	NA
References Books	1. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India 2. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition) 3. Ramaswamy, U.S & Nanakamari, S: Marketing Management: Global Perspective, Indian Context, Macmilan India, New Delhi.
MOOC Courses	https://nptel.ac.in/ https://www.udemy.com/course/pharmaceutical-sales-and-marketing/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	2	2	1	1	-	2	1	-	2	1	1
CO2	2	2	1	-	1	2	1	1	-	1	1	-	1	1	1
CO3	3	1	1	-	1	2	1	1	-	2	1	-	1	1	1
CO4	3	1	2	-	1	1	1	1	-	1	2	-	1	1	1
CO5	2	2	1	-	1	2	1	1	-	2	1	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmaceutical Regulatory Science
Course Code	BP804ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	DMF Preparation and its submission, review of DMF of any given company	PBL	BL3-Apply	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, Nirali Prakashan. 2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences, Vol.185. Informa Health care Publishers. 3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences, Vol.190. 4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.
Articles	https://medwinpublishers.com/PDRAJ/
References Books	5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus. 6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143 7. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams 8. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene 9. Drugs: From Discovery to Approval, Second Edition By Rick Ng
MOOC Courses	https://nptel.ac.in/
Videos	You tube and Carewell pharma

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-	-	3	2	1	-	1	2	-	2	2	1
CO2	3	2	-	1	-	2	2	1	-	-	1	-	2	1	1
CO3	2	3	1	-	-	1	2	1	-	-	2	-	2	2	2
CO4	3	3	-	1	-	3	2	1	-	1	2	-	2	2	1
CO5	3	3	1	1	-	3	2	1	-	-	2	-	-	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Pharmacovigilance
Course Code	BP805ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	ADR Reporting procedure in ITM hospital	PBL	BL3-Apply	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1.Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers. 2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers. 3. Mann's Pharmacovigilance: Elizabeth B. Andrews, Nicholas, Wiley Publishers. 4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
Articles	12.http://www.whoumc.org/DynPage.aspx?id=105825&mn1=7347&mn2=7259&mn 3=7297 13. http://www.ich.org/ 14. http://www.cioms.ch/ 15. http://cdsco.nic.in/ 16. http://www.who.int/vaccine_safety/en/ 17. http://www.ipc.gov.in/PvPI/pv_home.html
References Books	8.A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills:G. Parthasarathi, Karin NyfortHansen,Milap C. Nahata 9. National Formulary of India 10. Text Book of Medicine by Yashpal Munjal 11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna
MOOC Courses	https://nptel.ac.in/
Videos	Refer You tube and other lectures

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	1	-	2	3	2	2	-	-	-	-	1	2	1
CO2	-	2	1	-	1	2	2	1	-	-	-	-	1	1	1
CO3	-	1	1	-	2	2	2	1	-	-	-	-	1	1	2
CO4	-	1	1	-	1	2	2	1	-	-	-	-	1	1	1
CO5	-	1	1	-	2	2	1	2	-	-	-	-	1	-	-1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Quality Control and Standardization of Herbals
Course Code	BP806ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	TLC preparation and determination of various crude drug	Experiments	BL4-Analyze	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Pharmacognosy by Trease and Evans 2. Pharmacognosy by Kokate, Purohit and Gokhale 3. Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I , Carrier Pub., 2006. 4. Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002. 5. EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,
Articles	9. WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981. 10. WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999. 11. WHO. WHO Global Atlas of Traditional, Complementary and Alternative Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005. 12. WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.
References Books	6. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002. 7. Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-8. 8. WHO. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998. WHO. Guidelines for the Appropriate Use of Herbal Medicines. WHO Regional Publications, Western Pacific Series No 3, WHO Regional office for the Western Pacific, Manila, 1998.
MOOC Courses	https://nptel.ac.in/
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	1	1	-	-	-	-	-	2	-	1	1	1
CO2	2	2	3	1	1	-	-	-	-	-	2	-	1	1	1
CO3	1	1	2	1	1	-	-	-	-	-	1	-	1	1	1
CO4	1	1	1	1	1	-	--	-	-	-	2	-	1	2	-
CO5	1	1	1	1	-	-	-	-	-	-	1	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Computer Aided Drug Design
Course Code	BP807ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	CADD Workshop and drug design	Experiments	BL3-Apply	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Robert GCK, ed., "Drug Action at the Molecular Level" University Prak Press Baltimore. 2. Martin YC. "Quantitative Drug Design" Dekker, New York. 3. Delgado JN, Remers WA eds "Wilson & Gisvolds's Text Book of Organic Medicinal & Pharmaceutical Chemistry" Lippincott, New York. 4. Foye WO "Principles of Medicinal chemistry 'Lea & Febiger. 5. Koro Ikovas A, Burckhalter JH. "Essentials of Medicinal Chemistry" Wiley Interscience.
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5248982/
References Books	6. Wolf ME, ed "The Basis of Medicinal Chemistry, Burger's Medicinal Chemistry" John Wiley & Sons, New York. 7. Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press. 8. Smith HJ, Williams H, eds, "Introduction to the principles of Drug Design" Wright Boston. 9. Silverman R.B. "The organic Chemistry of Drug Design and Drug Action" Academic Press New York
MOOC Courses	https://nptel.ac.in/
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	-	1	1	-	-	1	1	2	-	1	1	2
CO2	1	2	1	-	2	1	-	-	1	2	2	-	1	1	-
CO3	1	2	1	-	1	1	-	-	-	-	1	-	1	2	2
CO4	1	2	1	-	2	-	-	-	1	1	2	-	1	2	1
CO5	1	2	1	-	1	1	-	-	-	1	1	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Cell and Molecular Biology
Course Code	BP808ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG12(Responsible consuption and production) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	DNA ISOLATION FROM ONION	Experiments	BL2-Understand	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C. 13. RA Goldshy et. al., Kuby Immunology.
Articles	https://global.oup.com/ukhe/disciplines/bioscience/cell-and-molecular-biology/
References Books	Book: Basic Cell and Molecular Biology (Bergtrom)
MOOC Courses	https://nptel.ac.in/
Videos	you tube somus biology channel

