



Viswambhara Educational Society  
**VAAGDEVI PHARMACY COLLEGE**  
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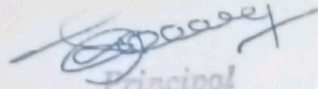
### COURSE OUTCOMES (COs)

The learning objectives for the programmes and courses are spelled out in detail by the college. The institution uses the following approach to inform teachers and students about the learning outcomes. For the convenience of the teachers and students, hard copies of the syllabus and learning outcomes are available in the departments. The Program and Course Learning Outcomes are displayed on the walls outside of each Department. For reference, a soft copy of each program's curriculum and learning outcomes is also uploaded on the institution's website. Every IQAC meeting and College Committee meeting has discussed the importance of the learning outcomes with the teachers. Through tutorial meetings, the pupils are also made aware of the same.

### PROGRAMME OUTCOMES (POs)

- 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the Profession of Pharmacy, including biomedical sciences; Pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- 2. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- 3. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- 4. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- 5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as



  
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responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
7. **Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
8. **Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
9. **The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
10. **Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
11. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in dependent and life-long learning in the broadest context of technological change



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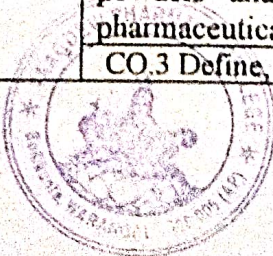
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Program: Bachelor of Pharmacy

Duration: 4 years

**COURSE OUTCOMES**  
**1 Year I Semester**

| COURSE CODE | COURSE NAME                      | COURSE OUTCOME   |
|-------------|----------------------------------|--|
|             |                                  | Upon completion of the course, the student should be able to   |
| PS101       | HUMAN ANATOMY AND PHYSIOLOGY - I | CO. 1 illustrate the Structural organization of body systems and use the anatomical terminology  |
|             |                                  | CO.2 Identify the functional classification of joints and formations of bones and integumentary system   |
|             |                                  | CO.3 Illustrate the Nerve impulse formation, transmission and release of neurotransmitter.   |
|             |                                  | CO.4 Identify the functional coordination between the CNS & PNS  |
|             |                                  | CO.5 Identify the disorders and approach for treatment of special senses.  |
|             |                                  | CO.6 Identify the disorders and approach for treatment of Endocrine system and can suggest the non-pharmacological treatment.  |
| PS102       | PHARMACEUTICAL ANALYSIS-I        | CO. 1 Apply different techniques of analysis and methods of expressing concentration in preparation and standardizations of different compounds and explain source, types and minimization of errors.. |
|             |                                  | CO.2 Classify and understand the theories of acid-base titrations along with an idea of non-aqueous titrations with suitable examples.   |
|             |                                  | CO.3 Describe concepts in precipitation titrations and complexometric titrations   |
|             |                                  | CO.4 Perform gravimetric Analysis along with identification of impurities  |
|             |                                  | CO.5 Comprehend concepts, principle, types and applications of Redox Titrations  |
|             |                                  | CO.6 Implement the Electro chemical method of analysis in Determination end points.  |
| PS103       | PHARMACEUTICS-I                  | CO.1 Describe historical background and development of pharmacy profession with special emphasis on prescriptions, dosage forms Posology.  |
|             |                                  | CO.2 Understand advantage and disadvantages of powders and liquid dosage forms along with pharmaceutical calculations.   |
|             |                                  | CO.3 Define, Classify, Prepare formulations such as  |



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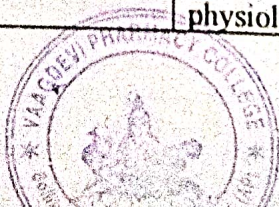


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|       |                                    |  |
|-------|------------------------------------|--|
|       |                                    | <p>suspensions and emulsions.</p> <p>CO.4 Identify stability problems and steps to overcome them along with an idea of monobasic liquids.</p> <p>CO.5 Define, Classify, Prepare and Evaluate suppositories and learn classification of Pharmaceutical Incompatibilities.</p> <p>CO.6 Define, Classify and understand mechanisms and factors influencing dermal penetration of drugs and understand preparation and evaluation of semisolid dosage forms.</p>   |
| PS104 | PHARMACEUTICAL INORGANIC CHEMISTRY | <p>CO.1 Determine the sources of impurities and principles involved in limit tests and to determine the impurities in inorganic drugs and pharmaceuticals.</p> <p>CO.2 Apprehend theories of acids and bases, buffer capacity and buffer action, extra and intracellular electrolytes and dental products.</p> <p>CO.3 Comprehend the ideal properties and mechanism of action of gastrointestinal agents.</p> <p>CO.4 Define and classify gastrointestinal agents.</p> <p>CO.5 Define, prepare following the principles and procedures involved in assay of expectorants, emetics, haematinics, astringent, poison and antidotes.</p> <p>CO.6 Apprehend the definition, preparation, assay methods of radiopharmaceuticals.</p> |
| PS105 | COMMUNICATION SKILLS               | <p>CO.1 Know the importance of communication, overcome barriers to communicate and perspectives in communication.</p> <p>CO.2 Learn elements of communication and communication styles.</p> <p>CO.3 Develop Listening skills required for communication</p> <p>CO.4 Develop effective writing skills for good communication</p> <p>CO.4 Develop skills to face interviews and deliver presentation of seminars.</p> <p>CO.5 Improve soft skills and participation in group discussions without hesitation or fear</p>  |
| PS106 | Remedial Biology                   | <p>CO.1 Classify five kingdoms of life with emphasis on salient features of them.</p> <p>CO.2 Apprehend basic concepts of anatomy and physiology of plants</p> <p>CO.3 Comprehend basic components of anatomy and physiology of animals.</p>   |



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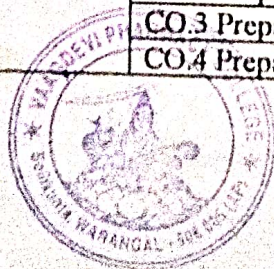


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|       |                                  |  |
|-------|----------------------------------|--|
|       |                                  | CO.4 Describe the basic components of anatomy and physiology of humans   |
|       |                                  | CO.5 Enumerate essential minerals, macro and micro nutrients for plant nutrition and also an idea on photosynthesis process. |
|       |                                  | CO.6 Define the terms respiration, growth and development of plant-cell  |
| PS107 | REMEDIAL MATHEMATICS             | CO.1 Learn in detail about matrices and components of matrices and determinants with emphasis on gauss elimination method    |
|       |                                  | CO.2 Acquire knowledge on logarithms and functions along with their application in solving pharmaceutical problems           |
|       |                                  | CO.3 Define and study limits and continuity of calculus  |
|       |                                  | CO.4 Comprehend properties and derivatives in differentiation  |
|       |                                  | CO.5 Understand integration with its formulae, rules and application.  |
|       |                                  | CO.6 Perform differential equations and their applications in solving pharmacokinetic equations.                             |
| PS108 | HUMAN ANATOMY AND PHYSIOLOGY LAB | CO.1 Record body temperature by using sphygmomanometer'  |
|       |                                  | CO.2 Interpret various organ system of human body with specimens and models.   |
|       |                                  | CO.3 Study handling of simple and compound microscope.   |
|       |                                  | CO.4 Identify axial and appendicular bones.  |
|       |                                  | CO.5 Observe microscopically epithelial, connective, muscular and nervous tissue.  |
| PS109 | PHARMACEUTICAL ANALYSIS I -LAB   | CO.1 Prepare and standardize different compounds   |
|       |                                  | CO.2 Classify titrimetric procedures by performing the assay along with percentage purity calculation                        |
|       |                                  | CO.3 Perform procedures of different methods of titrations   |
|       |                                  | CO.4 Work on use of pH meter and conductivity meter  |
|       |                                  | CO.5 Work on electro chemical method of analysis by calculation of potential and conductivity.                               |
| PS110 | PHARMACEUTICS I -LAB             | CO.1 Prepare Syrups and Elixirs  |
|       |                                  | CO.2 Prepare Tinctures and solutions   |
|       |                                  | CO.3 Prepare suspensions and emulsions   |
|       |                                  | CO.4 Prepare powders and granules  |



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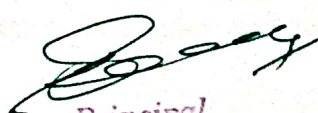
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|-------|--|--|
|       |  | CO.5 Prepare suppositories, semi-solids and gargles and mouthwashes.   |
| PS111 | PHARMACEUTICAL<br>INORGANIC CHEMISTRY<br>LAB | CO.1 Perform the limit test for chlorides, sulphates, lead, iron, heavy metals and arsenic   |
|       |  | CO.2 Carry out identification tests for magnesium hydroxide, ferrous sulphate, sodium carbonate etc                                    |
|       |  | CO.3 Perform swelling power of Bentonite   |
|       |  | CO.4 Perform neutralizing capacity of aluminum hydroxide gel   |
|       |  | CO.5 Prepare boric acid, potash alum and ferrous sulphate  |
| HS112 | COMMUNICATION SKILLS<br>-LAB                 | CO.1 Develop communicating with people by meeting people, asking questions and making friends and other modes of communicating people. |
|       |  | CO.2 Learn pronunciation of consonants, vowels and nouns   |
|       |  | CO.3 Listening comprehension by direct and indirect speech.  |
|       |  | CO.4 Develop effective writing skills and facing Interviews.   |
|       |  | CO.5 Learn presentation skills and mailing skills  |
| BS113 | REMEDIAL BIOLOGY -<br>LAB                    | CO.1 Handle simple and compound microscope.  |
|       |  | CO.2 Perform section cutting, mounting, staining and permanent slide preparation   |
|       |  | CO.3 Study of cell, root, leaf and modifications   |
|       |  | CO.4 Study of frog by using computer models  |
|       |  | CO.5 Determine blood group, blood pressure and total volume  |



  
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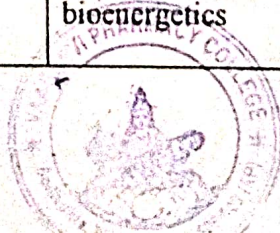
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I YEAR II SEMESTER

| COURSE CODE | COURSE NAME                        | COURSE OUTCOME  |
|-------------|------------------------------------|---|
| PS201       | Human Anatomy and Physiology II    | CO.1 Perform and analyze the hematological examination.   |
|             |                                    | CO.2 Differentiate various CVS & heart disorders  |
|             |                                    | CO.3 Analyze the GIT disorders based on the knowledge of anatomical & physiological of GIT                        |
|             |                                    | CO.4 Conceptualize the anatomical aspects and mechanism of respiration  |
|             |                                    | CO.5 Inter link the role of Urinary system with CVS in regulation and control of Blood Pressure.                  |
|             |                                    | CO.6 Conceptualize genetics to understand and illustrate the concepts of inheritance.                             |
| PS202       | PHARMACEUTICAL ORGANIC CHEMISTRY I | CO.1 Write the structure, name and type of isomerism of the organic compound.                                     |
|             |                                    | CO.2 Explain the concepts and theories in alkanes, alkenes and conjugated dienes.                                 |
|             |                                    | CO.3 Write the reaction, name the reaction and orientation of reactions   |
|             |                                    | CO.4 Write various reactions and uses of aldehyde and ketones   |
|             |                                    | CO.5 Recall structure and uses of various carboxylic compounds.   |
|             |                                    | CO.6 Explain Nucleophilic substitution reactions in alkyl halides.  |
| BS203       | PHARMACEUTICAL BIOCHEMISTRY        | CO.1 Understand the carbohydrate metabolism via various pathways and their significance and biological oxidation. |
|             |                                    | CO.2 Acquire knowledge on lipid metabolism and amino acid metabolism  |
|             |                                    | CO.3 Learn nucleic acid metabolism through biosynthesis and catabolism of nucleotides.                            |
|             |                                    | CO.4 Understand the structure and function of nucleic acids, transcription and translation process                |
|             |                                    | CO.5 Gain knowledge on biomolecules and bioenergetics   |



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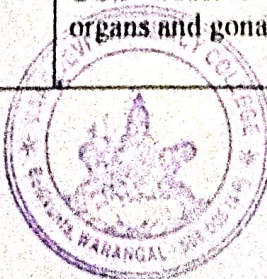


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|       |                                     |   |
|-------|-------------------------------------|---|
|       |                                     | CO.6 Acquire knowledge on properties nomenclature, classification of enzymes along with enzyme kinetics, enzyme inhibitors regulation of enzyme.  |
| BS204 | PATHOPHYSIOLOGY                     | CO.1 Know and understand the basic principles of cell injury and adaption as well as the basic mechanism involved in the process of inflammation and repair.                            |
|       |                                     | CO.2 Analyse and describe the signs and symptoms, etiology, pathogenesis and complications of diseases/disorders related to Cardiovascular system, Respiratory system and Renal system. |
|       |                                     | CO.3 Understand and describe the signs and symptoms, etiology, pathogenesis and complications of hematological diseases. and diseases/disorders related to Endocrine system,            |
|       |                                     | CO.4 Correlate the concepts of diseases/disorders related to Endocrine system and Nervous system  |
|       |                                     | CO.5 Understand and describe the signs and symptoms, etiology, pathogenesis and complications of diseases related to liver, intestine, bones and joints.                                |
|       |                                     | CO.6 Outline and describe the signs and symptoms, etiology, pathogenesis and complications of diseases like infectious and sexually transmitted diseases.                               |
| CS205 | COMPUTER APPLICATIONS IN PHARMACY   | CO.1 Apply concepts of Number system, Information systems and Software.   |
|       |                                     | CO.2 Apply knowledge of programming languages, web servers and web products and databases in pharmacy.  |
|       |                                     | CO.3 Apply knowledge of computers in drug designing and electronic prescribing.   |
|       |                                     | CO.4 Apply knowledge of computers in discharge systems and diagnostic systems.  |
|       |                                     | CO.5 Have an idea of Bioinformatics on databases and concepts of bioinformatics in Vaccine discovery.   |
|       |                                     | CO.6 Know the importance of computers as part of data analysis n preclinical development.   |
| PS206 | HUMAN ANATOMY AND PHYSIOLOGY II LAB | CO.1 Enumerate white and red blood cells.   |
|       |                                     | CO.2 Determine Hemoglobin content, blood group, ESR, Bleeding and clotting time   |
|       |                                     | CO.3 Record B.P by sphygmomanometer and basal mass index  |
|       |                                     | CO.4 Aware of using family planning devices and pregnancy diagnose test   |
|       |                                     | CO.5 Observe and identify permanent slides of vital organs and gonads.  |



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|       |   |   |
|-------|---|---|
| PS207 | PHARMACEUTICAL<br>ORGANIC CHEMISTRY I-<br>LAB | CO 1 Synthesize Various Organic Compounds   |
|       |   | CO 2 Carry out systematic qualitative analysis of unknown organic compounds                                   |
|       |   | CO 3 Identify unknown compound using melting and boiling point  |
|       |   | CO 4 Prepare and confirm the identity of derivatives of unknown compounds by melting/boiling point            |
|       |   | CO 5 Construct Molecular models   |
| BS208 | PHARMACEUTICAL<br>BIOCHEMISTRY- LAB           | CO 1 Carry out qualitative analysis of carbohydrates, reducing sugars and abnormal constituents               |
|       |   | CO 2 Study effect of temperature and substrate concentration on salivary amylase activity.                    |
|       |   | CO 3 Determine blood creatinine, blood sugar and serum total cholesterol.                                     |
|       |   | CO 4 Identify proteins by using chemical tests  |
|       |   | CO 5 Understand the effect of enzymatic hydrolysis of starch.   |
| CS209 | COMPUTER<br>APPLICATIONS IN<br>PHARMACY-LAB   | CO.1 Retrieve information of a drug and its adverse effects using online tools                                |
|       |   | CO.2 Create a HTML web page and database in MS Access to store patient information.                           |
|       |   | CO.3 Generate and print report from patient database  |
|       |   | CO.4 Design a questionnaire using a word processing package to gather information about a particular disease. |
|       |   | CO.5 Export tables, Queries, forms and reports to web pages and XML Pages.                                    |



