



**Rajarshi Shahu**  
**College of Pharmacy**

Journey Towards Academic Excellence

**Course Outcomes (COs) of the Programme offered  
by the institution**

**M. Pharmacy Course Outcomes**

**(New PCI Pattern)**



**Dwarka Bahuuddeshiya Gramin Vikas Foundation's**

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Estd: 2000

# **Rajarshi Shahu College of Pharmacy**

( Approved by AICTE & PCI, Affiliated to Sant Gadge Baba, Amravati University, Amravati )

**Shri. Dhruatraojl Sawale**  
President

**Prof. Dr. Shirish P. Jain**  
Principal

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**Semester-I**

**Branch: Pharmaceutics**

**Subject: Modern Pharmaceutical Analytical Techniques– Theory**

**Subject Code: MPH101T**

<b>COURSE OUTCOMES</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO 1</b>	Understand and apply the concepts of various analytical techniques and its applications in qualitative and quantitative analysis of drugs in single and combination dosage forms
<b>CO 2</b>	Understand the principle and applications of IR spectroscopy
<b>CO 3</b>	Understand and apply the principle and applications of NMR spectroscopy
<b>CO 4</b>	Understand and apply the principle and applications of MASS spectrometry
<b>CO 5</b>	Understand and apply the principle and applications of various chromatographic techniques
<b>CO 6</b>	Understand and apply theoretical and practical skills of instruments

**Subject: Drug Delivery System Theory**

**Subject Code: MPH102T**

<b>Course Outcome</b>	<b>Description/Statement</b>
<b>CO1</b>	Students should understand concept of controlled and sustained release drug delivery system and role of various polymers in the design and development of various novel drug delivery systems. 3D printing tech., telepharmacy, personalized and customized medicine, pharmacogenetics
<b>CO2</b>	Students should understand and design and development of various activation modulated drug delivery systems, feedback regulated DDS and fabrication of GRDDS
<b>CO3</b>	Students should understand and learn the various approaches for development of ocular drug delivery systems
<b>CO4</b>	Students should understand and learn formulation and evaluation of trans-dermal delivery systems
<b>CO5</b>	Students should understand concept of proteins and peptides and learn to develop and evaluate their drug delivery systems
<b>CO6</b>	Students should understand concept of vaccines and able to design the various formulations of vaccines





**Subject: Modern Pharmaceutics - Theory**

**Subject Code: MPH103T**

<b>COURSE OUTCOMES</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO 1</b>	Student shall be able to understand the concepts of preformulation and its various parameters, like compatibility study and stability study associated with dispersion system, parenterals and other dosage form.
<b>CO 2</b>	Student should express the concept of optimization and its significance in manufacturing of pharmaceutical formulations.
<b>CO 3</b>	Students shall be able to find out the scope, and significance of validation processes, various ICH & WHO guidelines and regulation associated with validations.
<b>CO 4</b>	Students should understand and apply the objectives and policies of cGMP in industry and shall be able to understand the various parameters of industry management.
<b>CO 5</b>	Students should evaluate various tablet dosage form, its compression and compaction and physics of tablet and there by understand the various methods of enhancement of solubility of drug.
<b>CO6</b>	After studying consolidation parameters like diffusion parameters, dissolution parameters and pharmacokinetic parameters, students shall be able to understand the various model of dissolution and concept of standard deviation.

**Subject: Regulatory Affairs**

**Subject Code: MPH104T**

<b>COURSE OUTCOME</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO1</b>	Students should be able to understand documentation in pharmaceutical industry
<b>CO2</b>	Students should be able familiar with regulatory requirements for product approval
<b>CO3</b>	Students should be able to explain the concept post approval regulatory affairs
<b>CO4</b>	Students should be able to describe various aspects of non clinical drug development
<b>CO5</b>	Students should be able to comprehend clinical trials requirements
<b>CO6</b>	Students should be able to illustrate ICH guidelines







DBUGVF's

## Rajarshi Shahu College of Pharmacy, Buldana

(Approved by AICTE, PCI, New Delhi and affiliated to Sant Gadge Baba Amravati University, Amravati)

**Subject: Pharmaceutics Practical I**

**Subject Code: MPH105P**

<b>COURSE OUTCOME</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO1</b>	Understand the elements of Preformulation studies
<b>CO2</b>	Conceptual understanding of Modern analytical Methods of drug analysis
<b>CO3</b>	Advance knowledge in formulation, quality control, and key process parameter on oral dosage forms
<b>CO4</b>	Knowledge of evaluation of various dosage forms