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	1	1	-	-	1	-	1	-	1	2	1
CO2	3	1	1	-	1	-	-	-	1	-	2	-	1	1	3
CO3	3	1	1	-	1	1	-	-	-	-	1	-	2	1	2
CO4	3	1	1	-	1	1	-	-	1	-	1	-	1	1	3
CO5	2	1	1	-	-	1	-	-	-	-	1	-	-	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Cosmetic Science
Course Code	BP809ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preapartion of some cosmetics	Experiments	BL3-Apply	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin. 2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi. 3) Text book of cosmelicology by Sanju Nanda & Roop K. Khar, Tata Publishers.
Articles	International Journal of Cosmetic Science
References Books	1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin. 2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi. 3) Text book of cosmelicology by Sanju Nanda & Roop K. Khar, Tata Publishers.
MOOC Courses	https://nptel.ac.in/
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	3	-	-	-	-	1	-	1	-	2	1	1
CO2	1	1	1	2	-	-	-	-	1	-	2	-	1	1	1
CO3	1	1	-	1	-	-	-	-	-	-	2	-	-	1	-
CO4	1	1	1	-	1	-	-	-	-	-	1	-	-	1	1
CO5	1	1	1	-	1	-	-	-	1	-	1	-	-	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Experimental Pharmacology
Course Code	BP810ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	ANOVA Using SPSS/Graph Pad	Simulation	BL3-Apply	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Fundamentals of experimental Pharmacology-by M.N.Ghosh 2. Hand book of Experimental Pharmacology-S.K.Kulakarni 3. CPCSEA guidelines for laboratory animal facility.
Articles	https://www.sciencedirect.com/book/9781483232669/screening-methods-in-pharmacology
References Books	4. Drug discovery and Evaluation by Vogel H.G. 5. Drug Screening Methods by Suresh Kumar Gupta and S. K. Gupta 6. Introduction to biostatistics and research methods by PSS Sundar Rao and J Richard
MOOC Courses	https://nptel.ac.in
Videos	You tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	-	1	1	-	-	-	-	2	-	3	1	2
CO2	2	1	1	-	2	1	-	-	-	-	1	-	3	1	2
CO3	2	1	1	-	2	-	-	-	-	-	1	-	3	1	2
CO4	2	1	1	-	-	1	-	-	-	-	2	-	3	1	2
CO5	2	1	1	-	2	-	-	-	-	-	1	-	3	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Advanced Instrumentation Techniques
Course Code	BP811ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	standard curve using UV	Experiments	BL3-Apply	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Instrumental Methods of Chemical Analysis by B.K Sharma 2. Organic spectroscopy by Y.R Sharma 3. Text book of Pharmaceutical Analysis by Kenneth A. Connors 4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
Articles	https://www.researchgate.net/publication/327751681_Advanced_Instrumentation_and_Its_Uses
References Books	6. Organic Chemistry by I. L. Finar 7. Organic spectroscopy by William Kemp 8. Quantitative Analysis of Drugs by D. C. Garrett 9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
MOOC Courses	https://nptel.ac.in/courses/104106122
Videos	https://www.youtube.com/watch?v=ZMtH-xO2Fv0&list=PL-IQezHLOAj4q6tsVPE1ApKVX3np5wItK