  
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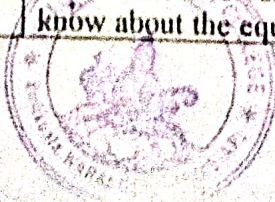
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## II YEAR I SEMESTER

| COURSE CODE | COURSE NAME                         | COURSE OUTCOME  |
|-------------|-------------------------------------|---|
| PS301       | PHARMACEUTICAL ORGANIC CHEMISTRY-II | CO.1 Write the structure, name and type of isomerism of the organic compound.   |
|             |                                     | CO.2 Explain the concepts and theories in alkanes, alkenes and conjugated dienes.   |
|             |                                     | CO.3 Write the reaction, name the reaction and orientation of reactions   |
|             |                                     | CO.4 Write various reactions and uses of aldehyde and ketones   |
|             |                                     | CO.5 Recall structure and uses of various carboxylic compounds.   |
|             |                                     | CO.6 Explain Nucleophilic substitution reactions in alkyl halides.  |
| PS302       | PHYSICAL PHARMACEUTICS-I            | CO.1 To explain various states of matter and their properties along with Physicochemical properties of drug molecules in the designing of the dosage form.  |
|             |                                     | CO.2 To elaborate the principles of solubility by applying various laws of dissolution and drug release.  |
|             |                                     | CO.3 To analyze the micromeritic properties of powders and their characteristics.   |
|             |                                     | CO.4 To acquire knowledge on derived properties of powders  |
|             |                                     | CO.5 To summarize the concepts of drug complexation and protein binding.  |
|             |                                     | CO.6 To determine the pH of different solutions and buffers in pharmaceutical and biological systems.   |
| BS303       | PHARMACEUTICAL MICROBIOLOGY         | CO.1 Acquire knowledge on history, scope, and diversity of microorganisms. Understand morphology, cultivation and preservation of various microorganisms.   |
|             |                                     | CO.2 Identify the bacteria by using various staining techniques and biochemical tests and understand the importance of sterilization in pharmaceutical industry   |
|             |                                     | CO.3 Describe the microbiology of fungi and virus.  |
|             |                                     | CO.4 Outline disinfectants and their evaluation tests, sterility testing of different pharmaceutical substances.  |
|             |                                     | CO.5 Apprehend the concepts of aseptic area, laminar air flow equipment, microbiological assays, standardization of antibiotics, vitamins, amino acids and general aspects of environmental cleanliness |
|             |                                     | CO.6 Relate the cell culture technology and its applications in pharmaceutical industries.  |
| PC304       | PHARMACEUTICAL ENGINEERING          | CO.1 Aware of size separation of different material to know about the equipments used in size separation. Aware   |



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|       |   |  |
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|       |   | <p>of mechanism of mixing &amp; different type of mixers.</p> <p>CO.2 Understand the basics of evaporation, equipments of evaporation. To know the heat transfer mechanisms. Acquire knowledge on Crystallization techniques.</p> <p>CO.3 Acquire knowledge on different types of dryers; EMC, FMC, DRC. Acquire knowledge on Distillation techniques.</p> <p>CO.4 Aware of Filtration of different material to know about the equipments used in Filtration &amp; Centrifugation.</p> <p>CO.5 Aware of plant location, plant layout, plant safety along with materials used in plant construction along with emphasis on Industrial Hazards and Accidents.</p> <p>CO.6 Gain the knowledge on the various equipment which are used in the pharmaceutical industry.</p> |
| PS305 | PHARMACEUTICAL ORGANIC CHEMISTRY-II LAB | <p>CO.1 Perform laboratory techniques such as recrystallization and steam distillation.</p> <p>CO.2 Determine acid value, saponification value and iodine value for oils.</p> <p>CO.3 Preparation of Various organic compounds using Acylation, Halogenation, Nitration, Oxidation, Hydrolysis and Coupling Reactions</p> <p>CO.4 Prepare Dibenzal acetone from Benzaldehyde by Claisen Schmidt reaction</p> <p>CO.5 Prepare Cinnamic acid from benzaldehyde by Perkin reaction.</p>   |
| PS306 | PHYSICAL PHARMACEUTICS -I LAB           | <p>CO.1 Determine % composition of NaCl in a solution using phenol-water system by CST method.</p> <p>CO.2 Determine solubility of drug at room temperature</p> <p>CO.3 Analyze particle size, particle size distribution using sieving method and Microscopic method</p> <p>CO.4 Calculate and compare bulk density, true density and porosity, angle of repose of various powders and granules.</p> <p>CO.5 Determine pKa value by Half Neutralization/ Henderson Hassel Balch equation</p>  |
| BS307 | PHARMACEUTICAL MICROBIOLOGY LAB         | <p>CO.1 Carry out sterilization of glassware and culture media</p> <p>CO.2 Determine motility of microorganism and bacteriological analysis of water</p> <p>CO.3 Demonstrate and perform different staining methods of microorganisms.</p> <p>CO.4 Incorporate and evaluate isolation of pure culture of microorganism.</p> <p>CO.5 Evaluation of microbiological assay of different antibiotics.</p>  |



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| PS308 | PHARMACEUTICAL<br>ENGINEERING LAB | CO 1 Determine the radiation constant of brass, iron, unpainted glass, various techniques of distillation and to gain knowledge about overall heat transfer mechanism. |
|       |                                   | CO 2 Determine the rate of drying, moisture content on rate of drying, humidity (relative humidity & absolute humidity)  |
|       |                                   | CO 3 Know about principles, working of various dryers and mixers. To calculate uniformity index by using double cone blender   |
|       |                                   | CO 4 Discuss about factors influencing rate of filtration & evaporation. To study the effect of time on rate of crystallization  |
|       |                                   | CO 5 Gain the knowledge on the various equipment which is used in the pharmaceutical industry  |



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**II YEAR II SEMESTER**

| COURSE CODE | COURSE NAME                          | COURSE OUTCOME   |
|-------------|--------------------------------------|--|
| PS401       | PHARMACEUTICAL ORGANIC CHEMISTRY-III | CO.1 Demonstrate the stereo chemical aspects of organic compounds and stereo chemical reactions.   |
|             |                                      | CO.2 Understand and explain Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity.                               |
|             |                                      | CO.3 Classify heterocyclic compounds with nomenclature.  |
|             |                                      | CO.4 Synthesize and recall the medicinal uses of some heterocyclic compounds.  |
|             |                                      | CO.5 Write the reaction mechanisms of some named reactions.  |
|             |                                      | CO.6 Recall properties of organic compounds and prepare heterocyclic compounds   |
| PS402       | PHYSICAL PHARMACEUTICS-II            | CO.1 Apply the principles of chemical kinetics in assigning expiry date for Formulation  |
|             |                                      | CO.2 Demonstrate the rheological properties of dug molecules.  |
|             |                                      | CO.3 Demonstrate use of physicochemical properties in evaluation of dosage forms.  |
|             |                                      | CO.4 Explain physical stability of emulsions and their preservation  |
|             |                                      | CO.5 Apply physicochemical properties of drug molecules in formulation research and Development.   |
|             |                                      | CO.6 Recall Classification of dispersed systems & their general characteristics  |
| PS403       | PHARMACOLOGY-I                       | CO.1 Define concepts of general pharmacology and their importance  |
|             |                                      | CO.2 Apply the concepts of signal transduction in drug discovery & development; and to analyze and report adverse drug reactions and drug interactions |
|             |                                      | CO.3 Apply mechanism of drug action and its relevance in the treatment of different ANS diseases.  |
|             |                                      | CO.4 Identify drug of choice in management of epilepsy   |
|             |                                      | CO.5 List out various neurotransmitters and their role in CNS Disorders  |
|             |                                      | CO.6 Apply basic pharmacological knowledge in the prevention and treatment of various CNS diseases.  |
| PC404       | PHARMACOGNOSY AND PHYTOCHEMISTRY- I  | CO.1 Describe basic concepts of pharmacognosy with emphasis on sources of drugs, their classification and quality control tests                        |





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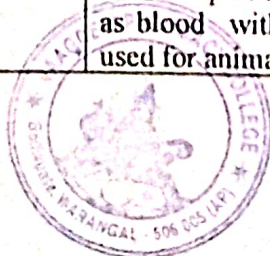


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|       |                               |   |
|-------|-------------------------------|---|
|       |                               | CO.2 Apprehend Cultivation, Collection, Processing and storage of drugs of natural origin   |
|       |                               | CO.3 Elaborate historical development of plant tissue culture, types of cultures.   |
|       |                               | CO.4 Determine nutritional requirements, growth and applications of plant tissue culture in pharmacognosy.  |
|       |                               | CO.5 Discuss the role of Pharmacognosy and secondary metabolites in allopathy and traditional systems of medicine.  |
|       |                               | CO.6 Comprehend biological source, chemical nature and uses of drugs of natural origin with emphasis on Plant Products like Primary metabolites, Proteins, Enzymes and Lipids.              |
| PS405 | PHARMACEUTICAL JURISPRUDENCE  | CO.1 Define the standards of schedules to the act and rules of D& C Act, Conditions for grant of license and conditions of license for manufacture of drugs,                                |
|       |                               | CO.2 List out important schedules administrative agencies of D& C Act   |
|       |                               | CO.3 Acquire knowledge on Pharmacy Act – 1948, Medicinal and Toilet Preparation Act -1955,  |
|       |                               | CO.4 Acquire knowledge on Narcotic Drugs and Psychotropic substances Act-1985 and Rules   |
|       |                               | CO.5 Restate Salient Features of Drugs and magic remedies Act and its rules, Prevention of Cruelty to animals Act-1960, National Pharmaceutical Pricing Authority                           |
|       |                               | CO.6 Acquire knowledge on Pharmaceutical Legislations, Code of Pharmaceutical ethics, Medical Termination of pregnancy act, right to information Act and Intellectual Property Rights (IPR) |
| PC406 | PHYSICAL PHARMACEUTICS-II LAB | CO.1 Determine of HLB number of a surfactant by saponification method & know the acid base values   |
|       |                               | CO.2 Determine viscosity of liquid using Ostwald's viscometer & know the viscosity of various liquids.  |
|       |                               | CO.3 Determine viscosity of semisolids by using Brookfield viscometer & know the viscosity of various liquids.  |
|       |                               | CO.4 Design Accelerated stability studies   |
| PS407 | PHARMACOLOGY-I LAB            | CO.1 Measure the effect of drug on Ciliary motility of frog oesophagus  |
|       |                               | CO.2 Observe the effects of drugs on locomotor activity using actophotometer  |
|       |                               | CO.3 Expertise in common laboratory techniques such as blood withdrawal, serum separation and anesthesia used for animal studies  |



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|       |   |  |
|-------|---|--|
|       |   | CO.4 Expertise different routes of drug administration in rats and mice                        |
|       |   | CO.5 Perform anxiolytic activity of drugs using rats and mice                                  |
| PC408 | PHARMACOGNOSY AND PHYTOCHEMISTRY- I LAB | CO.1 Determine morphology, histology, extraction and detection of different powder crude drugs |
|       |   | CO.2 Extract and isolate caffeine from tea   |
|       |   | CO.3 Carry out Isolation of herbal extraction by using TLC method                              |
|       |   | CO.4 Perform Extraction and Detection of various volatile oils by TLC.                         |
|       |   | CO.5 Perform Quality control tests of crude drugs.   |



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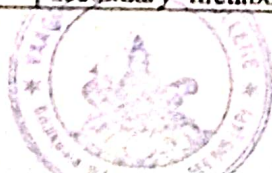
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**III YEAR I SEMESTER**

| COURSE CODE | COURSE NAME            | COURSE OUTCOME   |
|-------------|------------------------|--|
| PS501       | MEDICINAL CHEMISTRY-I  | CO.1 Understand the chemistry of drugs with respect to their pharmacological activity  |
|             |                        | CO.2 Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs   |
|             |                        | CO.3 Understand the Biosynthesis and Metabolism of Neurotransmitters   |
|             |                        | CO.4 Know the Structural Activity Relationship (SAR) of different class of drugs   |
|             |                        | CO.5 Write the chemical synthesis of some drugs  |
|             |                        | CO.6 Know the medicinal uses of some drugs   |
| PS502       | INDUSTRIAL PHARMACY -I | CO.1 Analyze the pre-formulation characteristics of drug substance in formulation & development of various dosage forms.                           |
|             |                        | CO.2 Acquire knowledge on manufacturing considerations in development of tablets and liquid orals  |
|             |                        | CO.3 Gain knowledge on formulation requirements and in process quality control tests for capsules and pellets with emphasis on special techniques. |
|             |                        | CO.4 Design a layout on parenteral and ophthalmic product with emphasis on evaluation studies.   |
|             |                        | CO.5 Learn the fundamentals of cosmetics and learn about various skin and hair care products   |
|             |                        | CO.6 List out the types of Parenteral Products, Formulation of injections, Containers and closures, Ophthalmic Preparations                        |
| PS503       | PHARMACOLOGY- II       | CO.1 Recall and explain pharmacology of drugs acting on cardiovascular System.   |
|             |                        | CO.2 Enlist the drugs acting on hematopoietic system and able to explain pharmacology of drugs acting on urinary system.                           |
|             |                        | CO.3 Analyze the pharmacological action of autacoids and related drugs.  |
|             |                        | CO.4 Apply the concepts of inflammatory mediators and their role in the management of inflammation.  |
|             |                        | CO.5 Identify endocrine glands & treatment strategies in the management of endocrine imbalances.   |
|             |                        | CO.6 Define the clinical significance of hormonal analogues and antagonists enumerate the types and application of bioassay.                       |
| PS504       | PHARMACOGNOSY          | CO.1 Inculcate the knowledge on biogenesis of secondary metabolites in the plant and utilization of  |



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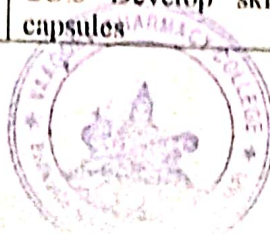


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|       |                             |   |
|-------|-----------------------------|---|
|       | AND<br>PHYTOCHEMISTRY - II  | <p>radioactive isotopes in the investigation of Biogenetic studies</p> <p>CO.2 Comprehend different extraction methods at laboratory with emphasis on chemical nature of few crude drugs</p> <p>CO.3 Understand and explain different crude drugs under the category of tannins and Resins</p> <p>CO.4 Understand and explain different crude drugs under the category of glycosides and terpenoids</p> <p>CO.5 Isolate, Identify and analyze Phyto-constituents belonging to Alkaloids, Glycosides, Terpenoids and Resins</p> <p>CO.6 Obtain awareness on industrial production of phytoconstituents.</p>  |
| PS508 | COSMETIC SCIENCE            | <p>CO1 –students gain knowledge on concepts of cosmetic and evolution cosmeceutical products and important excipients used along Structure of skin and oral cavity and their importance</p> <p>CO2 – Intended to provide basic information to students on the principles of formulation and building blocks of skin and hair care products</p> <p>CO3 – It imparts basic knowledge on the area of Sunscreen Formulations and role of herbs of skin, hair and oral care.</p> <p>CO4 –Designed to known the important principles of equipment's to known nature of skin and hair</p> <p>CO5–Upon completion of this course students can understand common problems associated to hair and skin along with formulations aspects of deodorants and antiperspirants.</p> |
| PC509 | MEDICINAL CHEMISTRY-I LAB   | <p>CO.1 Synthesize various drugs and gain skills in synthetic organic chemistry</p> <p>CO.2 Synthesize various drug Intermediates</p> <p>CO.3 Acquire the skills required for purification of organic Compounds through Column Chromatography method.</p> <p>CO.4 Know the importance and methods to perform assay of various drugs</p> <p>CO.5 Determine Partition coefficient of drugs.</p>   |
| PC510 | INDUSTRIAL PHARMACY – I LAB | <p>CO.1 Understand to Perform the pre-formulation parameters of drug substance</p> <p>CO.2 Formulate and evaluate tablets</p> <p>CO.3 Develop skills on filling and evaluation of capsules</p>  |



