

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 Pharmacology

Programme Code: 059

Programme Outcome (PO)

Programme Specific Outcome (PSO)

Programme Educational Objectives (PEO)

Course Outcomes (CO)

Dean

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 Pharmacology (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.

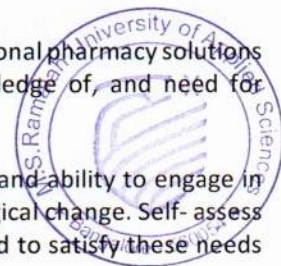
PO-11. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing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


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Programme Specific Outcomes (PSOs)

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

- PSO-1. Apply knowledge of recent advances in Pharmacology and Pharmacotherapy along with principles of molecular pharmacology in drug discovery process
- PSO-2. Justify the rationale for the usage of animal models with appropriate pharmacological techniques and validate various methods for identification and optimization of lead molecules by considering regulatory requirements
- PSO-3. Develop novel pharmacological screening methods by employing molecular modelling and virtual screening methods as alternatives for animal models with the capability to develop interpreted technical reports on drug responses
- PSO-4. Understand the significance of Life-long Learning philosophy with leadership qualities for the betterment of environment and society

Program Educational Objectives (PEOs)

The objectives of the M. Pharm program in Pharmacology are to:


- PEO-1. Uphold all laws, regulations, safety and ethical standards that apply to the experimental procedures in animals and the environment
- PEO-2. Impart adequate hands-on training with various animal models and determine the toxicological and pharmacological effects of drugs using appropriate models
- PEO-3. Provide practical knowledge in various analytical techniques used in molecular biology and screening of formulations in animals to establish *in-vitro* and *in-vivo* correlations in drug discovery process
- PEO-4. Train the students in using suitable statistical methods for interpretation of results and prepare the students for teamwork and lifelong learning for the betterment of mankind

Course Outcomes (COs)

Course Title & Code: Modern Pharmaceutical Analytical Techniques (Theory) (PLF510)

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 Pharmacology – I (Theory) (PLC502)

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

- CO-1. Outline the steps involved in neuro-humoral transmission
- CO-2. Explain the pharmacokinetics and mechanism of drug action at organ system/cellular/molecular levels
- CO-3. Summarize the pharmacology of drugs acting on various systems
- CO-4. Appraise the pathophysiology and pharmacotherapy of certain diseases
- CO-5. Predict adverse drug reactions and drug interactions
- CO-6. Discuss on the recent advances in Pharmacology and Pharmacotherapy

Course Outcomes (COs)

Course Title & Code: Pharmacological and Toxicological Screening Methods – I (Theory) (PLC503)

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

- CO-1. Summarize the good laboratory practices in maintenance and handling of experimental animals
- CO-2. Appraise the regulations and ethical requirements for the usage of experimental animals
- CO-3. Identify alternatives to animal experiments
- CO-4. Justify the screening methods used in drug development
- CO-5. Relate preclinical data to humans
- CO-6. Recommend appropriate preclinical models for evaluation of new drugs

Course Outcomes (COs)

Course Title & Code: Cellular and Molecular Pharmacology (Theory) (PLC504)

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

- CO-1. Outline the receptor signal transduction processes and molecular pathways affected by drugs
- CO-2. Demonstrate various molecular biology techniques
- CO-3. Appraise the principles of pharmacogenomics and their applications
- CO-4. Relate the applicability of molecular pharmacology and biomarkers in drug discovery process
- CO-5. Discuss the mechanism of gene expression and gene therapy
- CO-6. Apply the concepts of molecular biology to discover new therapeutic options

Course Outcomes (COs)

Course Title & Code: Pharmacology Practical - I (PLL505)

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

- CO-1. Analyze drugs using various instrumental techniques
- CO-2. Demonstrate various routes of drug administration
- CO-3. Evaluate drug action by in vitro and in vivo methods
- CO-4. Estimate DNA and RNA from different sources
- CO-5. Perform molecular biology techniques as applicable for Pharmacology