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	1	1	-	-	-	1	-	2	-	1	2	2
CO2	2	-	2	-	-	-	-	-	2	-	1	-	1	1	1
CO3	2	-	2	1	1	-	-	-	1	-	2	-	1	-	1
CO4	2	1	2	1	1	-	-	1	1	-	1	-	2	1	2
CO5	3	-	2	2	2	-	-	-	1	1	2	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Dietary Supplements and Nutraceuticals
Course Code	BP812ET

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	making of report on the ingredients under the project of Know Your Packed Food	Field work	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Dietetics by Sri Lakshmi 2. Role of dietary fibres and neutraceuticals in preventing diseases by K. T Agusti and P.Faizal: BSPunblication. 3. Advanced Nutritional Therapies by Cooper. K.A., (1996). 4. The Food Pharmacy by Jean Carper, Simon & Schuster, UK Ltd., (1988). 5. Prescription for Nutritional Healing by James F.Balch and Phyllis A.Balch 2nd Edn., Avery Publishing Group, NY (1997). 6. G. Gibson and C.williams Editors 2000 Functional foods Woodhead Publ.Co.London. 7. Goldberg, I. Functional Foods. 1994. Chapman and Hall, New York.
Articles	https://www.ffhdj.com/index.php/DietarySupplementsNutraceuticals
References Books	8. Labuza, T.P. 2000 Functional Foods and Dietary Supplements: Safety, Good Manufacturing Practice (GMPs) and Shelf-Life Testing in Essentials of Functional Foods M.K. Sachmidl and T.P. Labuza eds. Aspen Press. 9. Handbook of Nutraceuticals and Functional Foods, Third Edition (Modern Nutrition) 10. Shils, ME, Olson, JA, Shike, M. 1994 Modern Nutrition in Health and Disease. Eighth edition. Lea and Febiger
MOOC Courses	Arogyam.com
Videos	https://www.youtube.com/watch?v=TLSPWcJncso

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	1	-	1	1	-	-	-	-	2	-	1	1	1
CO2	3	-	1	-	-	1	-	-	-	-	1	-	1	2	1
CO3	2	-	1	-	1	1	-	-	-	-	2	-	1	1	-
CO4	2	-	1	-	1	1	-	-	-	-	1	-	1	1	1
CO5	2	-	1	-	1	1	-	-	-	-	2	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BPharm

Title of the Course	Project Work
Course Code	BP813PW

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	6	6
Course Type	Project							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	As per supervisor's instructions	PBL	BL2-Understand	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
150	75	100	50	50	25

Part E

Books	As per Given Topic
Articles	As per Given Topic https://www.sciencedirect.com/search NCBI/Pubmed Library
References Books	As per Given Topic
MOOC Courses	NA
Videos	As per Given Topic

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	3	1	-	-	-	-	1	-	1	-	1
CO2	2	1	2	3	2	1	-	-	-	-	2	-	1	-	1
CO3	2	1	2	3	2	1	-	-	-	-	1	-	1	-	2
CO4	3	2	2	-	1	-	-	-	-	-	1	-	3	3	1
CO5	3	3	1	-	1	1	-	-	-	-	2	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Regulatory Affairs
Course Code	MPH 104T

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)					

Part B

Modules	**Contents**	**Pedagogy**	**Hours**

Part C

Modules	**Title**	**Indicative-ABCA/PBL/ Experiments/Field work/ Internships**	**Bloom's Level**	**Hours**
UNIT-III	prepare regulatory guidelines for different countries	Seminar	BL3-Apply	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	1. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143 2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P.Martin, Drugs and the Pharmaceutical Sciences,Vol.185, Informa Health care Publishers. 3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD,5th edition, Drugs and the Pharmaceutical Sciences, Vol.190
Articles	https://regsci-ojs-tamu.tdl.org/regsci/
References Books	1. Guidebook fordrug regulatory submissions / Sandy Weinberg. By John Wiley & Sons.Inc. 2. FDA regulatory affairs: a guide for prescription drugs, medical devices, and biologics/edited By Douglas J. Pisano, David Mantus. 3. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A.Rozovsky and Rodney K. Adams 4. www.ich.org/ 5. www.fda.gov/ 6. europa.eu/index_en.htm 7. https://www.tga.gov.au/tga- basics
MOOC Courses	https://onlinecourses.nptel.ac.in/
Videos	https://www.youtube.com/watch?v=xrZI8g70Hol&list=PLpGCFhhV_JSXuh8vFq4MwInuNj9f6hfRY

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	1	1	-	-	2	-	-	3	-	1	-	1
CO2	2	-	-	-	2	1	-	3	-	-	3	-	2	1	2
CO3	1	2	-	-	-	-	-	2	-	-	2	-	-	-	-
CO4	3	2	-	1	-	2	-	3	-	-	2	-	-1	2	-
CO5	2	1	-	-	1	1	-	1	-	-	2	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Modern Pharmaceutical Analytical Techniques
Course Code	MPH 101T

