



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

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Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.

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2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all the Programmes offered by the institution are stated and displayed on the website.

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Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for B Pharmacy (UG Course)

Program Educational Objectives (PEOs)

PEO 1: Professionalism: Graduates will be able to demonstrate technical skills in medicine compounding and dispensing, offering drug information services to enhance the health care team's drug therapy.

PEO 2: Interdisciplinary Collaboration: Graduates will be able to inculcate leadership and management skills through effective communications, expertise in problem solving related to drugs, formulations and continuous professional development.

PEO 3: Liasion: Graduates will be able to train in synchronization with the requirements of pharmaceutical industry and encouraged to participate in seminars, conferences, workshops group discussions, quizzes, and health care programs.

PEO 4: Preventive Medicine: Graduates will be qualified to take part in national health development initiatives and serve the community with the highest standards of professional ethics.

Program Outcomes (POs)

PO 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.

PO 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.

PO 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.

PO 4: Modern Usage Tool: Learn, select, and apply appropriate methods and procedures, resources and modern pharmacy-related computing tools with an understanding of the limitations.

PO 5: Leadership Skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.





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PO 6: Professional Identity: Understand, analyze and communicate the value of their professional roles in the society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

PO 7: Pharmaceutical Ethics: Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO 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.

PO 9: The Pharmacist and the Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

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

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

Program Specific Outcomes (PSOs)

PSO 1: Scientific Analytical Thinking: Able to implement technical skills in extraction, purification, analysis, formulation, marketing of drugs and medicines.

PSO 2: Entrepreneurship: Able to develop entrepreneurial and administrative abilities to open community pharmacies, educational institutions, and training facilities for the long-term benefit of society.



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Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for Pharm D / Pharm D (PB) (PG Course)

Program Educational Objectives (PEOs)

PEO 1: Professionalism: Graduates will be able to inculcate leadership & entrepreneurship capabilities and practice ethics & values for providing services to society in promoting healthcare environment & social awareness. Graduates will be able to provide health care information for prevention or treatment of diseases and disorders and demonstrate technical skills in medicine compounding and dispensing of medicines.

PEO 2: Academic Excellence and Community wellness: Graduates should be capable of providing high quality pharmaceutical services and striving for excellence in pharmacy education in patent care research & community wellness.

PEO 3: Social Contribution: Graduates should contribute towards health care system by counseling for prophylaxis & prevention of diseases & creating awareness.

PEO 4: Self Identify Awareness: Graduates should update their knowledge & able to analyze pros and cons by organizing or conducting or attending workshops seminars and conferences at national & International Level.

Program Outcomes (POs)

PO 1: Comprehensive pharmacy and clinical knowledge: Demonstrate mastery and application of core knowledge and skills in relation to the evolving pharmaceutical, biomedical, clinical and epidemiological sciences. This includes competency in areas supporting high quality pharmacy practice.

PO 2: Patient Centered Care: 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 teams.

PO 3: Problem solving and decision making: Demonstrate the ability to use observational, analytical and critical thinking skills to develop, implement and evaluate solutions that solve pharmacotherapy problems and build the ability to take decisions based on evidenced based practice.


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PO 4: Social and cultural awareness: Recognize social determinants of health and respect patients' cultural, social and religious perspectives to produce safe and appropriate medication use throughout society. Reflect their knowledge, experiences, values, attitudes, biases and beliefs, to show evidence of being self-aware and life-long learners.

PO 5: Leadership Skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

PO 6: Innovation and entrepreneurship: Engage in innovative activities by using creative thinking to envision better ways of accomplishing professional goals. Utilize the principles of scientific enquiry and critical thinking while solving problems and making decisions in daily practice. Attain the key ability to start a community pharmacy or chain community pharmacies with patient care services.

PO 7: Pharmaceutical Ethics: Practice ethically, maintaining patient confidentiality, responding to errors in care and professional misconduct (including plagiarism), and understanding principles of ethical research (including conflicts of interest and obtaining appropriate informed consent). Apply ethical principles while making decisions and take responsibility for the outcomes associated with decisions.

PO 8: Interpersonal and Communication skills: Demonstrate effective interpersonal written and verbal skills, adapt to socioeconomic and cultural factors as well as situational applications. Effectively educate families, patients, caregivers and other health care professional (HCPs). Function effectively in a team and act in a consultative position for other members of the health care team, regulatory agencies and policy makers.

PO 9: Clinical Pharmacist and the Society: Apply contextual knowledge to assess the societal health care needs and demonstrate effective planning abilities in order to solve problems related to health care practice. Educate and aware the patients regarding the aspect of health and prevention of diseases and provide them a cost-effective drug therapy.

PO 10: Environment and Sustainability: Understand the impact of professional pharmacy solution in societal and environmental context and demonstrate the knowledge and need of sustainable development.


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PO 11: Practice based learning and improvement: Evaluate practice and care, and promote continuous improvement in one's own patient care and pharmacy services. Demonstrate self-calibration skills and a commitment to the lifelong learning needed to provide high quality care. Locate, appraise and assimilate evidence from scientific studies to enhance the quality of care and services.

Program Specific Outcomes (PSOs)

PSO 1: Scientific Thinking: Able to implement technical skills in dispensing, compounding of drugs and medicines and expertise in designing dosage regimen, recognizing possible adverse reactions.

PSO 2: Professional practice: Able to inculcate practice of pharmacy for empowering the healthy living in the community by various means of awareness and health strategies.


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Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for M Pharmacy Pharmaceutical Technology / Pharmaceutics (PG Course)

Program Educational Objectives (PEOs)

PEO 1: Comprehensive Expertise: Graduates should impart sound pharmaceutical knowledge in utilizing advanced laboratory techniques and instrumentation to make them ever-ready for producing quality, safety and effective pharmaceutical formulations.

PEO 2: Emerging Innovation Leaders: Graduates should become pioneers in the field of pharmaceutical innovation and research, constantly coming up with new and better techniques for drug development and assessment. Capable of making a substantial contribution towards the progress of pharmaceutical science and the creation of safer and more efficient pharmaceuticals.

PEO 3: Pharmaceutical regulations: Graduates should comprehend the goals, responsibilities, and duties of the several pharmaceutical regulatory agencies that oversee the effectiveness, safety, and quality of drugs from

PEO 4: Entrepreneurial Spirit: Graduates should produce skilled pharmaceutical professionals, leaders, policy makers and entrepreneurs for building healthy nation.

Program Outcomes (POs)

PO 1: Scientific knowledge: Apply the scientific and technological principles to design, develop effective pharmaceutical dosage forms and drug delivery systems for better therapeutic results.

PO 2: Technological applications: utilize technical knowledge and identify any factors affecting the quality of pharmaceutical production.

PO 3: Modern tool usage: Learn, select, and apply appropriate methods, procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 4: Entrepreneurship: Understand the basics of establishing and management of pharmaceutical enterprise.

PO 5: Practical Skills: Gain practical expertise in formulating and evaluating various novel drug release systems for minor ailments to major diseases.

PO 6: Applied science: Employ contemporary scientific knowledge viz., pharmacology, biotechnology for designing disease-centric pharmaceuticals.

PO 7: Computational and statistical methodologies: Applying and utilizing the statistical tools with the aid of computer software to optimize the formulations.





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PO 8: Pharmaceutical ethics: Respect personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural, personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO 9: Environment and Sustainability: Understand, protect and cooperate environmental concerns for sustaining biodiversity.

PO 10: Life-Long Learning: Develop the habit of updating knowledge from time to time to meet industrial demands and social needs for having a fruitful career.

Program Specific Outcomes (PSOs)

PSO 1: Formulation Expertise: Able to gain theoretical and practical knowledge on design of pharmaceutical formulations and manufacturing techniques, enabling the creation of novel drug delivery systems.

PSO 2: Computational application: Able to utilize artificial intelligence, software applications which are useful in screening formulations, interpretation of experimental data and their validation.




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Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for M Pharmacy Pharmacology (PG Course)

Program Educational Objectives (PEOs)

PEO 1: Ethical Awareness: Graduates will be able to understand, appreciate and apply concepts about various aspects of regulations and ethical requirement for the usage of experimental animals, CPCSEA guidelines for laboratory animal facilities, and toxicity studies.

PEO 2: Domain Knowledge: Graduates should inculcate advanced theoretical and practical knowledge of the pharmacological education which will help them to perform exceptionally in academics and their professions.

PEO3: Systems based approach: Graduates should develop novel approaches for minimizing and monitoring of adverse drug reactions to ensure safe use of drugs by providing practical inputs in pharmacokinetic studies of various drugs and formulations in animals to establish in-vitro and in-vivo correlations.

PEO 4: Social Awareness: Graduates should act responsibly towards environment, follow ethical principles, be able to comprehend, interpret and apply laws pertinent to all spheres of pharmaceutical and allied domains. imbibe the spirit of being an entrepreneur.

Program Outcomes (POs)

PO 1: Drug Expertise: Acquire knowledge on various classes of drugs and their mode of actions to unveil the remedies for many ailments.

PO 2: Analytical Reasoning: Identify assumptions and reveal the evidence-based reasons for the disease or disorder take place to select the type of relevant treatment.

PO 3: Experimental Ethics: Consider and follow ethics and guidelines specified by the authorities of various agencies and Government of India for animal congenial laboratory practice.

PO 4: Interdisciplinary engagement: Obtain skill oriented practical proficiency by exposing and utilizing the needs of pharmacy in all disciplines to emerge as potent researcher.

PO 5: Statistical Skills: Apply and analyze quantitative metrics to gain safety data on dosage, also to compare the effectiveness among experimental groups.

PO 6: Professional Identity: Be committed and responsible person to play a proactive role with fidelity to community and empower society.

PO 7: Environment and sustainability: understand, protect and cooperate environmental concerns for sustaining biodiversity.



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PO 8: Modern tool usage: Learn, select, apply appropriate methods, procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 9: Intellectual Flexibility: Engage in critical thinking and gain insight to identify, design and formulate pharmaceutical products that are in need of current aspects by using material from natural sources.

PO 10: Lifelong learning: Understand and apply the concepts in day-to-day life activities for the benefit of self and for the welfare of society and its concerns.

Program Specific Outcomes (PSOs)

PSO 1: Research Expertise: Graduates should have comprehensive knowledge of designing, conducting, analysis, reporting and documentation of the preclinical and clinical research studies for effective pharmacotherapy of drugs.

PSO 2: Pharmacovigilance Expertise: Graduates will be able to apply and appraise regulatory, computational and informatics tools and ethical concepts in preclinical and clinical research for pharmaceutical and healthcare domain in relation to society.



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Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for M Pharmacy Pharmaceutical Analysis (PG Course)

Program Educational Objectives (PEOs)

PEO 1: Advanced Analytical Proficiency: Graduates should gain an in-depth knowledge of the advanced analytical tools and methods utilized in pharmaceutical analysis, enabling students to accurately determine the chemical composition of pharmaceutical dosage forms.

PEO 2: Innovative Analytical Science Research: Graduates will be proficient in pharmaceutical analysis research and innovation, with an emphasis on advanced instruments. develops new and enhanced techniques for the accurate assessment of medications, advancing the analytical sciences in the pharmaceutical industry.

PEO 3: Effective Communicators and Collaborators in Analytical Research: Graduates will excel in communication, conveying their research findings and analytical results effectively to their peers and the broader scientific community. They will also demonstrate strong collaborative skills, working effectively with healthcare professionals and researchers to enhance pharmaceutical analysis and research initiatives, fostering interdisciplinary teamwork

PEO 4: Initiative and Entrepreneurialism: Individual's ability to turn ideas into practice. Like finding new opportunities to share information and concepts. Generating options and solutions to cope with changes. It involves imagination, novelty and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives.

Program Outcomes (POs)

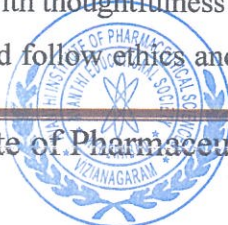
PO 1: Analytical Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including chromatographic and spectroscopic techniques and differentiate with volumetric analysis.

PO 2: Analytical Reasoning: Categorize assumptions and disclose the data according to guidelines.

PO 3: Problem Solving: Utilize the principles of analytical techniques with clear and critical thinking, while solving problems and making decisions. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO 4: Modern Techniques: Learn, choose and apply appropriate hyphenated methods and procedures and related computing tools with thoughtfulness of their applications.

PO 5: Experimental Ethics: Believe and follow ethics and guidelines specified by the regulatory





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authorities of various countries and Government of India for good laboratory practice.

PO 6: Interdisciplinary Commitment: Acquire skill oriented practical ability and utilize the needs of pharmacy in all other programmes to emerge as potent researcher.

PO 7: Professional Identity: Be committed and responsible person to play a proactive role with fidelity to community and empower society.

PO 8: Statistical Skills: Apply and evaluate quantitative metrics to gain method development, validation, safety data on dosage and also to compare the effectiveness among different marketed formulations.

PO 9: Rational Flexibility: Engage in critical and logical thinking and to gain an overall knowledge in developing newer methods, impurity profiling and validation protocols those are useful in laboratory purpose.

PO 10: 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.

Program Specific Outcomes (PSOs)

PSO 1: Advanced Analytical Proficiency: Achieve a deep and advanced understanding of analytical instrumentation and techniques in pharmaceutical analysis, enabling them to conduct precise chemical analyses of pharmaceutical products and contribute to the advancement of analytical sciences.

PSO 2: Entrepreneurship: Graduates should be able to develop entrepreneurial and administrative abilities to open community pharmacies, educational institutions, and training facilities for the long-term benefit of society.

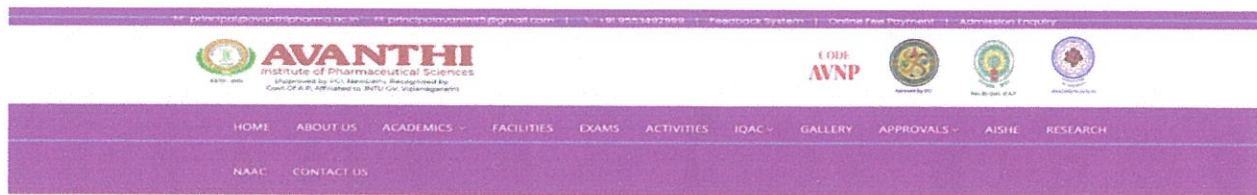


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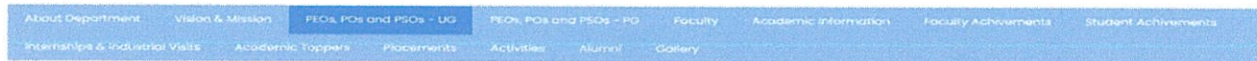
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DEPARTMENT OF PHARMACY



Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for B Pharmacy (UG Course)

Program Educational Objectives (PEOs)

- PEO 1: Professionalism:** Graduates will be able to demonstrate technical skills in medicine compounding and dispensing, offering drug information services to enhance the health care team's drug therapy.
- PEO 2: Interdisciplinary Collaboration:** Graduates will be able to inculcate leadership and management skills through effective communications, expertise in problem solving related to drugs, formulations and continuous professional development.
- PEO 3: Liaison:** Graduates will be able to train in synchronization with the requirements of pharmaceutical industry and encouraged to participate in seminars, conferences, workshops group discussions, quizzes, and health care programs.
- PEO 4: Preventive Medicine:** Graduates will be qualified to take part in national health development initiatives and serve the community with the highest standards of professional ethics.

Program Outcomes (POs)

- PO 1: Comprehensive pharmacy and clinical knowledge:** Demonstrate mastery and application of core knowledge and skills in relation to the evolving pharmaceutical, biomedical, clinical and epidemiological sciences. This includes competency in areas supporting high quality pharmacy practice.
- PO 2: Patient Centered Care:** 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 teams.
- PO 3: Problem solving and decision making:** Demonstrate the ability to use observational, analytical and critical thinking skills to develop, implement and evaluate solutions that solve pharmacotherapy problems and build the ability to take decisions based on evidenced based practice.
- PO 4: Social and cultural awareness:** Recognize social determinants of health and respect patients' cultural, social and religious perspectives to produce safe and appropriate medication use throughout society. Reflect their knowledge, experiences, values, attitudes, biases and beliefs, to show evidence of being self-aware and life-long learners.
- PO 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 responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
- PO 6: Innovation and entrepreneurship:** Engage in innovative activities by using creative thinking to envision better ways of accomplishing professional goals. Utilize the principles of scientific enquiry and critical thinking while solving problems and making decisions in daily practice. Attain the key ability to start a community pharmacy or chain community pharmacies with patient care services.
- PO 7: Pharmaceutical Ethics:** Practice ethically, maintaining patient confidentiality, responding to errors in care and professional misconduct (including plagiarism), and understanding principles of ethical research (including conflicts of interest and obtaining appropriate informed consent). Apply ethical principles while making decisions and take responsibility for the outcomes associated with decisions.
- PO 8: Interpersonal and Communication skills:** Demonstrate effective interpersonal written and verbal skills, adapt to socioeconomic and cultural factors as well as situational applications. Effectively educate families, patients, caregivers and other health care professional (HCPs). Function effectively in a team and act in a consultative position for other members of the health care team, regulatory agencies and policy makers.
- PO 9: Clinical Pharmacist and the Society:** Apply contextual knowledge to assess the societal health care needs and demonstrate effective planning abilities in order to solve problems related to health care practice. Educate and aware the patients regarding the aspect of health and prevention of diseases and provide them a cost-effective drug therapy.
- PO 10: Environment and Sustainability:** Understand the impact of professional pharmacy solution in societal and environmental context and demonstrate the knowledge and need of sustainable development.
- PO 11: Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

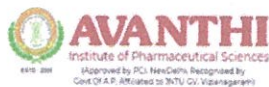
Program Specific Outcomes (PSOs)

- PSO 1: Scientific Analytical Thinking:** Able to implement technical skills in extraction, purification, analysis, formulation, marketing of drugs and medicines.
- PSO 2: Entrepreneurship:** Able to develop entrepreneurial and administrative abilities to open community pharmacies, educational institutions, and training facilities for the long-term benefit of society.

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DEPARTMENT OF PHARMACY

Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for M Pharmacy Pharmacology (PG Course)

Program Educational Objectives (PEOs)

PEO 1: Ethical Awareness: Graduates will be able to understand, appreciate and apply concepts about various aspects of regulations and ethical requirement for the usage of experimental animals, CPCSEA guidelines for laboratory animal facilities, and toxicity studies.

PEO 2: Domain Knowledge: Graduates should inculcate advanced theoretical and practical knowledge of the pharmacological education which will help them to perform exceptionally in academics and their professions.

PEO 3: Systems based approach: Graduates should develop novel approaches for minimizing and monitoring of adverse drug reactions to ensure safe use of drugs by providing practical inputs in pharmacokinetic studies of various drugs and formulations in animals to establish in-vitro and in-vivo correlations.

PEO 4: Social Awareness: Graduates should act responsibly towards environment, follow ethical principles, be able to comprehend, interpret and apply laws pertinent to all spheres of pharmaceutical and allied domains. imbibe the spirit of being an entrepreneur.

Program Outcomes (POs)

PO 1: Drug Expertise: Acquire knowledge on various classes of drugs and their mode of actions to unveil the remedies for many ailments.

PO 2: Analytical Reasoning: Identify assumptions and reveal the evidence-based reasons for the disease or disorder take place to select the type of relevant treatment

PO 3: Experimental Ethics: Consider and follow ethics and guidelines specified by the authorities of various agencies and Government of India for animal congenial laboratory practice.

PO 4: Interdisciplinary engagement: Obtain skill oriented practical proficiency by exposing and utilizing the needs of pharmacy in all disciplines to emerge as potent researcher.

PO 5: Statistical Skills: Apply and analyze quantitative metrics to gain safety data on dosage, also to compare the effectiveness among experimental groups

PO 6: Professional Identity: Be committed and responsible person to play a proactive role with fidelity to community and empower society.

PO 7: Environment and sustainability: understand, protect and cooperate environmental concerns for sustaining biodiversity.

PO 8: Modern tool usage: Learn, select, apply appropriate methods, procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 9: Intellectual Flexibility: Engage in critical thinking and gain insight to identify, design and formulate pharmaceutical products that are in need of current aspects by using material from natural sources.