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|       |   |  |
|-------|---|--|
|       |   | CO 4 Formulate and evaluate Parenteral   |
|       |   | CO 5 Evaluate materials used for packaging such as glass, plastic, rubber closures etc                           |
| PC511 | PHARMACOLOGY - II<br>LAB                        | CO 1 Measure the effect of drug on isolated frog heart   |
|       |   | CO 2 Observe the diuretic activity of drugs using rats and mice  |
|       |   | CO 3 Conduct DRC using frog rectus abdominus muscle by acetylcholine   |
|       |   | CO 4 Perform bioassay of different drugs on rats by matching method, interpolation method and four-point methods |
|       |   | CO 5 Perform anti-inflammatory and analgesic activities on rats  |
| PC512 | PHARMACOGNOSY AND<br>PHYTOCHEMISTRY<br>- II LAB | CO.1 Determine morphology, histology, extraction and detection of different powder crude drugs of Alkaloids      |
|       |   | CO.2 Extract and isolate caffeine from tea   |
|       |   | CO.3 Carry out isolation of herbal extraction by using TLC method  |
|       |   | CO.4 Carry out Extraction and Detection of various volatile oils by TLC.   |
|       |   | CO.5 Perform Quality control tests of crude drugs.   |
|       |   | CO.6 Determine morphology, histology, extraction and detection of different powder crude drugs of Glycosides     |



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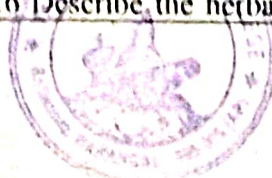
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**III YEAR II SEMESTER**

| COURSE CODE | COURSE NAME               | COURSE OUTCOME   |
|-------------|---------------------------|--|
| PS601       | MEDICINAL CHEMISTRY - III | CO.1 Answer the Nomenclature, Stereochemistry, Degradation, Adverse effects and therapeutic value of Beta Lactam antibiotics, Aminoglycosides and Tetracyclines. |
|             |                           | CO.2 Work on the concepts of SAR of Macrolide, Quinoline and Biguanide antibiotics   |
|             |                           | CO.3 Analyze the chemistry of drugs with respect to their biological activity.   |
|             |                           | CO.4 Determine Chemistry, Metabolism and SAR of Anti tubercular, Anti-viral, Quinolones and urinary tract ant infective agents.                                  |
|             |                           | CO.5 Classify and understand Mechanism of action, uses and synthesis of Anti-fungal, Anti-protozal, Anti-helminthics and sulfonamides.                           |
|             |                           | CO.6 Apply different techniques on drug design.  |
| PS602       | PHARMACOLOGY III          | CO.1 Enlist the different drugs used to treat various Respiratory and GIT disorders.   |
|             |                           | CO.2 Analyze the general principles of chemotherapy and list the clinical uses, side effects of different antibiotics.   |
|             |                           | CO.3 Enumerate the different therapeutic agents used to manage various diseases like tuberculosis, leprosy, malaria, etc.  |
|             |                           | CO.4 Identify the drug of choice in the management of different viral and fungal infections.   |
|             |                           | CO.5 Apply the chemotherapeutic approaches for the management of various infectious diseases.  |
|             |                           | CO.6 Define the principles of toxicology and can list out the treatment options for various poisoning conditions.  |
| PS603       | HERBAL DRUG TECHNOLOGY    | CO.1 Apply the fundamentals of herbal raw materials in biodynamic farming techniques   |
|             |                           | CO.2 Correlate the insights of nutraceuticals and herbal food interactions.  |
|             |                           | CO.3 Improve knowledge of herbal formulation preparation and evaluation.   |
|             |                           | CO.4 Explain the role of cosmetic excipients and building blocks in cosmetic formulation.  |
|             |                           | CO.5 Demonstrate the regulations that applies to protection of traditional knowledge against infringement.   |
|             |                           | CO.6 Describe the herbal drug industry's present and future  |



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|       |   |  |
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|       |   | prospects, as well as the components of Good Manufacturing Practice (GMP) for Indian medical systems   |
| PS604 | BIOPHARMACEUTICS<br>AND<br>PHARMACOKINETICS | CO.1 Explain the concepts of biopharmaceutics and pharmacokinetics, factors affecting drug absorption, distribution and Clinical significance of protein binding |
|       |   | CO.2 Acquire knowledge on basic metabolic pathways, renal excretion and protocols for bioequivalence studies   |
|       |   | CO.3 Outline the dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters   |
|       |   | CO.4 Compute various pharmacokinetic parameters from plasma and urinary excretion data by applying compartment and non-compartment modeling                      |
|       |   | CO.5 Familiarize with two compartment open model and IV bolus Kinetics of multiple dosing and their significance   |
|       |   | CO.6 Detect the causes of nonlinearity and compute $K_m$ and $V_{max}$ by Michaelis menton equation using graphical methods.                                     |
| PS606 | PHARMACEUTICAL<br>BIOTECHNOLOGY             | CO.1 Understanding the importance of Immobilized enzymes in Pharmaceutical Industries  |
|       |   | CO.2 Genetic engineering applications in relation to production of pharmaceuticals   |
|       |   | CO.3 Importance of Monoclonal antibodies in Industries   |
|       |   | CO.4 Appreciate the use of microorganisms in fermentation technology   |
|       |   | CO.5 Utilize the knowledge of hybridoma technolog and vaccines   |
|       |   | CO.6 Outline about recombinanat DNA technology and Immunity  |
| PS609 | MEDICINAL CHEMISTRY<br>- II LAB             | CO.1 Prepare Drugs and important intermediates.  |
|       |   | CO.2 Analyze the purity of drugs   |
|       |   | CO.3 Synthesize medicinally important compounds and intermediates by using microwave irradiation technique   |
|       |   | CO.4 Draw structures and reactions using chem draw software  |
|       |   | CO.5 Determine physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs.                      |
| PS610 | PHARMACOLOGY – III<br>LAB                   | CO.1 Calculate the dose for different pharmacological experiments  |
|       |   | CO.2 Evaluate the various novel compounds for their anti-ulcer activity.   |
|       |   | CO.3 Apply the concepts of pharmacological screening methods for determining the therapeutic effect of different   |



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|       |   |  |
|-------|---|--|
|       |   | drugs  |
|       |   | CO.4 Estimate the serum biochemical parameters by using semi-auto- analyzer.                             |
|       |   | CO.5 Apply several bio-statistic methods in experimental pharmacology.                                   |
| PS611 | HERBAL DRUG TECHNOLOGY LAB                | CO.1 Carry out phytochemical screening for crude drugs   |
|       |   | CO.2 Determine aldehyde, phenolic and alkaloid content in crude drugs                                    |
|       |   | CO.3 Evaluate different excipients of natural origin   |
|       |   | CO.4 Incorporate and evaluate natural extract in shampoos and creams                                     |
|       |   | CO.5 Incorporate and evaluate natural extract in syrups, tablets and mixtures                            |
| PS612 | BIOPHARMACEUTICS AND PHARMACOKINETICS LAB | CO.1 Perform Dissolution experimental study of influence of disintegration                               |
|       |   | CO.2 Analyze the drug release from semisolid dosage forms  |
|       |   | CO.3 Study of permeability of drugs using dialysis tubes/Sac   |
|       |   | CO.4 Drug permeation across membranes using diffusion cells  |
|       |   | CO.5 Evaluate all Pharmacokinetic parameters   |
| MC600 | HUMAN VALUES AND PROFESSIONAL ETHICS      | CO.1 Recall the importance of Values and Ethics in their personal life and professional life             |
|       |   | CO.2 Imbibe the students about the personal ethics by few Moral contents and to implement in their lives |
|       |   | CO.3 Analyze the role of Pharmacy in relation to other professions                                       |
|       |   | CO.4 Aware of their rights and responsibilities in work place and how to implement professional ethics   |
|       |   | CO.5 Know their rights and responsibilities as an employee, team member and a global citizen             |
|       |   | CO.6 List the current scenarios like world summits, issues and globalization                             |



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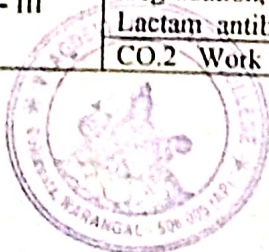
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**IV YEAR I SEMESTER**

| COURSE CODE | COURSE NAME                      | COURSE OUTCOME   |
|-------------|----------------------------------|--|
| PS701       | INSTRUMENTAL METHODS OF ANALYSIS | CO.1 Describe concepts of UV & Visible Spectrophotometry and Fluorimetry   |
|             |                                  | CO.2 Describe the principle, instrumentation and applications of IR and Atomic absorption spectra  |
|             |                                  | CO.3 Explain the Principles, Instrumentation and Applications of TLC and paper chromatography.   |
|             |                                  | CO.4 Explain the principles, instrumentation and applications of electrophoresis   |
|             |                                  | CO.5 Write the Principles, Instrumentation and Applications of HPLC and GC   |
|             |                                  | CO.6 Describe the principles, instrumentation and applications of Ion exchange and Gel Chromatographic Techniques and Affinity chromatography.                   |
| PS702       | INDUSTRIAL PHARMACY-II           | CO.1 Discuss the pilot plant and scale-up processes for pharmaceutical dosage forms, as well as the SUPAC guidelines.  |
|             |                                  | CO.2 Categorize the different aspects of technology transfer involved from research and development to manufacture.  |
|             |                                  | CO.3 Comprehend and implement different responsibilities and regulatory requirements for drug approval   |
|             |                                  | CO.4 Communicate different laws and acts that regulate pharmaceutical industry in India and US   |
|             |                                  | CO.5 Explore the functions and responsibilities of regulatory agencies in drug approval.   |
|             |                                  | CO.6 Describe the structure and functions of the national and state licensing authorities.   |
| PS703       | PHARMACY PRACTICE                | CO.1 Organize the hospital according to the primary, secondary and Tertiary Hospitals and their functioning.   |
|             |                                  | CO.2 Educate and implement various drug distribution methods used in the hospital.   |
|             |                                  | CO.3 Understand and to be able to do patient counseling in community pharmacy  |
|             |                                  | CO.4 Apply Clinical review, Medication history management and pharmaceutical care in health care sector.   |
|             |                                  | CO.5 Organize the pharmacy stores, Drug information Centre and importance of management  |
|             |                                  | CO.6 Carry out inventory control of pharmacy according to the needs of the hospital.   |
| PS704       | Medicinal Chemistry - III        | CO.1 Answer the Nomenclature, Stereochemistry, Degradation, Adverse effects and therapeutic value of Beta Lactam antibiotics, Aminoglycosides and Tetracyclines. |
|             |                                  | CO.2 Work on the concepts of SAR of Macrolide,   |



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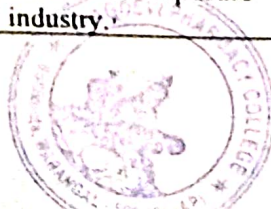


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|       |                                      |  |
|-------|--------------------------------------|--|
|       |                                      | <p>Quinoline and Biguanide antibiotics.</p> <p>CO.3 Analyze the chemistry of drugs with respect to their biological activity.</p> <p>CO.4 Determine Chemistry, Metabolism and SAR of Anti tubercular, Anti-viral, Quinilones and urinary tract ant infective agents.</p> <p>CO.5 Classify and understand Mechanism of action, uses and synthesis of Anti-fungal, Anti-protozal, Anti-helminthics and sulfonamides.</p> <p>CO.6 Apply different techniques on drug design.</p>  |
| PS707 | PHARMACOVIGILANCE                    | <p>CO.1 Know why drug safety monitoring is important?</p> <p>CO.2 Describe National and international scenario of pharmacovigilance</p> <p>CO.3 Adverse drug reaction reporting systems and communication in pharmacovigilance</p> <p>CO.4 Data during pre-clinical, clinical and post approval.</p> <p>CO.5 Pharmacovigilance Program of India (PvPI)</p> <p>CO.6 ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning</p>  |
| PS709 | INSTRUMENTAL METHODS OF ANALYSIS LAB | <p>CO.1 Perform the analysis of compounds by colorimetry, UV and Flourimetry.</p> <p>CO.2 Determine absorption maxima of organic compounds</p> <p>CO.3 Estimate compounds by Flame photometry and nephloturbidimetry</p> <p>CO.4 Carry out the separation of compounds by paper, column and Thin layer chromatography</p> <p>CO.5 Analyze the compounds by HPLC &amp; GC</p>   |
| PS710 | PRACTICE SCHOOL                      | <p>CO.1 Interact with executives to facilitate the process of learning by observations and discussions duly aided by checklist.</p> <p>CO.2 Visit the hospitals and work on some case studies like cardiovascular, diabetes and chronic diseases.</p> <p>CO.3 Collect the data from different pharmacy shops related to the most prescribed medicines in that area, prescription patterns, medical audit.</p> <p>CO.4 Submit the detailed report, to the concerned organization after successful completion of 150 hours in the hospital.</p> <p>CO.5 Collect and analyze the regulatory affairs of some important cases filed by drug control officers to be analyzed and reported.</p> |
| PS711 | INDUSTRIAL TRAINING                  | <p>CO.1 Visit Industries and get exposed to various equipment's used for formulations/Preparations in industries.</p> <p>CO.2 Get exposure to basic facilities required for an industry.</p>   |



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|  |  |   |
|--|--|---|
|  |  | CO 3 Understand GMP/GLP of Industries by practically observing them in industry.          |
|  |  | CO 4 Learn applications of theory which they have studied in their subject theoretically. |
|  |  | CO 5 Develop presentation skills of what they have learnt                                 |



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**IV YEAR II SEMESTER**

| COURSE CODE | COURSE NAME                            | COURSE OUTCOME  |
|-------------|--|---|
| PS801       | BIOSTATISTICS AND RESEARCH METHODOLOGY | CO.1 Define biostatistics, Statistics, measures of central tendency, measures of dispersion with emphasis on Karl Pearson coefficient of correlation.         |
|             |  | CO.2 Perform parametric tests along with acquiring knowledge on the concepts of Regression  |
|             |  | CO.3 Carry out non-parametric tests using specific tests like Wilcoxon Rank sum test, Mann whitney test and Friedman test                                     |
|             |  | CO.4 Design methodology of clinical trials using cohort studies, observational studies, experimental studies with special focus on phases of clinical trials. |
|             |  | CO.5 Operate MS EXCEL, SPSSR and MINITAB and Design of experiments.   |
|             |  | CO.6 Apply statistical techniques to design and carry out analysis of experiments like optimization software.   |
| PS802       | SOCIAL AND PREVENTIVE PHARMACY         | CO.1 Discuss the concepts of Health, Prevention & control of diseases, food in relation to nutrition, poverty, personal hygiene and health.                   |
|             |  | CO.2 Analyze the preventive & control measures for Communicable & Non-communicable Diseases.  |
|             |  | CO.3 Acquire knowledge on National Health Programs and its objectives.  |
|             |  | CO.4 Summarize the functioning and outcomes of National Health Programs.  |
|             |  | CO.5 Explain the concepts of various National health intervention program and Role of WHO in Indian National Program.   |
|             |  | CO.6 Extend the community services in rural, urban and school health like rural sanitation and health education programs.                                     |
| PS803       | NOVEL DRUG DELIVERY SYSTEM             | CO.1 Describe various approaches for the development of controlled drug delivery systems and application of polymers.   |
|             |  | CO.2 Summarize the concepts and formulation considerations of Microencapsulation, Mucoadhesive and Implantable drug delivery system.                          |
|             |  | CO.3 Design and evaluate the Transdermal and Gastro Retentive Drug Delivery systems.  |
|             |  | CO.4 Explain the concepts of Nasopulmonary drug   |



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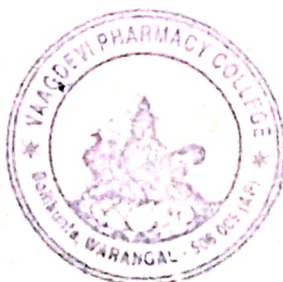