**Branch: Pharmaceutical Quality Assurance**

**Subject: Quality Management System**

**Subject Code: MQA102T**

<b>Course Outcome</b>	<b>Description/Statement</b>
<b>CO1</b>	Students should be able to illustrate various aspects of quality and customer focus
<b>CO2</b>	Students should be able to explain basics of Pharmaceutical Quality Management
<b>CO3</b>	Students should be able to describe management of drug stability
<b>CO4</b>	Students should be able to understand Statistical Process Control
<b>CO5</b>	Students should be able to comprehend Regulatory Compliance through Quality Management
<b>CO6</b>	Students should be able to explain Out of specifications and CAPA

**Subject: Quality Control and Quality Assurance**

**Subject Code: MQA103T**

<b>COURSE OUTCOME</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO1</b>	Students should understand the concept of quality control and quality assurance
<b>CO2</b>	Students should learn pharmacopoeial guidelines about in process quality control testing
<b>CO3</b>	Students should appreciate the need of documentation in pharmaceutical industry.
<b>CO4</b>	Students should understand the quality assurance aspects of manufacturing and process control, Discuss about intellectual property rights and their scope in pharmaceutical industry





**Subject: Product Development & Technology Transfer**

**Subject Code: MQA104T**

<b>COURSE OUTCOME</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO1</b>	Student should be able to understand the new product development process
<b>CO2</b>	Student should be able to identify preformulation characteristic to develop a product.
<b>CO3</b>	Student should be able to explain the necessary information to transfer technology from R&D to actual manufacturing site.
<b>CO4</b>	Student should be able to describe Pharmaceutical packaging parameters and Quality control test
<b>CO5</b>	Student should be able to explain tech transfer techniques and documentation parameters

**Subject: Pharmaceutical Quality Assurance Practical I**

**Subject Code: MQA105P**

<b>COURSE OUTCOME</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO1</b>	Student able to perform quantitative estimation of drugs from formulations
<b>CO2</b>	Student understand hands on training to students using different instruments like used for qualitative and quantitative analysis
<b>CO3</b>	Student understand concept TQM, Six Sigma, change management, change control, Deviations out of specifications, out of trend, CAPA
<b>CO4</b>	Student able to describe pharmacopoeial requirements for pharmaceuticals





**Department: Pharmacology**

**Subject: Advanced Pharmacology-I**

**Subject Code: MPL102T**

Course Outcome	Description/Statement
CO1	Student able to discuss the pathophysiology and pharmacotherapy of certain diseases
CO2	Student able to explain the mechanism of drug actions at cellular and molecular level
CO3	Student able to understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases

**Subject: Pharmacological and Toxicological Screening Methods – I**

**Subject Code: MPL103T**

COURSE OUTCOME	DESCRIPTION/STATEMENT
CO 1	Students should be able to understand the regulations and ethical requirement for the usage of experimental animals their use in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals.
CO 2	Students should be able to describe the general principles of preclinical screening and various newer screening methods for study of drugs acting on CNS, ANS and drugs for neurodegenerative diseases.
CO 3	Students should be able to explain the various screening methods for study of drugs acting on respiratory system, reproductive system, GIT and analgesics, antipyretics, anti-inflammatory drugs.
CO 4	Students should be able to discuss the various screening methods for study of drugs acting on CVS, drugs for metabolic disorders, anti cancer agents, hepatoprotective agents.
CO 5	Students should be able to understand the general principles of immunoassay, various screening methods for study of Immunomodulators, Immunosuppressant's and immunostimulants. Appreciate and correlate the preclinical data to humans.





**Subject: Cellular and Molecular Pharmacology**

**Subject Code: MPL104T**

<b>COURSE OUTCOME</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO1</b>	Student able to explain the receptor signal transduction processes
<b>CO2</b>	Student able to understand the molecular pathways affected by drugs
<b>CO3</b>	Student able to appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process
<b>CO4</b>	Student able to demonstrate molecular biology techniques as applicable for pharmacology

**Subject: Pharmacological Practical - I**

**Subject Code: MPL105P**

<b>COURSE OUTCOME</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO1</b>	Student able to acquire the knowledge about advanced analytical instruments used preclinical research
<b>CO2</b>	Student able to impart basic practical skills and knowledge of dose calculation, routes of drug administration, blood collection method along with anesthesia and euthanasia in experimental animals
<b>CO3</b>	Student able to understand the basic concepts used in behavioral pharmacology for screening of drugs
<b>CO4</b>	Student able to observe, understand , analyze and evaluate the effect of drugs in animals by in vivo-pharmacology