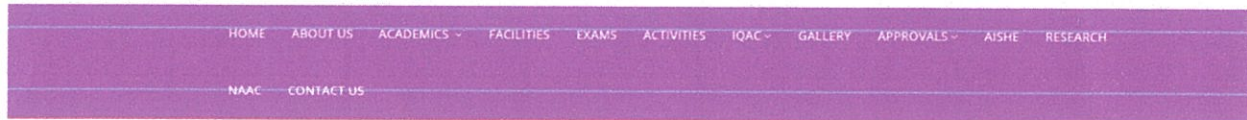
PO 10: Lifelong learning: Understand and apply the concepts in day-to-day life activities for the benefit of self and for the welfare of society and its concerns.

Program Specific Outcomes (PSOs)

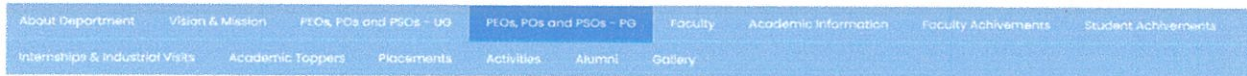
PSO 1: Research Expertise: Graduates should have comprehensive knowledge of designing, conducting, analysis, reporting and documentation of the preclinical and clinical research studies for effective pharmacotherapy of drugs.

PSO 2: Pharmacovigilance Expertise: Graduates will be able to apply and appraise regulatory, computational and informatics tools and ethical concepts in preclinical and clinical research for pharmaceutical and healthcare domain in relation to society.





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**Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for M Pharmacy
 Pharmaceutical Analysis (PG Course)**

Program Educational Objectives (PEOs)

- PEO 1: Advanced Analytical Proficiency:** Graduates should gain an in-depth knowledge of the advanced analytical tools and methods utilized in pharmaceutical analysis, enabling students to accurately determine the chemical composition of pharmaceutical dosage forms.
- PEO 2: Innovative Analytical Science Research:** Graduates will be proficient in pharmaceutical analysis research and innovation, with an emphasis on advanced instruments, develops new and enhanced techniques for the accurate assessment of medications, advancing the analytical sciences in the pharmaceutical industry.
- PEO 3: Effective Communicators and Collaborators in Analytical Research:** Graduates will excel in communication, conveying their research findings and analytical results effectively to their peers and the broader scientific community. They will also demonstrate strong collaborative skills, working effectively with healthcare professionals and researchers to enhance pharmaceutical analysis and research initiatives, fostering interdisciplinary teamwork.
- PEO 4: Initiative and Entrepreneurialism:** Individual's ability to turn ideas into practice. Like finding new opportunities to share information and concepts. Generating options and solutions to cope with changes. It involves imagination, novelty and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives.

Program Outcomes (POs)

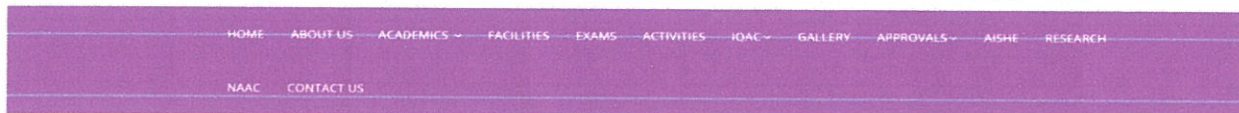
- PO 1: Analytical Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including chromatographic and spectroscopic techniques and differentiate with volumetric analysis.
- PO 2: Analytical Reasoning:** Categorize assumptions and disclose the data according to guidelines.
- PO 3: Problem Solving:** Utilize the principles of analytical techniques with clear and critical thinking, while solving problems and making decisions. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- PO 4: Modern Techniques:** Learn, choose and apply appropriate hyphenated methods and procedures and related computing tools with thoughtfulness of their applications.
- PO 5: Experimental Ethics:** Believe and follow ethics and guidelines specified by the regulatory authorities of various countries and Government of India for good laboratory practice.
- PO 6: Interdisciplinary Commitment:** Acquire skill oriented practical ability and utilize the needs of pharmacy in all other programmes to emerge as potent researcher.
- PO 7: Professional Identity:** Be committed and responsible person to play a proactive role with fidelity to community and empower society.
- PO 8: Statistical Skills:** Apply and evaluate quantitative metrics to gain method development, validation, safety data on dosage and also to compare the effectiveness among different marketed formulations.
- PO 9: Rational Flexibility:** Engage in critical and logical thinking and to gain an overall knowledge in developing newer methods, impurity profiling and validation protocols these are useful in laboratory purpose.
- PO 10: 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.

Program Specific Outcomes (PSOs)

- PSO 1: Advanced Analytical Proficiency:** Achieve a deep and advanced understanding of analytical instrumentation and techniques in pharmaceutical analysis, enabling them to conduct precise chemical analyses of pharmaceutical products and contribute to the advancement of analytical sciences.
- PSO 2: Entrepreneurship:** Graduates should be able to develop entrepreneurial and administrative abilities to open community pharmacies, educational institutions, and training facilities for the long-term benefit of society.



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Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for M Pharmacy Pharmaceutical Technology / Pharmaceutics (PG Course)

Program Educational Objectives (PEOs)

PEO 1: Comprehensive Expertise: Graduates should impart sound pharmaceutical knowledge in utilizing advanced laboratory techniques and instrumentation to make them over-ready for producing quality, safety and effective pharmaceutical formulations.

PEO 2: Emerging Innovation Leaders: Graduates should become pioneers in the field of pharmaceutical innovation and research, constantly coming up with new and better techniques for drug development and assessment. Capable of making a substantial contribution towards the progress of pharmaceutical science and the creation of safer and more efficient pharmaceuticals.

PEO 3: Pharmaceutical regulations Graduates should comprehend the goals, responsibilities, and duties of the several pharmaceutical regulatory agencies that oversee the effectiveness, safety, and quality of drugs from

PEO 4: Entrepreneurial Spirit: Graduates should produce skilled pharmaceutical professionals, leaders, policy makers and entrepreneurs for building healthy nation

Program Outcomes (POs)

PO 1: Scientific knowledge: Apply the scientific and technological principles to design, develop effective pharmaceutical dosage forms and drug delivery systems for better therapeutic results.

PO 2: Technological applications: utilize technical knowledge and identify any factors affecting the quality of pharmaceutical production.

PO 3: Modern tool usage: Learn, select, and apply appropriate methods, procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 4: Entrepreneurship: Understand the basics of establishing and management of pharmaceutical enterprise.

PO 5: Practical Skills: Gain practical expertise in formulating and evaluating various novel drug release systems for minor ailments to major diseases.

PO 6: Applied science: Employ contemporary scientific knowledge viz. pharmacology, biotechnology for designing disease-centric pharmaceuticals.

PO 7: Computational and statistical methodologies: Applying and utilizing the statistical tools with the aid of computer software to optimize the formulations.

PO 8: Pharmaceutical ethics: Respect personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural, personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO 9: Environment and Sustainability: Understand, protect and cooperate environmental concerns for sustaining biodiversity.

PO 10: Life-Long Learning: Develop the habit of updating knowledge from time to time to meet industrial demands and social needs for having a fruitful career.

Program Specific Outcomes (PSOs)

PSO 1: Formulation Expertise: Able to gain theoretical and practical knowledge on design of pharmaceutical formulations and manufacturing techniques, enabling the creation of novel drug delivery systems.

PSO 2: Computational application: Able to utilize artificial intelligence, software applications which are useful in screening formulations, interpretation of experimental data and their validation.



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DEPARTMENT OF PHARMACY

About Department Vision & Mission PEOs, POs and PSOs - UG PEOs, POs and PSOs - PG Faculty Academic Information Faculty Achievements Student Achievements
 Internships & Industrial Visits Academic Toppers Placements Activities Alumni Gallery

Programme Outcomes (POs), Programme Educational Outcomes (PEOs), and Programme Specific Outcomes (PSOs) for Pharm D / Pharm D (PB) (PG Course)

Program Educational Objectives (PEOs)

PEO 1: Professionalism: Graduates will be able to inculcate leadership & entrepreneurship capabilities and practice ethics & values for providing services to society in promoting healthcare environment & social awareness. Graduates will be able to provide health care information for prevention or treatment of diseases and disorders and demonstrate technical skills in medicine compounding and dispensing of medicines.

PEO 2: Academic Excellence and Community wellness: Graduates should be capable of providing high quality pharmaceutical services and striving for excellence in pharmacy education in patient care research & community wellness.

PEO 3: Social Contribution: Graduates should contribute towards health care system by counseling for prophylaxis & prevention of diseases & creating awareness.

PEO 4: Self Identify Awareness: Graduates should update their knowledge & able to analyze pros and cons by organizing or conducting or attending workshops seminars and conferences at national & international level.

Program Outcomes (POs)

PO 1: Comprehensive pharmacy and clinical knowledge: Demonstrate mastery and application of core knowledge and skills in relation to the evolving pharmaceutical, biomedical, clinical and epidemiological sciences. This includes competency in areas supporting high quality pharmacy practice.

PO 2: Patient Centered Care: 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 teams.

PO 3: Problem solving and decision making: Demonstrate the ability to use observational, analytical and critical thinking skills to develop, implement and evaluate solutions that solve pharmacotherapy problems and build the ability to take decisions based on evidenced based practice.

PO 4: Social and cultural awareness: Recognize social determinants of health and respect patients' cultural, social and religious perspectives to produce safe and appropriate medication use throughout society. Reflect their knowledge, experiences, values, attitudes, biases and beliefs, to show evidence of being self-aware and life-long learners.

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

PO 6: Innovation and entrepreneurship: Engage in innovative activities by using creative thinking to envision better ways of accomplishing professional goals. Utilize the principles of scientific enquiry and critical thinking while solving problems and making decisions in daily practice. Attain the key ability to start a community pharmacy or chain community pharmacies with patient care services.

PO 7: Pharmaceutical Ethics: Practice ethically, maintaining patient confidentiality, responding to errors in care and professional misconduct (including plagiarism), and understanding principles of ethical research (including conflicts of interest and obtaining appropriate informed consent). Apply ethical principles while making decisions and take responsibility for the outcomes associated with decisions.

PO 8: Interpersonal and Communication skills: Demonstrate effective interpersonal written and verbal skills, adapt to socioeconomic and cultural factors as well as situational applications. Effectively educate families, patients, caregivers and other health care professional (HCPs). Function effectively in a team and act in a consultative position for other members of the health care team, regulatory agencies and policy makers.

PO 9: Clinical Pharmacist and the Society: Apply contextual knowledge to assess the societal health care needs and demonstrate effective planning abilities in order to solve problems related to health care practice. Educate and aware the patients regarding the aspect of health and prevention of diseases and provide them a cost-effective drug therapy.

PO 10: Environment and Sustainability: Understand the impact of professional pharmacy solution in societal and environmental context and demonstrate the knowledge and need of sustainable development.

PO 11: Practice based learning and improvement: Evaluate practice and care, and promote continuous improvement in one's own patient care and pharmacy services. Demonstrate self-calibration skills and a commitment to the lifelong learning needed to provide high quality care. Locate, appraise and assimilate evidence from scientific studies to enhance the quality of care and services.

Program Specific Outcomes (PSOs)

PSO 1: Scientific Thinking: Able to implement technical skills in dispensing, compounding of drugs and medicines and expertise in designing dosage regimen, recognizing possible adverse reactions.

PSO 2: Professional practice: Able to inculcate practice of pharmacy for empowering the healthy living in the community by various means of awareness and health strategies.



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Avanthi Institute of Pharmaceutical Sciences

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DEPARTMENT OF PHARMACY

Program: B Pharmacy

Regulation: PCI (R14)

No. of Courses: 75

COURSE OUTCOMES

I – I Sem	Course: Human Anatomy and Physiology – I (BP101T)
CO101.1	Recognize the various homeostatic mechanisms, cellular level organization and summarize the characteristics of different types of tissues and their location in various organs.
CO101.2	Organize the structure and functions of skin, bones and joints of human body.
CO101.3	Analyze the importance of haemopoietic system in human body.
CO101.4	Understand the importance of lymphatic system in human body.
CO101.5	Relate the physiology of sympathetic, parasympathetic, spinal/cranial nerves and organization of special senses.
CO101.6	Illustrate the anatomy, physiology and coordinated pathway of heart and blood vessels.
I – I Sem	Course: Pharmaceutical Analysis– I (BP102T)
CO102.1	Understand the physiochemical concepts of analysis and gain knowledge of sources of errors and minimizing techniques.
CO102.2	Analyze the techniques of acid-base titrations and non-aqueous titrations.
CO102.3	Employ volumetric titrations in quality control of pharmaceuticals.
CO102.4	Analyze the techniques of gravimetry in quality control of pharmaceuticals.
CO102.5	Analyze the techniques of redox titrations and develop analytical skills.
CO102.6	Analyze various electro chemical titrations and interpret the results.
I – I Sem	Course: Pharmaceutics – I (BP103T)
CO103.1	Know the history of profession of pharmacy. Understand the basics of different dosage forms and importance of prescription and posology.
CO103.2	Solve the pharmaceutical calculations and summarize the basics of compounding and dispensing of powders.
CO103.3	Summarize the basics of compounding and dispensing of liquid dosage forms.
CO103.4	Summarize the basics of dispensing and compounding of biphasic liquid dosage forms.
CO103.5	Know the preparation of suppositories and understand various pharmaceutical incompatibilities.
CO103.6	Understand the preparation of various semisolid dosage forms and their evaluations.
I – I Sem	Course: Pharmaceutical Inorganic Chemistry (BP104T)
CO104.1	Understand the history of pharmacopoeia sources and types of impurities and

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	describe the official methods of control like limit tests.
CO104.2	Acquires knowledge on acids, bases, buffers, buffered isotonic solutions, methods of adjusting isotonicity and major extra and intra cellular electrolytes and know the monographs of dental products.
CO104.3	Classify the gastrointestinal agents and described the methods of preparation, properties, storage, assay and uses with marketed formulations of inorganic compounds in gastrointestinal agents.
CO104.4	Analyze the importance of Cathartics and anti-microbials in treatment of gastric diseases or disorders.
CO104.5	Classify the miscellaneous compounds and know the monographs of inorganic compounds in each category.
CO104.6	Understand the radioactivity and study of different radioisotopes, storage, precautions and applications of radioactive substances.
I – I Sem	Course: Communication Skills (BP105T)
CO105.1	Understand and apply knowledge of human communication and language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communication, technologically mediated communication.
CO105.2	Find, use, and evaluate primary academic writing associated with the communication discipline.
CO105.3	Develop knowledge, skills, and job-ready skills in pharmaceutical industry that facilitate their ability to work collaboratively with others.
CO105.4	Develop effective writing skills for the purpose of running organization.
CO105.5	Enhance communication competencies such as managing conflict, understanding small group processes, active listening, appropriate self-disclosure, and other work place norms.
CO105.6	Learn interview skills.
I – I Sem	Course: Remedial Biology (BP106RBT)
CO106.1	Know the anatomical principles followed by scientists for classification of five kingdom animals and its salient features.
CO106.2	Getting knowledge on different parts of plants and its morphological and anatomical characters and its importance.
CO106.3	Know the basic components of human anatomy & physiology of prescribed systems.
CO106.4	Understand the Chemical coordination and regulation of endocrine glands and hormones.
CO106.5	Know the basic components in plant anatomy & physiology and summarize photosynthesis in plants.
CO106.6	Know the basic structural and functional organization of living organism.
I – I Sem	Course: Remedial Mathematics (BP106RMT)
CO106a.1	Know Basic mathematical operations

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CO106a.2	Know trigonometry mostly used in any sciences.
CO106a.3	Know Basic calculus which is used in analytical study of their life sciences applications
CO106a.4	Know the basic trigonometric functions from first principles.
CO106a.5	Draw lines, finding the equations for the purpose of relational study
CO106a.6	Know Some advanced calculations in Research or Project works
I – I Sem Course: Human Anatomy and Physiology - I (BP107P)	
CO107.1	Recall handling of compound microscope and to outline the microscopic characteristics of various tissues.
CO107.2	Summarize the characteristics of different bones (skeletal system) & types of joints.
CO107.3	Estimate the various haematological parameters such as WBC, RBC count, Hb, ESR, bleeding, clotting time and their own blood group.
CO107.4	Determine various physical parameters such as heart rate, BP.
I – I Sem Course: Pharmaceutical Analysis – I (BP108P)	
CO108.1	Understand the principles of identification of impurity in given sample by performing limit tests.
CO108.2	Able to prepare and standardize solutions of different concentrations.
CO108.3	Determine percentage purity of [pharmaceutical drugs by various volumetric analytical titrations.
CO108.4	Determine normality of pharmaceutical drugs by electro analytical methods.
I – I Sem Course: Pharmaceutics - I (BP109P)	
CO109.1	Able to formulate skills of preparing syrups, elixirs, Linctus and solutions.
CO109.2	Gain knowledge on preparation of biphasic liquid dosage forms.
CO109.3	Able to prepare various solid dosage forms using different techniques and equipment's.
CO109.4	Understand the preparation of Semisolid dosage forms.
I – I Sem Course: Pharmaceutical Inorganic Chemistry (BP110P)	
CO110.1	Know the source of impurities and perform the limit tests for qualitative analysis of impurities for given sample.
CO110.2	Perform the identification test for the pharmaceutical compounds.
CO110.3	Identify the test for purity of compounds.
CO110.4	Able to prepare inorganic pharmaceuticals.

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I – I Sem	Course: Communication Skills (BP111P)
CO111.1	Learn and understand basic communication skills needed for effective for working of pharmacist in areas of pharmaceutical operations.
CO111.2	Effective in verbal and nonverbal pronunciation.
CO111.3	Develop communication skills effectively to manage team as team lead & handling the interview.
CO111.4	Presenting the advanced learning skills effectively with aid of learning.
I – I Sem	Course: Remedial Biology (BP112RBP)
CO111.1	Understand the usage and handling of microscope and study the microscope and study the microscopic investigation of cell and it's inclusions.
CO111.2	Identify microscopic and morphological characteristics of stem, root, fruit and flowers.
CO111.3	Identify bones and study frog by using computing models.
CO111.4	Determine physical parameters such as BP, blood groups.
I – II Sem	Course: Human Anatomy and Physiology - II (BP201T)
CO201.1	Relate the physiology of Central nervous system with the functioning of neurons.
CO201.2	Analyze the importance of digestive system in human body. Outline the bioenergetics involved in metabolism of food.
CO201.3	Outline the importance of Respiratory system in human body.
CO201.4	Understand the importance of Urinary system in human body.
CO201.5	Analyze the importance of endocrine system in body.
CO201.6	Illustrate the anatomy, physiology and coordinated pathway of Reproductive system. Understand basic concepts of genetics.
I – II Sem	Course: Pharmaceutical Organic Chemistry - I (BP202T)
CO202.1	Capable to give nomenclature and identify isomerism of organic compounds.
CO202.2	Remember the preparation methods and properties of alkanes, alkenes and conjugated dienes.
CO202.3	Remember the preparation methods and properties of alkyl halides and alcohols.
CO202.4	Remember the preparation methods and properties of Alcohols.
CO202.5	Remember the preparation methods and properties of Carbonyl compounds.
CO202.6	Remember the preparation methods and properties of Carboxylic acids.
I – II Sem	Course: Biochemistry (BP203T)
CO203.1	Remember the classification, properties, significance and metabolic reactions of carbohydrates, lipids, nucleic acids, proteins and amino acids.

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CO203.2	Understand the metabolism of carbohydrates and process of electron transport and ATP formation. Appraise the causes, manifestations and diagnosis of metabolic disorders.
CO203.3	Remember the metabolism of Lipids and aminoacids.
CO203.4	Understand the causes, manifestations and diagnosis of metabolic disorders.
CO203.5	Understand the metabolism of Nucleic acid and distinguish the process of DNA replication, transcription and translation.
CO203.6	Apply the concept of catalytic activity and enzyme inhibition in design of new drugs, diagnostic and therapeutic applications of enzymes.
I – II Sem Course: Pathophysiology (BP204T)	
CO204.1	Understand the process of cell injury, morphology of cell injury and cellular adaptations.
CO204.2	Describe the etiology and pathogenesis of CVS, respiratory and renal systems diseases or disorders.
CO204.3	Explain the etiopathogenesis of hematologic, endocrine, nervous, gastrointestinal, musculoskeletal diseases and Immunopathogenesis of infectious diseases.
CO204.4	Explain the etiopathogenesis of gastrointestinal, musculoskeletal diseases and Immunopathogenesis of infectious diseases.
CO204.5	Understand the principles of physical, chemical and biologic carcinogenesis.
CO204.6	Describe the etiology and pathogenesis of infectious diseases.
I – II Sem Course: Computer applications in pharmacy (BP205T)	
CO205.1	Illustrate the concept of number system in computers and understand different types of databases, applications of computers and databases in pharmacy.
CO205.2	Employ web technologies such as HTML, XML, CSS, programming languages, Web servers and pharmacy drug database in pharmaceutical field.
CO205.3	Appraise the applications of computers in pharmacy such as drug information services, pharmacokinetics in drug design.
CO205.4	Understand and apply the uses of computers in hospital and clinical pharmacy.
CO205.5	Understand the importance of bioinformatics and its impact in vaccine discovery.
CO205.6	Elaborate the applications of computers for data analysis in preclinical development.
I – II Sem Course: Environmental Sciences (BP206T)	
CO206.1	Remember the natural renewable sources.
CO206.2	Acquire knowledge about various types of non- renewable resources and understand the role of an individual in conservation of natural resources.
CO206.3	Impart basic knowledge about various ecosystems on earth.
CO206.4	Motivate the learner to participate in environment protection.
CO206.5	Acquire knowledge on different types of Pollution.