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
UNIT-4	High Performance Liquid chromatography	PBL	BL4-Analyze	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004. 2.Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5thedition, Eastern press, Bangalore, 1998. 3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers. 4. Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
Articles	https://www.sciencedirect.com/journal/journal-of-pharmaceutical-analysis
References Books	1. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991. 2. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997. 3. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series
MOOC Courses	https://onlinecourses.nptel.ac.in/
Videos	https://www.udemy.com/course/modern-analytical-techniques/?utm_source=adwords-pmax&utm_medium=udemyads&utm_campaign=PMax_Ia.EN_cc.INDIA&utm_content=deal4584&utm_term=_._ag__._kw__._ad__._de_c_._dm__._pl__._ti__._li_1007795_._pd__._&gad_source=2&gclid=Cj0KCQjwzZmwBhD8ARIsAH4v1gVb5PzO7EviNr_12MuMwoz1rKlhE_Qov_xOdxhwjSAvvuE6kO0Ay6waAtDsEALw_wcB&c

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	-	3	-	-	-	-	-	3	-	1	-	1
CO2	3	2	3	-	2	1	-	-	-	-	3	-	2	1	2
CO3	3	1	1	-	1	2	-	-	-	-	3	-	2	-	1
CO4	3	1	1	2	2	2	-	-	-	-	3	-	1	2	2
CO5	2	1	2	-	2	2	-	-	-	-	3	-	-	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Drug Delivery System
Course Code	MPH 102T

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
UNIT-1	3D PRINTING TECHNOLOGY	PBL	BL4-Analyze	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	1.N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001). 2. S. P. Vya s and R. K. Khar, Controlled Drug Delivery- conceptsand advances, Vallabh Prakashan, New Delhi, First edition 2002
Articles	2.Indian Journal of Pharmaceutical Sciences (IPA) 3. Indian drugs (IDMA) 4. Journal of controlled release (Elsevier Sciences) desirable 4. Drug Development and Industrial Pharmacy (Marcel & Decker) desirable
References Books	5. 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, Editor-Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York! Chichester/Weinheim
MOOC Courses	https://onlinecourses.nptel.ac.in/
Videos	https://www.youtube.com/watch?v=1Jk08tf1Gh8

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	3	1	-	-	-	-	3	-	1	-	1
CO2	3	-	2	-	1	2	-	-	-	-	3	-	2	1	-
CO3	3	1	3	-	2	-	-	-	-	-	3	-	-	-	2
CO4	3	-	1	-	2	1	-	-	-	-	3	-	-	1	2
CO5	2	2	3	1	1	-	-	-	-	-	3	-	1	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Modern Pharmaceutics
Course Code	MPH 103T

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
UNIT-V	study of diffussion and dissolution parameters	PBL	BL4-Analyze	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1.Theory and Practice of Industrial Pharmacy By Lachmann and Libermann 2. Pharmaceutical dosage forms: Tablets Vol. 1-3 by Leon Lachmann. 3.Pharmaceutical Dosage forms: Disperse systems, Vol, 1-2; By Leon Lachmann. 4. Pharmaceutical Dosage forms: Parenteral medications Vol. 1-2; By Leon Lachmann. 5. Modern Pharmaceutics; By Gillbert and S. Banker. 6. Remington's Pharmaceutical Sciences
Articles	https://www.ijmpronline.com/
References Books	7.Advances in Pharmaceutical Sciences Vol. 1-5; By H.S. Bean & A.H. Beckett. 8. Physical Pharmacy; By Alfred martin 9. Bentley's Textbook of Pharmaceutics – by Rawlins. 10. Good manufacturing practices for Pharmaceuticals: Aplan for total quality control, Second edition; By Sidney H. Willig. 11. Quality Assurance Guide; By Organization of Pharmaceutical producers of India. 12.Drug formulation manual; By D.P.S. Kohli and D.H.Shah. Eastern publishers, New Delhi. 13.How to practice GMPs; By P. P. Sharma. Vandhana Publications, Agra. 12. Pharmaceutical Process Validation; By Fra. R. Berry and Robert A. Nash. 13.Pharmaceutical Preformulations; By J.J. Wells. 14. Applied production and operations management; By Evans, Anderson, Sweeney and Williams. 15. Encyclopedia of Pharmaceutical technology, Vol I – III
MOOC Courses	https://swayam.gov.in/nc_details/NPTEL
Videos	https://www.youtube.com/watch?v=mRJvss9bMVc&list=PL0o-kamDFTumhseOKF-6OCrHdhBySNkAA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	3	-	1	-	-	-	-	-	3	-	1	-	1
CO2	3	1	1	-	2	-	-	-	-	-	3	-	-	1	-
CO3	2	2	2	1	2	-	-	-	-	-	3	-	2	2	2
CO4	2	1	1	-	2	-	-	-	-	-	3	-	1	-	2
CO5	2	2	2	2	-	1	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Pharmaceutics Practical I
Course Code	MPH 105P

