

M.S Ramaiah University of Applied Sciences

New BEL Road, MSR Nagar, Bangalore – 560054



**RAMAIAH
UNIVERSITY**
OF APPLIED SCIENCES

PO, PSO, PEO & CO

Programme: M. Pharm in Pharmaceutical Chemistry

Programme Code: 057

Programme Outcome (PO)

Programme Specific Outcome (PSO)

Programme Educational Objectives (PEO)

Course Outcomes (CO)

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Faculty of Pharmacy

M.S. Ramaiah University of Applied Sciences
Bangalore-560054

Registrar

M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

Approved in 23rd ACM (Resolution 23.05) held on 15th July 2021

Faculty of Pharmacy (FPH)

Programme Name: M. Pharm Pharmaceutical Chemistry (Master of Pharmacy)

Programme Outcomes (POs)

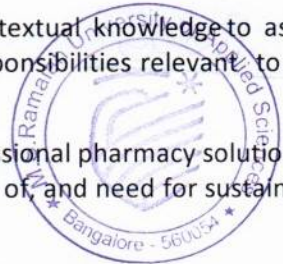
M. Pharm. graduates will be able to:

- 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 tool usage:** 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 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. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- PO-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 society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
- PO-10. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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


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Programme Specific Outcomes (PSOs)

At the end of the M. Pharm program in Pharmaceutical Chemistry, the graduate will be able to:

- PSO-1. Apply the knowledge to ensure the quality of drugs and pharmaceuticals by using various modern techniques to develop innovative and safe solutions to real-world problems
- PSO-2. Adapt to various advancements in synthesis of various drug molecules, summarize the concepts of QSAR and CADD and elucidate structures of natural products of medicinal interest
- PSO-3. Acquire the leadership qualities and strive for the betterment of organization, environment, and society
- PSO-4. Demonstrate an understanding of the importance of life-long learning through professional development, practical training, and specialized certifications

Programme Educational Objectives (PEOs)

The objectives of the M. Pharm Programme in Pharmaceutical Chemistry are to:

- PEO-1. Provide students with various advancements in pharmaceutical Chemistry to enable them to devise and deliver efficient solutions to challenging problems in Pharmacy and allied disciplines
- PEO-2. Impart analytic and cognitive skills required to develop innovative solutions for R&D, Industry, and societal requirements
- PEO-3. Provide sound knowledge of pharmacy, managerial and entrepreneurial skills to enable students to contribute to the well-being and welfare of the society
- PEO-4. Inculcate strong human values and social, interpersonal and leadership skills required for professional success in evolving global professional environments

Course Outcomes (COs)

Course Title & Code: Modern Pharmaceutical Analytical Techniques (Theory) (PCF501)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize the fundamental principles, theory, and applications of UV-visible and IR spectroscopy, fluorimetric analysis, flame emission and atomic absorption spectroscopy
- CO-2. Theory, instrumentation and applications of NMR and Mass spectroscopy,
- CO-3. Explain the principles and applications of chromatographic, and electrophoretic separation techniques
- CO-4. Elaborate the principle and applications of potentiometric methods, X-ray crystallographic methods and thermo-analytical methods
- CO-5. Discuss the instrumentation of the various modern analytical techniques



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Course Outcomes (COs)

Course Title & Code: Advanced Organic Chemistry-I (Theory) (PCC502)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize the formation, reactivity, stability and applications of various organic reactions and reaction intermediates
- CO-2. Explain the mechanisms involved and applications of selected name reactions
- CO-3. Appraise the constitution and utility of chosen synthetic reagents
- CO-4. Discuss the synthesis of representative drugs containing heterocyclic nucleuses
- CO-5. Analyze the principles, guidelines of synthon approach and retro-synthesis
- CO-6. Design and strategize the synthesis of specific organic compounds along with mechanism, reactivity, stability and possible applications

Course Outcomes (COs)

Course Title & Code: Advanced Medicinal Chemistry (Theory) (PCC503)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize the different stages of drug discovery
- CO-2. Outline the concepts of drug development like stereochemistry, enzyme inhibitors, prodrugs and analogue design, combating multidrug resistance
- CO-3. Discuss the medicinal chemistry aspects of drugs acting on CNS and CVS
- CO-4. Discuss the chemistry, MOA, Synthesis and SAR of new generation molecules of anticancer and antiviral agents
- CO-5. Recognize the design strategies and therapeutic potential of peptidomimetics
- CO-6. Develop strategies for design and development of new drug molecules

Course Outcomes (COs)

Course Title & Code: Chemistry of Natural Products (Theory) (PCC504)

After the successful completion of this course, the student will be able to:

- CO-1. Analyze the importance of natural compounds as lead molecules for new drug discovery
- CO-2. Discuss the different types of natural compounds and their chemistry with emphasis on their medicinal importance
- CO-3. Illustrate chemical methods for structural elucidation of compounds from natural origin
- CO-4. Summarize the isolation, purification and characterization methods of active phytoconstituents from natural source
- CO-5. Compile the recent trends and advances/development in chemistry of natural products
- CO-6. Develop the concept of rDNA technology tool for new drug discovery


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Course Outcomes (COs)

Course Title & Code: Pharmaceutical Chemistry practical- I (Practical) (PCL505)

After the successful completion of this course, the student will be able to:

- CO-1. Apply various instrumental analytical techniques to analyse pharmaceutical substances.
- CO-2. Apply the concepts of organic reactions for the synthesis of medically important compounds.
- CO-3. Select proper method of isolation of natural products and degradation of the same
- CO-4. Analyse organic compounds and characterize the same with different physical and chemical parameters.
- CO-5. Propose different purification methods for synthesized or isolated compounds.

Course Outcomes (COs)

Course Title & Code: Seminar/Assignment (PCS506)

After the successful completion of this course, the student will be able to:

- CO-1. Develop critical thinking, analytical thinking and problem-solving skills
- CO-2. Demonstrate the ability to synthesise the report
- CO-3. Develop academic report with appropriate citation and referencing style
- CO-4. Communicate the contents of the report to the panel
- CO-5. Defend the contents of the report in the panel

Course Outcomes (COs)

Course Title & Code: Advanced Spectral Analysis (Theory) (PCC507)

After the successful completion of this course, the student will be able to:


- CO-1. Explain the role of various spectroscopic techniques including UV-Visible and Infra-red spectroscopy in interpretation of organic compounds
- CO-2. Summarize the principle and applications of thermal analysis, Raman spectroscopy and immunoassays
- CO-3. Apply advanced instrumentation techniques of mass spectroscopy and NMR in interpretation of organic compounds
- CO-4. Compare the fundamental principle, instrumentation and applications of different chromatographic methods in pharmaceutical analysis
- CO-5. Interpret the various spectra such as IR, Mass and NMR to identify an organic compound
- CO-6. Discuss the importance of hyphenated instrumental techniques in pharmaceutical analysis

Course Outcomes (COs)

Course Title & Code: Advanced Organic Chemistry-II (Theory) (PCC508)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize the concepts and strategies of peptide synthesis
- CO-2. Analyze various techniques of green chemistry and its applications in organicsynthesis
- CO-3. Appraise the different types of catalysis and their applications in organic reactions


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- CO-4. Explain the principles of photochemical and pericyclic reactions
- CO-5. Discuss the concepts of stereochemistry and its applications in organic reactions
- CO-6. Discuss the trends and advances in organic synthesis and their applications in drug discovery

Course Outcomes (COs)

Course Title & Code: Computer Aided Drug Design (Theory) (PCC509)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize the different Computer Aided Drug Design (CADD) techniques and their applications
- CO-2. Outline the objectives of QSAR, molecular modeling and virtual screening methods
- CO-3. Discuss the methodology for QSAR studies and concepts of molecular modeling
- CO-4. Determine physico-chemical parameter values for drug molecules
- CO-5. Analyze the in silico virtual screening protocols
- CO-6. Develop strategies for design and development of new drug molecules

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Process Chemistry (Theory) (PCC510)

After the successful completion of this course, the student will be able to:

- CO-1. Discuss the methods for synthesis of APIs and scale up of processes for large scale production
- CO-2. Compose different types of unit operations applied in the manufacturing and purification of APIs
- CO-3. Develop the chemical processes for pharmaceutical manufacturing
- CO-4. Apply procedures like reduction, fermentation for the production of important drugs and antibiotics
- CO-5. Recommend safety measures for the management of industrial hazards in the pharmaceutical industry
- CO-6. Design strategies for manufacturing of APIs on large scale in industry in a safe and cost-effective manner

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Chemistry Practical -II (Practical) (PCL511)

After the successful completion of this course, the student will be able to:

- CO-1. Synthesize drug molecules or intermediates by applying different synthetic route
- CO-2. Deduce the structure of organic compounds by interpretation of UV, IR, NMR and Mass Spectral data
- CO-3. Design new drug like molecules by molecular modeling and docking studies
- CO-4. Predict the ADMET properties of new compounds and generate QSAR equations



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Course Outcomes (COs)

Course Title & Code: Seminar/Assignment (PCS512)

After the successful completion of this course, the student will be able to:

- CO-1. Develop critical thinking, analytical thinking and problem-solving skills
- CO-2. Demonstrate the ability to synthesise the report
- CO-3. Develop academic report with appropriate citation and referencing style
- CO-4. Communicate the contents of the report to the panel
- CO-5. Defend the contents of the report in the panel