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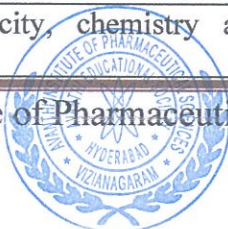
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CO206.6	Understand the sources, causes and prevention of pollution.
I – II Sem	Course: Human anatomy and physiology – II (BP207P)
CO207.1	Recall the physiology of special senses with the help of models, charts and specimens.
CO207.2	Develop the knowledge on coordinating working of organs of various systems with the help of models, charts and specimens.
CO207.3	Analyze the functions of cranial nerves by various sensory and motor functions. Evaluate body temperature and body mass index.
CO207.4	Determine tidal volume and vital capacity Assess the knowledge on family planning devices, pregnancy diagnostic tests, tissues of vital organs and gonads.
I – II Sem	Course: Pharmaceutical Organic Chemistry – I (BP208P)
CO208.1	Analyze unknown pharmaceutical organic compounds by determining their melting point/boiling point.
CO208.2	Prepare and characterize the derivatives of organic compounds.
CO208.3	Perform qualitative analysis of pharmaceutical organic compounds and identify the extra elements present in the pharmaceutical organic compounds and find the presence of several functional groups in pharmaceutical compounds.
CO208.4	Able to construct molecular models.
I – II Sem	Course: Biochemistry (BP209P)
CO209.1	Remember the qualitative analysis of carbohydrates and proteins.
CO209.2	Understand the principle and clinical significance of blood glucose. Identify the amount of reducing sugars by DNSA method
CO209.3	Determine the effect of temperature and substrate concentration on salivary amylase activity.
CO209.4	Examine the constituents present in Urine and their clinical significance.
I – II Sem	Course: Computer applications in pharmacy (BP210P)
CO210.1	Demonstrate and make use of MS Office, MS Word, MS Excel, MS Access and MS Power point.
CO210.2	Understand the paradigms of program languages and be exposed to at least one language from each model, C and SQL.
CO210.3	Summarize the report and printing the report from patient database. Design a questionnaire using a word processing package to gather information about a particular disease.
CO210.4	Create HTML web page to show personal information.
II – I Sem	Course: Pharmaceutical organic chemistry – II (BP301T)
CO301.1	Understand about aromaticity, chemistry and reactions of Benzene and its derivatives.

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CO301.2	Understand the Chemistry and Reactions of phenols, aromatic amines and acids
CO301.3	Understand the basic concepts of fats and oils.
CO301.4	Understand the concept of hydrolysis, hydrogenation, saponification and rancidity of fatty acids & oils.
CO301.5	Understand the Chemistry and Reactions of Polynuclear hydrocarbons.
CO301.6	Understand the Chemistry and Reactions, theories of cycloalkanes.
II – I Sem Course: Physical Pharmaceutics – I (BP302T)	
CO302.1	Understand the effect of solubility in designing dosage forms.
CO302.2	Identify the properties of states of matter. Understand the various physiochemical properties of drug molecules to design dosage forms.
CO302.3	Understand the principle of interfacial tension and the applications of surface-active agents in drug solubilization.
CO302.4	Understand the concepts of Interfacial Phenomenon.
CO302.5	Perceive and apply the concepts of complexation and protein binding in pharmacy.
CO302.6	Gain knowledge of pH and buffers and their use in the stabilization of pharmaceutical formulations.
II – I Sem Course: Pharmaceutical Microbiology (BP303T)	
CO303.1	Remember the scope of microbiology and its branches, methods of classification. Understand the structure, morphology of bacteria.
CO303.2	Gain the knowledge on various staining techniques. Understand the importance and implementation of sterilization in pharmaceutical processing and industry.
CO303.3	Understand the structure, morphology of fungi and virus.
CO303.4	Understand the importance and implementation of disinfectants in pharmaceutical industry.
CO303.5	Remember the tests used for the microbiological standardization of pharmaceuticals.
CO303.6	Remember the preservation of pharmaceutical products. Choose the cell culture technology and microbial characters for the pharmaceutical industry.
II – I Sem Course: Pharmaceutical Engineering (BP304T)	
CO304.1	Understand the concepts of flow of fluids, size reduction and size separation used for manufacturing of pharmaceutical products.
CO304.2	Summarize different mechanisms of heat transfer. Compare and contrast different types of evaporation and distillation process.
CO304.3	Understand the BP207T and principle involved in operation of drying equipments.
CO304.4	Summarize the BP207T and principle of mixing equipments.
CO304.5	Understand the BP207T, principle and determine the factors influencing mixing, filtration and centrifugation.

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CO304.6	Elaborate various preventive methods used for corrosion control in pharmaceutical industries.
II – I Sem Course: Pharmaceutical organic chemistry – II (BP305P)	
CO305.1	Gain the knowledge on different recrystallization and steam distillation techniques.
CO305.2	Identify the purity of fats and oils by acid value, saponification value and iodine value of fatty acids and oils.
CO305.3	Perform various reactions like diazotization, oxidation reactions.
CO305.4	Test the knowledge on different electrophilic aromatic substitutions reactions like bromination, nitration in monosubstituted aromatic compounds.
II – I Sem Course: Physical Pharmaceutics - I (BP306P)	
CO306.1	Understand the significance of physical properties such as solubility, surface tension, partition coefficient and pKa in the design of dosage forms.
CO306.2	Determine the surface tension of sample liquids by drop count and drop weight methods.
CO306.3	Estimate the HLB value and critical micellar concentration of surfactants. Explain adsorption isotherms and determine Freundlich-Langmuir constant using activated charcoal.
CO306.4	Estimate the stability constants of complexes by solubility and pH titration methods.
II – I Sem Course: Pharmaceutical Microbiology (BP307P)	
CO307.1	Recall different techniques of sterilization. Interpret the results of microbial testing
CO307.2	Demonstrate various staining methods – simple, gram staining and acid fast staining.
CO307.3	Test for possible microbial contaminants. Estimate the microbiological assay of antibiotics.
CO307.4	Estimate the motility in the given sample. Choose the correct method to evaluate the microbes to be tested.
II – I Sem Course: Pharmaceutical Engineering (BP308P)	
CO308.1	Determine overall heat transfer coefficient by heat exchanger and calculate the efficiency of steam distillation.
CO308.2	Demonstrate various staining methods – simple, gram staining and acid fast staining.
CO308.3	Demonstrate and explain about the construction, working and applications of pharmaceutical equipments such as colloid mill, planetary mixer, fluidized bed dryer and freeze dryer.
CO308.4	Estimate the process variables of filtration, evaporation and infer the same.
II – II Sem Course: Pharmaceutical organic chemistry - III (BP401T)	
CO401.1	Discuss optical isomerism-optical activity, enantiomers, diastereoisomerism and meso compounds.

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CO4012	Understand the fundamentals of geometric and conformational stereo chemical aspects.
CO401.3	Understand the nomenclature, properties and methods of preparation of heterocyclic compounds.
CO401.4	Identify preparation, properties, medicinal uses and other applications of five membered heterocyclic compounds.
CO401.5	Identify preparation, properties, medicinal uses and other applications of six membered and fused heterocyclic compounds.
CO401.6	Elaborate the reactions, understand their mechanisms and synthetic importance of organic naming reactions.
II – II Sem Course: Medicinal Chemistry – I (BP402T)	
CO402.1	Understand the physicochemical properties, steric aspects of drugs and their metabolic pathways in relation to biological action
CO402.2	Categorize the drugs acting on Autonomous nervous system based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO402.3	Categorize the drugs acting on Parasympathetic nervous system based on their mechanism of action, understand their SAR and clinical uses.
CO402.4	Identify medicinal uses and other applications of drugs acting on Parasympathetic nervous system.
CO402.5	Categorize the drugs acting on Central nervous system based on their mechanism of action, understand their SAR and clinical uses.
CO402.6	Categorize the general anesthetics, Narcotic analgesics based on their mechanism of action, understand their and clinical uses.
II – II Sem Course: Physical Pharmaceutics – II (BP403T)	
CO403.1	Demonstrate the suitable physical properties that contribute in designing a stable colloidal dispersion and understand the applications of colloidal dispersions.
CO403.2	Gain knowledge about different rheological or thixotropic behavior of different pharmaceutical dosage forms & deformation of solids and to demonstrate, modify & predict the designing of different pharmaceutical dosage forms.
CO403.3	Formulate and evaluate Emulsions making use of rheological and electrical properties for effective clinical management.
CO403.4	Formulate and evaluate Suspensions making use of rheological and electrical properties for effective clinical management.
CO403.5	Formulate and evaluate coarse Suspensions making use of rheological and electrical properties for effective clinical management.
CO403.6	Formulate and evaluate Colloidal Suspensions making use of rheological and electrical properties for effective clinical management.
II – II Sem Course: Pharmacology – I (BP404T)	
CO404.1	Define the fundamental concepts of pharmacology and pharmacokinetics of drugs.
CO404.2	Understand the basic concepts of pharmacodynamics of drugs, adverse drug reactions and drug discovery.

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CO404.3	Describe organization, function, and neurohumoral transmission of peripheral nervous system.
CO404.4	Employ the knowledge to study the pharmacological actions of drugs acting on peripheral nervous system.
CO404.5	Describe neurohumoral transmission of the central nervous system with reference to Excitatory and Inhibitory neurotransmitters and apply the basics in studying the pharmacological actions of drugs acting on the central nervous system.
CO404.6	Understand the effects of drugs against neurodegenerative disorders and to elaborate the concepts of drug addiction/abuse/tolerance/ dependence.
II – II Sem Course: Pharmacognosy - I (BP405T)	
CO405.1	Recall the history, scope and development of pharmacognosy and remember different sources, classification and quality control of crude drugs.
CO405.2	Illustrate about cultivation, collection, processing and storage of crude drugs. Understand the factors affecting the production of crude drugs along with its hybridization.
CO405.3	Elaborate the applications of advanced technologies of plant tissue culture.
CO405.4	Employ the knowledge to study the usage of edible vaccines.
CO405.5	Illustrate the basic plant metabolites and the various metabolic pathways to form secondary metabolites.
CO405.6	Understand systematic pharmacognostic study of primary metabolites, ayurvedic drugs, marine drugs and teratogens.
II – II Sem Course: Medicinal chemistry - I (BP406P)	
CO406.1	Synthesize, characterize and purify various medicinal compounds and intermediates.
CO406.2	Analyze the selected drugs present in dosage forms and to determine the assay by using various analytical techniques.
CO406.3	Prepare drugs and determine melting point or boiling point for prepared drugs.
CO406.4	Determine the partition coefficient of drugs.
II – II Sem Course: Physical Pharmaceutics - II (BP407P)	
CO407.1	Determine the flow properties of powders and interpret the characteristics of powders.
CO407.2	Asses the rheology of fluids by using viscometers. Evaluate the stability of coarse dispersions.
CO407.3	Distinguish the rate constants as per the chemical reaction.
CO407.4	Interpret the shelf life of a given formulation by accelerated stability studies.
II – II Sem Course: Pharmacology - I (BP408P)	
CO408.1	Learn about basic instruments, common laboratory animals used in experimental pharmacology and to organize animal house as per the CPCSEA guidelines.

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	Demonstrate the common laboratory techniques like routes of administration, blood withdrawal, anesthetics and euthanasia used for animal studies.
CO408.2	Interpret the effects of various drugs on rabbit eye and ciliary motility of frog esophagus in correlation with humans.
CO408.3	Analyse the effect of drugs acting as enzyme inducers, skeletal muscle relaxants and affecting locomotor activity in laboratory animals.
CO408.4	Predict various screening models for anticonvulsant and anxiolytic activity.
II – II Sem Course: Pharmacognosy - I (BP409P)	
CO409.1	Remember different morphological and microscopical characteristic features of crude drugs.
CO409.2	Analyze crude drugs as per regulatory guidelines.
CO409.3	Evaluate the crude drugs by quantitative evaluation methods.
CO409.4	Understand the cellular structure of crude drugs.
III – I Sem Course: Medical Chemistry-II (BP501T)	
CO501.1	Categorize drugs acting on GIT based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO501.2	Categorize the anti-anginal and anti-hypertensive drugs based on their mechanism of action; understand their SAR, synthesis and clinical uses.
CO501.3	Categorize the drugs acting on Cardiovascular system based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO501.4	Categorize the drugs acting on heart based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO501.5	Categorize the drugs acting on Endocrine system based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO501.6	Categorize the anti-diabetics and Local anesthetics based on their mechanism of action, understand their SAR, synthesis and clinical uses.
III – I Sem Course: Industrial Pharmacy-I (BP502T)	
CO502.1	Know the importance of preformulation studies, excipients in the development and stability of dosage forms.
CO502.2	Understand the manufacturing techniques, formulation and evaluation methods of Tablets and Liquid oral preparations.
CO502.3	Understand the manufacturing techniques, formulation and evaluation methods of Capsules.
CO502.4	Understand the manufacturing techniques, formulation and evaluation methods of Pellets.
CO502.5	Gain the knowledge on manufacturing techniques, formulation and evaluation methods of Parenteral and Ophthalmic preparations.
CO502.6	Summarize formulation, manufacturing and evaluation of cosmetic preparations, pharmaceutical aerosols and appraise the science of packaging materials.

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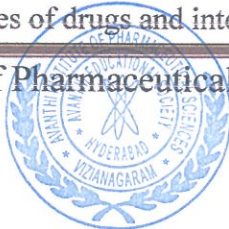
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III – I Sem	Course: Pharmacology-II (BP503T)
CO503.1	Describe organization, function, of cardiovascular system and employ the knowledge to study the pharmacological actions of drugs acting on cardiovascular system.
CO503.2	Describe organization, function, of urinary system and employ the knowledge to study the pharmacological actions of drugs acting on urinary system.
CO503.3	Gain the knowledge on pharmacology of autocooids and related drugs.
CO503.4	Summarize the pharmacology of NSAIDS, anti-gout agents and anti-rheumatic agents.
CO503.5	Describe organization, function, of endocrine system and employ the knowledge to study the pharmacological actions of drugs acting on endocrine system.
CO503.6	Predict principles of bioassay and to construct the bioassay methods of various compounds.
III – I Sem	Course: Pharmacognosy - II (BP504T)
CO504.1	Outline the metabolic pathway in higher plants and their biogenetic studies.
CO504.2	Summarize the pharmacognostic study of secondary metabolites like alkaloids, glycosides, tannins, volatile oils.
CO504.3	Demonstrate the different types and steps involved in isolation, identification and analysis of Phytoconstituents like terpenoids and glycosides.
CO504.4	Summarize the pharmacognostic study of alkaloids and resins.
CO504.5	Understand the industrial production, estimation and utilization of Phytoconstituents.
CO504.6	Assess the crude drug by modern methods of extraction, spectroscopy, chromatography, isolation and purification.
III – I Sem	Course: Pharmaceutical Jurisprudence (BP505T)
CO505.1	Understand about objectives of the Drug and Cosmetics Act.
CO505.2	Gain knowledge about the sale of drugs, labeling of drugs.
CO505.3	Gain knowledge about the code of pharmaceutical ethics with the importance of pharmacist role and pharmacists' oath and to remember Pharmacy Act with the education regulation & to get knowledge about Medical and toilet preparation Act.
CO505.4	Understand the constitution and functions of narcotic & Psychotropic consultative committee and to remember the objectives of, offences and penalties.
CO505.5	Remember the objectives of Drug and Magic remedies Act with the prohibition of certain advertisements and prevention of cruelty to animal Act with ethical committee and guidelines. Know about drug price control order on bulk drugs and the sale price.
CO505.6	Know about the pharmaceutical legislation including different committees and understand about the objectives and rules regulations of Medical Termination and Pregnancy and all types of Intellectual property rights.
III – I Sem	Course: Industrial Pharmacy-I (BP506P)
CO506.1	Assess the preformulation studies of drugs and interpret the characteristics of drugs.

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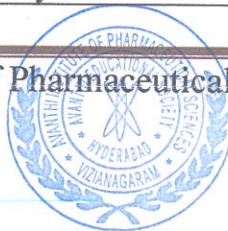
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CO506.2	Gain the knowledge on formulation and evaluation of tablets, capsules, containers.
CO506.3	Gain the knowledge on formulation and evaluation of injections and ophthalmics.
CO506.4	Prepare and evaluate cosmetics such as lipstick, cold cream and shampoo.
III – I Sem	
Course: Pharmacology-II (BP507P)	
CO507.1	Learn the importance of physiological salt solutions and to identify the effect of various drugs on isolated frog heart, blood pressure and heart rate of dog. Illustrate the diuretic activity of drugs in mice/rats.
CO507.2	Identify the dose response relationship, effect of drugs on DRC and to construct the drug concentrations by various bioassay methods using animal simulator software.
CO507.3	Categorize the PA2 and PD2 value of drugs using rat anococcygeus muscle and guinea pig ileum.
CO507.4	Interpret the effect of spasmogens and spasmolytics using rabbit jejunum. Predict various screening models for analgesic and anti-inflammatory.
III – I Sem	
Course: Pharmacognosy - II (BP508P)	
CO508.1	Remember the wide variety of the crude drugs and their sources by morphological and microscopic characteristics.
CO508.2	Exercise the isolation and detective principles of crude drugs,
CO508.3	Predict the crude drug by performing chromatographic techniques.
CO508.4	Analyze crude drugs by chemical tests.
III - II Sem	
Course: Medical Chemistry-III (BP601T)	
CO601.1	Categorize the antibiotics based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.2	Categorize the antimalarials based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.3	Categorize the anti tubercular and anti infective drugs based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.4	Categorize the anti viral drugs based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.5	Categorize the drugs used to treat infectious diseases based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO601.6	Apply modern techniques like Quantitative Structure Activity Relationship (QSAR), Prodrug concept, Combinatorial Chemistry and Computer Aided Drug Design (CADD) in rational drug design.
III - II Sem	
Course: Pharmacology - III (BP602T)	
CO602.1	Describe organization, function, of Respiratory and Gastro-intestinal systems and employ the knowledge to study the pharmacological actions of drugs acting on Respiratory and Gastro-intestinal systems.

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CO602.2	Understand the principles of chemotherapy and illustrate the mechanism of action of antibiotics.
CO602.3	Analyze the chemotherapy of UTI's, STD's and to categorize the immunopharmacology.
CO602.4	Summarize the chemotherapy of anti-cancer drugs.
CO602.5	Assess the various types of toxicity studies, principles of treatment of poisoning and management of various poisoned conditions.
CO602.6	Understand the principles of toxicology and treatment of metal poisoning. Compile the biological clock and its significance leading to chronotherapy.
III - II Sem Course: Herbal Drug Technology (BP603T)	
CO603.1	Recall the fundamental concepts of herbal raw materials and biodynamic agriculture techniques
CO603.2	Understand the concept of formulation and evaluation of nutraceuticals and herbal drug and herbal food interactions.
CO603.3	Acquire the knowledge on formulation and evaluation of herbal cosmetics.
CO603.4	Acquire the knowledge on herbal formulations.
CO603.5	Remember the regulatory guidelines for the assessment of herbal drugs and patenting.
CO603.6	Establish and follow the SOP's, infrastructure of industries as per GMP.
III - II Sem Course: Biopharmaceutics and Pharmacokinetics (BP604T)	
CO604.1	Understand basic concepts of absorption, distribution of drugs in body.
CO604.2	Understand basic concepts of elimination of drugs in body. Define and explain the principles and importance of drug products as they are bioavailable and bioequivalent as well as to outline the results by using the hyphenated tools to interpret the results.
CO604.3	Utilize the pharmacokinetic models for the determination of pharmacokinetic parameters.
CO604.4	Understand the application of pharmacokinetic models in design of dosage form.
CO604.5	Able to design multiple dosage regimens based on pharmacokinetic parameters for maximizing patient compliance and therapeutic effectiveness.
CO604.6	Interpret the data and to understand the basic principles of multi-compartmental & nonlinear Pharmacokinetic models.
III - II Sem Course: Pharmaceutical Biotechnology (BP605T)	
CO605.1	Remember the basic concepts of biotechnology with respect to enzyme technology, immunology, microbial technology, genetic engineering and protein engineering.
CO605.2	Understand the steps involved in development of biosensors, recombinant products and concepts of immunology. Outline the production parameters important in pharmaceutical product development using principles of biotechnology.
CO605.3	Elaborate on microbial genetics, biotransformation of products.