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|       |                                 |  |
|-------|---------------------------------|--|
|       |                                 | delivery systems.  |
|       |                                 | CO.5 Acquire the concepts, approaches and applications of Targeted Drug Delivery Systems.  |
|       |                                 | CO.6 Outline the concepts and applications of Ocular and Intrauterine Drug Delivery Systems.   |
| PS805 | NANO TECHNOLOGY                 | CO.1 This course will provide an insight into the fundamentals of Nanoscience and Nanotechnology.  |
|       |                                 | CO.2. The course provides basics of nanostructures and different types of nanostructures.  |
|       |                                 | CO.3. Describe the applications of nano technology   |
|       |                                 | CO.4 It also provides information about different thin film deposition techniques and transport phenomena.   |
|       |                                 | CO.5 Learn the characterization, drug release and stability of nano materials  |
| PS808 | NOVEL DRUG DELIVERY SYSTEMS LAB | CO.1 Acquire knowledge on diffusion of drugs through various polymeric membranes   |
|       |                                 | CO.2 Learn the Preparation and Evaluation of Microencapsules by different methods  |
|       |                                 | CO.3 Learn the Preparation and Evaluation of Mucosal Drug Delivery Systems   |
|       |                                 | CO.4 Acquire knowledge on preparation and evaluation of Transdermal Drug Delivery Systems  |
|       |                                 | CO.5 Learn the preparation and evaluation of Gastroretentive Drug Delivery Systems   |
|       |                                 | CO.6 Acquire knowledge on preparation and evaluation of Liposomes, Niosomes and Nanoparticles  |
|       | Project Work                    | CO.1 Learn basic level of research like literature collection, literature review by visiting online journals and reading offline journals and books. |
|       |                                 | CO.2 Learn to select an area of research for their project work keeping, in view of their subject of interest.                                       |
|       |                                 | CO.3 Get exposure to Experimental works beyond regular laboratory studies in curriculum along with operation of equipment's.                         |
|       |                                 | CO.4 Acquire knowledge on basics of all subjects in a nut shell and new techniques in various departments of Pharmacy.                               |
|       |                                 | CO.5 Learn techniques involved in documentation of results obtained, interpretation of results and thesis writing.                                   |
|       |                                 | CO.6 Learn presentation skills with emphasis on ppt preparation and communication skills.  |



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**COURSE OUTCOMES (COs)**

The learning objectives for the programmes and courses are spelled out in detail by the college. The institution uses the following approach to inform teachers and students about the learning outcomes. For the convenience of the teachers and students, hard copies of the syllabus and learning outcomes are available in the departments. The Program and Course Learning Outcomes are displayed on the walls outside of each Department. For reference, a soft copy of each program's curriculum and learning outcomes is also uploaded on the institution's website. Every IQAC meeting and College Committee meeting has discussed the importance of the learning outcomes with the teachers. Through tutorial meetings, the pupils are also made aware of the same.

**Program: Doctor of**

**Pharmacy Duration: 6 years**

**Program Outcomes (PO):**

| PO Nos. | Program Objective     | Program Outcome  |
|---------|-----------------------|--|
| PO1     | Pharmacy Knowledge    | Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.   |
| PO2     | Planning Abilities    | Demonstrate effective planning abilities including time management, resource management, delegations skills and organizational skills. Develop and implement plans and organize work to meet deadlines.  |
| PO3     | Problem analysis      | Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.  |
| PO4     | Modern tool usage     | Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations   |
| PO5     | Leadership skills     | Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing. |
| PO6     | Professional Identity | Understand, analyze and communicate the value of their professional roles in society (e.g. healthcare professionals, promoters of health, educators, managers, employers, employees).  |



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|      |                                |  |
|------|--------------------------------|--|
| PO7  | Pharmaceutical Ethics          | Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions. |
| PO8  | Communication                  | Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.   |
| PO9  | The Pharmacist and society     | Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.   |
| PO10 | Environment and sustainability | Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for, sustainable development.  |
| PO11 | Life-long learning             | Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis   |



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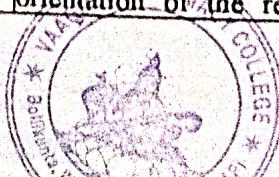
Program: Doctor of Pharmacy

Duration: 6 years

COURSE OUTCOMES

First Year Pharm D

| COURSE CODE | COURSE NAME                               | COURSE OUTCOME   |
|-------------|---|--|
| PH101       | HUMAN ANATOMY AND PHYSIOLOGY-I (THEORY)   | CO.1 To describe the structure (gross and histology) and functions of various organs of the human body.<br>CO.2 To describe various homeostatic mechanisms and their imbalances of various systems.<br>CO.3 To describe hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes.<br>CO.4 To understand coordinated working pattern of different organs of each system and to enhance the understanding of how the drugs act on the various body systems in correcting the disease state of the organs.   |
| PH102       | PHARMACEUTICS (THEORY)                    | CO.1 To understand the formulation of different dosage forms.<br>CO.2 To understand the basics of the applied field of pharmacy.<br>CO.3 To understand different pharmaceutical calculation involved in formulation specifically for children.<br>CO.4 To understand the importance of good formulation and effectiveness.   |
| PH103       | MEDICINAL BIOCHEMISTRY (THEORY)           | CO.1 To understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases.<br>CO.2 To know the metabolic process of<br>CO.3 To understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism.<br>CO.4 To know the biochemical principles of organ function tests of kidney, liver and endocrine gland.   |
| PH104       | PHARMACEUTICAL ORGANIC CHEMISTRY (THEORY) | CO.1 To be able to write IUPAC/Common names of simple organic compounds belonging to different classes of organic compounds in organic chemistry.<br>CO.2 To achieve understanding of some important physical properties of pharmaceutical organic compounds.<br>CO.3 To acquire the knowledge and understanding of the Free radical/ nucleophilic [alkyl/ acyl/ aryl] /electrophilic substitution, free radical/ nucleophilic / electrophilic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, along with order of reactivity. |



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|       |   |  |
|-------|---|--|
|       |   | stability of compounds etc.<br>CO.4 To gain through knowledge of some named organic reactions with mechanisms.   |
| PH105 | PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY) | CO.1 To understand applications of inorganic pharmaceuticals.<br>CO.2 To achieve Knowledge about the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals by assay, semiquantitative inorganic analysis methods.<br>CO.3 To appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.<br>CO.4 To have been introduced to a variety of inorganic drug classes.   |
| PH106 | REMEDIAL MATHEMATICS (THEORY)               | CO.1 Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.<br>CO.2 Create, use and analyze mathematical representations and mathematical relationships.<br>CO.3 Communicate mathematical knowledge and understanding to help in the field of Clinical Pharmacy.<br>CO.4 Perform abstract mathematical reasoning  |
| PH107 | REMEDIAL BIOLOGY (THEORY)                   | CO.1 Knowledge on composition of plant cell and its importance.<br>CO.2 Knowledge on different cellular composition and its functions of different parts of plant and their modifications.<br>CO.3 Know classification of plants based on its taxonomical characters.<br>CO.4 Knowledge on taxonomical characters of specified families.<br>CO.5 Knowledge about structural composition of microorganisms.<br>CO.6 Knowledge on structural composition of animal cell and its importance.<br>CO.6 Know the external and internal characters of different types of vertebrates.<br>CO.7 Knowledge about poisonous animals in the environment. |
| PH108 | HUMAN ANATOMY AND PHYSIOLOGY-I (PRACTICAL)  | CO.1 To identify the various tissues of the different systems of the human body.<br>CO.2 To study and identify different organs in different systems of the human body.<br>CO.3 To perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes.<br>CO.4 To perform the various experiments related to special senses and nervous system.   |



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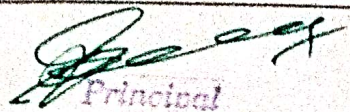
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|       |   |   |
|-------|---|---|
| PH109 | PHARMACEUTICS<br>(PRACTICAL)                            | CO.1 To understand the formulation of different dosage forms like solid, liquid and semisolid dosage forms.<br>CO.2 To understand the packaging of the different formulations.<br>CO.3 To know about the label, storage, application and handling of the dosage forms.<br>CO.4 To understand different types of incompatibilities of different dosage forms.  |
| PH110 | MEDICINAL<br>BIOCHEMISTRY<br>(PRACTICAL)                | CO.1 To perform qualitative analysis and determination of bio-molecules in the body fluids.<br>CO.2 To perform quantitative analysis and determination of electrolytes.<br>CO.3 To estimate SGOT, SGPT, Urea & protein in serum<br>CO.4 To study factors affecting enzyme activity and preparation, pH measurement of standard buffer solution functional groups.   |
| PH111 | PHARMACEUTICAL<br>ORGANIC<br>CHEMISTRY<br>(PRACTICAL)   | CO.1 To acquire the knowledge and understanding of the basic experimental principles related to basic experimental techniques.<br>CO.2 To know about the synthesis of pharmaceutical organic molecules by mechanism and Principle.<br>CO.3 To identify unknown pharmaceutical organic molecules by systemic qualitative analysis.<br>CO.4 To construction of organic stereo models of simple organic molecules.   |
| PH112 | PHARMACEUTICAL<br>INORGANIC<br>CHEMISTRY<br>(PRACTICAL) | CO.1 To acquire the knowledge and understanding of the basic lab experimental techniques in Pharmaceutical Inorganic Chemistry.<br>CO.2 To become well acquainted with the principles, procedures to make test, standard and reactions of limit tests of inorganic impurities.<br>CO.3 To know about assay of drugs by different volumetric titration methods.<br>CO.4 To gain knowledge of tests for identity, preparations and test for purity for inorganic pharmaceuticals. |
| PH113 | REMEDIAL<br>BIOLOGY (PRACTICAL)                         | CO.1 Get knowledge on instruments used in experimental biology and its operation.<br>CO.2 Know the principles and procedures involved in staining techniques for the preparation of slide.<br>CO.3 Grasp knowledge on different cellular composition and its importance in living organisms (Plants & Animal).<br>CO.4 Get knowledge about morphological features and modified morphological features and its importance of different parts of plant.                           |



  
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|  |  |   |
|--|--|---|
|  |  | <p>CO.5 Know about anatomical features and physiological features with reference to human by simulator model.</p> <p>CO.6 Grasp knowledge on different cellular composition of different parts of plant.</p> <p>CO.7 Know different types of animals for its identification.</p> <p>CO.8 Know about few plant physiology techniques</p> |
|--|--|---|



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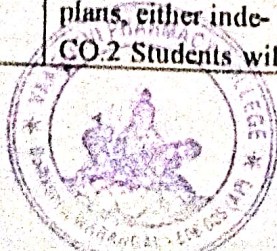
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Pharm D Second Year

| COURSE CODE | COURSE NAME  | COURSE OUTCOME  |
|-------------|--|---|
| PH201       | PATHOPHYSIOLOGY<br>(THEORY)                              | CO.1 Describe the etiology of the selected diseases states.<br>CO.2 Describe the Pathogenesis of the selected diseased states.<br>CO.3 Name the signs and symptoms of the diseases.<br>CO.4 Mention the complications of the diseases.  |
| PH202       | PHARMACEUTICAL<br>MICROBIOLOGY<br>(THEORY)               | CO.1 To understand the anatomy, identification, growth factors and sterilization of microorganisms.<br>CO.2 To know the mode of transmission of disease-causing microbes, symptoms of disease, and treatment<br>CO.3 To do estimation of RNA and DNA and there by identifying the source<br>CO.4 To do cultivation and identification of the microorganisms and their diagnostic test in the lab.   |
| PH203       | PHARMACOGNOSY<br>AND<br>PHYTOPHARMACEUTICALS<br>(THEORY) | CO.1 To know history, scope, sources, classification and quality control methods of natural origin, meaning and significance of Pharmacognostic parameters and Pharmacognostic scheme of study of crude drugs.<br>CO.2 To understand techniques of cultivation, collection, storage of crude drugs, morphology and anatomy of plant parts and know primary and secondary metabolites of crude drugs.<br>CO.3 To know the source, properties, methods of extraction, active constituents, uses of crude drugs, pharmaceutical and industrial applications of carbohydrates, natural fibres, lipids and proteins and their derived products.<br>CO.4 To understand adulteration and methods of adulteration of crude drugs. |
| PH204       | PHARMACOLOGY-I<br>(THEORY)                               | CO.1 Understand the pharmacological aspects of drugs falling under the above-mentioned chapters.<br>CO.2 Handle and carry out the animalexperiments.<br>CO.3 Appreciate the importance of pharmacology subject as basis of therapeutics.<br>CO.4 Correlate and apply the knowledgetherapeutically.  |
|             |  | CO.1 Students will provide patient centered care to diverse patients using the best available evidence and in consideration of patients' circumstances to devise, modify, implement, document and monitor pharmacotherapy care plans, either independently or as part of healthcare team<br>CO.2 Students will demonstrate knowledge of the business  |



  
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|       |  |   |
|-------|--|---|
| PH205 | COMMUNITY PHARMACY (THEORY)                        | and professional practice management skills in community pharmacies.<br>CO.3 Students will educate patients through counseling & provide health screening services to public<br>CO.4 Students will identify symptoms of minor ailments and provide appropriate medication<br>CO.5 Students will participate in prevention programs of communicable diseases<br>6. Students will exhibit professional ethics by promoting safe and appropriate medication use throughout society   |
| PH206 | PHARMACOTHERAPEUTICS - I (THEORY)                  | CO.1 The Pathophysiology of selected disease states and the rationale for drug therapy. And therapeutic approach to management of these diseases.<br>CO.2 The controversies in drug therapy; The importance of preparation of individualized therapeutic plans based on diagnosis; Needs to identify the patient-specific parameters relevant in initiating drug therapy and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).<br>CO.3 Describe the Pathophysiology of selected disease states and explain the rationale for drug therapy.<br>CO.4 Summarize the therapeutic approach to management of these diseases including reference to the latest available evidence; discuss the controversies in drug therapy. |
| PH207 | PHARMACEUTICAL MICROBIOLOGY (PRACTICAL)            | CO.1 To study the apparatus used in microbiology & preparation, sterilization of glassware's and media<br>CO.2 To study different staining techniques, motility characters, enumeration of microorganism, method of isolation of pure culture and biochemical testing for identification of microorganism<br>CO.3 To perform culture sensitivity testing, sterility testing for powder & liquid and determination of MIC<br>CO.4 To perform microbiological assay of antibiotics, vitamins and determination of RWC, Widal, Malaria parasite.   |
| PH208 | PHARMACOGNOSY AND PHYTOPHARMACEUTICALS (PRACTICAL) | CO.1 To understand cell wall constituents and cell inclusions<br>CO.2 To understand morphology, microscopy and powder characteristics of crude drugs.<br>CO.3 To be able to determine the quality of lipids<br>CO.4 To be able to identify unorganized drugs by chemical methods  |
|       |  | CO.1 Discuss the controversies in drug therapy.<br>CO.2 Discuss the preparation of individualized therapeutic   |



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|       |   |   |
|-------|---|---|
| PH209 | PHARMACOTHERAPEUTICS - I<br>(PRACTICAL) | plans based on diagnosis.<br>CO.3 Identify the patient-specific parameters relevant in initiating drug therapy.<br>CO.4 Monitoring of drug therapy (including alternatives, time- course of clinical and laboratory indices of therapeutic response and adverse effects). |
|-------|---|---|



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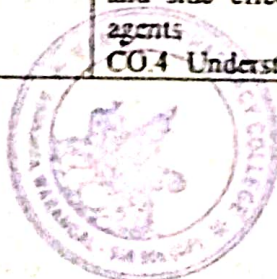
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Pharm D Third Year