**SEMESTER-II**

**Branch: Pharmaceutics**

**Subject: Molecular Pharmaceutics**

**Subject Code: MPH201T**

Course Outcome	Description/Statement
CO1	Students should understand the concept of microencapsulation and able to learn various methods for the development of microcapsules and its evaluation, applications
CO2	Students should learn and understand the concept of pulmonary drug delivery systems and also to design the intranasal formulations
CO3	Students should be able to understand the nucleic acid based drug delivery systems. Also able to remember its application in targeting the various diseases like gene therapy
CO4	Students should understand and learn the various concepts of targeted drug delivery systems and biological processes involved in tumor targeting with the help of nanoparticles, liposomes

**Subject: Advanced Biopharmaceutics & Pharmacokinetics**

**Subject Code: MPH202T**

Course Outcome	Description/Statement
CO1	Understanding of the basic concepts in biopharmaceutics and pharmacokinetics
CO2	The use and application of raw data and derive the pharmacokinetic models and parameters that best describe the process of drug absorption, distribution, metabolism and elimination.
CO3	The critical evaluation of biopharmaceutic studies involving drug product equivalency.
CO4	The design and evaluation of dosage regimen of the drugs using pharmacokinetic and biopharmaceutic parameters.
CO5	The potential clinical pharmacokinetic problems and application of basics of pharmacokinetics





**Subject: Computer Aided Drug Development System- Theory**

**Subject Code: MPH203T**

<b>COURSE OUTCOMES</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO 1</b>	Students will be able to understand, the history of computers in product development. also shall be able to understand about the various models/software, QbD as per ICH guidelines and regulatory and industry views on QbD.
<b>CO 2</b>	Students shall be able to understand the, computers in Drug absorption, distribution, excretion, intestinal permeation and Solubility. Also how active transporter helps to move the drug molecules.
<b>CO 3</b>	Students should know the concept of optimization, parameters and role of computers in development of pharmaceutical emulsions and microemulsion. The rights, ethics and drug on computer use is also understand by students.
<b>CO 4</b>	Students shall be able to understand the biopharmaceutical characterization with the help of computers including in-vitro and in-vivo correlation. Computers in clinical data collection and simulation is also another concept will understand the students.
<b>CO 5</b>	Pharmaceutical Automation, applications, Advantages and Disadvantages of Artificial intelligence shall be understand by the students.

**Subject: Cosmetics and Cosmeceuticals - Theory**

**Subject Code: MPH204T**

<b>Course Outcome</b>	<b>Description/Statement</b>
<b>CO1</b>	Students should be able to understand Indian regulatory requirements for cosmetics
<b>CO2</b>	Students should be able to explain biological aspects of cosmetics
<b>CO3</b>	Students should be able to describe formulation aspects of cosmetics
<b>CO4</b>	Students should be able to illustrate design of Cosmeceuticals products
<b>CO5</b>	Students should be able to comprehend basics of herbal cosmetics
<b>CO6</b>	Students should be able to explain perfumes and controversial ingredients







**Subject: Pharmaceutics Practical II**

**Subject Code: MPH205P**

<b>Course Outcome</b>	<b>Description/Statement</b>
<b>CO1</b>	Understanding of the formulation aspects of Pharmaceuticals
<b>CO2</b>	Knowledge of novel drugdesign anddevelopment
<b>CO3</b>	Evaluation studies for dosage form
<b>CO4</b>	Use of modern tools for the development for dosage forms



**Department: Pharmaceutical Quality Assurance**

**Subject: Hazards and Safety Management**

**Subject Code: MQA201T**

Course Outcome	Description/Statement
<b>CO1</b>	Student able to understand about the multidisciplinary nature of environmental studies, various natural resources and its allied problems
<b>CO2</b>	Student able to understand the concept, structure and function of an ecosystem
<b>CO3</b>	Student able to learn about sources and type's industrial hazards and method of Hazard assessment, procedure, and methodology for provide safe industrial atmosphere.
<b>CO4</b>	Student able to understand the prevention of air, chemical and fire hazards and critical hazard management systems
<b>CO5</b>	Student able to describe the hazard and risk management in workplace, and the rules and guidelines on risk assessment and management

**Subject: Pharmaceutical Validation– Theory**

**Subject Code: MQA202T**

COURSE OUTCOMES	DESCRIPTION/STATEMENT
<b>CO 1</b>	Understand and apply the concepts of qualification and validation including their types and significance.
<b>CO 2</b>	Understand and apply the process of qualification of manufacturing equipment and analytical instruments
<b>CO 3</b>	Understand and apply the process of qualification of laboratory equipments and validation of utility system.
<b>CO 4</b>	Understand and apply the process of "process validation of various formulations", "analytical method validation", "guidelines on process validation" and" documentation of process validation".
<b>CO 5</b>	Understand and apply the cleaning method development and cleaning validation of various equipment and facilities including sterile and non-sterile plant.
<b>CO 6</b>	Understand and apply the concept of intellectual property, its importance, mechanism, process of filing patent applications, its rights and responsibilities there under.