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CO605.4	Understand the various immunological products and its manufacturing process.
CO605.5	Assess the genetic organization of different types of cells and to list detection methods at genomic level, gene transfer methods and mutagens.
CO605.6	Assess the general requirements of fermentative production and biotechnological production of pharmaceuticals.
III - II Sem Course: Pharmaceutical Quality Assurance (BP606T)	
CO606.1	Summarize the different levels of pharmaceutical quality development and quality assurance such as cGMP, QC tests, literature and regulatory issues.
CO606.2	Gain knowledge on cGMP perspectives and QA and QC departments roles.
CO606.3	Understand guidelines related to ICH, Q-series, SOP and Testing protocols.
CO606.4	Able to differentiate, and demonstrate the value of personnel responsibilities, training, hygiene and maintenance of stores.
CO606.5	Outline the concept of demands and approval, return handling, recall and waste management, request and assessment. Followed by concepts of master formula record, SOP, quality audit, quality review and recording of quality, distribution reports and articles as well as its application.
CO606.6	Understand calibration principles, certification and validation concepts, validation significance and scale, forms of validation, master plan for validation.
III - II Sem Course: Medicinal Chemistry - III (BP607P)	
CO607.1	Synthesize, characterize and purify various medicinal compounds and intermediates.
CO607.2	Analyze the selected drugs present in dosage forms and to determine the assay by using various analytical techniques.
CO607.3	Compare the advantages of microwave technique over conventional synthesis of drugs.
CO607.4	Able to drawing chemical structures and reactions by using software. Predict the relation between physicochemical properties and biological activity.
III - II Sem Course: Pharmacology - III (BP608P)	
CO608.1	Recall the dose calculations in pharmacological experiments, and to relate the antiallergic activity / anti-ulcer activity in rat models.
CO608.2	Demonstrate of effect of drugs on gastrointestinal motility and the effect of agonist/antagonists on guinea pig ileum. Construct serum biochemical parameters by using semi auto analyzer.
CO608.3	Analyze effect of saline purgative on frog intestine, insulin hypoglycemic effect and test for pyrogens using rabbit method. .
CO608.4	Predict the pharmacokinetic parameters and adapt the biostatistics methods in experimental pharmacology. Evaluate acute oral toxicity (LD50), acute skin irritation / corrosion and acute eye irritation / corrosion of a test substance C608.6 Predict the pharmacokinetic parameters and adapt the biostatistics methods in experimental pharmacology.

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III - II Sem	Course: Herbal Drug Technology (BP609P)
CO609.1	Remember different preliminary phytochemical screening of crude drugs.
CO609.2	Able to formulate and evaluate herbal cosmetics.
CO609.3	Apply monographic analysis of herbal drugs as per pharmacopoeias.
CO609.4	Assess the evaluation parameters such as aldehyde and phenol content and total alkaloid content.
IV- I Sem	Course: Instrumental Methods of Analysis - II (BP701T)
CO701.1	Understand principle, operation and applications of UV visible spectrophotometer and fluorimetry.
CO701.2	Gain maximum knowledge on characterization and estimation of molecules, ions by spectroscopical techniques.
CO701.3	Elaborate various principles, BP207T and instruments employed for the characterization and analysis of drugs by using chromatographic techniques.
CO701.4	Undersatand the principle, operation and applications of chromatographic techniques.
CO701.5	Create protocol for analysis of pharmaceutical substances by spectroscopic and chromatographic techniques.
CO701.6	Interpret chromatographic separation & analysis of drugs.
IV- I Sem	Course: Industrial Pharmacy – II (BP702T)
CO702.1	Gain maximum knowledge on pilot plant scale up techniques and SUPAC guidelines.
CO702.2	Outline various aspects of technology transfer involved from R & D to production departments.
CO702.3	Understand the importance of regulatory affairs for drug approval.
CO702.4	Know the process of drug approval guidelines in india.
CO702.5	Remember the quality management system protocols for quality of products delivery.
CO702.6	Able to process the regulatory requirements for drug approval process in india.
IV- I Sem	Course: Pharmacy Practice (BP703T)
CO703.1	Acquire knowledge on organization of hospitals, various methods of distribution and hospital formulary in hospitals and apply it in the practice of pharmacy.
CO703.2	Demonstrate the knowledge of therapeutic drug monitoring, patient medication history interview and to apply the knowledge on assessment of drug related problems.
CO703.3	Evaluate the role of hospital pharmacist in pharmacy and therapeutic committee, drug information services in hospitals.
CO703.4	Remember the role of patient counseling, education and training programs in hospitals.

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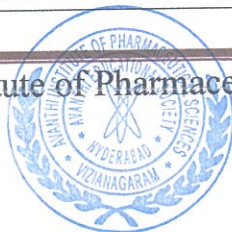
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CO703.5	Understand the professional responsibilities of the clinical pharmacist.
CO703.6	Explain the principles of drug store management and inventory control methods during practice. Interpret clinical laboratory tests of specific disease states to provide better patient centered service.
IV- I Sem Course: Novel Drug Delivery Systems (BP704T)	
CO704.1	Understand fundamentals, polymers used in the design of controlled drug delivery systems.
CO704.2	Outline the concepts of formulation and evaluation of oral, mucosal and implantable drug delivery system.
CO704.3	Develop and study oral, mucosal, dermal, pulmonary drug delivery systems over conventional dosage forms for prolonged action.
CO704.4	Understand the mechanism, formulation and evaluation of Nasal drug delivery systems.
CO704.5	Illustrate the principles and fundamentals of drug targeting in the design of site-specific drug delivery system.
CO704.6	Study the importance of site-specific drug delivery systems or devices for ocular and intra uterine routes.
IV- I Sem Course: Instrumental Methods of Analysis - II (BP705P)	
CO705.1	Acquire the knowledge in interpretation of UV, IR, NMR, MS spectra's of simple organic compounds for structure.
CO705.2	Understand process, interpret the data obtained through experimentation and report the results as per regulatory requirements.
CO705.3	Acquire the knowledge in operation of HPLC, TLC, column chromatography and paper chromatography.
CO705.4	Understand the separation and identification of compounds by electrophoresis technique.
IV- II Sem Course: Biostatistics and research Methodology (BP801T)	
CO801.1	Understand the basic aspects of statistics such as central tendency, dispersion, correlation and regression.
CO801.2	Know the statistical techniques and to apply those to solve the statistical problems
CO801.3	Explain the need of research, research designs and their applications and to explain methodological designs.
CO801.4	Apply the clinical research methods in clinical development of drugs.
CO801.5	Operate statistical tools like M.S. Excel, SPSS, R and MINITAB.
CO801.6	To elaborate design and analysis of experiments and response surface methodology.
IV- II Sem Course: Social and Preventive Pharmacy (BP802T)	
CO802.1	Recognize the concepts and evaluation of public health.

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CO802.2	Relate food to nutrition health, balanced diet, deficiencies and its prevention.
CO802.3	Illustrate sociocultural factors and its relation with health.
CO802.4	Identify avoidable habits for personal hygiene and health.
CO802.5	Explain the principles on the prevention and control of communicable and non-communicable diseases.
CO802.6	Identify National health programs its objectives functioning and outcomes.
IV- II Sem Course: Pharma Marketing Management (BP803T)	
CO803.1	Understand the concept of marketing and able to recognize the aspects related to pharmaceutical market.
CO803.2	Gain knowledge about product decision.
CO803.3	Classify different types of sales promotion.
CO803.4	Know the skills required for sales promotion.
CO803.5	Know different channels of product promotion in market.
CO803.6	Know the principles of drug pricing according to DPCO and NPPA.
IV- II Sem Course: Pharmaceutical Regulatory Science (BP804T)	
CO804.1	Recall the concepts of Drug discovery, development process, clinical studies and generic drug product development.
CO804.2	Understand the basic guidelines of drug regulatory approval process.
CO804.3	Know the regulatory registration process of Indian drugs in overseas market.
CO804.4	Understand about technical documents like DMF, CTD, eCTD and ACTD.
CO804.5	Assimilate the process of clinical trials and pharmacovigilance as well as to understand obligations of GCP in clinical trials.
CO804.6	Understand the concepts of Regulatory science in pharmaceutical industry as well as to make use of regulatory guidelines.
IV - II Sem Course: Pharmacovigilance (BP805T)	
CO805.1	Recall the history, scope, development and basic terms used in pharmacovigilance.
CO805.2	Able to utilize Drug dictionaries, coding, information resources in Pharmacovigilance programme.
CO805.3	Understand methods of pharmacovigilance and communication process during ADR reporting
CO805.4	Analyze the concepts of ADR reporting by using software.
CO805.5	Appraise safety data generation and ICH guidelines in pharmacovigilance.
CO805.6	Build the ability to report adverse drug reactions through various ADR reporting forms.

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IV - II Sem	Course: Quality control and Standardization of Herbal drugs (BP806T)
CO806.1	Remember the WHO guidelines for the quality control of herbal drugs.
CO806.2	Outline the quality assurance in herbal drug industry including CGMP.
CO806.3	Understand EU guidelines for the quality control, safety and efficacy of herbal drugs.
CO806.4	Understand ICH guidelines for the quality control, safety and efficacy of herbal drugs.
CO806.5	Gain the knowledge on stability testing of herbal drugs. Know the procedure for export of drugs and new drug approval.
CO806.6	Know the regulatory requirements of herbal medicines.
IV - II Sem	Course: Computer Aided Drug Design (BP807T)
CO807.1	Understand stages in drug discovery and development, lead discovery based on metabolism and clinical observation and also analog based drug design of molecular modeling and virtual screening techniques.
CO807.2	Able to perform QSAR in drug design by using software tools.
CO807.3	Understand the basic concepts of molecular docking.
CO807.4	Apply the molecular docking techniques to examine the binding interactions of ligand with molecular targets.
CO807.5	Explain the applications of bioinformatics, chemo informatics, ADME databases, chemical, biochemical and pharmaceutical databases relevant to drug design
CO807.6	Discuss the conformational analysis of molecules using molecular and quantum mechanics approach and also determine the global conformational minima.
IV- II Sem	Course: Cell and Molecular Biology (BP808T)
CO808.1	Summarize the history, functioning and composition of cell and molecular biology.
CO808.2	Describe the chemical foundations of cell biology. Summarize the DNA properties of cell biology.
CO808.3	Understand the structure, synthesis and function of proteins.
CO808.4	Apply the structure of protein in molecular docking studies.
CO808.5	Describe the cell membrane structure and function.
CO808.6	Summarize the cell cycle and elaborate how cell communication occur and discuss mechanisms of receptors for cell signaling/signaling pathways/Protein kinase.
IV- II Sem	Course: Cosmetic Science (BP809T)
CO809.1	Remember classification and historical evolution of cosmoceuticals, cosmetic excipients. Understand the basic structure of skin, hair and oral cavity.
CO809.2	Understand the principles of formulation and building blocks of various skin care products and hair care products.
CO809.3	Understand the principles of formulation and evaluation of sun screen products.

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CO809.4	Understand the principles of formulation and evaluation of herbal products.
CO809.5	Understand the principles of cosmetic evaluation.
CO809.6	Apply the knowledge gained and develop cosmetics to solve problems associated with skin, hair and scalp.
IV- II Sem Course: Experimental Pharmacology (BP810T)	
CO810.1	Understand CPCSEA/OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals and to demonstrate different laboratory/transgenic/ mutant animals, various routes of administration, techniques of blood collection and euthanasia.
CO810.2	Outline various preclinical screening models for diuretics, hypnotics, antiasthmatics and drugs acting on CNS.
CO810.3	Construct preclinical screening models for drugs acting on ANS, eye.
CO810.4	Construct preclinical screening models for local anesthetics.
CO810.5	Construct preclinical screening models for drugs acting on CVS.
CO810.6	Compile research methodology and biostatistics in pharmacological screening methods.
IV - II Sem Course: Advanced Instrumentation Techniques (BP811T)	
CO811.1	Understand the principle and procedure involved in NMR and mass spectrophotometer.
CO811.2	Gain knowledge on characterization and estimation of drugs by thermal techniques and X-ray diffraction techniques.
CO811.3	Simplify the importance of calibration of analytical instruments as per ICH and USFDA guidelines.
CO811.4	Analyze the validation parameters according ICH guidelines.
CO811.5	Gain knowledge on RIA and principles involved in extraction techniques.
CO811.6	Summarize the principle, instrumentation and applications of hyphenated techniques.
IV - II Sem Course: Dietary Supplements and Nutraceuticals (BP812T)	
CO812.1	Classify and remember the functional foods, Nutraceuticals and dietary supplements.
CO812.2	Interpret the applications of phytochemicals as Nutraceuticals like sulfies, phytochemicals as Nutraceuticals like sulfides, polyphenolics, flavonoids, probiotics, Tocopherols, proteins, minerals etc.
CO812.3	Analyse the role of dietary fibres and complex carbohydrates as functional food ingredients.
CO812.4	Identify the damaging reactions of free radicals on terpenoids, carbohydrates, proteins and nucleic acids.
CO812.5	Role of functional foods in various disease conditions.

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CO812.6	Discuss the regulatory aspects, adulteration of dietary fibres and Nutraceuticals and their pharmacopoeial specifications.
IV – II Sem	Project Work
CO813.1	Define the fundamentals, carry out the literature review on the proposed research work and identify the problem.
CO813.2	Develop the research hypothesis.
CO813.3	Summarise the requirements in the proposed research.
CO813.4	Take part in research experiments and documented.
CO813.5	Evaluate the work done by applying statistic tools.
CO813.6	Appraise societal application and appreciation.

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DEPARTMENT OF PHARMACY

Program: B Pharmacy

Regulation: R16

No. of Courses: 65

COURSE OUTCOMES

I – I Sem	Course: English (PHR16111)
CO111.1	Achieve a higher quality of life, strength and sovereignty of a developed nation.
CO111.2	Understand that all men can come together and avert the peril.
CO111.3	Understand how Gandhi grew in introspection and maturity.
CO111.4	Able to think clearly and logically and write clearly and logically.
CO111.5	Emulate G.D.Naidu and take to practical applications.
CO111.6	Able to achieve much at a low cost and help the common man.
I – I Sem	Course: Mathematics (PHR16112)
CO112.1	Able to perform the Arithmetic and Geometric progressions in pharmaceutical calculations.
CO112.2	Know the basic trigonometric functions from first principles.
CO112.3	Employ volumetric titrations in quality control of pharmaceuticals.
CO112.4	Know basic calculus which is used in analytical study of their life sciences applications
CO112.5	Know integral calculus which is used in analytical study of their life sciences applications.
CO112.6	Draw lines, finding the equations for the purpose of relational study.
I – I Sem	Course: Human Anatomy and Physiology - I (PHR16113)
CO113.1	Recognize the various homeostatic mechanisms, cellular level organization and summarize the characteristics of different types of tissues and their location in various organs. Organize the structure and functions of skin, bones and joints of human body.
CO113.2	Understand the functioning of haemopoietic system and elements of blood.
CO113.3	Illustrate the anatomy, physiology and coordinated pathway of heart and blood vessels. Understand the importance of lymphatic system in human body.
CO113.4	Summarize the basics of dispensing and compounding of biphasic liquid dosage forms.
CO113.5	Organize the structure and functions of skin, bones and joints of human body.
CO113.6	Relate the physiology of sympathetic, parasympathetic, spinal/cranial nerves and organization of special senses.

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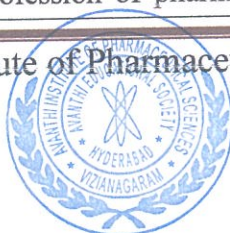
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I – I Sem	Course: General and Dispensing Pharmacy (PHR16114)
CO114.1	Know the history of profession of pharmacy.
CO114.2	Know the history of profession of pharmacy dispensing. Solve the pharmaceutical calculations
CO114.3	Solve the pharmaceutical calculations and summarize the basics of compounding and dispensing of powders, liquids.
CO114.4	Summarize the basics of compounding and dispensing of liquid dosage forms, Summarize the basics of dispensing and compounding of biphasic liquid dosage forms.
CO114.5	Know the preparation of suppositories and understand various pharmaceutical incompatibility.
CO114.6	Understanding principles and procedures of extraction of galenicals, tinctures, extracts etc.
I – I Sem	Course: Pharmaceutical Organic Chemistry I (PHR16115)
CO115.1	Understand basic concepts of mechanism and reactivity of organic molecules.
CO115.2	Remember the preparation methods and properties of alkanes, alkenes and conjugated dienes.
CO115.3	Remember the preparation methods and properties of alkyl halides and alcohols.
CO115.4	Remember the preparation methods and properties of Alcohols, ethers.
CO115.5	Discuss optical isomerism-optical activity, enantiomers, diastereoisomerism and meso compounds. Understand the fundamentals of geometric and conformational stereo chemical aspects.
CO115.6	Understand structure, mechanism and usefulness of Grignard reagent.
I – I Sem	Course: English Lab (PHR16116)
CO116.1	Impart listening and speaking skills through specific activities.
CO116.2	Provide confidence in participation in debates and elocution
CO116.3	Impart reading and writing skills through case writing.
CO116.4	Draft circulars, resume and career skills.
I – I Sem	Course: Biology Lab (PHR16117)
CO117.1	Analyze compound and simple microscope.
CO117.2	Impart techniques in section cutting, staining and mounting.
CO117.3	Perform histological studies of various parts of plants
CO117.4	Describe the floral characters of plants of different families.
I – I Sem	Course: General and Dispensing Pharmacy Lab (PHR16118)
CO118.1	Know the history of profession of pharmacy. Understand the basics of different

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	dosage forms and importance of prescription and posology.
CO118.2	Dispensing of prescription filling.
CO118.3	Identify various types of incomplete in prescription
CO118.4	Analyse the calculation involved in prescription for gedeutics and pediatrics. Dispensing involved in adjustment of tonicity.
I – I Sem	Course: Pharmaceutical Organic Chemistry I Lab (PHR16119)
CO119.1	Dispensing of Prescription Filling.
CO119.2	Identify various types of incompletes in Prescription.
CO119.3	Analyze the calculating involved in prescription for gediatics and paediatrics.
CO119.4	Dispensing involving adjustment of tonicity.
I – I Sem	Course: Human Anatomy and Physiology II (PHR16121)
CO121.1	Relate the physiology of Central nervous system with the functioning of neurons.
CO121.2	Relate the physiology of Central nervous system with the functioning of neurons.
CO121.3	ANS
CO121.4	Analyze the importance of endocrine system in body.
CO121.5	Illustrate the anatomy, physiology and coordinated pathway of Reproductive system.
CO121.6	Know basic anatomy and physiology of sense organs and its co-ordination with brain.
I – I Sem	Course: Pharmaceutical Inorganic Chemistry (PHR16122)
CO122.1	Classification of inorganic compounds. Understand the history of pharmacopoeia, sources and types of impurities and describe the official methods of control like limit tests.
CO122.2	Classify the gastrointestinal agents and described the methods of preparation, properties, storage, assay and uses with marketed formulations of inorganic compounds in gastrointestinal agents.
CO122.3	Acquires knowledge on Absorbents, Protectives, Anti-infectives.
CO122.4	Classify the gastrointestinal agents and described the methods of preparation, properties, storage, assay and uses with marketed formulations of inorganic compounds in gastrointestinal agents.
CO122.5	Acquires knowledge on acids, bases, buffers, buffered isotonic solutions, methods of adjusting isotonicity and major extra and intra cellular electrolytes and know the monographs of dental products.
CO122.6	Classify the miscellaneous compounds and know the monographs of inorganic compounds.
I – II Sem	Course: Pharmaceutical Organic Chemistry II (PHR16123)
CO123.1	Understand About Aromaticity, Chemistry and Reactions of Benzene and Its

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	Derivatives. Understand the concept of hydrolysis, hydrogenation, saponification and rancidity of fatty acids & oils, polynuclear HC.
CO123.2	Remember the preparation methods and properties of Carbonyl compounds.
CO123.3	Remember the preparation methods and properties of Carboxylic acids.
CO123.4	Understand the Chemistry and Reactions Of phenols, aromatic amines and acids
CO123.5	Amines and Diazo compounds
CO123.6	Elaborate the reactions, understand their mechanisms and synthetic importance of organic naming reactions.
I – II Sem Physical Pharmacy – I (PHR16124)	
CO124.1	Understand the effect of solubility in designing dosage forms.
CO124.2	Identify the properties of states of matter. Understand the various physiochemical properties of drug molecules to design dosage forms.
CO124.3	Understand the principle of interfacial tension and the applications of surface-active agents in drug solubilization.
CO124.4	Understand the concepts of Interfacial Phenomenon.
CO124.5	Perceive and apply the concepts of complexation and protein binding in pharmacy.
CO124.6	Gain knowledge of pH and buffers and their use in the stabilization of pharmaceutical formulations.
I – II Sem Computer applications and Biostatistics (PHR16125)	
CO125.1	Illustrate the concept of number system in computers and understand different types of databases, applications of computers and databases in pharmacy.
CO125.2	Employ web technologies such as HTML, XML, CSS, programming languages, Web servers and pharmacy drug database in pharmaceutical field.
CO125.3	Appraise the applications of computers in pharmacy such as drug information services, pharmacokinetics in drug design.
CO125.4	Understand the basic aspects of statistics such as central tendency, dispersion, correlation and regression.
CO125.5	Know the statistical techniques and to apply those to solve the statistical problems
CO125.6	Explain the need of research, research designs and their applications and to explain methodological designs.
I – II Sem Human Anatomy and Physiology Lab (PHR16126)	
CO126.1	Recall handling of compound microscope and to outline the microscopic characteristics of various tissues.
CO126.2	Summarize the characteristics of different bones (skeletal system) & types of joints.
CO126.3	Estimate the various haematological parameters such as WBC, RBC count, Hb, ESR, bleeding, clotting time and their own blood group.
CO126.4	Determine various physical parameters such as heart rate, BP.