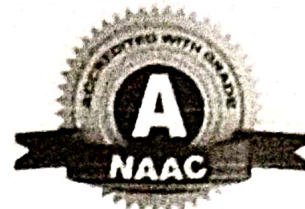
| COURSE CODE | COURSE NAME                           | COURSE OUTCOME   |
|-------------|---------------------------------------|--|
| PH301       | PHARMACOLOGY II<br>(THEORY)           | CO.1 To understand the pharmacological aspects of drugs acting on blood and blood forming agents and pharmacology of drugs acting on renal system<br>CO.2 To study pharmacology of chemotherapeutic agents, vita- mins and essential minerals<br>CO.3 To study immune system, pharmacology of autocooids and hormones and to study principles of animal toxicology<br>CO.4 To study the dynamic cell & genome structure and function   |
| PH302       | PHARMACEUTICAL ANALYSIS (THEORY)      | CO 1 To understand validation of analytical instruments & meth- ods as per ICH/ USP guidelines, concept of quality assurance and quality control techniques.<br>CO.2 To understand principles, instrumentation and application of various chromatographic techniques employed for the analysis of APIs and formulation.<br>CO.3 To understand principle, instrumentation and application of various Electrometric methods.<br>CO.4 To Understand principle, instrumentation and application of UV- Vis, Atomic Absorption and Emission Spectroscopy, Flame Photometry, NMR, Mass spectroscopy, Fluorimetry, Thermal, X ray diffraction techniques. |
| PH303       | PHARMACOTHERAPEUTICS - II<br>(THEORY) | CO.1 To know the pathophysiology of selected disease states and the rationale for drug therapy<br>CO.2 To understand the therapeutic approach for management of different diseases<br>CO.3 To know the importance of preparation of individualized therapeutic plans based on diagnosis & controversies in drug therapy,<br>CO.4 To understand & identify the patient-specific parameters relevant in initiating drug therapy. and monitoring therapy.   |
| PH304       | MEDICINAL CHEMISTRY (THEORY)          | CO.1 Understand modern concept of rational drug design.<br>CO.2 Learn development of the anti-infective drugs including structure activity relationship, mechanism of action, synthesis, chemical nomenclature, brand names and side effects of important compounds.<br>CO.3 Understand classification, mechanism of action, structure activity relationship, synthesis, nomenclature and side effects of the drugs acting as antineoplastic agents<br>CO.4 Understand classification, mechanism of action,  |



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|       |                                       |   |
|-------|---------------------------------------|---|
|       |                                       | structure activity relationship, synthesis, nomenclature and side effects of the drugs acting as Cardio vascular agents, Hypoglycemic agents, Diuretics, Steroidal Hormones and Adrenocorticoids etc  |
| PH305 | PHARMACEUTICAL JURISPRUDENCE (THEORY) | CO.1 To appreciate study Pharmaceutical Legislation, relevance and significance of jurisprudence to Pharmaceutical Sciences.<br>CO.2 To know fundamentals of legislation to regulate import manufacture, distribution and sales of drug and cosmetics.<br>CO.3 To know the various parameters in the Drug and Cosmetic Act and rules, Drug policy, Drug Price Control Order,<br>CO.4 To understand the concepts of Narcotic Drugs and Psycho- tropic substances, Pharmacy Act and Excise duties Act |
| PH306 | PHARMACEUTICAL FORMULATION (THEORY)   | CO.1 To understand the principle involved in formulation of various pharmaceutical dosage forms<br>CO.2 To prepare various pharmaceutical formulation<br>CO.3 To perform evaluation of pharmaceutical dosage forms CO.4 To understand and appreciate the concept of bioavailability and bioequivalence, their role in clinical situations   |
| PH307 | PHARMACOLOGY II (PRACTICAL)           | CO.1 To study various routes of drug administration, use of anesthetics in laboratory animals and their handling<br>CO.2 To learn the composition of physiological salt solutions and basic instruments used in experimental pharmacology<br>CO.3 To perform isolated experiments using various isolated preparation and the effect of different drugs on the concentration response curves<br>CO.4 To study the preclinical screening of various drugs   |
| PH308 | PHARMACEUTICAL ANALYSIS (PRACTICAL)   | CO.1 To perform separation and identification of samples using paper, thin layer chromatographic technique.<br>CO.2 To analyze the samples using UV visible spectrophotometer, study the effect of pH, solvent effect, derivatization on UV spec- tra.<br>CO.3 To perform potentiometric, conductometric titra- tions, colorimetry, fluorimetry, nephelometry, flame photometric determination.<br>CO.4 To study and demonstrate IR spectroscopy, HPLC, HPTLC, polarimeter etc.                     |
|       |                                       | CO.1 To understand therapeutic goals of the drugs used in different diseases.   |



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|-------|--|--|
| PH309 | PHARMACOTHERAPEUTICS<br>- II<br>(PRACTICAL)  | CO.2 To check & analyze drug interactions, adverse drug reactions<br>CO.3 To understand dose and frequency of the medications<br>CO.4 To understand the time-course of clinical and laboratory indices of therapeutic response and adverse effects.  |
| PH310 | MEDICINAL<br>CHEMISTRY<br>(PRACTICAL)        | CO.1 Learn assays of important drugs from the course<br>CO.2 Learn synthesis of medicinally important compounds / drug intermediates with recrystallization, TLC techniques.<br>CO.3 Understand monograph analysis of important drugs.<br>CO.4 Determine partition coefficients, dissociation constants and molar refractivity of compounds for QSAR analysis. |
| PH311 | PHARMACEUTICAL<br>FORMULATION<br>(PRACTICAL) | CO.1 To inculcate various formulation skills.<br>CO.2 To understand mechanisms behind<br>CO.3 To evaluate various quality control analysis of developed formulations.<br>CO.4 To understand clinical implications of the various dosage forms.   |



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|       | (THEORY)  | therapy and approaches to manage the disease.<br>CO.3 To Identify the patient specific parameters relevant in initiating drug therapy, and monitoring therapy (Including alternatives, Time course of clinical and laboratory indices of therapeutic responses and adverse effects)<br>CO.4 To know the importance of preparation of individualized therapeutic plan   |
| PD406 | CLINICAL TOXICOLOGY<br>(THEORY)                       | CO.1 Able to Answer drug information questions.<br>CO.2 Able to perform patient medication counselling.<br>CO.3 Able to solve case studies related to laboratory investigations.<br>CO.4 Able to conduct patient medication history interview.   |
| PD407 | PHARMACOTHERAPEUTICS -<br>I II<br>(PRACTICAL)         | CO.1 To take part in hospital ward round and clinical discussion<br>CO.2 To assess and justify the changes made in drug therapy in allotted patients.<br>CO.3 To identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy<br>CO.4 To discuss the case presentation of the allotted case after discharge  |
| PD408 | HOSPITAL PHARMACY<br>(PRACTICAL)                      | CO.1 To analyse prescriptions for drug interaction<br>CO.2 Formulate and prepare parenteral formulations and powders<br>CO.3 Perform inventory analysis<br>CO.4 Answer drug information queries through literature search<br>CO.5 Conduct planned experiments and prepare laboratory report in a standard format   |
| PD409 | CLINICAL PHARMACY<br>(PRACTICAL)                      | CO.1 Assess prescriptions for drug interaction and answer drug in-formation query<br>CO.2 Perform patient counselling on medication and conduct medi- cation history interview<br>CO.3 Analyse and interpret the data obtained through laboratory tests<br>CO.4 Conduct planned experiments and prepare laboratory report in a standard format   |
| PD410 | BIOPHARMACEUTICS &<br>PHARMACOKINETICS<br>(PRACTICAL) | CO.1 Enhance dissolution characteristics of slightly soluble drugs by co-solvency, solid dispersion and use of surfactant<br>CO.2 Compare dissolution studies of two different marketed products of same drug.<br>CO.3 Perform Protein binding studies of a drug and Calculation of bioavailability<br>CO.4 Calculate the Pharmacokinetic parameters like $K_a$ , $K_e$ , $t_{1/2}$ , $C_{max}$ , AUC, AUMC, MRT |



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|  |  | <p>etc. from blood profile data.<br/>CO.5 Calculate bioavailability from urinary excretion data for two drugs.<br/>CO.6 Determine metabolic pathways for different drugs based on elimination kinetics data<br/>CO.7 Perform absorption studies in animal inverted intestine using various drugs.</p> |
|--|--|---|



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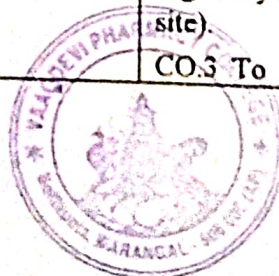
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**Pharm D Fifth Year**

| COURSE CODE | COURSE NAME   | COURSE OUTCOME   |
|-------------|---|--|
| PD501       | CLINICAL RESEARCH<br>(THEORY)   | <p>CO.1 To Understand new drug development process</p> <p>CO.2 To Understand clinical studies scenario in Indian and other countries</p> <p>CO.3 To Understand the regulatory and ethical requirement in clinical trails</p> <p>CO.4 To Know the role and responsibilities of clinical trial personnel</p> <p>CO.5 To Know the designing of clinical trial documents</p> <p>CO.6 To Manage the clinical trial coordination process</p> <p>CO.7 To Know safety monitoring and reporting in clinical trails</p>  |
| PD502       | PHARMACO<br>EPIDEMIOLOGY &<br>PHARMACO ECONOMICS<br>(THEORY)                          | <p>CO.1 To Compare and contrasts different study designs.</p> <p>CO.2 To Distinguish methods of data collection and recording.</p> <p>CO.3 To Understand issues involved in selecting sample and recruiting participants.</p> <p>CO.4 To Discuss threats to validity and issues of interpretations</p> <p>CO.5 To Discuss applications of pharmaco epidemiological concepts and methods to pharmacy practice.</p> <p>CO.6 To Explain measures of disease occurrence and association.</p> <p>CO.7 To Demonstrate knowledge and understanding of statistical theory.</p> <p>CO.8 To Select and apply appropriate statistical techniques for managing common types of medical data.</p> <p>CO.9 To Interpret correctly the results of statistical analyses.</p> |
| PD503       | CLINICAL<br>PHARMAKINETICS<br>&<br>PHARMACOTHERAPEUTIC<br>DRUG MONITORING<br>(THEORY) | <p>CO.1 To Apply PK-PD principles in cases using patient data to optimize pharmacotherapy and drug dosing for maximal efficacy and minimal toxicity.</p> <p>CO.2 To recognize, document and manage drug dosing in cases involving significant patient pharmacokinetic variability due to physiology or disease (eg age, obesity, pregnancy, malabsorption, organ dysfunction, critical illness, therapeutic target site).</p> <p>CO.3 To recognize, characterize and manage cases</p>  |



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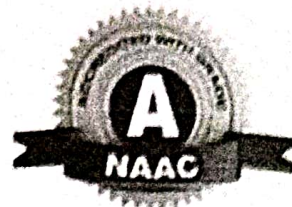
|       |              |  |
|-------|--------------|--|
|       |              | <p>with clinically significant PK-PD drug interactions</p> <p>CO.4 To demonstrate appropriate therapeutic drug management (TDM) in cases with medications for which concentrations can be measured or predicted from available PK research data.</p>   |
| PD504 | CLERKSHIP    | <p>CO.1 To discuss the role of Pharmacist in clinical pharmacy services</p> <p>CO.2 To demonstrate the skills of a clinical Pharmacist</p> <p>CO.3 To discuss the available therapeutic options in the management of diseases</p> <p>CO.4 To Prepare a pharmaceutical care plan for a given case</p> <p>CO.5 To detect, Interpret and report medication errors and drug interactions</p>   |
| PD505 | PROJECT WORK | <p>CO.1 To address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality</p> <p>CO.2 To address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality</p> <p>CO.3 To define the problem to be addressed and translate it into a statement of aim, objectives, scope and plan for the project</p> <p>CO.4 To carry out and report an information survey and take account of findings in executing project</p> <p>CO.5 To evaluate, select and apply relevant theories and techniques from the full range of courses studied using conceptual models and frameworks to enhance depth of understanding</p> <p>CO.6 To select appropriate methodology for investigative work, taking into account the pros and cons of the alternatives available and develop solution proposals based on reasoned judgement</p> <p>CO.7 To present a coherent, logically argued, fully referenced report and engage in a professional manner in a viva-voce discussion about the project drug</p> |



  
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**Pharm D Sixth Year**

| COURSE NAME | COURSE OUTCOME  |
|-------------|---|
| INTERNSHIP  | <p>To provide patient care in cooperation with patients, prescribers and other members of an inter-professional health care team-based health care team based upon sound therapeutic principles and evidence-based data, taking into account relevant legal, ethical, social cultural, economic and professional issues, emerging technologies and evolving biomedical, pharmaceutical, social or behavioral or administrative and clinical sci- ences that may impact therapeutic outcomes.</p> <p>To manage and use resources of the health care system in cooperation with patients, prescribers, other health care providers, administrative and supportive personnel to promote health, to provide, assess and coordinate safe, accurate and time sensitive medication distribution and to improve therapeutic outcome of medication use.</p> <p>To promote health improvement, wellness and prevention in co- operation with patients, communities, at risk population, and other members of inter professional team of health care providers.</p> <p>To demonstrate skills in monitoring of the national health programs and schemes oriented to provide preventive and promotive health care ser- vices to the community.</p> <p>To develop leadership qualities to function effectively as a member of the health care team organized to deliver the health and family welfare services in existing socio- economic, political and cultural environment. To communicate effectively with patients and the community.</p> |



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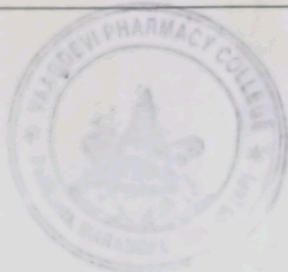
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**M.Pharmacy Program Outcomes**

| Programme Outcomes (POs) |  |
|--------------------------|--|
| PO1                      | <b>Pharmaceutical Sciences knowledge:</b> Apply the knowledge of mathematics, science, pharmaceutical physical properties of the different pharmaceutical ingredients and the factor influencing them is very valuable for pharmaceutical dosage form design. Enables the students to learn about different packaging materials used in pharmaceutical industry and the factors governing their use. |
| PO2                      | <b>Unit Operations:</b> Pharmaceutical engineering renders knowledge about the basic unit operations that are taking place in pharmaceutical industry and the different factors associated with it. This information is useful for both pharmaceutics and pharmaceutical engineering.  |
| PO3                      | <b>Entrepreneurship:</b> The knowledge on different pharmaceutical dosage forms are imparted on students. This knowledge comes while handling a pharmacy or a manufacturing unit or in the further courses.  |
| PO4                      | <b>Design/Development of solutions:</b> The information on solid dosage forms like tablets and capsules, their formulation and quality control serves as an important prerequisite for dosage form design.   |
| PO5                      | <b>Application oriented Knowledge:</b> The knowledge of biopharmaceutics enables the students to visualize the effect of pharmacokinetic (ADMET) parameters on the biological effect of the drug. The correlation of pharmacokinetics and pharmacodynamics is thus introduced and is experimentally explained to them.   |
| PO6                      | <b>Conduct investigations of complex problems:</b> To understand biopharmaceutical principles and pharmacokinetic principles through different compartment models, multiple dosage regimens, non-linear pharmacokinetics, and assessment of bioavailability and bioequivalence   |
| PO7                      | <b>Effective Citizenship:</b> Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.  |
| PO8                      | <b>Ethics:</b> Recognize different value systems including your own, understand the moral  |



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|      |   |
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|      | dimensions of your decisions, and accept responsibility for them.   |
| PO9  | <b>Environment and Sustainability:</b> Understand the issues of environmental contexts and sustainable development.   |
| PO10 | <b>Self-directed and Life-long Learning:</b> Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes. |



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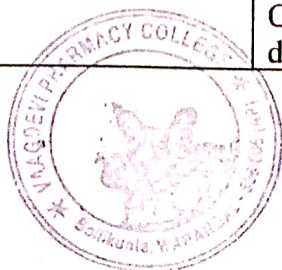
Program: M. Pharm (Pharmaceutics)