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					0	0	6	6
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)					

Part B

Modules	**Contents**	**Pedagogy**	**Hours**

Part C

Modules	**Title**	**Indicative-ABCA/PBL/ Experiments/Field work/ Internships**	**Bloom's Level**	**Hours**
1	1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer 2. Simultaneousestimation ofmulti component containing formulations by UV spectrophotometry	Experiments	BL4-Analyze	8
2	3. Experiments based on HPLC 4. Experiments based on Gas Chromatography	Experiments	BL3-Apply	8
3	5. Estimation of riboflavin/quinine sulphate by fluorimetry 6. Estimation of sodium/potassium by flame photometry	Experiments	BL4-Analyze	8
4	7. To perform In-vitro dissolution profile of CR/ SR marketed formulation 8. Formulation and evaluation of sustained release matrix tablets	Experiments	BL5-Evaluate	8
5	9. Formulation and evaluation osmotically controlledDDS 10. Preparation and evaluation of Floating DDS- hydro dynamically balanced DDS	Experiments	BL6-Create	8
6	11. Formulation and evaluation of Muco adhesive tablets. 12. Formulation and evaluation of trans dermal patches	Experiments	BL6-Create	8
7	13. To carry out preformulation studies of tablets. 14. To study the effect of compressional force on tablets disintegration time.	Experiments	BL3-Apply	8
8	15. To study Micromeritic properties of powders and granulation. 16. To study the effect of particle size on dissolution of a tablet	Experiments	BL3-Apply	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
150	0	100	50	50	25

Part E

Books	PRACTICAL MANUAL
Articles	JOURNALS
References Books	LAB MANUAL
MOOC Courses	SWAYAM NPTEL
Videos	YOUTUBE

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	3	1	1	-	-	-	-	-	3	-	1	-	1
CO2	3	1	2	2	2	-	-	-	-	-	3	-	2	1	2
CO3	3	2	3	-	1	-	-	-	-	-	3	-	3	-	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Online Certificate Course
Course Code	MPH 107ET

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					1	0	0	1
Course Type	Online course							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	ELECTIVES			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)					

Part B

Modules	**Contents**	**Pedagogy**	**Hours**

Part C

Modules	**Title**	**Indicative-ABCA/PBL/ Experiments/Field work/ Internships**	**Bloom's Level**	**Hours**
1	patent drafting and filing	Case Study	BL3-Apply	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	25	12	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	NA
Articles	NA
References Books	NA
MOOC Courses	1.https://www.coursera.org/courses?query=regulatory%20affairs 2. https://www.igmpi.ac.in/RAprograms.html
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	-	-	3	-	-	3	-	3	1	2
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Good Manufacturing in Pharma
Course Code	MPH 108ET

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	GMP	Seminar	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Karmacharya JB. Good manufacturing practices (GMP) for medicinal products. Promising Pharmaceuticals. 2014;101.
Articles	Patel KT, Chotai NP. Pharmaceutical GMP: past, present, and future–a review. Die Pharmazie-An International Journal of Pharmaceutical Sciences. 2008 Apr 1;63(4):251-5.
References Books	Durivage MA, editor. The Certified Pharmaceutical GMP Professional Handbook. Quality Press; 2016 May 23.
MOOC Courses	UDEMY, COURSERA, PHARMASTATE ACADEMY
Videos	You tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	1	-	1	1	2	-	3	-	1	1	1
CO2	1	-	-	1	1	-	1	1	2	-	3	-	1	1	1
CO3	1	-	-	-	1	-	2	1	2	-	3	-	2	1	1
CO4	2	-	-	1	1	-	1	2	2	-	2	-	1	-	3
CO5	1	-	-	1	1	-	2	2	2	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Molecular Pharmaceutics (Nano Tech and Targeted DDS)
Course Code	MPH 201T

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Upon completion of the course student shall be able to understand The various approaches for development of novel drug delivery systems. • The criteria for selection of drugs and polymers for the development of NTDS The formulation and evaluation of novel drug delivery systems			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
UNIT-2	PREPARATION OF NANOSOMES	PBL	BL4-Analyze	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992. 2. S. P. Vyas and R. K. Khar, Controlled Drug Delivery - concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
Articles	https://pubs.acs.org/journal/mpohbp
References Books	Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992. 2. S. P. Vyas and R. K. Khar, Controlled Drug Delivery - concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
MOOC Courses	https://onlinecourses.nptel.ac.in/
Videos	https://www.youtube.com/watch?v=rGP7KZOTkzE