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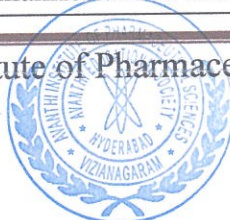


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I – II Sem	Physical Pharmacy – I Lab (PHR16127)
CO127.1	Understand the significance of physical properties such as solubility, surface tension, partition coefficient and pKa in the design of dosage forms.
CO127.2	Determine the surface tension of sample liquids by drop count and drop weight methods.
CO127.3	Estimate the HLB value and critical micellar concentration of surfactants. Explain adsorption isotherms and determine Freundlich-Langmuir constant using activated charcoal.
CO127.4	Estimate the stability constants of complexes by solubility and pH titration methods.
I – II Sem	Computer applications Lab (PHR16128)
CO128.1	Demonstrate and make use of MS Office, MS Word, MS Excel, MS Access and MS Power point.
CO1238.2	Understand the paradigms of program languages and be exposed to at least one language from each model, C and SQL.
CO128.3	Summarize the report and printing the report from patient database. Design a questionnaire using a word processing package to gather information about a particular disease.
CO128.4	Create HTML web page to show personal information.
II – I Sem	Pharmaceutical Unit Operations – I (PHR16211)
CO211.1	Understand the concepts of flow of fluids, size reduction and size separation used for manufacturing of pharmaceutical products.
CO211.2	Summarize different mechanisms of heat transfer. Compare and contrast different types of evaporation and distillation process.
CO211.3	Understand the BP207T and principle involved in operation of drying equipments.
CO211.4	Summarize the BP207T and principle of mixing equipments.
CO211.5	Understand the BP207T, principle and determine the factors influencing mixing, filtration and centrifugation.
CO211.6	Elaborate various preventive methods used for corrosion control in pharmaceutical industries.
II – I Sem	Biochemistry (PHR1621)
CO212.1	Remember the classification, properties, significance and metabolic reactions of carbohydrates, lipids, nucleic acids, proteins and amino acids.
CO212.2	Understand the metabolism of carbohydrates and process of electron transport and ATP formation. Appraise the causes, manifestations and diagnosis of metabolic disorders.
CO212.3	Remember the metabolism of Lipids and aminoacids.
CO212.4	Understand the causes, manifestations and diagnosis of metabolic disorders.

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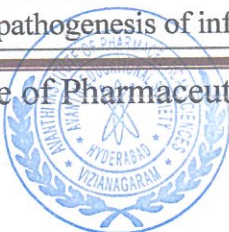


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CO212.5	Understand the metabolism of Nucleic acid and distinguish the process of DNA replication, transcription and translation.
CO212.6	Apply the concept of catalytic activity and enzyme inhibition in design of new drugs, diagnostic and therapeutic applications of enzymes.
II – I Sem Physical Pharmacy -II (PHR16213)	
CO213.1	Demonstrate the suitable physical properties that contribute in designing a stable colloidal dispersion and understand the applications of colloidal dispersions.
CO213.2	Gain knowledge about different rheological or thixotropic behavior of different pharmaceutical dosage forms & deformation of solids and to demonstrate, modify & predict the designing of different pharmaceutical dosage forms.
CO213.3	Formulate and evaluate Emulsions making use of rheological and electrical properties for effective clinical management.
CO213.4	Formulate and evaluate Suspensions making use of rheological and electrical properties for effective clinical management.
CO213.5	Formulate and evaluate coarse Suspensions making use of rheological and electrical properties for effective clinical management.
CO213.6	Formulate and evaluate Colloidal Suspensions making use of rheological and electrical properties for effective clinical management.
II – I Sem Pharmaceutical Microbiology (PHR16214)	
CO214.1	Remember the scope of microbiology and its branches, methods of classification. Understand the structure, morphology of bacteria.
CO214.2	Gain the knowledge on various staining techniques. Understand the importance and implementation of sterilization in pharmaceutical processing and industry.
CO214.3	Understand the structure, morphology of fungi and virus.
CO214.4	Understand the importance and implementation of disinfectants in pharmaceutical industry.
CO214.5	Remember the tests used for the microbiological standardization of pharmaceuticals.
CO214.6	Remember the preservation of pharmaceutical products. Choose the cell culture technology and microbial characters for the pharmaceutical industry.
II – I Sem Health Education & Pathophysiology (PHR16215)	
CO215.1	Understand the process of cell injury, morphology of cell injury and cellular adaptations.
CO215.2	Describe the etiology and pathogenesis of CVS, respiratory and renal systems diseases or disorders.
CO215.3	Explain the etiopathogenesis of hematologic, endocrine, nervous, gastrointestinal, musculoskeletal diseases and Immunopathogenesis of infectious diseases.
CO215.4	Explain the etiopathogenesis of gastrointestinal, musculoskeletal diseases and Immunopathogenesis of infectious diseases.
CO215.5	Understand the principles of physical, chemical and biologic carcinogenesis.
CO215.6	Describe the etiology and pathogenesis of infectious diseases.

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II – I Sem	Pharmaceutical Biochemistry Lab (PHR16216)
CO216.1	Remember the qualitative analysis of carbohydrates and proteins.
CO216.2	Understand the principle and clinical significance of blood glucose. Identify the amount of reducing sugars by DNSA method
CO216.3	Determine the effect of temperature and substrate concentration on salivary amylase activity.
CO216.4	Examine the constituents present in Urine and their clinical significance.
II – I Sem	Physical Pharmacy – II Lab (PHR16217)
CO217.1	Determine the flow properties of powders and interpret the characteristics of powders.
CO217.2	Asses the rheology of fluids by using viscometers. Evaluate the stability of coarse dispersions.
CO217.3	Distinguish the rate constants as per the chemical reaction.
CO217.4	Interpret the shelf life of a given formulation by accelerated stability studies.
II – I Sem	Pharmaceutical Microbiology Lab (PHR16218)
CO218.1	Recall different techniques of sterilization. Interpret the results of microbial testing
CO218.2	Demonstrate various staining methods – simple, gram staining and acid fast staining.
CO218.3	Test for possible microbial contaminants. Estimate the microbiological assay of antibiotics.
CO218.4	Estimate the motility in the given sample. Choose the correct method to evaluate the microbes to be tested.
II – II Sem	Course: Pharmaceutical Unit Operations - II (PHR16221)
CO221.1	Summarize different mechanisms of heat transfer and illustrate the equipments used in transfer of heat.
CO221.2	Compare and contrast different types of equipments used in evaporation.
CO221.3	Elaborate the process, types and equipment of distillation.
CO221.4	Understand the theory and principle involved in operation of drying equipments.
CO221.5	Understand the concepts of size reduction used for manufacturing of pharmaceutical products.
CO221.6	Summarize the theory and principle of mixing equipments.
II – II Sem	Course: Pharmaceutical Analysis – I (PHR16222)
CO222.1	Understand the physiochemical concepts of analysis and gain knowledge of sources of errors and minimizing techniques.





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CO222.2	Analyze the techniques of acid-base titrations and non-aqueous titrations.
CO222.3	Employ volumetric titrations in quality control of pharmaceuticals.
CO222.4	Analyze the techniques of gravimetry in quality control of pharmaceuticals.
CO222.5	Analyze the techniques of redox titrations and develop analytical skills.
CO222.6	Understand the moisture content in drugs that can be determined by KFR titration.
II – II Sem Course: Pharmacognosy – I (PHR16223)	
CO223.1	Recall the history, scope and development of pharmacognosy.
CO223.2	Remember different sources, classification and quality control of crude drugs.
CO223.3	Illustrate about cultivation, collection, processing and storage of crude drugs. Understand the factors affecting the production of crude drugs along with its hybridization.
CO223.4	Provide enough knowledge to identify adulterants from genuine products.
CO223.5	Understand the pharmacognostic study of Carbohydrates.
CO223.6	Remember the pharmacognostic study of Lipids.
II – II Sem Course: Medicinal Chemistry - I (PHR16224)	
CO224.1	Understand the nomenclature, properties and methods of preparation of heterocyclic compounds. Identify preparation, properties, medicinal uses and other applications of five membered heterocyclic compounds.
CO224.2	Understand the physicochemical properties, steric aspects of drugs and their metabolic pathways in relation to biological action.
CO224.3	Categorize the drugs acting on Central nervous system based on their mechanism of action, understand their SAR and clinical uses.
CO224.4	Categorize the drugs acting on Autonomous nervous system based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO224.5	Categorize the general anesthetics, Narcotic analgesics based on their mechanism of action, understand their and clinical uses.
CO224.6	Categorize the anti-diabetics and Local anesthetics based on their mechanism of action, understand their SAR, synthesis and clinical uses.
II – II Sem Course: Pharmacology – I (PHR16225)	
CO225.1	Define the fundamental concepts of pharmacology and pharmacokinetics of drugs.
CO225.2	Describe organization, function, and neurohumoral transmission of peripheral nervous system. Employ the knowledge to study the pharmacological actions of drugs acting on peripheral nervous system.
CO225.3	Describe neurohumoral transmission of the central nervous system with reference to Excitatory and Inhibitory neurotransmitters and apply the basics in studying the pharmacological actions of drugs acting on the central nervous system.
CO225.4	Obtain the knowledge on pharmacology of Anaesthetics.

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CO225.5	Apply the basics in studying the pharmacological actions of anti-epileptics, Lithium compounds.
CO225.6	Describe organization, functions of Gastro-intestinal system and employ the knowledge to study the pharmacological actions of drugs acting on Gastro-intestinal system.
II – II Sem Course: Pharmaceutical Unit Operations - I (PHR16226)	
CO226.1	Determine overall heat transfer coefficient by heat exchanger and calculate the efficiency of steam distillation.
CO226.2	Demonstrate various staining methods – simple, gram staining and acid fast staining.
CO226.3	Demonstrate and explain about the construction, working and applications of pharmaceutical equipments such as colloid mill, planetary mixer, fluidized bed dryer and freeze dryer.
CO226.4	Estimate the process variables of filtration, evaporation and infer the same.
II – II Sem Course: Pharmaceutical Analysis - I (PIIR16227)	
CO227.1	Understand the principles of identification of impurity in given sample by performing limit tests.
CO227.2	Able to prepare and standardize solutions of different concentrations.
CO227.3	Determine percentage purity of [pharmaceutical drugs by various volumetric analytical titrations.
CO227.4	Determine normality of pharmaceutical drugs by electro analytical methods.
II – II Sem Course: Pharmacognosy – I (PHR16228)	
CO228.1	Remember different morphological and microscopical characteristic features of crude drugs.
CO228.2	Analyze crude drugs as per regulatory guidelines.
CO228.3	Evaluate the crude drugs by quantitative evaluation methods.
CO228.4	Understand the cellular structure of crude drugs.
II – II Sem Course: Pharmacognosy - II (PHR16311)	
CO311.1	Summarize the pharmacognostic study of secondary metabolites like Glycosides.
CO311.2	Summarize the pharmacognostic study of secondary metabolites like Alkaloids.
CO311.3	Summarize the pharmacognostic study of secondary metabolites like Volatile oils.
CO311.4	Summarize the pharmacognostic study of Enzymes.
CO311.5	Outline the metabolic pathway in higher plants and their biogenetic studies.
CO311.6	Understand the pharmacognostic study of Fibres.





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III – I Sem	Course: Medicinal Chemistry - II (PHR16312)
CO312.1	Categorize the anti tubercular and anti infective drugs based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO312.2	Categorize the anti malarials, anti fungals based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO312.3	Categorize the anti virals based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO312.4	Categorize the antibiotics based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO312.5	Remember the chemistry, SAR, biological importance and clinical uses of water soluble vitamins.
CO312.6	Remember the chemistry, SAR, biological importance and clinical uses of fat soluble vitamins.
III – I Sem	Course: Pharmaceutical Technology - I (PHR16313)
CO313.1	Know the importance of preformulation studies, excipients in the development and stability of dosage forms.
CO313.2	Understand the manufacturing techniques, formulation and evaluation methods of Liquid oral preparations.
CO313.3	Understand the manufacturing techniques, formulation and evaluation methods of Semi solid preparations.
CO313.4	Understand the manufacturing techniques, formulation and evaluation methods of Aerosols and Ophthalmic preparations.
CO313.5	Summarize formulation, manufacturing and evaluation of skin cosmetic preparations.
CO313.6	Summarize formulation, manufacturing and evaluation of dental cosmetic preparations.
III – I Sem	Course: Environmental sciences (PHR16314)
CO314.1	Remember the natural renewable sources.
CO314.2	Acquire knowledge about various types of non- renewable resources and understand the role of an individual in conservation of natural resources.
CO314.3	Impart basic knowledge about various ecosystems on earth.
CO314.4	Motivate the learner to participate in environment protection.
CO314.5	Acquire knowledge on different types of Pollution.
CO314.6	Understand the sources, causes and prevention of pollution.
III – I Sem	Course: Pharmaceutical Management (PHR16315)
CO315.1	Understand business organization and functions.
CO315.2	Understand production management, organization, planning layout and product

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	development.
CO315.3	Understand principles, contribution and quality concepts of work flow.
CO315.4	Classify different types of sales promotion and Know the skills required for sales promotion.
CO315.5	Understand structure, manufacturing of products in pharmaceutical industry.
CO315.6	Understand types of insurance and its governance in pharmacy profession.
III – I Sem Course: Medicinal chemistry - I (PHR16316)	
CO316.1	Remember the wide variety of the crude drugs and their sources by morphological and microscopic characteristics.
CO316.2	Exercise the isolation and detective principles of crude drugs,
CO316.3	Predict the crude drug by performing chromatographic techniques.
CO316.4	Analyze crude drugs by chemical tests.
III – I Sem Course: Pharmacognosy - II (PHR16317)	
CO317.1	Synthesize, characterize and purify various medicinal compounds and intermediates.
CO317.2	Analyze the selected drugs present in dosage forms and to determine the assay by using various analytical techniques.
CO317.3	Prepare drugs and determine melting point or boiling point for prepared drugs.
CO317.4	Interpret the functional groups of compounds by qualitative analysis.
III – I Sem Course: Pharmaceutical Technology – I (PHR16318)	
CO318.1	Able to formulate skills of preparing syrups, elixirs, Linctus, solutions and semisolids.
CO318.2	Assess the preformulation studies of drugs and interpret the characteristics of drugs. Gain the knowledge on formulation and evaluation of tablets, capsules, containers.
CO318.3	Gain the knowledge on formulation and evaluation of injections and ophthalmics.
CO318.4	Prepare and evaluate cosmetics such as lipstick, cold cream and shampoo.
III – II Sem Course: Pharmaceutical Technology - II (PHR16321)	
CO321.1	Understand the manufacturing techniques, formulation and evaluation methods of Capsules.
CO321.2	Understand the manufacturing techniques of microencapsulation.
CO321.3	Understand the manufacturing techniques, formulation and evaluation methods of Tablets.
CO321.4	Understand the manufacturing process and techniques of tablet coating.
CO321.5	Gain the knowledge on manufacturing techniques, formulation and evaluation

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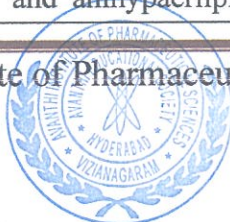
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	methods of Parenteral preparations.
CO321.6	Appraise the science of packaging materials.
III – II Sem Course: Pharmaceutical Biotechnology (PHR16322)	
CO322.1	Assess the general requirements of fermentative production and biotechnological production of pharmaceuticals.
CO322.2	Understand the fermentative production of pharmaceuticals.
CO322.3	Understand the steps involved in development of biosensors, recombinant products and concepts of immunology. Outline the production parameters important in pharmaceutical product development using principles of biotechnology.
CO322.4	Elaborate on microbial genetics, biotransformation of products. Understand the various immunological products and its manufacturing process.
CO322.5	Understand the technology and applications of enzymes.
CO322.6	Understand the various blood products and its manufacturing, storage process.
III – II Sem Course: Pharmacology – II (PHR16323)	
CO323.1	Assess the general requirements of fermentative production and biotechnological production of pharmaceuticals.
CO323.2	Employ the knowledge to study the pharmacological actions of anticoagulants and drugs acting on urinary system.
CO323.3	Employ the knowledge to study the pharmacological actions of drugs acting on endocrine system.
CO323.4	Gain the knowledge on pharmacology of autocooids and related drugs.
CO323.5	Describe organization, function, of Respiratory system and employ the knowledge to study the pharmacological actions of drugs acting on Respiratory system.
CO323.6	Understand the principles of chemotherapy and illustrate the pharmacology of antibiotics and anti neoplastic agents.
III – II Sem Course: Medicinal Chemistry – III (PHR16324)	
CO324.1	Apply modern techniques like Quantitative Structure Activity Relationship (QSAR), Prodrug concept, Combinatorial Chemistry and Computer Aided Drug Design (CADD) in rational drug design.
CO324.2	Apply modern techniques like molecular modeling and docking studies in rational drug design.
CO324.3	Categorize the steroidal anti-inflammatory agents based on their mechanism of action, understand their SAR, synthesis and uses.
CO324.4	Categorize the anti-arrythmic drugs and cardiac glycosides based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO324.5	Categorize the drugs acting on Cardiovascular system based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO324.6	Categorize the Diuretics and anihypaerlipidemics based on their mechanism of

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	action, understand their SAR, synthesis and uses.
III – II Sem	Course: Regulatory Affairs, IPR & Patents (PHR16325)
CO325.1	Understand the regulatory guidelines involved in preformulation studies.
CO325.2	Understand the regulatory guidelines involved in manufacturing, validation of equipment, products and materials.
CO325.3	Understand the regulatory guidelines involved in packaging materials.
CO325.4	Assimilate the process of clinical trials and pharmacovigilance as well as to understand obligations of GCP in clinical trials.
CO325.5	Understand IPR and patents with examples.
CO325.6	Understand patenting laws and regulations.
III – II Sem	Course: Pharmaceutical Technology - II (PHR16326)
CO326.1	Assess the preformulation studies of drugs and interpret the characteristics of drugs.
CO326.2	Gain the knowledge on formulation and evaluation of tablets, capsules, containers.
CO326.3	Gain the knowledge on formulation and evaluation of injections and ophthalmics.
CO326.4	Evaluate the packaging guidelines according to pharmacopeial tests.
III – II Sem	Course: Pharmaceutical Bioechnology - II (PHR16327)
CO327.1	Isolate antibiotic producing microorganism from soil. Determine MIC of the given antibiotic.
CO327.2	Perform Production of pharmaceuticals by fermentation techniques.
CO327.3	Evaluate Sterility testing of Pharmaceutical products and find the measures for storage of blood products.
CO327.4	Demonstrate extraction of DNA and RNA.
III – I Sem	Course: Pharmacology (PHR16328)
CO328.1	Recall the dose calculations in pharmacological experiments, and to relate the antiallergic activity / anti-ulcer activity in rat models.
CO328.2	Demonstrate of effect of drugs on gastrointestinal motility and the effect of agonist/antagonists on guinea pig ileum. Construct serum biochemical parameters by using semi auto analyzer.
CO328.3	Analyze effect of saline purgative on frog intestine, insulin hypoglycemic effect and test for pyrogens using rabbit method.
CO328.4	Predict the pharmacokinetic parameters and adapt the biostatistics methods in experimental pharmacology. Evaluate acute oral toxicity (LD50), acute skin irritation / corrosion and acute eye irritation / corrosion of a test substance C608.6 Predict the pharmacokinetic parameters and adapt the biostatistics methods in experimental pharmacology.