Duration: 2 years

**COURSE OUTCOMES**

**I YEAR I Semester**

| COURSE CODE | COURSE NAME   | COURSE OUTCOMES  |
|-------------|---|--|
| MPH101T     | <b>Modern Pharmaceutics-I<br/>(Professional Core – I)</b>                                 | <p>CO 1: understand the science of Preformulation studies before developing a novel drug delivery system</p> <p>CO 2: apply ICH guidelines and evaluate drug excipient compatibility</p> <p>CO 3: gain knowledge about the use of excipients in dosage forms like tablets, powders, capsules, micro encapsules.</p> <p>CO 4: understand formulation and development of various solid dosage forms and capsules.</p> <p>CO 5: learn optimization techniques and able to apply the statistical design in different formulations.</p> |
| MPH102T     | <b>Applied<br/>Biopharmaceutics and<br/>Pharmacokinetics<br/>(Professional Core – II)</b> | <p>CO 1: understand the factors affecting the bioavailability and stability of dosage form. Student is able to know bioequivalence studies.</p> <p>CO 2: know the parameters for the drug disposition</p> <p>CO 3: know the parameters for the absorption of drugs</p> <p>CO 4: know the Michaelis-Menton constants for nonlinear kinetics and Clinical Pharmacokinetics</p> <p>CO 5: learn about the time dependent pharmacokinetics and drug interactions</p>  |
| MPH103T     | <b>Advanced Physical<br/>Pharmaceutics<br/>(Professional Elective – I)</b>                | <p>CO 1: acquire knowledge on polymer classification, polymer properties and its applications, mechanism of biodegradation, the stability calculations, shelf- life calculations and accelerated stability studies</p> <p>CO 2: learn about the basic principles of interactions, science behind tablet compression and consolidation</p> <p>CO 3: summarize the kinetics behind the drug degradation and various factors affecting</p>  |



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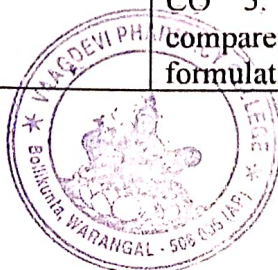


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|         |   | degradation of API  |
|         |   | CO 4: elucidate theoretical considerations of viscoelasticity, principle, instrumentation and applications of DSC and X-Ray diffraction studies.  |
|         |   | CO 5: enumerate the concepts of solubility and dissolution  |
| MPH104T | Cosmetics and Cosmeceuticals (Professional Elective – II) | CO 1: know the regulatory biological aspects of cosmetics   |
|         |   | CO 2: understand the excipients used and key building blocks in various formulations.   |
|         |   | CO 3: design cosmeceuticals and herbal products with desired safety and stability.  |
| MPH105T | Research Methodology and IPR                              | CO 1: understand research problem formulation.  |
|         |   | CO 2: analyze research related information  |
|         |   | CO 3: follow research ethics  |
|         |   | CO 4: understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.  |
|         |   | CO 5: understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular. |
|         |   | CO 6: understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.                   |
| MPH106P | Modern Pharmaceutics-I Lab                                | CO 1: carry out Pre-formulation studies on solid dosage forms   |
|         |   | Co 2: study the effect of particle size and various binders on in vitro release of drug.  |
|         |   | CO 3: Determine the rate constants of acid and alkaline hydrolysis  |
|         |   | CO 4: formulate and evaluate beta cyclodextrin complexes of new drugs   |
|         |   | CO 5: prepare paracetamol tablets and compare the in vitro release with marketed formulation  |



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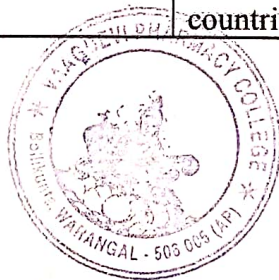



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| MPH107P | <b>Applied<br/>Biopharmaceutics and<br/>Pharmacokinetics Lab</b> | CO 1: compare dissolution studies of two different marketed products of same drug.  |
|         |  | CO 2: perform Protein binding studies of a drug and Calculation of bioavailability  |
|         |  | CO 3: calculate the Pharmacokinetic parameters like $K_a$ , $K_e$ , $t_{1/2}$ , $C_{max}$ , AUC, AUMC, MRT etc. from blood profile data.            |
|         |  | CO 4: calculate Bioavailability and Bioequivalence Studies  |
|         |  | CO 5: perform Permeation studies and Drug Release from semisolids   |
| MPH108  | <b>Disaster Management<br/>Audit Course - I</b>                  | CO 1: learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.                           |
|         |  | CO 2: critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.                         |
|         |  | CO 3: develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations |
|         |  | CO 4: critically understand the strengths and weaknesses of disaster management approaches  |
|         |  | CO5: planning and programming in different countries, particularly their home country or the countries they work in.                                |



  
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**I YEAR II SEMESTER**

| COURSE CODE | COURSE NAME                    | COURSE OUTCOMES  |
|-------------|--------------------------------|--|
| MPH201T     | MODERN PHARMACEUTICS - II      | CO 1: understand the planning of pilot plant techniques used for pharmaceutical dosage forms – tablets and capsules  |
|             |                                | CO 2: understand the planning of pilot plant techniques used for pharmaceutical dosage forms - parenteral  |
|             |                                | CO 3: understand the planning of pilot plant techniques used for pharmaceutical dosage forms - aerosols  |
|             |                                | CO 4: understand the planning of pilot plant techniques used for pharmaceutical dosage forms - cosmetics and nutraceuticals.   |
|             |                                | CO 5: gain knowledge about aseptic processing operation  |
| MPH201T     | ADVANCED DRUG DELIVERY SYSTEMS | CO 1: understand drug delivery system through detailed information of transporting a pharmaceutical compound in the body as needed to safely achieve its desired therapeutic effect. To study about basic knowledge of the pharmacokinetic and pharmacodynamic principles in the design of CDDS. Understand recent developments in protein and peptide for parenteral delivery approaches. |
|             |                                | CO2: understand approaches, formulations, technologies, and systems for suitable drug delivery. To identify a suitable drug delivery system based on the physicochemical characteristics of drug and select a suitable polymer for formulation of the drug delivery system.  |
|             |                                | CO3: Understand approaches, formulations, technologies and evaluation for bioadhesive, Nasal, colon drug delivery systems.   |
|             |                                | CO4: Understand recent developments in design, formulation and evaluation of various particulate systems including nanoparticles, liposomes, microspheres, niosomes and resealed erythrocytes  |
|             |                                | CO 5: Understand the concept, events and biological process involved in drug targeting.  |
| MPH203T     | INDUSTRIAL PHARMACY            | CO 1: explain the machinery involved in milling, mixing, filtration and drying.  |
|             |                                | CO 2: gain knowledge of materials used in the construction of machinery and packaging materials.   |



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|         |  |   |
|---------|--|---|
|         |  | CO 3: learn salient features of GMP, TQM applicable in industry.  |
|         |  | CO 4: understand the effluent treatments and prevent the pollution.   |
|         |  | CO 5: evaluate the validation of analytical methods and processes.  |
| MPH204T | NANO BASED DRUG DELIVERY SYSTEMS                     | CO.1 Determination and classification of various properties of nano materials with their role of size, its distribution and its properties.                               |
|         |  | CO.2 Summarize various physical, chemical, biological methods for the synthesis of different types of nano particles like gold, magnetic, polymeric, assembly structures. |
|         |  | CO.3 Elaborate about Biomedical applications of nano technology   |
|         |  | CO.4 Designing of nano materials for drug delivery related to pulmonary, nasal, cancer therapy and cardio vascular diseases.  |
|         |  | CO.5 Distinguish the principles of size reduction, analysis of nano particles, size, PDI, size separation and different methods of analysis for the release of drugs.     |
| MPH205P | MODERN PHARMACEUTICS -II (LAB)                       | CO.1 Acquire knowledge on preparation of mouth wash   |
|         |  | CO.2 Learn the formulation and evaluation of vanishing cream and calamine lotion  |
|         |  | CO.3 Acquire knowledge on preparation and evaluation of floating tablets and Fast dissolving tablets  |
|         |  | CO.4 Determine evaluation of Chewable tablets   |
|         |  | CO.5 Experimenting the preparation of oral rehydration solution   |
| MPH206P | ADVANCED DRUG DELIVERY SYSTEMS (LAB)                 | CO 1: design formulate and evaluate microparticulate formulations.  |
|         |  | CO 2: formulate and evaluate sustained release systems.   |
|         |  | CO 3: know the effect of drug diffusion through various types of polymeric membranes.   |
|         |  | CO 4: compare various marketed formulations by in vitro drug release studies  |
|         |  | CO 5: formulate and evaluate enteric coated tablets   |
|         |  | CO 6: formulate and evaluate mucoadhesive drug delivery systems.  |
| MPH207  | ENGLISH FOR RESEARCH PAPER WRITING AUDIT COURSE - II | CO 1: understand the Biostatistics arrangement  |
|         |  | CO 2: know the presentation and formation of tables and charts  |
|         |  | CO 3: learn the correlation and regression  |
|         |  | CO 4: gain the knowledge of analysis of data  |
|         |  | CO 5: learn the Hypothesis testing  |



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**II YEAR I SEMESTER**

| COURSE CODE | COURSE NAME                      | COURSE OUTCOMES  |
|-------------|----------------------------------|--|
| MPH301T     | SCALE UP AND TECHNOLOGY TRANSFER | CO 1: Design the pilot scale up technology   |
|             |                                  | CO 2: Judge the documentation process  |
|             |                                  | CO 3: Conclude in choosing of equipment for dosage form production                             |
|             |                                  | CO 4: Summarize the process validation   |
|             |                                  | CO 5: Describe safety and hazards in industries  |
| MPH302T     | COSMETICS AND COSMECEUTICALS     | CO 1: know the regulatory biological aspects of cosmetics                                      |
|             |                                  | CO 2: understand the excipients used and key building blocks in various formulations.          |
|             |                                  | CO 3: design cosmeceuticals and herbal products with desired safety and stability.             |
| MPH303      | AUDITS AND REGULATORY COMPLIANCE | CO 1: explain the importance of auditing in the pharmaceutical industry.                       |
|             |                                  | CO 2: discuss the different types of audits that are conducted in the pharmaceutical industry. |
|             |                                  | CO 3: identify the key steps involved in the audit process.                                    |
|             |                                  | CO 4: gather evidence to support audit findings.   |
|             |                                  | CO 5: prepare an objective and comprehensive audit report.                                     |
|             |                                  | CO 6: develop a checklist to use during the audit process.                                     |



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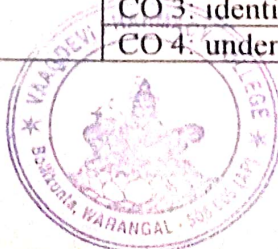
Program: M. Pharm (Pharmacology)

Duration: 2 years

COURSE OUTCOMES

I YEAR I SEMESTER

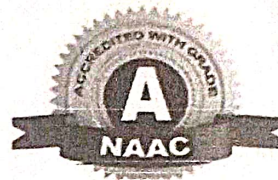
| COURSE CODE | COUSE NAME  | COURSE OUTCOME  |
|-------------|---|---|
| MPH101T     | Advanced Pharmacology-I   | CO 1: discuss pathophysiology and pharmacology of specific disorders  |
|             |   | CO 2: understand how drugs function at the cellular and molecular level   |
|             |   | CO 3: recognise the Adverse effects, contraindications, and clinical applications of medications used to treat disorders.   |
| MPH102T     | Clinical Pharmacology and Pharmacotherapeutics (Professional Core - II) | CO 1: understand the pathophysiology of selected disease states and the rationale for drug therapy  |
|             |   | CO 2: understand the controversies in drug therapy  |
|             |   | CO 3: understand the importance of preparation of individualized therapeutic plans based on diagnosis   |
|             |   | CO 4: understand the needs to identify the patient-specific parameters relevant in initiating drug therapy  |
|             |   | CO 5: understand the monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects                 |
|             |   | CO 6: summarize the therapeutic approach to management of these diseases including reference to the latest available evidence   |
|             |   | CO 7: know the therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects                                  |
|             |   | CO 8: understand the pathophysiology and applied Pharmacotherapeutics of diseases associated with following system/diseases with of special reference to the drug of choice |
| MPH103T     | Pharmacokinetics and Drug Metabolism                                    | CO 1: understand various pharmacokinetic parameter like absorption, distribution, metabolism, and elimination   |
|             |   | CO 2: know the influence of these pharmacokinetic parameters on efficacy of drugs   |
|             |   | CO 3: identify and resolve drug related problems  |
|             |   | CO 4: understand the concept of pharmacogenetics  |



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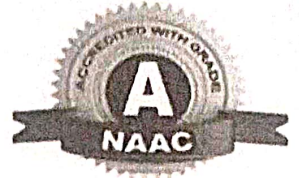
|         |   |  |
|---------|---|--|
|         | Animal Cell Cultures and Applications<br>(Professional Elective – II) | CO 1: describe the various types of cell cultures, their requirements and advantages<br>CO 2: understand the importance of the bioreactor, cell lines and their applications<br>CO 3: explain various culture, preservation and maintenance techniques<br>CO 4: understand and explain the various IVF techniques, embryo cultures and gene transfer<br>CO 5: appreciate the importance of the role embryo culture in and its applications   |
| MPH105T | Research Methodology and IPR  | CO 1: understand research problem formulation.<br>CO 2: analyze research related information<br>CO 3: follow research ethics<br>CO 4: understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.<br>CO 5: understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.<br>CO 6: understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits. |
| MPH106P | Advanced pharmacology- I Lab  | CO 1: know arious routes of drug administration.<br>CO 2: study techniques of blood sampling, anesthesia and euthanasia of experimental animals.<br>CO 3: plot CRC of agonists<br>CO 4: interpolat bioassay, three and four point bioassay. Calculate of PA <sub>2</sub> value.  |
| MPH107P | Clinical Pharmacology and   | CO 1: prepare SOAPS and Case presentation..<br>CO 2: know rational use of medicines in special population<br>CO 3: calculate Bioavailability and Bioequivalence from the given data  |



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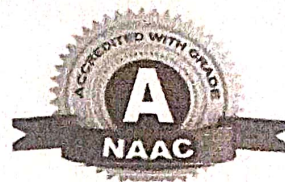
|        |   |  |
|--------|---|--|
|        | Pharmacotherapeutics<br>Lab                               | CO 4: interpret Therapeutic Drug Monitoring reports of a given patient   |
| MPH108 | English for Research<br>Paper Writing Audit<br>Course - I | CO 1: understand that how to improve your writing skills and level of readability                                      |
|        |   | CO 2: learn about what to write in each section  |
|        |   | CO 3: understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission |



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I YEAR II SEMESTER

| COURSE CODE | COURSE NAME  | COURSE OUTCOME  |
|-------------|--|---|
| MPH201T     | Advanced Pharmacology- II  | CO 1: understand the mechanism of drug actions at cellular and molecular level  |
|             |  | CO 2: discuss the Pathophysiology and pharmacotherapy of different diseases   |
|             |  | CO 3: understand the adverse effects, contraindications and clinical uses of drugs used in treatment of various diseases                                |
| MPH202T     | Pharmacological Screening Methods and Toxicology                             | CO 1: appraise the regulations and ethical requirement for the usage of experimental animals.   |
|             |  | CO 2: describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals |
|             |  | CO 3: discuss various newer screening methods involved in the drug discovery process  |
|             |  | CO 4: correlate the preclinical data to humans  |
| MPH203T     | Quality Use of Medicines (Professional Elective – III)                       | CO 1: understand the principles of quality use of medicines   |
|             |  | CO 2: know the benefits and risks associated with use of medicines  |
|             |  | CO 3: understand regulatory aspects of quality use of medicines   |
|             |  | CO 4: identify and resolve medication related problems  |
|             |  | CO 5: practice evidence-based medicines   |
| MPH204T     | Pharmacokinetic and Therapeutic Drug Monitoring (Professional Elective – IV) | CO 1: design the drug dosage regimen for individual patients  |
|             |  | CO 2: interpret and correlate the plasma drug concentrations with patients' therapeutic outcomes  |
|             |  | CO 3: recommend dosage adjustment for patients IV Infusion to Oral dosing   |
|             |  | CO 4: recommend dosage adjustment depending on patient's response   |
|             |  | CO 5: know application of pharmacokinetic parameters in analytical determination  |
| MPH205P     | Advanced Pharmacology- II Lab  | CO 1: Record CRC of agonist   |
|             |  | CO 2: Effect of agonist and antagonist on CRC   |
|             |  | CO 3: Bioassay – Interpolation three and four point   |
|             |  | CO 4: Effect of drugs on Frog heart   |