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	3	-	-	-	-	-	3	-	3	-	3
CO2	2	2	2	3	2	-	-	-	-	-	3	-	2	1	2
CO3	2	1	3	2	1	-	-	-	-	-	3	-	2	-	1
CO4	3	2	3	2	3	-	-	-	-	-	3	-	3	2	2
CO5	1	1	3	2	2	-	-	-	-	-	2	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Advanced Biopharmaceutics & Pharmacokinetics
Course Code	MPH 202T

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
EXPERIMENT	PREPARATIONS OF TARGETED DRUG DELIEVERY SYSTEM	PBL	BL3-Apply	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	1. Biopharmaceutics and Clinical Pharmacokinetics, An Introduction, 4th edition, revised and expande by Robert. E. Notari, Marcel Dekker Inc, New York and Basel,1987. 2. Biopharmaceutics and Relevant Pharmacokinetics by John. G Wagner and M.Pemarowski, 1st edition, Drug Intelligence Publications, Hamilton, Illinois, 1971. 3. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G. Boylan, Marcel Dekker Inc, New York, 1996. 12. Basic Pharmacokinetics, 1st edition, Sunil S Jambhekar and Philip J Breen, pharmaceutical press, RPS Publishing,2009. 13. Absorption and Drug Development- Solubility, Permeability, and Charge State, Alex Avdeef, John Wiley & Sons, Inc,2003. 9. Biopharmaceutics and Clinical Pharmacokinetics, An Introduction, 4th edition, revised and expande by Robert. E. Notari, Marcel Dekker Inc, New York and Basel,1987. 10. Biopharmaceutics and Relevant Pharmacokinetics by John. G Wagner and M.Pemarowski, 1st edition, Drug Intelligence Publications, Hamilton, Illinois, 1971. 11. Encyclopedia of Pharmaceutical Technology, Vol 13, James Swarbrick, James. G. Boylan, Marcel Dekker Inc, New York, 1996. 12. Basic Pharmacokinetics, 1st edition, Sunil S Jambhekar and Philip J Breen, pharmaceutical press, RPS Publishing,2009. 13. Absorption and Drug Development- Solubility, Permeability, and Charge State, Alex Avdeef, John Wiley & Sons, Inc,2003.
Articles	JOURNAL OF PHARMACEUTICS JOURNAL OF MOLECULAR PHARMACEUTICS
References Books	1. Biopharmaceutics and Clinical Pharmacokinetics by Milo Gibaldi, 4th edition,Philadelphia, Lea and Febiger, 1991 2. Biopharmaceutics and Pharmacokinetics, A. Treatise, D .M. Brahmankar and Sunil B. Jaiswal., VallabPrakashan, Pitampura, Delhi 3. Applied Biopharmaceutics and Pharmacokinetics by Shargel. Land YuABC, 2ndedition, Connecticut Appleton Century Crofts, 1985 4. Textbook of Biopharmaceutics and Pharmacokinetics, Dr. Shobha Rani R. Hiremath, Prism Book 5. Pharmacokinetics by Milo Gibaldi and D. Perrier, 2nd edition, Marcel Dekker Inc.,New York, 1982 6. Current Concepts in Pharmaceutical Sciences: Biopharmaceutics, Swarbrick. J, Leaand Febiger, Philadelphia, 1970 7. Clinical Pharmacokinetics, Concepts and Applications 3rd edition by MalcolmRowland and Thom~ N. Tozer, Lea and Febiger, Philadelphia, 1995 8. Dissolution, Bioavailability and Bioequivalence, Abdou. H.M, Mack Publishing Company, Pennsylvania 1989
MOOC Courses	NPTEL
Videos	https://www.youtube.com/watch?v=hXrniai9ZR0

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	3	1	3	-	-	-	-	3	-	1	1	1
CO2	2	1	2	2	2	2	-	-	-	-	2	-	2	2	2
CO3	2	2	3	1	2	1	-	-	-	-	2	-	1	2	2
CO4	3	-	1	2	2	2	-	-	-	-	3	-	2	-	2
CO5	3	1	3	2	3	2	-	-	-	-	2	-	1	1	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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MPharm-PharmaCeutics