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IV – I Sem	Course: Pharmaceutical Analysis - II (PHR16411)
CO411.1	Understand principle, operation and applications of UV visible, IR, NMR and mass spectrophotometer.
CO411.2	Understand the principle and procedure involved in NMR and mass spectrophotometer.
CO411.3	Gain knowledge on characterization and estimation of drugs by thermal techniques and X-ray diffraction techniques.
CO411.4	Elaborate various principles, theory and instruments employed for the characterization and analysis of drugs by using chromatographic techniques.
CO411.5	Create protocol for analysis of pharmaceutical substances by spectroscopic techniques.
CO411.6	Understand the principle, operation and applications of chromatographic and LC-MS techniques.
IV– I Sem	Course: Pharmaceutical Analysis - II (PHR16412)
CO412.1	Understand basic concepts of absorption of drugs in body.
CO412.2	Understand basic concepts of distribution of drugs in body.
CO412.3	Understand basic concepts of elimination of drugs in body.
CO412.4	Understand the application of pharmacokinetic models in design of dosage form.
CO412.5	Able to design multiple dosage regimens based on clinical pharmacokinetic parameters for maximizing patient compliance and therapeutic effectiveness.
CO412.6	Define and explain the principles and importance of drug products as they are bioavailable and bioequivalent as well as to outline the results by using the hyphenated tools to interpret the results.
IV – I Sem	Course: Chemistry of Natural Products (PHR16413)
CO413.1	Understand structures, features, stabilities and uses of Carbohydrates.
CO413.2	Understand structures, features, stabilities and uses of proteins and amino acids.
CO413.3	Understand structures, features, stabilities and uses of Lipids, purines and Xanthine derivatives.
CO413.4	Understand structures, features, stabilities and uses of Terpenes.
CO413.5	Understand structures, features, stabilities and uses of Alkaloids.
CO413.6	Understand structures, features, stabilities and uses of Vitamins and Steroids.
IV – I Sem	Course: Hospital & Community Pharmacy (PHR16414)
CO414.1	Understand Hospital Pharmacy organisation structure, Budget preparation and implementation hospital formulary, organization of drug store, purchase and inventory control, patient counseling, role of pharmacist in community health care and education.





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CO413.2	Understand the pharmacy procedural manual, drug distribution, dispensing to outpatients, in-patients and ambulatory patient dispensing of ancillary and controlled substances, Drug Information Center.
CO414.3	Understand Prescription filling, drug profile, patient medication profile, cases on drug interaction and adverse reactions and idiosyncrasy.
CO414.4	Understand Community pharmacy role and relationship, professional responsibilities and prescribed medication order.
CO414.5	Understand communication with prescribers and patients, Rational use of common OTC medications.
CO414.6	Understand Family planning, First aid, Participation in primary health programs, Smoking cessation, Screening programs, Nutrition, Responding to common ailments and Community pharmacy management and Home Medicines Review (HMR).
IV- I Sem	Course: Pharmaceutical Jurisprudence (PHR16415)
CO415.1	Understand Pharmaceutical Legislations, Drugs & Pharmaceutical Industry, Pharmaceutical Education and Pharmaceutical ethics & policy.
CO415.2	Understand rules prescribed order, Pharmacy act, Drugs (Price control) order.
CO415.3	Understand rules, schedules of Drugs and Cosmetics Act.
CO415.4	Understand procedures under medicinal and toilet preparations act and Narcotic Drugs & Psychotropic Substances Act.
CO415.5	Understand the rules and procedures under drugs and magic remedies.
CO415.6	Understand the salient features, of GATT policy, Prevention of Cruelty to animals Act, Factory act and Pharmaceutical Policy.
IV - I Sem	Course: Pharmaceutical Analysis - II (PHR16416)
CO416.1	Interpret IR Spectra.
CO416.2	Estimate the assay of drugs by UV- spectrophotometry and Colorimetric method.
CO416.3	Isolate mixture of compounds by suitable chromatography techniques.
CO416.4	Demonstrate HPLC, Column chromatography and Gel electrophoresis.
IV-I Sem	Course: Biopharmaceutics And Pharmacokinetics (PHR16417)
CO417.1	Estimate of various pharmacokinetic parameters for plasma and urinary excretion studies.
CO417.2	Analyze biological specimens for drug content and estimation its pharmacokinetic parameters.
CO417.3	Analyze In-vitro evaluation of different dosage forms for drug release.
CO417.4	Apply the Statistical treatment for pharmaceutical data.
IV-I Sem	Course: Chemistry of Natural Products (PHR16418)
CO418.1	Identify alkaloids, steroids, steroidal glycosides and cardiac glycosides by specific

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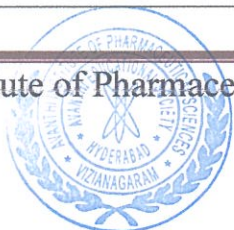
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	tests.
CO418.2	Extract drugs from plants and animal sources.
CO418.3	Identify natural products by TLC.
CO418.4	Demonstrate Volatile oil production by steam distillation.
IV—II Sem	Course: Bioassays & Toxicology (PHR16421)
CO421.1	Gain knowledge on bioassays and its applications, its importance and need in the present context.
CO421.2	Understand Principles and procedures involved in bioassays and their limitations.
CO421.3	Grasp knowledge on scope, principles, mechanisms and risk assessment.
CO421.4	Overview on acute, sub-acute and chronic toxicity studies, carcinogenicity and chemical carcinogenesis in humans.
CO421.5	Acquire knowledge on toxic responses of target organs, poisoning and its treatment strategies.
CO421.6	Understand the intoxication produced by various toxicants.
IV—II Sem	Course: Clinical Pharmacy, Therapeutics and Pharmacovigilance (PHR16422)
CO422.1	Understand several concepts of essential drug list, Rational drug therapy, medication errors and patient drug compliance.
CO422.2	Understand the concept of Pharmacoeconomics, Pharmacoepidemiology, Pharmacovigilance, Therapeutic drug monitoring and Total Parental Nutrition.
CO422.3	Understand the drug therapy of above diseases.
CO422.4	Understand the drug therapy of above Endocrine disorders.
CO422.5	Acquire knowledge on the concept of Pharmacovigilance.
CO422.6	Understand the importance of Pharmacovigilance role in Clinical practice.
IV—II Sem	Course: Controlled Release and Novel Drug Delivery Systems (PHR16423)
CO423.1	Understand Factors to be considered, principles and regulatory considerations involved in controlled drug delivery systems.
CO423.2	Understand fundamentals, Dissolution Controlled, Diffusion Controlled, Ion Exchange Resins, Osmotic based systems, pH Independent Systems and altered density systems.
CO423.3	Understand fundamentals, types of TDDS, Materials Employed and Evaluation of TDDS.
CO423.4	Understand mechanism of bioadhesion, mucoadhesive materials, formulation and evaluation of mucoadhesive-based systems.
CO423.5	Understand fundamentals and applications, formulation and evaluation of Liposomes, Resealed Erythrocytes and Nano particles.
CO423.6	Understand classification, study of biodegradable polymers & hydrogels.

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IV-II Sem	Course: Quality Assurance, GMP & GLP (PHR16424)
CO424.1	Understand Concept of Quality assurance, philosophy of GMP, CGMP and GLP.
CO424.2	Understand GMP requirements for the production of pharmaceuticals.
CO424.3	Understand selection, purchase specifications, maintenance, clean in place, sterilize in place.
CO424.4	Acquire knowledge on documentation in production of pharmaceuticals.
CO424.5	Acquire knowledge on GLP requirements.
CO424.6	Understand handling of returned goods, recovered materials and reprocessing. Complaints and recalls, evaluation of complaints, recall procedures, related records and documents.
IV—II Sem	Course: Bioassays & Toxicology (PHR16425)
CO425.1	Analyze the potency of test sample using a suitable isolated tissue.
CO425.2	Calculate the PA2 value of Atropine using Acetyl Choline as an agonist on rat Ileum.
CO425.3	Determine of toxic responses of drugs.
CO425.4	Demonstrate on Test for Pyrogens.
IV—II Sem	Course: Bioassays & Toxicology (PHR16426)
CO426.1	Analyze the potency of test sample using a suitable isolated tissue.
CO426.2	Calculate the PA2 value of Atropine using Acetyl Choline as an agonist on rat Ileum.
CO426.3	Determine of toxic responses of drugs.
CO426.4	Demonstrate on Test for Pyrogens.
IV – II Sem	Project Work
CO427.1	Define the fundamentals, carry out the literature review on the proposed research work and identify the problem.
CO427.2	Develop the research hypothesis.
CO427.3	Summarise the requirements in the proposed research.
CO427.4	Take part in research experiments and documented.
CO427.5	Evaluate the work done by applying statistic tools.
CO427.6	Appraise societal application and appreciation.


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DEPARTMENT OF PHARMACY

Program : Pharm D

Regulation : PCI (R08)

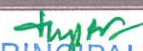
No. of Courses : 47

COURSE OUTCOMES

Year: I	Course: Human Anatomy and Physiology (T1101)
CO101.1	Recall the terminologies in the human anatomy and physiology, along with learn the functions of human cell and tissues. Summarize the functions of bones and joints in the skeleton.
CO101.2	Understand the functions of formed elements in the blood along with lymph and its role in immunity.
CO101.3	Compare the anatomical functions of heart, lungs, Digestive system and to analyze their physiology.
CO101.4	Assess the structure and function of brain, spinal cord and cranial nerves and to interpret the physiology of urinary system.
CO101.5	Elaborate the physiology of endocrine glands, reproductive organs.
CO101.6	Understand the anatomy and physiology of sensory organs and skeletal muscles. Discuss the physiology of skeletal muscles.
Year: I	Course: Pharmaceutics (T1102)
CO102.1	Outline the classification of dosage forms, handling of prescription and summarize the importance of posology.
CO102.2	Solve the pharmaceutical calculations involved in design of dosage form.
CO102.3	Understand the formulation of powders, granules & monophasic dosage forms.
CO102.4	Gain knowledge on formulation of bi phasic liquid dosage forms.
CO102.5	Acquire knowledge on formulation of Suppositories & Galenical's.
CO102.6	Identify the types of incompatibilities in dosage forms & avoid the incompatibilities during dispensing.
Year: I	Course: Medicinal Biochemistry (T1103)
CO103.1	Remember the classification, properties, significance and metabolic reactions of carbohydrates, lipids, nucleic acids, proteins and amino acids.
CO103.2	Understand catalytic activity of enzymes and importance of co enzymes in diagnosis of diseases. Know the metabolism of carbohydrates.
CO103.3	Understand the process of metabolism of proteins and lipids.
CO103.4	Acquire knowledge on nucleic acid metabolism and disorders associated with it.
CO103.5	Understand genetic organization of mammalian genome. Interpret qualitative analysis of biomolecules in body fluids.
CO103.6	Elaborate knowledge on immunochemical techniques & electrolytes.

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Year: I	Course: Pharmaceutical Organic Chemistry (T1104)
CO104.1	Capable to give nomenclature and identify isomerism of organic compounds.
CO104.2	Understand the mechanism, reactivity of free radicals chain reactions, nucleophilic aliphatic substitution reaction.
CO104.3	Study the kinetics, mechanism, stereochemistry of free radicals, electrophiles, dehydrogenation of alkyl halides reactions.
CO104.4	Understand T1102 of resonance. Analyze the importance of Cathartics and anti-microbials in treatment of gastric diseases or disorders.
CO104.5	Understand mechanisms of aldol condensation, Hoffmann rearrangement oxidation, reduction reactions.
CO104.6	Identify the tests for purity, medical uses of some pharmaceutical products.
Year: I	Course: Pharmaceutical Inorganic Chemistry (T1105)
CO105.1	Analyze the techniques of acid-base titrations and non-aqueous titrations. Understand the physiochemical concepts of analysis and gain knowledge of sources of errors and minimizing techniques.
CO105.2	Employ volumetric titrations in quality control of pharmaceuticals. Analyze the techniques of gravimetry in quality control of pharmaceuticals.
CO105.3	Identify impurities of compounds by limit tests.
CO105.4	Appreciate the importance of inorganic compounds in preventing Diseases.
CO105.5	Classify the gastrointestinal agents and described the methods of preparation, properties, storage, assay and uses with marketed formulations of inorganic compounds in gastrointestinal agents. Analyze the importance of Cathartics and anti-microbials in treatment of gastric diseases or disorders.
CO105.6	Classify the miscellaneous compounds and know the monographs of inorganic compounds in each category. Understand the radioactivity and study of different radioisotopes, storage, precautions and applications of radioactive substances.
Year: I	Course: Remedial Mathematics (T1106)
CO106a.1	Know Basic mathematical operations.
CO106a.2	Apply trigonometrical principles, calculations in pharmaceutical calculations.
CO106a.3	Utilize mathematical equations in doing problems.
CO106a.4	Analyze solving problems by applying the concepts.
CO106a.5	Appraise the important applications of mathematics, to solve and convert elementary functions using Laplace transform.
Year: I	Course: Remedial Biology (T1107)
CO106b.1	Learn the organization and nomenclature of living things.
CO106b.2	Summarize the functions of various types of tissues in plants and animals.
CO106b.3	Develop knowledge on structural modifications in plants and importance of pollination in plants.

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CO106b.4	Analyze various physiological processes in plants and animals.
CO106b.5	Determine the various taxonomical characters of different families and micro-organisms, to elaborate the study of different kinds of phylum's includes Pisces, Reptiles, Amphibians, Aves & Mammals.
CO106b.6	Summarize the study of fungi, yeast, penicillin and bacteria and animal cell, animal tissues.
Year: I Course: Human Anatomy and Physiology (T1107)	
CO107.1	To find and relate characteristics of various tissues of human body, To demonstrate bleeding time, clotting time, blood pressure and blood grouping.
CO107.2	To identify the number of RBC and WBC using hemocytometer.
CO107.3	To examine the functions of various organ systems in human body.
CO107.4	To interpret the mechanisms of pregnancy diagnosis tests and various family planning appliances, to construct and record simple curves using frog gastrocnemius sciatic nerve.
Year: I Course: Pharmaceutics (T1108)	
CO108.1	Able to formulate skills of preparing syrups, elixirs, Linctus and solutions.
CO108.2	Gain knowledge on preparation of biphasic liquid dosage forms.
CO108.3	Able to prepare various solid dosage forms using different techniques and equipment's.
CO108.4	Understand the preparation of Semisolid dosage forms.
Year: I Course: Medicinal Biochemistry (T1109)	
CO109.1	Identify qualitative, quantitative estimation of normal, abnormal constituents of urine.
CO109.2	Interpret SGOT, SGPT, Glucose, urea, proteins, bilirubin in serum samples.
CO109.3	Study factors affecting enzyme activity, and identify electrolytes in serum.
CO109.4	To perform the liver function tests and lipid profile tests.
Year: I Course: Pharmaceutical Organic Chemistry (T1110)	
CO110.1	Prepare and characterize the derivatives of organic compounds.
CO110.2	Analyze unknown pharmaceutical organic compounds by determining their melting point/boiling point.
CO110.3	Perform qualitative analysis of pharmaceutical organic compounds and identify the extra elements present in the pharmaceutical organic compounds and find the presence of several functional groups in pharmaceutical compounds.
CO110.4	Able to construct molecular models.
Year: I Course: Pharmaceutical Inorganic Chemistry (T1111)	
CO111.1	Know the source of impurities and perform the limit tests for qualitative analysis of

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	impurities for given sample.
CO111.2	Perform the identification test for the pharmaceutical compounds.
CO111.3	Identify the test for purity of compounds.
CO111.4	Able to prepare inorganic pharmaceuticals.
Year: I	Course: Remedial Biology (T1112)
CO112.1	Understand the usage and handling of microscope and study the microscope and study the microscopic investigation of cell and it's inclusions.
CO112.2	Identify microscopic and morphological characteristics of stem, root, fruit and flowers.
CO112.3	Identify bones and study frog by using computing models.
CO112.4	Determine physical parameters such as BP, blood groups.
Year: II	Course: Pathophysiology (T2101)
CO201.1	Understand the process of cell injury, morphology of cell injury and cellular adaptations.
CO201.2	Gain knowledge on aetiology, pathogenesis of immunological diseases, cancer.
CO201.3	Understand stages and mechanisms of shock treatment.
CO201.4	To assess the need of balanced diet and the effect of radiation and air pollution on human body.
CO201.5	Explain the etiopathogenesis of hematologic, endocrine, nervous, gastrointestinal, musculoskeletal diseases and Immunopathogenesis of infectious diseases.
CO201.6	Describe the aetiology and pathogenesis of infectious diseases.
Year: II	Course: Pharmaceutical Microbiology (T2102)
CO202.1	Remember the scope of microbiology and its branches, methods of classification. Understand the structure, morphology of bacteria, fungi, viruses.
CO202.2	Know process of cultivation isolation of micro-organisms and study staining techniques.
CO202.3	Understand the importance and implementation of sterilization in pharmaceutical processing and industry, disinfectants in pharmaceutical industry.
CO202.4	Under the importance of immunity, immunization programme.
CO202.5	Summarize the diagnostic tests used for identification of infectious diseases and interpret its results.
CO202.6	Gain knowledge on mode of transmission, aetiology, symptoms, and treatment of infectious diseases.
Year: II	Course: Pharmacognosy and Phyto pharmaceuticals (T2103)
CO203.1	Recall the history, scope and development of pharmacognosy and remember different sources, classification and quality control of crude drugs.
CO203.2	Illustrate about cultivation, collection, processing and storage of crude drugs. Understand





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	the factors affecting the production of crude drugs along with its hybridization.
CO203.3	Illustrate the basic plant metabolites and the various metabolic pathways to form secondary metabolites, Understand systematic pharmacogenetic study of primary metabolites, ayurvedic drugs, marine drugs and teratogens.
CO203.4	To identify the crude drugs by chemical tests: Tragacanth, Acacia, Gelatin, Starch, Honey and lipids.
CO203.5	Study pharmacognosy of proteins, lipids, fibres.
CO203.6	Identify type and methods of adulteration of crude drugs.
Year: II	Course: Pharmacology – I (T2104)
CO204.1	Define the fundamental concepts of pharmacology and pharmacokinetics of drugs. Understand the basic concepts of pharmacodynamics of drugs, adverse drug reactions and drug discovery.
CO204.2	Describe organization, function, and neurohumoral transmission of peripheral nervous system. Employ the knowledge to study the pharmacological actions of drugs acting on peripheral nervous system.
CO204.3	Describe organization, function, of cardiovascular system and employ the knowledge to study the pharmacological actions of drugs acting on cardiovascular system.
CO204.4	Describe neurohumoral transmission of the central nervous system with reference to Excitatory and Inhibitory neurotransmitters and apply the basics in studying the pharmacological actions of drugs acting on the central nervous system.
CO204.5	Describe organization, function, of urinary system and employ the knowledge to study the pharmacological actions of drugs acting on respiratory system.
CO204.6	Gain the knowledge on pharmacology of autocooids and related drugs.
Year: II	Course: Community Pharmacy (T2105)
CO205.1	Understand the roles and responsibilities of community pharmacist. Know process of clinical pharmacy management.
CO205.2	To recollect the parts of prescription and study the concepts of pharmaceutical care.
CO205.3	To identify the best way of improving medication adherence and to excel in conducting patient counselling.
CO205.4	To survey the health status of patients in the community by participating on health screening services and to build the ability to manage minor ailments.
CO205.5	To explain the importance of rational drug therapy, OTC medication counselling and code of ethics to become a competent pharmacist.
CO205.6	To improve the professional skills about health, balance diet, family planning, health promotion and prevention of communicable diseases in community.
Year: II	Course: Pharmacotherapeutics-I (T2106)
CO206.1	Recall the pathophysiology of cardiovascular disorders and relate their etiology with the therapeutic approach including treatment controversies.
CO206.2	Recall the pathophysiology of respiratory system disorders and relate their etiology with the therapeutic approach including treatment controversies.