  
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|        |  |  |
|--------|--|--|
|        | Pharmacological Screening Methods and Toxicology Lab | CO 1: screen various pharmacological activities<br>CO 2: learn guidelines of CPCSEA, OECD<br>CO 3: screen psychopharmacological, anti-inflammatory and analgesic activities  |
| MPH207 | Constitution of India Audit Course - II              | CO 1: understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.<br>CO 2: address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.<br>CO 3: address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution. |



  
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II YEAR I SEMESTER

| COURSE CODE | COURSE NAME                                      | COURSE OUTCOME   |
|-------------|--|--|
| MPH301T     | Biostatistics                                    | CO 1: understand the Biostatistics arrangement   |
|             |  | CO 2: know the presentation and formation of tables and charts                                 |
|             |  | Co 3: learn the correlation and regression   |
|             |  | Co 4: gain the knowledge of analysis of data   |
|             |  | Co 5: learn the Hypothesis testing   |
| MPH302T     | Audits and Regulatory Compliance (Open Elective) | CO 1: explain the importance of auditing in the pharmaceutical industry.                       |
|             |  | CO 2: discuss the different types of audits that are conducted in the pharmaceutical industry. |
|             |  | CO 3: identify the key steps involved in the audit process.                                    |
|             |  | CO 4: gather evidence to support audit findings.   |
|             |  | CO 5: prepare an objective and comprehensive audit report.                                     |
|             |  | CO 6: develop a checklist to use during the audit process.                                     |



  
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Program: M. PHARM PHARMACEUTICAL REGULATORY AFFAIRS

Duration: 2 years

**COURSE OUTCOMES**

**I YEAR I SEMESTER**

| COURSE CODE | COURSE NAME                  | COURSE OUTCOME   |
|-------------|------------------------------|--|
| MPH101T     | Drug regulatory affairs      | CO.1 Discuss the rationale behind regulatory requirements and ways and means of complying with them in India.  |
|             |                              | CO.2 Point out the important aspects of GMP  |
|             |                              | CO.3 List various laws, legislation and guidance related to safety, efficacy ethical conduct and regulatory approval of drugs in USA & Brazil.   |
|             |                              | CO.4 Handle documentation and general principles involved in regulatory writing and submission to agencies.  |
|             |                              | CO.5 Organize the submission of Drug Master Files to regulatory authorities as per their specific requirements in USA, Europe and Canada.  |
| MPH102T     | Intellectual property rights | CO.1 Differentiate types of intellectual properties (IPs) and their roles in contributing to organizational competitiveness  |
|             |                              | CO.2 Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development. |
|             |                              | CO.3 List the impact of International Treaties / Conventions related to IPR.   |
|             |                              | CO.4 Discuss the application procedure of patent in USA & EU.  |
|             |                              | CO.5 Identify the claims in a given document and draft it.   |
| MPH103T     | Drug regulation and writing  | CO.1 Discuss the types of documents in pharmaceutical industry.  |
|             |                              | CO.2 Organize the modules of dossier preparation and CTD submission.   |
|             |                              | CO.3 List the basics of internal and external audits & focus on ISO standards and guidelines on audits.  |
|             |                              | CO.4 Structure the inspection systems in pharmaceutical companies and follow up actions.   |
|             |                              | CO.5 Prioritize the regulatory aspects of product life-cycle management and product recalls.   |
| MPH104T     | Good regulatory practice     | CO.1 Analyze Current good manufacturing  |



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|         |   |   |
|---------|---|---|
|         |   | <p>practices introduction to cGMP part 210 and part 211 WHO c GMP guideline ,Global Harmonization Task Force Guidance docs</p> <p>CO.2 Survey Introduction to USFDA good laboratory practice regulation inspection process documentation audits future regulations quality Council of India standards</p> <p>CO.3 Award Good automated laboratory practice introduction principles requirements sop's training documentation checklist software evaluation checklist element ISO and QCI standards</p> <p>CO.4 Determine Good distribution practice introduction requirements principles documentation process and equipments delivery to customer return self inspection stability testing elemental CDSCO guidance and ISO standards</p> <p>CO.5 Evaluate Quality management system concept of quality, quality by design Six Sigma concept out of specification validations type of validation, validation master plan analytical method validation heat ventilation and air conditioning and cleaning validation ICH guidelines to establish the quality safety efficacy of drug substances on product and CDSCO regulatory guidance document</p> |
| MPH105T | Research Methodology & Intellectual Property Rights | <p>CO 1: understand research problem formulation.</p> <p>CO 2: analyze research related information</p> <p>CO 3: follow research ethics</p> <p>CO 4: understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.</p> <p>CO 5: understanding that when IPR would take such important place in growth of individuals &amp; nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general &amp; engineering in particular.</p> <p>CO 6: understand that IPR protection provides an incentive to inventors for further research work and investment in R &amp; D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.</p>   |
| MPH106P | Drug regulation and                                 |   |



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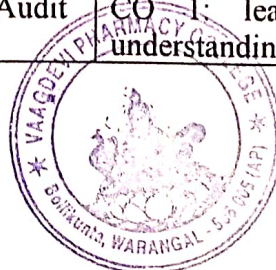


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|         |   |   |
|---------|---|---|
|         | lab (Lab)                                   | <p>change control deviation and corrective and preventive action. Import of drugs for research and development development activity .GMP audit requirement as per CDSCO</p> <p>CO.2 Classify preparation of checklist for registration of IND as per ICH CTD formatPreparation of checklist for registration of NDA as per ICH CTD formatPreparation of checklist for registration of NDA as per ICH CTD format</p> <p>CO.3 Comparative study of DMF system in US ,Europe and JapanPreparation of regulatory submission using e CTD software</p> <p>CO.4 Estimate Documentation of raw materials analysis as per official monographs Preparation of audit checklist for various agencies</p> <p>CO.5 Determine Preparation of the submission to FDA using e CTD softwarePreparation of submission to EMA using e CTD softwarePreparation of submission to MHRA using e CTD software</p>   |
| MPH107P | Regulatory practice and documentation (Lab) | <p>CO.1 Categorize Introduction on Good Pharmaceutical Practices, Case study: Facilities and equipment system, Case study: Packaging and labeling system ,Case study: Production system, Case study: Laboratory system.</p> <p>CO.2 Analyze Regulatory Documentation in K4 Pharmaceutical industry, Documentation for in process and finished products Quality control tests for Solid, liquid, Semisolid and Sterile preparations.</p> <p>CO.3 Criteria Preparation of Standard Operating Procedures , Preparation of analytical report ,preparation of BMR MFR ,DR labeling comparison between brand &amp;generics, preparation of regulatory dossier as per Indian CTD format</p> <p>CO.4 Influence Submission in Sugam system of CDSCO , USFDA Warning Letter Case study 1 and 2 on Response with scientific rationale to USFDA warning letter Preparation of submission checklist of IMPD for EU.</p> <p>CO.5 Importance submission Study of marketing authorization procedures in EU ,ISO:13485: - Medical devices - Quality management systems ,ISO : 31000: - Quality Risk Management</p> |
| MPH108  | Disaster Management Audit Course - I        | CO-1: learn to demonstrate a critical understanding of key concepts in disaster   |



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|  |  |   |
|--|--|---|
|  |  | risk reduction and humanitarian response.   |
|  |  | CO 2: critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.                         |
|  |  | CO 3: develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations |
|  |  | CO 4: critically understand the strengths and weaknesses of disaster management approaches  |
|  |  | CO5: planning and programming in different countries, particularly their home country or the countries they work in.                                |



  
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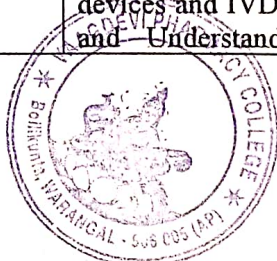
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**I YEAR II SEMESTER**

| COURSE CODE | COURSE NAME                             | COURSE OUTCOME   |
|-------------|---|--|
| MPH201T     | Regulatory aspects of herbals biologics | CO.1 Explain the regulations & guidelines, principles for development of similar biologics & data requirements for preclinical studies, clinical trial application, market authorization application & pharmacovigilance, GMP & GDP  |
|             |   | CO.2 Summarize the introduction to biologics; biologics, biological & biosimilars, different biological products, difference between generic drug & biosimilars, laws, regulations & guidance on biologics/biosimilars, development & approval of biologics, preclinical & clinical development considerations, advertising, labeling & packing of biologics                           |
|             |   | CO.3 illustrate the introduction to biologics; derivatives, scientific guidelines & guidance related to biologics in EU, comparability/ biosimilarity assessment, plasma master file, TSE/BSE evaluation, development & regulatory approval of biologics, preclinical & clinical development considerations; stability, safety, advertising, labeling & packing of biologics in EU     |
|             |   | CO.4 Describe Vaccine regulations in India, US & European union: clinical evaluation, marketing authorization, registration or licensing, quality assessment, pharmacovigilance, additional requirements blood & blood products regulations in India, US & European union: regulatory requirements of blood or its components including blood products, label requirements, ISBT & IHN |
|             |   | CO.5 Summarize Quality, safety & legislation for herbal products in India, US & European union.  |
| MPH202T     | Regulatory aspects of medical devices   | CO.1 Group the basics of medical devices and IVDs, process of development, ethical and quality considerations  |
|             |   | CO.2 Present the quality system regulations and quality risk management of medical devices   |
|             |   | CCO.3 lassify the medical devices and IVDs regulations in USA.   |
|             |   | CO.4 Summarize the medical devices and IVDs directives in European Union   |
|             |   | CO.5 Explain the regulatory approval process for medical devices and IVDs in China, Japan and ASEAN countries and Understand organizational structure, regulatory  |



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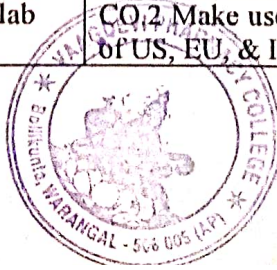
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|         |   |  |
|---------|---|--|
| MPH203T | NANO BASED DRUG DELIVERY SYSTEMS            | guidelines and functions of IMDRF/GHTF.  |
|         |   | CO.1 Determination and classification of various properties of nano materials with their role of size, its distribution and its properties.  |
|         |   | CO.2 Summarize various physical, chemical, biological methods for the synthesis of different types of nano particles like gold, magnetic, polymeric, assembly structures.  |
|         |   | CO.3 Elaborate about Biomedical applications of nano technology  |
|         |   | CO.4 Designing of nano materials for drug delivery related to pulmonary, nasal, cancer therapy and cardio vascular diseases.   |
| MPH204T | Advanced Drug Delivery Systems              | CO.5 Distinguish the principles of size reduction, analysis of nano particles, size, PDI, size separation and different methods of analysis for the release of drugs.  |
|         |   | CO 1: understand drug delivery system through detailed information of transporting a pharmaceutical compound in the body as needed to safely achieve its desired therapeutic effect. To study about basic knowledge of the pharmacokinetic and pharmacodynamic principles in the design of CDDS. Understand recent developments in protein and peptide for parenteral delivery approaches. |
|         |   | CO2: understand approaches, formulations, technologies, and systems for suitable drug delivery. To identify a suitable drug delivery system based on the physicochemical characteristics of drug and select a suitable polymer for formulation of the drug delivery system.  |
|         |   | CO3: Understand approaches, formulations, technologies and evaluation for bioadhesive, Nasal, colon drug delivery systems.   |
|         |   | CO4: Understand recent developments in design, formulation and evaluation of various particulate systems including nanoparticles, liposomes, microspheres, niosomes and resealed erythrocytes  |
| MPH205P | Regulatory aspects of herbals biologics lab | CO 5: Understand the concept, events and biological process involved in drug targeting.  |
|         |   | CO.1 Demonstrate biological license applications(BLA) & documents required for vaccine product approval  |
|         |   | CO.2 Make use of clinical trial application requirements of US, EU, & INDIA of biologics   |



  
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|         |   |  |
|---------|---|--|
|         |   | CO.3 Identify the checklist for registration of blood & blood products   |
|         |   | CO.4 Analyze registration requirement comparison study in 5 emerging markets (WHO, BRICS, CHINA & SOUTH COREA, ASEAN & GCC) & preparing checklist for market authorization |
|         |   | CO.5 Construct document required for the approval of herbal products of diverse dosage forms (3 products) as per regulations requirements                                  |
| MPH206P | Regulatory aspects of medical devices (Lab)             | CO.1 GMP of medical devices and quality requirements   |
|         |   | CO.2 Checklist for 510K and PMA for US market  |
|         |   | CO.3 Clinical investigation of medical devices: regulations of investigational medical devices   |
|         |   | CO.4 Check list for CE marking for various classes of devices for EU   |
|         |   | CO.5 Audit checklist for medical device facility   |
| MPH207  | ENGLISH FOR RESEARCH PAPER WRITING<br>AUDIT COURSE - II | CO 1: understand the Biostatistics arrangement   |
|         |   | CO 2: know the presentation and formation of tables and charts   |
|         |   | CO 3: learn the correlation and regression   |
|         |   | CO 4: gain the knowledge of analysis of data   |
|         |   | CO 5: learn the Hypothesis testing   |



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**II YEAR IST SEMESTER**

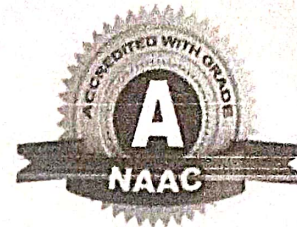
| COURSE CODE | COURSE NAME                      | COURSE OUTCOMES  |
|-------------|----------------------------------|--|
| MPH301T     | SCALE UP AND TECHNOLOGY TRANSFER | CO 1: Design the pilot scale up technology   |
|             |                                  | CO 2: Judge the documentation process  |
|             |                                  | CO 3: Conclude in choosing of equipment for dosage form production                             |
|             |                                  | CO 4: Summarize the process validation   |
|             |                                  | CO 5: Describe safety and hazards in industries  |
| MPH302T     | COSMETICS AND COSMECEUTICALS     | CO 1: know the regulatory biological aspects of cosmetics                                      |
|             |                                  | CO 2: understand the excipients used and key building blocks in various formulations.          |
|             |                                  | CO 3: design cosmeceuticals and herbal products with desired safety and stability.             |
| MPH303      | AUDITS AND REGULATORY COMPLIANCE | CO 1: explain the importance of auditing in the pharmaceutical industry.                       |
|             |                                  | CO 2: discuss the different types of audits that are conducted in the pharmaceutical industry. |
|             |                                  | CO 3: identify the key steps involved in the audit process.                                    |
|             |                                  | CO 4: gather evidence to support audit findings.   |
|             |                                  | CO 5: prepare an objective and comprehensive audit report.                                     |
|             |                                  | CO 6: develop a checklist to use during the audit process.                                     |



  
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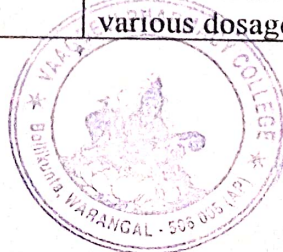
Program: M. Pharm (PHARMACEUTICAL ANALYSIS)