Title of the Course	Computer Aided Drug Delivery System
Course Code	MPH 203T

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	ARTIFICIAL INTELLIGENCE IN HEALTH CARE	Seminar	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	1. Computer Applications in Pharmaceutical Research and Development, Sean Ekins, 2006, John Wiley & Sons. 2. Computer-Aided Applications in Pharmaceutical Technology, 1st Edition, Jelena Djuris, Woodhead Publishing 3. Encyclopediaof Pharmaceutical Technology, Vol 13, James Swarbrick, James. G. Boylan, Marcel Dekker Inc, New York, 1996.
Articles	1. Computer Applications in Pharmaceutical Research and Development, Sean Ekins, 2006, John Wiley & Sons. 2. Computer-Aided Applications in Pharmaceutical Technology, 1st Edition, Jelena Djuris, Woodhead Publishing 3. Encyclopediaof Pharmaceutical Technology, Vol 13, James Swarbrick, James. G. Boylan, Marcel Dekker Inc, New York, 1996.
References Books	1. Computer Applications in Pharmaceutical Research and Development, Sean Ekins, 2006, John Wiley & Sons. 2. Computer-Aided Applications in Pharmaceutical Technology, 1st Edition, Jelena Djuris, Woodhead Publishing 3. Encyclopediaof Pharmaceutical Technology, Vol 13, James Swarbrick, James. G. Boylan, Marcel Dekker Inc, New York, 1996.
MOOC Courses	nptel
Videos	pharmawins

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	3	-	3	-	1	-	-	-	3	-	1	-	1
CO2	2	2	3	-	3	-	-	-	-	-	3	-	-	1	2
CO3	1	-	2	-	2	-	-	-	-	-	3	-	2	2	2
CO4	3	1	2	-	3	-	1	-	-	-	2	-	1	-	-
CO5	3	-	1	-	3	-	1	-	-	-	2	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Cosmetics and Cosmeceuticals
Course Code	MPH 204T

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
UNIT-4	COSMETIC PREPARATIONS	PBL	BL3-Apply	12

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Harry's Cosmeticology. 8th edition. Poucher'sperfumecosmeticsandSoaps,10th edition. 3. Cosmetics - Formulation, Manufacture and quality control, PP.Sharma,4th edition Handbook of cosmetic science and Technology A. O. Barel, M. Payeand H.I. Maibach. 3rd edition 5. Cosmetic and Toiletries recent suppliers catalogue. CTFA directory.
Articles	https://onlinelibrary.wiley.com/journal/14682494
References Books	Harry's Cosmeticology. 8th edition. Poucher'sperfumecosmeticsandSoaps,10th edition. Cosmetics - Formulation, Manufacture and quality control, PP.Sharma,4th edition Handbook of cosmetic science and Technology A. O. Barel, M. Payeand H.I. Maibach. 3rd edition Cosmetic and Toiletries recent suppliers catalogue. CTFA directory.
MOOC Courses	https://nptel.ac.in/
Videos	https://www.youtube.com/watch?v=bcCkQ1liaKA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	-	-	-	-	-	3	-	1	1	1
CO2	3	1	-	-	2	-	-	-	-	-	3	-	2	2	2
CO3	2	2	-	-	2	-	-	-	-	-	1	-	1	-	2
CO4	1	2	-	-	1	-	-	-	-	-	2	-	1	-	3
CO5	3	-	-	-	-	-	-	-	-	-	1	-	-	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Pharmaceutics Practical II
Course Code	MPH 205P

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					7	0	0	7
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	TO GAIN EXPERIMEMTAL KNOWLEDGE			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. To study the effect of temperature change, non-solvent addition, incompatible polymer addition in microcapsules preparation	Experiments	BL4-Analyze	4
2	2. Preparation and evaluation of Alginate beads	PBL	BL6-Create	4
3	3. Formulation and evaluation of gelatin /albumin microspheres	PBL	BL6-Create	4
4	4. Formulation and evaluation of liposomes/niosomes	PBL	BL6-Create	4
5	5. Formulation and evaluation of spherules	PBL	BL6-Create	4
6	6. Improvement of dissolution characteristics of slightly soluble drug by Solid dispersion technique.	PBL	BL4-Analyze	4
7	7. Comparison of dissolution of two different marketed products /brands	PBL	BL5-Evaluate	4
8	8. Protein binding studies of a highly protein bound drug & poorly protein bound drug	PBL	BL4-Analyze	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
150	75	100	50	50	25

Part E

Books	7. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill Livingstone, Latest edition
Articles	https://www.ipinnovative.com/journal-name/JPBS
References Books	1 Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition 2.Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS) 3. Theory and Practice of Industrial Pharmacy by Liberman & Lachman
MOOC Courses	https://nptel.ac.in/
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	3	-	1	-	1
CO2	3	-	1	1	-	-	-	-	-	-	3	-	-	1	2
CO3	2	-	2	2	-	-	-	-	-	-	3	-	2	-	3
CO4	3	-	-	1	-	-	-	-	-	-	3	-	-	-	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Seminars
Course Code	MPH 206S