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CO206.3	Identify various types of respiratory and endocrine disorders with respect to clinical features and laboratory investigation, list their complications along with replacement in their management.
CO206.4	Outline general prescribing guidelines for geriatric, pediatric, pregnant, and feeding people.
CO206.5	Understand etiopathogenesis and pharmacotherapy of ophthalmic diseases.
CO206.6	Analyse role of pharmacist in rational drug use.
Year: II Course: Pharmaceutical Microbiology (T2107)	
CO207.1	Demonstrate various staining methods – simple, gram staining and acid-fast staining.
CO207.2	Test for possible microbial contaminants. Estimate the microbiological assay of antibiotics.
CO207.3	Estimate the motility in the given sample. Choose the correct method to evaluate the microbes to be tested.
CO207.4	Demo on diagnostic tests for some common tests.
Year: II Course: Pharmacognosy and Phyto pharmaceuticals (T2108)	
CO208.1	Remember different morphological and microscopical characteristic features of crude drugs.
CO208.2	Analyse crude drugs as per regulatory guidelines.
CO208.3	Evaluate the crude drugs by quantitative evaluation methods.
CO208.4	Understand the cellular structure of crude drugs.
Year: II Course: Pharmacotherapeutics-I (T2109)	
CO209.1	To recall the pathophysiology of cardiovascular disorders and relate their etiology with the therapeutic approach including treatment controversies. pathophysiology of respiratory system disorders and relate their etiology with the therapeutic approach including treatment controversies.
CO209.2	To identify various types of respiratory and endocrine disorders with respect to clinical features and laboratory investigations, list their complications along with replacement in their management.
CO209.3	Outline general prescribing guidelines for geriatric, pediatric, pregnant, and feeding people.
CO209.4	Understand etiopathogenesis and pharmacotherapy of ophthalmic diseases.
Year: III Course: Pharmacology-II (T3101)	
CO301.1	Describe organization, function, of urinary system and employ the knowledge to study the pharmacological actions of drugs acting on urinary system.
CO301.2	Describe organization, function, of urinary system and employ the knowledge to study the pharmacological actions of drugs acting on urinary system, blood forming agents.

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CO301.3	Summarize the chemotherapy of antibiotics.
CO301.4	Understand the pharmacology of ant infectious agents.
CO301.5	Outline pharmacology of immunosuppressants and stimulants. Discuss principles of animal toxicology.
CO301.6	Understand structure functions of cell and gene.
Year: III Course: Pharmaceutical Analysis (T3102)	
CO302.1	Outline the importance of quality assurance in pharmaceutical drug development.
CO302.2	Elaborate various principles, T1102 and instruments employed for the characterization and analysis of drugs by using chromatographic techniques.
CO302.3	Understand principle, operation and applications of electrochemical methods.
CO302.4	Understand principle, operation and applications of UV visible spectrophotometer and fluorimetry.
CO302.5	Gain maximum knowledge on characterization and estimation of molecules, ions by spectroscopical techniques.
CO302.6	Acquire knowledge on operation and applications of X-RD, DSC, DTA.
Year: III Course: Pharmacotherapeutics-II (T3103)	
CO303.1	To know etiopathogenesis and pharmacotherapy of infectious diseases.
CO303.2	Understand the clinical management therapy of viral, fungal infections.
CO303.3	Assess the drug therapy used for treatment of musculoskeletal disorders.
CO303.4	Understand pharmacotherapy of drug's acting on renal system.
CO303.5	Understand basic principles of chemotherapy of cancer.
CO303.6	Acquire knowledge on pharmacotherapy of dermatological diseases.
Year: III Course: Pharmaceutical Jurisprudence (T3104)	
CO304.1	Understand about objectives of the Drug and Cosmetics Act.
CO304.2	Gain knowledge about the sale of drugs, labeling of drugs.
CO304.3	Gain knowledge about the code of pharmaceutical ethics with the importance of pharmacist role and pharmacists' oath and to remember Pharmacy Act with the education regulation & to get knowledge about Medical and toilet preparation Act.
CO304.4	Understand the constitution and functions of narcotic & Psychotropic consultative committee and to remember the objectives of, offences and penalties.
CO304.5	Remember the objectives of Drug and Magic remedies Act with the prohibition of certain advertisements and prevention of cruelty to animal Act with ethical committee and guidelines. Know about drugprice control order on bulk drugs and the sale price.
CO304.6	Know about the pharmaceutical legislation including different committees and understand about the objectives and rules regulations of Medical Termination and Pregnancy and all types of Intellectual property rights.





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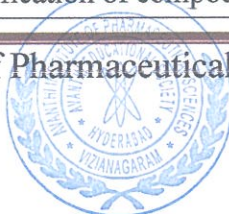
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Year: III	Course: Medicinal Chemistry (T3105)
CO305.1	Apply modern techniques like Quantitative Structure Activity Relationship (QSAR), Prodrug concept, Combinatorial Chemistry and Computer Aided Drug Design (CADD) in rational drug design.
CO305.2	Categorize the anti-infective agents based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO305.3	Categorize the anti-malarial and anti-cancer agents based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO305.4	Categorize the drugs acting on heart based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO305.5	Categorize the anti-diabetics and Local anesthetics based on their mechanism of action, understand their SAR, synthesis and clinical uses.
CO305.6	Categorize the drugs acting on Endocrine system based on their mechanism of action, understand their SAR, synthesis and clinical uses.
Year: III	Course Pharmaceutical Formulations (T3106)
CO306.1	Know the importance of preformulation studies, excipients in the development and stability of dosage forms.
CO306.2	Understand the manufacturing techniques, formulation and evaluation methods of Tablets.
CO306.3	Understand the manufacturing techniques, formulation and evaluation methods of Capsules.
CO306.4	Understand the manufacturing techniques, formulation and evaluation methods of Liquid oral preparations. Gain the knowledge on manufacturing techniques, formulation and evaluation methods of Parenteral and Ophthalmic preparations.
CO306.5	Understand the manufacturing techniques, formulation and evaluation methods of Capsules, Semisolids.
CO306.6	Understand formulation, design and evaluation of various types of controlled drug delivery systems.
Year: III	Course: Pharmacology-II (T3107)
CO307.1	Learn the importance of physiological salt solutions and to identify the effect of various drugs on isolated frog heart, blood pressure and heart rate of dog. Illustrate the diuretic activity of drugs in mice/rats.
CO307.2	Identify the dose response relationship, effect of drugs on DRC and to construct the drug concentrations by various bioassay methods using animal simulator software.
CO307.3	Categorize the PA2 and PD2 value of drugs using rat anococcygeus muscle and guinea pig ileum.
CO307.4	Interpret the effect of spasmogens and spasmolytics using rabbit jejunum. Predict various screening models for analgesic and anti-inflammatory.
Year: III	Course: Pharmaceutical Analysis (T3108)
CO308.1	Recall the separation and identification of compounds by chromatographic techniques.

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CO308.2	Explain the qualitative and quantitative analysis of drugs by spectroscopic techniques.
CO308.3	Summarize instrumental analysis of selected drugs as per Pharmacopoeia.
CO308.4	Compare and characterize compounds by using analytical Techniques.
CO308.5	Determine concentration of ions by electrometric analysis, to discuss the instrumentation, applications of advanced analytical techniques and to interpret spectral data.
Year: III Course Pharmacotherapeutics-II (T3109)	
CO309.1	Remember and recall the pathophysiology and management of cardiovascular, respiratory, endocrine diseases and viral infections.
CO309.2	Identify various drug interactions and rationalize the prescription.
CO309.3	Plan the quality use of medicines surrounding the therapeutic agents in the treatment of selected diseases.
CO309.4	Analyse the clinical skills in the therapeutic management of selected disease conditions.
CO309.5	Prioritize the treatment strategies for better patient outcome and discuss the controversies in treatment.
Year: III Course: Medicinal Chemistry (T3110)	
CO310.1	Synthesize, characterize and purify various medicinal compounds and intermediates.
CO310.2	Analyze the selected drugs present in dosage forms and to determine the assay by using various analytical techniques.
CO310.3	Prepare drugs and determine melting point or boiling point for prepared drugs.
CO310.4	Determine the partition coefficient of drugs.
Year: III Course: Pharmaceutical Formulations (T3111)	
CO311.1	Assess the preformulation studies of drugs and interpret the characteristics of drugs.
CO311.2	Gain the knowledge on formulation and evaluation of tablets, capsules, containers.
CO311.3	Gain the knowledge on formulation and evaluation of injections and ophthalmics.
CO311.4	Prepare and evaluate cosmetics such as lipstick, cold cream and shampoo.
Year: IV Course: Pharmacotherapeutics-III (T4101)	
CO401.1	Understand etiopathogenesis and pharmacotherapy of GIT.
CO401.2	Understand etiopathogenesis and pharmacotherapy of hematological diseases.
CO401.3	Understand etiopathogenesis and pharmacotherapy of nervous system diseases / disorders.
CO401.4	Understand etiopathogenesis and pharmacotherapy of psychiatric diseases.

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CO401.5	Know the pain pathways and manage the pain condition in patients.
CO41.6	Acquire knowledge on evidence-based medicine.
Year: IV Course: Hospital Pharmacy (T4102)	
CO402.1	Understand basic organization, functions, budget preparation and implementation of hospital pharmacy.
CO402.2	Acquire the hospital drug policy and implement in hospital pharmacy services.
CO402.3	Understand and implement the hospital pharmacy services for patient care.
CO402.4	Acquire knowledge on compounding and dispensing pharmaceutical preparations.
CO402.5	Continue education and training in professional developmental programs.
CO402.6	Understand the professional relations and practices of hospital pharmacy.
Year: IV Course: Clinical Pharmacy (T4103)	
CO403.1	Monitor and review the daily activities of clinical pharmacist and remain better services to patients.
CO403.2	Interpret the patient data, case history, and give suggestions to patients for better care.
CO403.3	Interpret the clinical laboratory tests for evaluation /diagnosis of diseases.
CO403.4	Obtain drug and poison information form resources and establish DIC.
CO403.5	Conduct pharmacovigilance studies for ADR monitoring.
CO403.6	Evaluate critical medical errors.
Year: IV Course: Biostatistics and Research Methodology (T4104)	
CO404.1	Explain the need of research, research designs and their applications and to explain methodological designs. Apply the clinical research methods in clinical development of drugs.
CO404.2	Understand the basic aspects of statistics such as central tendency, dispersion, correlation and regression.
CO404.3	Know the statistical techniques and to apply those to solve the statistical problems.
CO404.4	Operate statistical tools like M.S. Excel, SPSS, R and MINITAB.
CO404.5	Apply statistical principles in epidemiology.
CO404.6	Analyze and apply the computers applications in pharmacy.
Year: IV Course: Biopharmaceutics And Pharmacokinetics (T4105)	
CO405.1	Understand basic concepts of absorption, distribution of drugs in body.
CO405.2	Understand basic concepts of elimination of drugs in body. Define and explain the principles and importance of drug products as they are bioavailable and bioequivalent as well as to outline the results by using the hyphenated tools to interpret the results.

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CO405.3	Utilize the pharmacokinetic models for the determination of pharmacokinetic parameters.
CO405.4	Understand the application of pharmacokinetic models in design of dosage form.
CO405.5	Able to design multiple dosage regimens based on pharmacokinetic parameters for maximizing patient compliance and therapeutic effectiveness.
CO405.6	Interpret the data and to understand the basic principles of multi-compartmental & nonlinear Pharmacokinetic models.
Year: IV Course: Clinical Toxicology (T4106)	
CO406.1	Understand general principles in management of poisoning and its antidotes.
CO406.2	Study toxicokinetic and know measures taken in supporting clinical toxicology.
CO406.3	Understand clinical symptoms and management of acute poisoning.
CO406.4	Analyse clinical symptoms and management of metal poisoning.
CO406.5	Gain knowledge on first aid for snake bite and plant food poisoning.
CO406.6	Understand the envenomations effects and substance abuse.
Year: IV Course: Pharmacotherapeutics-III (4107)	
CO407.1	Remember and recall the pathophysiology of selected diseases and rationale for drug therapy.
CO407.2	Identify various therapeutic approaches for the management of selected diseases.
CO407.3	Apply the concepts of various drug therapies and identify the controversies in drug therapy.
CO407.4	Assess the drug therapy by preparing individual therapeutic plan based on diagnosis.
CO407.5	Evaluate the patient specific parameters relevant in initiating drug therapy and monitoring therapy. To create a pharmaceutical care plan, design a list of patient counselling points on the specific illness.
Year: IV Course: Hospital Pharmacy (T4108)	
CO408.1	Assess the drug interaction in given prescription.
CO408.2	Design the formulations and dispense it.
CO408.3	Suggest the solutions related to drug information queries.
CO408.4	Acquire knowledge to prepare inventory control in hospital pharmacy.
Year: IV Course : Clinical Pharmacy (T4109)	
CO409.1	Analyze drug information queries.
CO409.2	Conduct patient medication counseling and suggest necessary precautions.
CO409.3	Perform case studies related to lab reports.

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CO409.4	Conduct interview with patients regarded premedication history.
Year: IV	Course : Biopharmaceutics & Pharmacokinetics (T4110)
CO410.1	Compare dissolution profiles of 2/more marketed drugs and analyse its efficacy.
CO410.2	Improve dissolution rate of poorly water-soluble drugs.
CO410.3	Conduct BA studies according to BA protocol.
CO410.4	Calculate different PK parameters by using PK models.
Year: V	Course: Clinical Research (T5101)
CO501.1	Explain various approaches in drug development process.
CO501.2	Outline various phases of clinical trails.
CO501.3	Abbreviate the drug approval process in India and USA.
CO501.4	Understand OECD guidelines in clinical research and ICH guidelines.
CO501.5	Understand roles and responsibilities of clinical trial personnel according to GCP.
CO501.6	Dosing clinical research protocols.
Year: V	Course: Pharmacoepidemiology and Pharmacoeconomics (T5102)
CO502.1	Understand the scope, measurement of outcomes and risk in pharmacoepidemiology.
CO502.2	Elaborate the methods used in pharmacoepidemiology.
CO502.3	Understance source of data and application of pharmaco epidemiology.
CO502.4	Understand history needs of pharmaco economic evaluation.
CO502.5	Know types and outcome assessment of PE evaluation.
CO502.6	Apply software to solve Pharmacoeconomics.
Year: V	Course: Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring (T5103)
CO503.1	Elaborate the need and method of designing dosage regimens.
CO503.2	Evaluate pk of drug interactions of drugs.
CO503.3	Evaluate TDM in detail.
CO503.4	Apply PK models and parameters to adjust the drug dose in renal and hepatic diseases treatment.
CO503.5	Gain knowledge on population PK.
CO503.6	Understand pharmacogenetics and its PK considerations.

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Year : V	Clerkship (T5104)
CO504.1	Discuss the role of the pharmacist in clinical pharmacy services.
CO504.2	Enlist the various therapeutic alternatives for the management of disease and disorders.
CO504.3	Create a drug treatment strategy for a specific situation.
CO504.4	Recognize, understand and report drug interactions and medication errors.
CO504.5	Exhibit the abilities of a clinical pharmacist.
CO504.6	Analyze the medical records and report the treatment.
Year : V	Project Work (T5105)
CO505.1	Define the fundamentals, carry out the literature review on the proposed research work and identify the problem.
CO505.2	Develop the research hypothesis.
CO505.3	Summarise the requirements in the proposed research.
CO505.4	Take part in research experiments and documented.
CO505.5	Evaluate the work done by applying statistic tools.
CO505.6	Appraise societal application and appreciation.



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Cherukupally (V), Bhogapuram Mandal
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DEPARTMENT OF PHARMACY

Program : M Pharmacy Pharmaceutics / Pharmaceutical Technology

Regulation : PCI (R16)

No. of Courses : 14

COURSE OUTCOMES

I – I Sem	Course: Modern Pharmaceutical Analytical Techniques (MPH101T)
CO101.1	Recall principle, operation and applications of selected instrumental spectroscopic, chromatographic analysis.
CO101.2	Gain knowledge on interpretation of NMR spectra for determination of molecular structure of compounds.
CO101.3	Build the analytical understanding in the level of ion, atom, group and molecular structure of organic and inorganic compounds with different functional groups by Mass spectroscopy and their applications in pharmacy.
CO101.4	Understand the concept of separation and identification of compounds by chromatographic techniques.
CO101.5	Categorize different anions and cations by using suitable electrophoresis techniques.
CO101.6	Elaborate principle, theory and instruments employed for the analysis of drugs by thermal techniques.
I – I Sem	Course: Drug Delivery Systems (MPH102T)
CO102.1	Gain basic knowledge on sustained release, controlled release, polymer science and personalized medicine.
CO102.2	Summarize the various approaches for development of novel drug delivery systems.
CO102.3	Remember the development of formulations of gastro retentive drug delivery systems.
CO102.4	Understand the formulation and evaluation of Ocular drug delivery systems.
CO102.5	Summarize the formulation and evaluation of Transdermal drug delivery systems.
CO102.6	Elaborate formulation of protein delivery and evaluate the formulated vaccine drug delivery systems.
I – I Sem	Course: Modern Pharmaceutics (MPH103T)
CO103.1	Illustrate the elements of preformulation studies, optimization techniques and its applications in formulation development.
CO103.2	Develop validation and calibration master plan as per regulatory guidelines.
CO103.3	Understand the Industrial Management and GMP Considerations for the manufacturing of pharmaceuticals.
CO103.4	Know the methods of production management in industries.
CO103.5	Analyze the effects of compression and compaction in production of tablets.
CO103.6	Compile the consolidation parameters to determine the stability of a dosage form.
I – I Sem	Course: Regulatory Affairs (MPH104T)
CO104.1	Recall Documentation procedure in Pharmaceutical industry for drug approval process.





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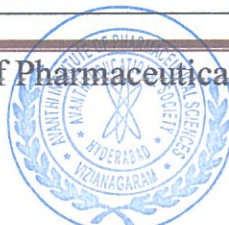
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CO104.2	Understand the concepts of Regulatory guidance's and guidelines for filing and approval process of drugs.
CO104.3	Summarize the process of Submission of global documents in CTD/ eCTD formats.
CO104.4	Understand Post approval regulatory requirements for actives and drug products.
CO104.5	Recall Pharmacovigilence studies and process of monitoring in clinical trials.
CO104.6	Understand the guidelines and requirements for approvals for conducting clinical trials.
I – I Sem Course: Pharmaceutics Practical- I (MPH105PA)	
CO105.1	Identify the concentration of test compounds using HPLC, UV, GC, fluorimetry and flame photometry.
CO105.2	Estimate the amount of drug by different analytical techniques.
CO105.3	Perform In-vitro dissolution profile of CR marketed formulations.
CO105.4	Perform In-vitro dissolution profile of CR marketed formulations.
I – I Sem Course: Pharmaceutics Practical – II (MPH105PB)	
CO106.1	Formulate and evaluate different types of tablets by different manufacturing techniques.
CO106.2	Carry out preformulation studies of tablets, Powders.
CO106.3	Study Micromeritic properties of powders and granulation.
CO106.4	Study the effect of formulative additives on dissolution of tablets.
I – II Sem Course: Molecular Pharmaceutics (Nano Technology & Targeted DDS (MPH201T)	
CO201.1	Recall the techniques involved in design of Targeted Drug Delivery Systems.
CO201.2	Outline the principles of preparation and evaluation of Nanoparticles and Liposomes.
CO201.3	Understand the preparation, mechanism of drug release from microspheres and microcapsules. .
CO201.4	Understand the preparation and application of Niosomes, Aquasomes, Phytosomes, Electrosomes.
CO201.5	Assess the mechanism of drugs through Pulmonary Drug Delivery Systems.
CO201.6	Elaborate the role of Nucleic acid based therapeutic delivery systems in personalized medicine.
I – II Sem Course: Advanced Biopharmaceutics & Pharmacokinetics (MPH202T)	
CO202.1	Appreciate the importance of Drug Absorption from the Gastrointestinal Tract.
CO202.2	Illustrate factors affecting the drug absorption from GIT.
CO202.3	Outline Biopharmaceutic considerations in drug product design.
CO202.4	Demonstrate the pharmacokinetic models for the interpretation of ADME Parameters.