**Subject: Audit & Regulatory Compliance**

**Subject Code:MQA203T**

<b>Course Outcome</b>	<b>Description/Statement</b>
<b>CO1</b>	Students should understand the importance of auditing
<b>CO2</b>	Students should understand the methodology of auditing
<b>CO3</b>	Students should understand execution of audit process
<b>CO4</b>	To prepare the audit report.

**Subject: Pharmaceutical Manufacturer Technique**

**Subject Code: MQA204T**

<b>Course Outcome</b>	<b>Description/Statement</b>
<b>CO1</b>	Student should be able to understand the new product development process
<b>CO2</b>	Student should be able to identify preformulation characteristic to develop a product
<b>CO3</b>	Student should be able to identify preformulation characteristic to develop a product
<b>CO4</b>	Student should be able to describe Pharmaceutical packaging parameters and Quality control test
<b>CO5</b>	Student should be able to explain tech transfer techniques and documentation parameters

**Subject: Pharmaceutical Quality Assurance Practical II**

**Subject Code:MQA205P**

<b>COURSE OUTCOME</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO1</b>	Student able to understand Identification & estimation of drug in pharmaceuticals by various techniques
<b>CO2</b>	Student able to describe the basic principles and methods of validation of an analytical method for pharmaceuticals
<b>CO3</b>	Student able to understand and perform Qualification of Pharmaceutical Testing Equipment
<b>CO4</b>	Student able to describe the principles and applications of QbD, Design of plant layout: Sterile and non-sterile





**Department: Pharmacology**

**Subject: Advanced Pharmacology II– Theory**

**Subject Code: MPL201T**

<b>COURSE OUTCOMES</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO 1</b>	Explain the mechanism of drug actions at cellular and molecular level
<b>CO 2</b>	Discuss the pathophysiology and pharmacotherapy of certain diseases
<b>CO 3</b>	Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases.
<b>CO 4</b>	Learn, acquire and update knowledge about recent advancement in diagnosis and drug therapy of various diseases

**Subject: Pharmacological and Toxicological Screening Methods-II**

**Subject Code: MPL202T**

<b>COURSE OUTCOMES</b>	<b>DESCRIPTION/STATEMENT</b>
<b>CO 1</b>	Students should be able to understand the definition and types of toxicology, regulatory guidelines for conducting toxicity studies, OECD principles of good laboratory practice (GLP) - history, concept and its importance in drug development.
<b>CO 2</b>	Students should be able to describe the acute, sub-acute and chronic- oral, dermal and inhalational studies as per OECD guidelines. Acute eye irritation, skin sensitization, dermal irritation & dermal toxicity studies. Test item characterization- importance and methods in regulatory toxicology studies
<b>CO 3</b>	Students should be able to explain the reproductive toxicology studies, teratogenicity studies, genotoxicity studies, In vivo carcinogenicity studies.
<b>CO 4</b>	Students should be able to discuss the IND enabling studies, Safety pharmacology studies- Tier1- CVS, CNS and respiratory safety pharmacology, HERG assay. Tier2- GI, renal and other studies
<b>CO 5</b>	Students should be able to understand the toxicokinetics & Alternative methods to animal toxicity testing.





**Subject: Principles of Drug Discovery**

**Subject Code: MPL203T**

<b>Course Outcome</b>	<b>Description/Statement</b>
<b>CO1</b>	Student able to explain the various stages of drug discovery.
<b>CO2</b>	Student able to describe the importance of the role of genomics, proteomics and bioinformatics in drug discovery
<b>CO3</b>	Student able to explain various targets for drug discovery
<b>CO4</b>	Student able to explain various lead seeking method and lead optimization
<b>CO5</b>	Student able to understand the importance of the role of computer aided drug design in drug discovery

**Subject: Pharmacological Practical II– Practical**

**Subject Code: MPL205P**

<b>Course Outcome</b>	<b>Description/Statement</b>
<b>CO1</b>	Student able to gain the knowledge about basics of experimental pharmacology i.e. in-vivo and in-vitro methods
<b>CO2</b>	Student able to impart practical knowledge of preparation of different Physiological salt solution and its application in experimental pharmacology
<b>CO3</b>	Student able to study the effect of drug and drug receptor interaction on isolated organs/tissues of animals by using different bioassay methods
<b>CO4</b>	Student able to learn and understand the guidelines used in preclinical research for toxicity studies
<b>CO5</b>	Student able to gain the knowledge about non-invasive techniques used in preclinical research
<b>CO6</b>	Student able to understand the basic knowledge of different protocol design