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Course Outcomes (COs)

Course Title & Code: Seminar/Assignment (PLS506)

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 synthesize 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 Pharmacology – II (Theory) (PLC507)

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

- CO-1. Describe the pharmacology of drugs acting on various systems
- CO-2. Outline the pathophysiology and pharmacotherapy of certain diseases
- CO-3. Predict adverse drug reactions and drug interactions
- CO-4. Appraise the applications of chronotherapy in various diseases
- CO-5. Signify the role of free radicals in the pathogenesis of several diseases
- CO-6. Discuss on the recent advances in Pharmacology and Pharmacotherapy

Course Outcomes (COs)

Course Title & Code: Pharmacological and Toxicological Screening Methods – II (Theory) (PLC508)

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

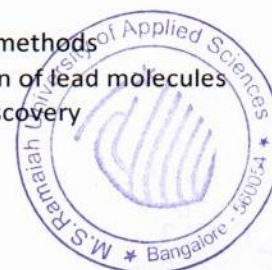
- CO-1. List the studies needed for IND submission
- CO-2. Illustrate various types of toxicity studies
- CO-3. Demonstrate the practical skills required to conduct the preclinical toxicity studies
- CO-4. Point out the importance of ethical and regulatory requirements for toxicity studies
- CO-5. Identify alternatives to animal experiments
- CO-6. Recommend appropriate preclinical models for evaluation of new drugs

Course Outcomes (COs)

Course Title & Code: Principles of Drug Discovery (Theory) (PLC509)

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

- CO-1. Outline the various stages of drug discovery
- CO-2. Summarize the importance of genomics, proteomics and bioinformatics in drug discovery
- CO-3. Discuss the general sequence of rational drug design
- CO-4. Demonstrate QSAR, molecular modelling and virtual screening methods
- CO-5. Evaluate the various methods for identification and optimization of lead molecules
- CO-6. Demonstrate the role of computer aided drug design in drug discovery



Course Outcomes (COs)

Course Title & Code: Clinical Research and Pharmacovigilance (Theory) (PLC510)

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

- CO-1. Appraise the regulatory requirements for conducting clinical trial
- CO-2. Outline the types of clinical trial designs
- CO-3. Point out the responsibilities of key players involved in clinical trials
- CO-4. Summarize the significance of safety monitoring and establishment of pharmacovigilance
- CO-5. Conduct safety monitoring, reporting and close-out activities
- CO-6. Apply the concepts of clinical research

Course Outcomes (COs)

Course Title & Code: Pharmacology Practical – II (PLL511)

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

- CO-1. Acquire knowledge in In-silico docking and QSAR studies
- CO-2. Record vital parameters of small experimental animals
- CO-3. Evaluate drug action using various isolated tissue preparations
- CO-4. Conduct toxicity studies following regulatory guidelines
- CO-5. Design protocols for clinical trials and ADR reporting

Course Outcomes (COs)

Course Title & Code: Seminar/Assignment (PLS512)

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 synthesize 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 (Theory) (PLF613)

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 (PLF614)

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 (PLF615)

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

Course Outcomes (COs)

Course Title & Code: Discussion / Synopsis Presentation (Theory) (PLF616)

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 (PLF617)

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


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Course Outcomes (COs)

Course Title & Code: Journal Club (PLF618)

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 (Theory) (PLF619)

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

Course Outcomes (COs)

Course Title & Code: Research Work (PLF620)

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

- CO-1. Prepare and present a research proposal
- CO-2. Conduct research to achieve research objectives
- CO-3. Propose new ideas/ methodologies or procedures for further improvement of the research problem
- CO-4. Create research document of the findings
- CO5. Defend the research findings in front of scholarly audience

Course Outcomes (COs)

Course Title & Code: Participation/ Presentation in Research Forum (PLF621)

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




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Course Outcomes (COs)

Course Title & Code: Publication: National/ International (PLF622)

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 (PLF623)

- 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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