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CO202.5	Analyze Drug Product Performance through Bioavailability and Bioequivalence studies.
CO202.6	Compile the importance and applications of Pharmacokinetics in various products.
I – II Sem Course: Computer Aided Drug Development (MPH203T)	
CO203.1	Understand the importance and applications of Computers in Pharmaceutical Research and Development.
CO203.2	Illustrate various stages of Quality-by-Design technique In Pharmaceutical Development.
CO203.3	Know the various approaches for Computational Modeling of Drug Disposition.
CO203.4	Summarize various softwares and modelling techniques for Computer-aided formulation development.
CO203.5	Assess the Computer-aided biopharmaceutical characterization for better therapeutic activity.
CO203.6	Appreciate the importance of the role of Artificial Intelligence (AI), Robotics and Computational fluid dynamics in drug product development.
I – II Sem Course: Formulation Development of Pharmaceutical and Cosmetic Products (MPH204T)	
CO204.1	Understand various Preformulation Studies for new drug substances.
CO204.2	Outline the various types of formulation Additives in product development.
CO204.3	Construct the documentation process of clinical trials. Detect new adverse drug reactions and their assessment.
CO204.4	Contrast the roles and responsibilities of Pharmacovigilance.
CO204.5	Appraise various methods of ADR reporting and tools used in Pharmacovigilance.
CO204.6	Predict principles and concepts of Pharmacoepidemiology, Pharmacoeconomics and Safety pharmacology.
I – II Sem Course: Pharmaceutics Practical - III (MPH205PA)	
CO205.1	Record the DRC of agonist using suitable isolated tissues preparation.
CO205.2	Evaluate the drug concentrations by various bioassay methods using isolated tissue preparations.
CO205.3	Study the effects of various drugs on isolated heart preparations.
CO205.4	Recording of rat BP, heart rate and ECG.
I – II Sem Course: Pharmaceutics Practical – IV (MPH205PB)	
CO206.1	Study the drug absorption studies by averted rat ileum preparation.
CO206.2	Study the acute oral and dermal toxicity studies as per OECD guidelines.
CO206.3	Design the clinical trail and ADR monitoring protocols.

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CO206.4	Interpret <i>in-silico</i> pharmacophore based screening and QSAR studies by using software.
II – I Sem	
Course: Research Methodology & Biostatistics (MRM301T)	
CO301.1	Recall the concepts of research methodology which includes study design, type of studies, stratifies and different design techniques.
CO301.2	Infer the data using biostatistics technique like “t” test, ANOVA and chi square tests as well as recognize the importance of samples size and its significances.
CO301.3	Learn the history of medical research for understanding the values of clinical ethics.
CO301.4	Appraise the importance of communication and sociological relationships in medical research.
CO301.5	Understand CPCSEA guidelines for laboratory animal facilities which include handling, maintenance, record keeping and transportation of lab animals.
CO301.6	Discuss the history and basic principles of Declaration of Helsinki for medical research.
II-II Sem	
Research Work	
CO401.1	Define the fundamentals, carry out the literature review on the proposed research work and identify the problem.
CO401.2	Develop the research hypothesis.
CO401.3	Summarise the requirements in the proposed research.
CO401.4	Take part in research experiments and documented.
CO401.5	Evaluate the work done by applying statistic tools.
CO401.6	Appraise societal application and appreciation.


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DEPARTMENT OF PHARMACY

Program : M Pharmacy (Pharmacology)

Regulation : PCI (R16)

No. of Courses : 14

COURSE OUTCOMES

I – I Sem	Course: Modern Pharmaceutical Analytical Techniques (MPL101T)
CO101.1	Recall principle, operation and applications of selected instrumental spectroscopic, chromatographic analysis.
CO101.2	Gain knowledge on interpretation of NMR spectra for determination of molecular structure of compounds.
CO101.3	Build the analytical understanding in the level of ion, atom, group and molecular structure of organic and inorganic compounds with different functional groups by Mass spectroscopy and their applications in pharmacy.
CO101.4	Understand the concept of separation and identification of compounds by chromatographic techniques.
CO101.5	Categorize different anions and cations by using suitable electrophoresis techniques.
CO101.6	Elaborate principle, theory and instruments employed for the analysis of drugs by thermal techniques.
I – I Sem	Course: Advanced Pharmacology - I (MPL102T)
CO102.1	Gain basic knowledge on pharmacokinetics and Pharmacodynamics modeling, parameters and its determination.
CO102.2	Summarize the mechanism and effects of neurotransmission and understand the pharmacology of Systemic and Autonomic Pharmacology.
CO102.3	Remember the pharmacology of drugs acting on Central nervous system.
CO102.4	Understand the pharmacology of neurodegenerative diseases.
CO102.5	Categorize the drugs acting on Cardiovascular system and understand its pharmacology.
CO102.6	Elaborate pharmacology of drugs used to treat allergic reactions.
I – I Sem	Course: Pharmacological and Toxicological Screening Methods – I (MPL103T)
CO103.1	Gain basic knowledge on rules and CPSCEA guidelines of handling laboratory animals. Understand the production of transgenic animals and GLP.
CO103.2	Outline General principles of <i>in-vivo</i> , <i>in-vitro</i> preclinical screening techniques for drugs acting on CNS and ANS.
CO103.3	Identify the newer screening methods for drug acting on respiratory, reproductive systems.
CO103.4	Investigate new screening methods for drugs acting on Gastro-intestinal system.
CO103.5	Understand the principles of <i>in-vivo</i> , <i>in-vitro</i> preclinical screening techniques for drugs acting on Cardiovascular system.
CO103.6	Understand General principles of preclinical screening techniques for Immunomodulators, Immunosuppressants. Outline general principles of immunoassay and extrapolation of in vitro/preclinical data to human.

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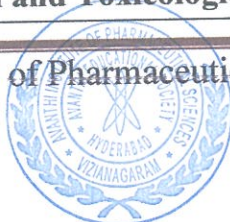
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I – I Sem	Course: Cellular and Molecular Pharmacology (MPL104T)
CO104.1	Understand the basic structure and functions of cell and genome in the living organisms. Summarize various phases of cell cycle, apoptosis, necrosis and autophagy.
CO104.2	Remember the pathways of cell signaling and know the importance of primary and secondary messengers.
CO104.3	Understand the principles and applications of genomic and proteomic tools.
CO104.4	Know the principles of rDNA technology and gene therapy.
CO104.5	Elaborate the significance of Pharmacogenomics and immunotherapeutics.
CO104.6	Design various cell culture techniques. Understand the applications of biosimilars.
I – I Sem	Course: Pharmacology Practical - I (MPL105PA)
CO105.1	Identify the concentration of test compounds using HPLC, UV, GC, fluorimetry and flame photometry.
CO105.2	Estimate the amount of drug by different analytical techniques.
CO105.3	Examine diuretic, antiulcer activities and to analyse Oral glucose tolerance test.
CO105.4	Evaluate various pharmacological activities by <i>in-vitro</i> or <i>in-vivo</i> methods.
I – I Sem	Course: Pharmacology Practical – II (MPL105PB)
CO106.1	Isolate and identify DNA, RNA from various tissues and estimate by using UV spectroscopy.
CO106.2	Estimate the amount of protein, cell damage process by different analytical techniques.
CO106.3	Examine pharmacokinetic studies of drugs by using softwares.
CO106.4	Extract drug from biological samples by using UV and HPLC.
I – II Sem	Course: Advanced Pharmacology - II (MPL201T)
CO201.1	Relate functions of hormones and to list out drugs acting on endocrine system.
CO201.2	Outline the principles of chemotherapy and illustrate the mechanism of action of antibiotics, Antifungal, antiviral, and anti-TB drugs .
CO201.3	Identify the chemotherapeutic agents for Protozoal and Helmenthetic infections.
CO201.4	Understand the chemotherapy of cancer, Immunosuppressants, Immunostimulants and pharmacotherapy of Asthma and COPD.
CO201.5	Assess the mechanism of drugs acting on GIT and applications of chronopharmacology to treat disorders.
CO201.6	Elaborate the role of free radicals in etiopathology of various diseases and adapt the recent advances in treatment of various diseases.
I – II Sem	Course: Pharmacological and Toxicological Screening Methods – II

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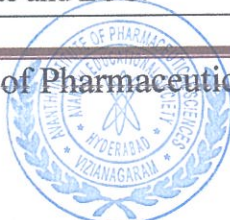


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	(MPL202T)
CO202.1	Appreciate the importance of ethical and regulatory guide lines for conducting toxicity studies.
CO202.2	Illustrate Acute, sub-acute and chronic- oral, dermal and inhalational toxicity studies as per OECD guidelines.
CO202.3	Construct reproductive toxicology, teratogenicity studies.
CO202.4	Demonstrate the practical skills to conduct Genotoxicity studies and Carcinogenicity studies.
CO202.5	Categorize IND enabling studies. Appraise the importance of Safety pharmacology.
CO202.6	Compile the importance and applications of Toxicokinetic studies and alternative methods to animal toxicity testing.
I – II Sem	Course: Principles of Drug Discovery (MPL203T)
CO203.1	Understand the various stages of drug discovery. Appreciate the importance of the role of genomics, proteomics and bioinformatics in drug discovery.
CO203.2	Illustrate various targets for drug discovery. Explain various lead seeking method and lead optimization.
CO203.3	Know the various approaches for rational drug design.
CO203.4	Summarize various virtual screening techniques for lead discovery.
CO203.5	Assess the molecular docking studies for drug discovery.
CO203.6	Appreciate the importance of the role of computer aided drug design in drug discovery.
I – II Sem	Course: Clinical Research and Pharmacovigilance (MPL204T)
CO204.1	Understand various regulatory requirements for conducting clinical trials.
CO204.2	Demonstrate the types of clinical trial designs and Explain the responsibilities of key players involved in clinical trials.
CO204.3	Construct the documentation process of clinical trials. Detect new adverse drug reactions and their assessment.
CO204.4	Contrast the roles and responsibilities of Pharmacovigilance.
CO204.5	Appraise various methods of ADR reporting and tools used in Pharmacovigilance.
CO204.6	Predict principles and concepts of Pharmacoepidemiology, Pharmacoconomics and Safety pharmacology.
I – II Sem	Course: Pharmacology Practical – III (MPL205PA)
CO205.1	Record the DRC of agonist using suitable isolated tissues preparation.
CO205.2	Evaluate the drug concentrations by various bioassay methods using isolated tissue preparations.
CO205.3	Study the effects of various drugs on isolated heart preparations.
CO205.4	Recording of rat BP, heart rate and ECG.





I – II Sem	Course: Pharmacology Practical - IV (MPL205PB)
CO206.1	Study the drug absorption studies by averted rat ileum preparation.
CO206.2	Study the acute oral and dermal toxicity studies as per OECD guidelines.
CO206.3	Design the clinical trail and ADR monitoring protocols.
CO206.4	Interpret <i>in-silico</i> pharmacophore based screening and QSAR studies by using software.
II – I Sem	Course: Research Methodology & Biostatistics (MRM301T)
CO301.1	Recall the concepts of research methodology which includes study design, type of studies, stratifies and different design techniques.
CO301.2	Infer the data using biostatistics technique like “t” test, ANOVA and chi square tests as well as recognize the importance of samples size and its significances.
CO301.3	Learn the history of medical research for understanding the values of clinical ethics.
CO301.4	Appraise the importance of communication and sociological relationships in medical research.
CO301.5	Understand CPCSEA guidelines for laboratory animal facilities which include handling, maintenance, record keeping and transportation of lab animals.
CO301.6	Discuss the history and basic principles of Declaration of Helsinki for medical research.
II-II Sem	Research Work
CO401.1	Define the fundamentals, carry out the literature review on the proposed research work and identify the problem.
CO401.2	Develop the research hypothesis.
CO401.3	Summarise the requirements in the proposed research.
CO401.4	Take part in research experiments and documented.
CO401.5	Evaluate the work done by applying statistic tools.
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DEPARTMENT OF PHARMACY

Program : M Pharmacy (Pharmaceutical Analysis)

Regulation : PCI (R16)

No. of Courses : 14

COURSE OUTCOMES

I – I Sem	Course: Modern Pharmaceutical Analytical Techniques (MPA101T)
CO101.1	Recall principle, operation and applications of selected instrumental spectroscopic, chromatographic analysis.
CO101.2	Gain knowledge on interpretation of NMR spectra for determination of molecular structure of compounds.
CO101.3	Build the analytical understanding in the level of ion, atom, group and molecular structure of organic and inorganic compounds with different functional groups by Mass spectroscopy and their applications in pharmacy.
CO101.4	Understand the concept of separation and identification of compounds by chromatographic techniques.
CO101.5	Categorize different anions and cations by using suitable electrophoresis techniques.
CO101.6	Elaborate principle, theory and instruments employed for the analysis of drugs by thermal techniques.
I – I Sem	Course: Advanced Pharmaceutical Analysis (MPA102T)
CO102.1	Gain basic knowledge on Impurities in new drug products and residual solvents. Analyze the stability studies of products.
CO102.2	Describe the potential sources for elemental impurities. Summarize the protocols for conducting stability testing of drug substances and products.
CO102.3	Analyze the identification and quantification of Impurity profiling and degradant characterization.
CO102.4	Understand the basic principles of Stability testing of phytopharmaceuticals.
CO102.5	Summarize the Principles and Procedures involved in Biological tests and assays of Vaccines, Hormones and Blood Products.
CO102.6	Elaborate principle, instrumentation and applications of various types of Immunoassays in Pharmaceutical Field.
I – I Sem	Course: Pharmaceutical Validation (MPA103T)
CO103.1	Illustrate the importance of Qualification and Validation of instruments and equipments.
CO103.2	Outline the process of Qualification of analytical instruments.
CO103.3	Understand the methods of Validation of Utility systems.
CO103.4	Know the methods of cleaning validation.
CO103.5	Outline ICH and USP guidelines of Analytical method validation. Enlighten the significance of usage of Computerized system validation.
CO103.6	Compile the General Principles, role and responsibilities of Intellectual Property.

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I – I Sem	Course: Food Analysis (MPA104T)
CO104.1	Understand the concepts of classification, properties, analysis and applications of food carbohydrates and Proteins.
CO104.2	Understand the concepts of classification, properties, analysis and applications of food Lipids and Vitamins.
CO104.3	Outline the applications and applications of Food additives.
CO104.4	Summarize the importance of Pigments and synthetic dyes in food preparations and know the principles of analysis.
CO104.5	Identify the purity of milk, milk constituents and milk products by various Analytical techniques.
CO104.6	Understand the concepts of Pesticide analysis. Acquire basic knowledge on food regulations and legislations.
I – I Sem	Course: Pharmaceutical Analysis Practical - I (MPA105PA)
CO105.1	Able to perform the calibration of Glassware and Instruments.
CO105.2	Estimate the amount of Impurity for the given drugs.
CO105.3	Examine the purity of official compounds by instrumental techniques and different titrations.
CO105.4	Identify the Quantitative determination of functional groups and drugs by using different reagents.
I – I Sem	Course: Pharmaceutical Analysis Practical – II (MPA105PB)
CO106.1	Estimate the drug content by using UV spectroscopy, GC and HPLC.
CO106.2	Able to determine Carbohydrate, Protein, Vitamin and Lipid content in food products.
CO106.3	Determine preservatives, pesticide residue in food products.
CO106.4	Analysis of vitamin content in food products
I – II Sem	Course: Advanced Pharmaceutical Analysis - II (MPA201T)
CO201.1	Recall principle, operation and applications of HPLC.
CO201.2	Gain knowledge on Biochromatography for the separation of compounds.
CO201.3	Understand the concept of separation and identification of compounds by Gas chromatographic techniques.
CO201.4	Elaborate the Principles, instrumentation, pharmaceutical applications of Supercritical fluid chromatography
CO201.5	Build the analytical understanding in the level of ion, atom, group and molecular structure of organic and inorganic compounds with different functional groups by Mass spectroscopy and their applications in pharmacy.
CO201.6	Elaborate principle, theory and instruments employed for the analysis of drugs by NMR Spectroscopy.
I – II Sem	Course: Modern Bio-Analytical Techniques (MPA202T)
CO202.1	Appreciate the importance of Extraction of drugs and metabolites from biological matrices.

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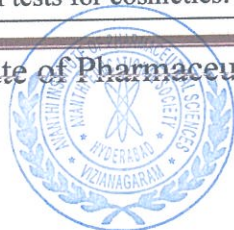
AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by A.I.C.T.E, P.C.I, New Delhi, Recognized by the Govt. OF A.P. & Affiliated to JNTUGV, Vizianagaram)
Cherukupally (Village), Chittivalasa (SO), Bhogapuram (Mandal), Vizianagaram (Dist) -531162.

www.avanthipharma.ac.in, principal@avanthipharma.ac.in

CO202.2	Illustrate Biopharmaceutical Factors Affecting Drug Bioavailability.
CO202.3	Understand drug interactions involved in the design of dosage regimen.
CO202.4	Understand the Importance and applications of toxicokinetic studies.
CO202.5	Understand various types of Cell culture techniques.
CO202.6	Compile the importance and applications of In Vivo Bioavailability and Bioequivalence studies.
I – II Sem Course: Quality Control And Quality Assurance (MPA203T)	
CO203.1	Understand the Concept and Evolution of Quality Control and Quality Assurance.
CO203.2	Remember cGMP guidelines according to schedule M.
CO203.3	Know the Analysis of raw materials, finished products, packaging materials, in process quality control.
CO203.4	Summarize Quality control test for containers, closures and secondary packing materials.
CO203.5	Assess the Documentation process in pharmaceutical industry.
CO203.6	Appreciate the importance of the role of Manufacturing operations and controls in product development.
I – II Sem Course: Herbal and Cosmetic Analysis (MPA204T)	
CO204.1	Determine herbal remedies and regulations.
CO204.2	Identify Adulterants and Deterioration products.
CO204.3	Demonstrate Testing of natural products and drugs.
CO204.4	Understand Analysis of natural products and monographs.
CO204.5	Appraise various methods of Herbal drug-drug interactions.
CO204.6	Predict principles and concepts of Evaluation of cosmetic products as per BSI.
I – II Sem Course: Pharmaceutical Analysis Practical - III (MPA205PA)	
CO205.1	Interpretation of organic compounds by FT-IR, NMR.
CO205.2	Determine purity by DSC in pharmaceuticals.
CO205.3	Study the Quantitative analysis of components by gel electrophoresis, HPLC.
CO205.4	Record Protocol preparation for the conduct of BA/BE studies according to guidelines.
I – II Sem Course: Pharmaceutical Analysis Practical - IV (MPA205PB)	
CO206.1	Perform Quality control tests for Primary and secondary packing materials.
CO206.2	Study the Preparation of Master Formula Record.
CO206.3	Determine of Quality control tests for cosmetics.

Avanthi Institute of Pharmaceutical Sciences **PRINCIPAL**



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ESTD : 2005

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CO206.4	Interpret Quantitative analysis of rancidity in lipsticks and hair oil.
II – I Sem	
Course: Research Methodology & Biostatistics (MRM301T)	
CO301.1	Recall the concepts of research methodology which includes study design, type of studies, stratifies and different design techniques.
CO301.2	Infer the data using biostatistics technique like “t” test, ANOVA and chi square tests as well as recognize the importance of samples size and its significances.
CO301.3	Learn the history of medical research for understanding the values of clinical ethics.
CO301.4	Appraise the importance of communication and sociological relationships in medical research.
CO301.5	Understand CPCSEA guidelines for laboratory animal facilities which include handling, maintenance, record keeping and transportation of lab animals.
CO301.6	Discuss the history and basic principles of Declaration of Helsinki for medical research.
II-II Sem	
Research Work	
CO401.1	Define the fundamentals, carry out the literature review on the proposed research work and identify the problem.
CO401.2	Develop the research hypothesis.
CO401.3	Summarise the requirements in the proposed research.
CO401.4	Take part in research experiments and documented.
CO401.5	Evaluate the work done by applying statistic tools.
CO401.6	Appraise societal application and appreciation.


Principal

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