Duration: 2 years

COURSE OUTCOMES

**I YEAR I Semester**

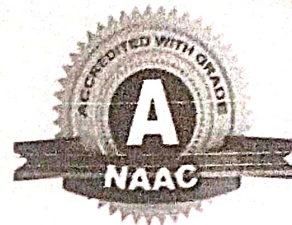
| COURSE CODE | COURSE NAME                                 | COURSE OUTCOMES  |
|-------------|---|--|
| MPH101T     | Modern Pharmaceutical Analytical Techniques | CO.1 Knowledge will be gained by the students in the Modern Analytical Techniques and can apply the theories in the Analysis of various bulk drugs and their formulations.   |
|             |   | CO.2 Students will also be in a position to apply their knowledge in developing the new methods for the determination and validate the procedures.                           |
|             |   | CO.3 Knowledge in the field of Pharmaceutical Analysis. The various modern analytical techniques like UV-Visible, IR, NMR, Mass, GC, HPLC, different chromatographic methods |
|             |   | CO.4 To enable the students to understand and apply the principles involved in the determination of different bulk drugs and their formulation.                              |
|             |   | CO.5 Basic practical knowledge relevant to the analysis is also imparted.  |
| MPH102T     | Pharmaceutical And Food Analysis            | CO.1 To impart knowledge on analysis of food constituents and finished food products.  |
|             |   | CO.2 Application of instrumental analysis in the determination of pesticides in variety of food products   |
|             |   | CO.3 Student shall be able to understand various analytical techniques in the determination of Food constituents   |
|             |   | CO.4 To know the quantitative determination of drugs from different category of both API and dosage forms  |
|             |   | CO.5 Student shall have the knowledge on food regulations and legislations   |
| MPH103T     | Advanced Pharmaceutical Analysis            | CO.1 Perception on qualitative determination of various organic compounds  |
|             |   | CO.2 Accomplished with spectral analysis, dissolution parameters and microbial assays.   |
|             |   | CO.3 Knowledge on principles and procedures involved in determination of organic functional groups.  |
|             |   | CO.4 Performing different tests on excipients such as bulk density, particle size distribution etc.  |
|             |   | CO.5 Knowledge on drug dissolution testing of various dosage forms   |



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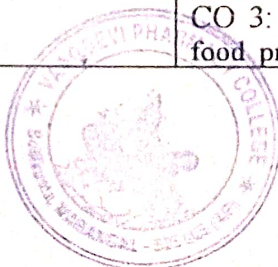


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|         |   |   |
|---------|---|---|
| MPH104T | Stability of Drugs and Dosage Forms                 | CO.1 Judge and prioritize, and plan regarding hydrolysis, photolysis  |
|         |   | CO 2 Define and describe about the physical stability   |
|         |   | CO 3 Summarize the use of excipients and knowledge regarding extraction of drugs  |
|         |   | CO.4 Design and modify raw materials used in cosmetic industry  |
|         |   | CO.5 Solve the theory of hair and skin formulations   |
| MPH105T | Research Methodology & Intellectual Property Rights | CO 1: understand research problem formulation.  |
|         |   | CO 2: analyze research related information  |
|         |   | CO 3: follow research ethics  |
|         |   | CO 4: understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.  |
|         |   | CO 5: understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular. |
|         |   | CO 6: understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.                   |
| MPH106P | Modern Pharmaceutical Analytical Techniques (Lab)   | CO 1: Colorimetry / UV / Visible, Spectroscopy, scanning of few compounds for UV-absorption, calculation of Assay / content uniformity / % of drug release  |
|         |   | CO 2: Separation and calculation of Rf values by using paper chromatography, TLC, HPTLC Technique   |
|         |   | CO 3: Estimate samples using HPLC technique   |
|         |   | CO 4: Simultaneous estimation of multi component containing formulations by UV spectrophotometry  |
|         |   | CO 5: Evaluate various glassware and analytical instruments by calibration.   |
| MPH107P | Pharmaceutical And Food Analysis (Lab)              | CO 1: Student shall be able to determine the total reducing sugar and proteins  |
|         |   | CO 2: Student shall be able to determine the saponification value, Iodine value, Peroxide value, Acid value in food products  |
|         |   | CO 3: Students would able to determine rancidity in food products, preservatives in food and Analysis of  |



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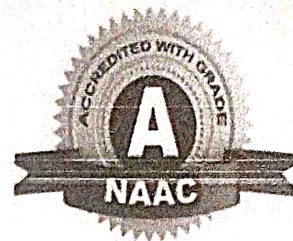
|        |                                      |   |
|--------|--------------------------------------|---|
|        |                                      | natural and synthetic colors & food additives in food<br>CO 4: To know the determination of pesticide residue in food products and Assay of any two Analgesic & Antipyretic drugs<br>CO 5: To know the Assay of any two Diuretics and Microbiological assay of any two.   |
| MPH108 | Disaster Management Audit Course - I | CO 1: learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.<br>CO 2: critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.<br>CO 3: develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations<br>CO 4: critically understand the strengths and weaknesses of disaster management approaches<br>CO5: planning and programming in different countries, particularly their home country or the countries they work in. |



  
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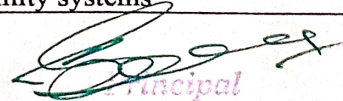
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**I YEAR II SEMESTER**

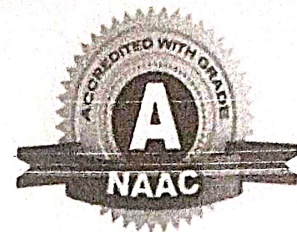
| COURSE CODE | COURSE NAME                      | COURSE OUTCOME  |
|-------------|----------------------------------|---|
| MPH201T     | Advanced Instrumental Analysis-I | CO 1: Students will come out with the thorough knowledge of various spectral aspects of X-Ray and different aspects regarding X-Ray diffraction methods.  |
|             |                                  | CO 2: Students would able to know Biochromatography and Super critical fluid chromatography their principles, Instrumentation and applications.   |
|             |                                  | CO 3: To know about the Capillary Electrophoresis the concepts of CE in pharmaceutical analysis.  |
|             |                                  | CO 4: Describe on DSC, DTA, TGA and brief discussion about this techniques.   |
|             |                                  | CO 5: To know Scanning electron microscope and its principle, Instrumentation and applications..  |
| MPH202T     | Modern Bio Analytical Techniques | CO 1: Students would be able to know the Extraction of drugs from biological samples and principles, procedures.  |
|             |                                  | CO 2: To know Biopharmaceutical factors affecting drug bioavailability in In-vitro and In-vivo studies  |
|             |                                  | CO 3: Students would able to learn about Bioanalysis and Bioanalytical method validation and its concepts.  |
|             |                                  | CO 4: Students would able to learn Pre-Formulation, Physical characteristics, Chemical Characteristics - Degradation  |
|             |                                  | CO 5: To determine Automation and computer-aided analysis, LIMS concept of auto samplers and high through put analysis and Drug Product performance, In Vivo. Bioavailability and Bioequivalence Studies. |
| MPH203T     | Pharmaceutical validation        | CO 1: Students would have studied about the different types of validation procedures and how it can be applied to various instruments and equipments at different stages of usage.                        |
|             |                                  | CO 2: To know a complete procedures involved in qualification of various analytical instruments and Glass ware  |
|             |                                  | CO 3: Students would able to learn about the steps involved in qualification of laboratory equipments and validation of utility systems   |



  
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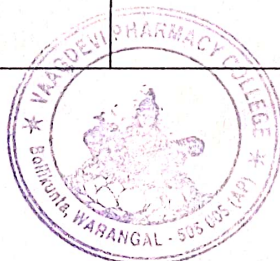


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|         |  |  |
|---------|--|--|
|         |  | CO 4: Carryout validation of analytical method used in cleaning. Cleaning of equipments, facilities and cleaning in place.   |
|         |  | CO 5: Apply the knowledge of validation of analytical method as per ICH guidelines and USP.  |
| MPH204T | Advanced Instrumental Analysis – II      | CO 1: Students will come out with the thorough knowledge of various electrochemical methods  |
|         |  | CO 2: Students will come out with the thorough knowledge of AAS, RIA, ELISA etc. which help them in further projects works and also industrial opportunities       |
|         |  | CO 3: Various hyphenated analytical instrumental techniques for identification, characterization and quantification of drugs.                                      |
|         |  | CO 4: Students will come out with the thorough knowledge of LC-MS, GC-MS, and hyphenated techniques.   |
|         |  | CO 5: Students will come out with the thorough knowledge of fluorimetry.   |
| MPH205P | Advanced Instrumental Analysis - I (Lab) | CO 1: Students would be able to know about Determination of chlorides and sulphates by Nephelo – Turbidimetry.   |
|         |  | CO 2: Students would be able to learn compounds of sodium, potassium and calcium by Flame photometry and Estimation of riboflavin/quinine sulphate by fluorimetry. |
|         |  | CO 3: Students would be able to learn about assay of official compounds by potentiometric titrations and conductometric titrations                                 |
|         |  | CO 4: To know about Demonstration on ELISA, Quenching of fluorescence.   |
|         |  | CO 5: Students would be able to study phosphate interference on absorption of calcium  |
| MPH206P | Modern Bio Analytical Techniques Lab     | CO 1: Analyze samples quantitatively using gel electrophoresis & isolate analgesics from biological fluids   |
|         |  | CO 2: Analyze samples using HPLC technique & develop method for API using HPLC   |
|         |  | CO 3: Determine antihistaminic drugs using TLC   |
|         |  | CO 4: Estimate drugs from biological matrices by SPE/LLE technique   |
|         |  | CO 5: Assess the drug from Diclofenac formulation by HPLC technique  |



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|        |   |  |
|--------|---|--|
| MPH207 | ENGLISH FOR<br>RESEARCH PAPER<br>WRITING<br>AUDIT COURSE - II | CO 1: understand the Biostatistics arrangement                 |
|        |   | CO 2: know the presentation and formation of tables and charts |
|        |   | CO 3: learn the correlation and regression                     |
|        |   | CO 4: gain the knowledge of analysis of data                   |
|        |   | CO 5: learn the Hypothesis testing                             |



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II YEAR I SEMESTER

| COURSE CODE | COURSE NAME                      | COURSE OUTCOMES  |
|-------------|----------------------------------|--|
| MPH301T     | SCALE UP AND TECHNOLOGY TRANSFER | CO 1: Design the pilot scale up technology   |
|             |                                  | CO 2: Judge the documentation process  |
|             |                                  | CO 3: Conclude in choosing of equipment for dosage form production                             |
|             |                                  | CO 4: Summarize the process validation   |
|             |                                  | CO 5: Describe safety and hazards in industries  |
| MPH302T     | COSMETICS AND COSMECEUTICALS     | CO 1: know the regulatory biological aspects of cosmetics                                      |
|             |                                  | CO 2: understand the excipients used and key building blocks in various formulations.          |
|             |                                  | CO 3: design cosmeceuticals and herbal products with desired safety and stability.             |
| MPH303      | AUDITS AND REGULATORY COMPLIANCE | CO 1: explain the importance of auditing in the pharmaceutical industry.                       |
|             |                                  | CO 2: discuss the different types of audits that are conducted in the pharmaceutical industry. |
|             |                                  | CO 3: identify the key steps involved in the audit process.                                    |
|             |                                  | CO 4: gather evidence to support audit findings.   |
|             |                                  | CO 5: prepare an objective and comprehensive audit report.                                     |
|             |                                  | CO 6: develop a checklist to use during the audit process.                                     |



  
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**PROGRAM SPECIFIC OUTCOMES (PSO'S)**

**(B.PHARMACY)**

**PSO 1:** Detail understanding of theoretical and practical knowledge of all core and allied subjects of pharmaceutical sciences, which consist of dosage form design, routes of administration of various drugs, their mechanism of action, chemical moiety involved, doses of drugs, patient treatment, patient counseling, drug dispensing, hospital administration, drug manufacturing, QA/QC and regulation etc.

**PSO2:** Highlight the concepts and operative components of pharmacovigilance, clinical pharmacy, hospital pharmacy, community pharmacy, pharmaceutical care, pharmacovigilance, pharmacoconomics, clinical research, clinical pharmacokinetics and other related areas for the benefit of academicians, hospital/community pharmacists and industry, emphasizing the consequences of the use of medications.

**PSO3:** Rigorous core course-work in biopharmaceutics, drug transport, pharmacokinetics & pharmacodynamics, drug delivery systems, cell and molecular biology, synthetic and macromolecular chemistry, chemical and biomedical engineering, materials science, physiology and pharmacology.



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**PROGRAM SPECIFIC OUTCOMES (PSO'S)**

**PHARM D**

**PSO 1.** Acquire knowledge in the field of synthetic and natural sources of drugs as well as their formulation and evaluation, including their regulatory requirements.

**PSO 2.** Using the fundamentals in physiology, anatomy and pathology to understand and explain the pharmacological and toxicological aspects of various drugs and increase their creativity in developing novel clinical research initiatives in these areas.

**PSO 3.** Applying their expertise to recognize possible adverse drug interactions and counsel the patients in complying with the prescribed treatment regimen.

**PSO 4.** Graduates can comprehend the role of pharmaceutical care, medication management, pharmacoconomics, pharmacogenomics, and the concepts of hospital, community and clinical pharmacy for serving the community.



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**M. Pharmacy Program specific outcomes**

| <b>M.Pharm Pharmaceutics Program specific outcome (MPH)</b> |   |
|---|---|
| PO1(MPH)  | To Understand the principles of novel drug delivery system and apply the same for the fabrication of cost effective, efficacious, and patient compliant dosage form.  |
| PO2(MPH)  | To Understand the concepts of pre-formulation and its importance in developing a quality, efficacious, safe and stable dosage form and gain knowledge in performing various analytical techniques using different equipments and instruments.   |
| PO3(MPH)  | To Gain knowledge of drug and cosmetics regulatory process in India and other countries. To comprehend the computer aided drug development process using various PK-PD soft wares and understand the basic concepts of bio pharmaceutics & pharmacokinetics and its Problem solving techniques.   |
| PO4(MPH)  | To Attain hands-on training in handling various analytical equipment; perform pre-formulation studies, and formulation of cosmetics and novel drug delivery system, usage of pharmacokinetics softwares and hands-on training in the formulation of cosmetics and cosmoceuticals. Ability to understand research methodology and conduct research work and its presentation |

| <b>M.Pharm Regulatory Affairs Program specific outcome (MPH)</b> |  |
|--|--|
| PO1(MRA)   | Understand key regulatory, registration and compliance elements with respect to documentation, clinical trials, drugs & cosmetics, biologicals and intellectual property rights. |
| PO2(MRA)   | Understand the regulatory aspects of drugs & cosmetics, herbal & biologicals, medical devices, food and nutraceuticals.  |
| PO3(MRA)   | Gain knowledge in research & review article writing, research methodologies and biostatistics tools.   |
| PO4(MRA)   | Able to file documents for registration and marketing of drugs, cosmetics, medical devices, biologicals, herbals for different regulatory bodies.                                |



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**M.Pharm Pharmaceutical Analysis Program specific outcome (MPH)**

|          |   |
|----------|---|
| PO1(MPA) | Gain appreciable knowledge about the theoretical and practical aspects of modern analytical techniques and their application in analysis of drug substances, formulations, excipients and food products and about different validation procedures according to guidelines |
| PO2(MPA) | Understand the advancements in major instrumental analytical techniques used in bio-analysis, herbal and cosmetic analysis and also about QA practices  |
| PO3(MPA) | Attain knowledge in research methodologies, biostatistical tools and article writing in Journals.   |
| PO4(MPA) | Able to develop new analytical methods by using various instrumental techniques for application in different fields of science  |

**M.Pharm Pharmacology Program specific outcome (MPC)**

|          |   |
|----------|---|
| PO1(MPC) | Work in different divisions of pharmaceutical industry like manufacturing, quality assurance, analytical, preclinical research, pharmacovigilance and regulatory affairs. |
| PO2(MPC) | Become an entrepreneur in the areas of clinical research, preclinical development, pharmaceutical consultancy services, drug sales and distribution.                      |
| PO3(MPC) | Explore opportunities in different government and non-government organizations as clinical research associate, academician, research scientist and drug inspector.        |



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