Course Outcomes (COs)

Course Title & Code: Research Methodology and Biostatistics (PCF613)

After the successful completion of this course, the student will be able to:

- CO-1. Recognize the value, scope, objective and requirements of research
- CO-2. Discuss the basic concept and importance of statistical analysis
- CO-3. Outline the basic principles of medical research
- CO-4. Summarize the guidelines for the maintenance of laboratory animals
- CO-5. Perform the profession of Pharmacy with code of conduct and ethics
- CO-6. Apply the principles of medical research for the development of knowledge in the field of medicine

Course Outcomes (COs)

Course Title & Code: Journal Club (PCF614)

After the successful completion of this course, the student will be able to:

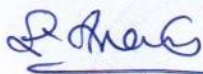
- CO-1. Select scientific articles from reputed journals
- CO-2. Use search engines to select scientific articles
- CO-3. Critically appraise scientific articles and assess the quality
- CO-4. Develop a report on the critically appraised article
- CO-5. Present the critically appraised article in appropriate forum

Course Outcomes (COs)

Course Title & Code: Group Project (PCF615)

After the successful completion of this course, the student will be able to:

- CO-1. Work in a team and undertake a project in the area of Pharmaceutical Sciences
- CO-2. Apply concepts of pharmaceutical sciences for executing the project
- CO-3. Apply appropriate research methodology while formulating a project
- CO-4. Generate specifications, synthesize, analyse, develop and evaluate a project
- CO-5. Defend the project, exhibit, make a presentation and document the work



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Course Outcomes (COs)

Course Title & Code: Discussion / Synopsis Presentation (PCF616)

After the successful completion of this course, the student will be able to:

- CO-1. Identify Research problem
- CO-2. Discuss research problem with team and peers for solution
- CO-3. Develop a protocol report on the critically appraised research problem
- CO-4. Present the critically appraised research problem in appropriate forum

Course Outcomes (COs)

Course Title & Code: Research Work (PCF617)

After the successful completion of this course, the student will be able to:

- CO-1. Review scholarly literature collected from various sources critically for the project and formulate a research problem
- CO-2. Prepare and present a research proposal
- CO-3. Conduct research to achieve research objectives
- CO-4. Propose new ideas/ methodologies or procedures for further improvement of the research problem
- CO-5. Create research document of the findings
- CO-6. Defend the research findings in front of scholarly audience

Course Outcomes (COs)

Course Title & Code: Journal Club (PCF618)

After the successful completion of this course, the student will be able to:

- CO-1. Select scientific articles from reputed journals
- CO-2. Use search engines to select scientific articles
- CO-3. Critically appraise scientific articles and assess the quality
- CO-4. Develop a report on the critically appraised article
- CO-5. Present the critically appraised article in appropriate forum

Course Outcomes (COs)

Course Title & Code: Discussion / Presentation (PCF619)

After the successful completion of this course, the student will be able to:

- CO-1. Identify the research problem
- CO-2. Discuss research problem with team and peers for solution
- CO-3. Develop a protocol report on the critically appraised research problem
- CO-4. Present the critically appraised research problem in appropriate forum


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Course Outcomes (COs)

Course Title & Code: Research Work (PCF620)

After the successful completion of this course, the student will be able to:

- CO-1. Review scholarly literature collected from various sources critically for the project and formulate a research problem
- CO-2. Prepare and present a research proposal
- CO-3. Conduct research to achieve research objectives
- CO-4. Propose new ideas/ methodologies or procedures for further improvement of the research problem
- CO-5. Create research document of the findings
- CO-6. Defend the research findings in front of scholarly audience

Course Outcomes (COs)

Course Title & Code: Participation/ Presentation in Research Forum (PCF621)

After the successful completion of this course, the student will be able to:

- CO-1. Identify a suitable conference /research forum/workshop/symposium for participation/presentation
- CO-2. Participation in a conference/research forum/workshop/symposium of the chosen research domain
- CO-3. Present a research work in the conference/research forum of the chosen research domain

Course Outcomes (COs)

Course Title & Code: Publication: National/ International (PCF622)

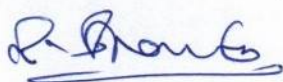
After the successful completion of this course, the student will be able to:

- CO-1. Write a research paper based on research and journal requirements
- CO-2. Publish the research work manuscript in a reputed journal

Course Outcomes (COs)

Course Title & Code: Academic/Research Award (PCF623)

- CO-1. Synthesize the academic accomplishments /research findings in the form of report
- CO-2. Identify an appropriate award granting agency to submit the report
- CO-3. Develop required documents applicable to submit the academic accomplishment / research report



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