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					0	0	7	7
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG7(Affordable and clean energy)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Polymers in NDDS	Seminar	BL2-Understand	12
2	Gene theray	Seminar	BL2-Understand	10
3	PKPD studies	Research Paper Presentation	BL4-Analyze	12
4	Insilico drug designing	Simulation	BL3-Apply	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13

Part E

Books	NA
Articles	NA
References Books	NA
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1-	-	-	-	-	-	-	3	3	1	1	-	3
CO2	-	2	2	-	-	-	-	-	-	3	3	2	-	-	1
CO3	2	-	1	-	-	-	-	-	-	3	3	1	2	-	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Online Certificate Course
Course Code	MPH 207ET

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Online course							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Pharmaceutical background			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	25	35	18	15	8
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	NA
Articles	N A
References Books	NA
MOOC Courses	1. https://ispe.org/training/course/qbd 2. https://www.udemy.com/course/quality-by-design-qbd-in-pharmaceutical-development/?-=&utm_source=adwords&utm_medium=udemyads&utm_campaign=LongTail_la.EN_cc.INDIA&utm_content=deal4584&utm_term=_._ag_118445032537_._ad_618853564450_._kw_._de_c_._dm__._pl_._ti_dsa-1212271230479_._li_1007795_._pd___._&matchtype=&gad_source=1&gclid=Cj0KCQjwztOwBhD7ARIsAPDKnkBXWZvoPEBACFjanUEyfigFRV8AJSdYMY2AH1tTLjXCBcpyt7DSYX8aAsvOEALw_wcB&couponCode=IND21PM 3. https://www.6sigma.us/quality-by-design/
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	-	-	-	-	-	3	-	1	1	1
CO2	2	2	2	-	-	-	-	-	-	-	3	-	2	2	2
CO3	3	-	-	-	-	-	-	-	-	-	3	-	1	1	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Introduction to intellectual property rights
Course Code	MPH 208ET

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)** **CO5-** To predict the relation between physicochemical properties and biological activity**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	38	25	13
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Cockburn IM. Intellectual property rights and pharmaceuticals: challenges and opportunities for economic research. The economics of intellectual property. 2009 Jan:150.
Articles	Savale SK, Savale VK. Intellectual property rights (IPR). World J Pharm Pharm Sci. 2016 Apr 22;5:2559-92.
References Books	Prabu SL, Tnk S, editors. Intellectual property rights. BoD–Books on Demand; 2017 Jun 21.
MOOC Courses	NEPTEL
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	1	-	-	-	3	-	2	3	-	1	1	1
CO2	-	1	-	-	-	-	-	3	-	-	2	-	1	-	1
CO3	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Research Methodology and Biostatistics
Course Code	MPH 301T

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)** **CO4-** To compare the advantages of microwave technique over conventional synthesis of drugs**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	75	37	25	12
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork. 2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
Articles	NA
References Books	1. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam. 2. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery
MOOC Courses	https://www.coursera.org/search?query=biostatistics%20in%20public%20health
Videos	https://www.youtube.com/watch?v=UtivXLO7c9A

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	3	3	-	-	-	-	-	-	3	-	1	1	1
CO2	-	2	2	1	-	-	-	-	-	-	3	-	2	2	2
CO3	-	3	1	2	-	-	-	-	-	-	2	-	1	2	1
CO4	-	3	3	3	-	-	-	-	-	-	2	-	2	-	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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MPharm-PharmaCeutics

Title of the Course	Research Work
Course Code	MPH 304P

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					0	0	14	14
Course Type	Lab only							
Course Category	Projects and Internship							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	175				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
350	175	200	100	150	75

Part E

Books	NA
Articles	NA
References Books	NA
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	2	-	-	-	-	3	-	1	3	3
CO2	3	2	3	2	2	1	-	-	-	-	3	-	2	1	3
CO3	3	3	3	2	2	1	-	-	-	-	3	-	3	1	3
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

MPharm-PharmaCeutics

Title of the Course	Research Publication /Report
Course Code	MPH 404T

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Projects and Internship							
Pre-Requisite/s							**Co-Requisite/s**	
Course Outcomes & Bloom's Level	**CO1-** To define and select the method for preparation of drugs and intermediates**(BL1-Remember)** **CO2-** To explain principle underlying the preparation of drugs**(BL2-Understand)** **CO3-** To choose the method for assay of drugs by quantitative analysis**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professsonal Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	presenting research/review papers in various seminars ,conferences or symposiums	PBL		

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	25				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
50	0	50	25	0	0

Part E

Books	NA
Articles	NA
References Books	NA
MOOC Courses	NA
Videos	NA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2	2	1	-	-	-	-	-	3	-	1	1	3
CO2	1	1	2	2	-	-	-	-	-	-	2	-	2	2	3
CO3	1	3	3	2	1	-	-	-	-	-	3	-	1	2	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-