بسم الله الرحمن الرحيم

Rawalpindi Medical University
Rawalpindi

PhD Program

Health Sciences (Pharmacology)

(2025)

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1. Introduction to Rawalpindi Medical University

1.1. RMU at a Glance

Rawalpindi Medical College (RMC) was established in Faisalabad on 18th March 1974 and later shifted to Rawalpindi on 5th November 1974 in an incomplete building at Tipu Road (Science block of Gordon College Rawalpindi), later handed over to RMC.

The founder principal of RMC, Prof. Abdul Latif, and his predicessors worked hard to establish the institution. Since 1974 more than 8600 students have graduated and are serving nationally and internationally. RMC was privileged to claim top positions in university examination several times. Best of the best graduate in UHS is also a Rawalian.

First Rawalian Principal, Prof. Mohammad Umar after taking over the office in 2013, started working on multi-dimensional approach to further develop the institution. Because of the untiring and dedicated efforts of Prof. Muhammad Umer, the Rawalpindi Medical College was upgraded to Rawalpindi Medical University recently by Government of Punjab, Health Department on 6th May 2017. Higher Education Commission has given NOC to RMU for post-graduate teachimg in many basic and clinical subjects.

Academic programs of the university are accredited by UHS, CPSP and PMDC. The university has got full recognition by General Medical Council UK, American specialty boards and internship programs with different universities abroad and WHO.

Rawalpindi Medical University has always occupied a unique position in the public sector, being one of the leading medical University in Pakistan. In 2021 and 2022, RMU was ranked first among medical universities of Pakistan by the Impact Times Higher Education (It is an international agency which gives ranking to universities). This achievement shows that RMU has become the fastest growing university of not only of Punjab but also of Pakistan.

Rawalpindi Medicl University serves as an extraordinary interface between health care provision and medical education; with the three allied hospitals bearing the brunt of the city's health care needs, medical and paramedical undergraduate courses that train the sharpest minds of the country, and diverse post-graduate training programs.

The institute has strived to be upgraded to the level of an independent University after which the annual system of MBBS degree has been changed to the internationally preferred modular system. Moreover, after the successful launching of MD/MS program by VC RMU we are struggling hard to get the M.Phil and Ph.D programs approved.

Campus and Attached Teaching Hospitals:
The University is divided in two campuses. Old teaching Block at Tipu Road campus & New Teaching Block at Holy family hospital (HFH). Besides HFH, Benazir Bhatto Hospital and District Head Quarter Hospital (Now named, Rawalpindi Teaching Hospital) are attached for teaching undergraduate and postgraduate students.

Societies:
The various societies of the university include; Rawalians Arts society, Rawalians sports society, Medicose Aid society, Rawalians literary society, Rawalians dramatic club, Rawalians student research society, Islamic society.

Magazine & Research Journals:
Shifa Magazine (Annual, Journal of Rawalpindi medical college (JRMC), Resident journal of Rawalpindi medical college (RJRMU), Journal of Rawalpindi medical college student supplement (JRMCs), Journal of Nursing and Allied health (JNAH). Student Journal (SJRMU) and Resident journal of Rawalpindi Medical University (RJRMU).

Office of Research, Innovation and Commercialisation (ORIC):
In 2019 the university opened the Office of Research, Innovation and Commercialisation as the focal point of all research related activities. The university's research focuses primarily on medical developments and improvements in the health sector. Students also contribute to the university's research projects and publish their work in SJRMU.

1.2. Mission, Vision and Values

Mission Statement

- To impart evidence-based research oriented medical education in the field of Pharmacology and associated Health Sciences.
- To cultivate a community of scholars dedicated to advancing knowledge in field of Pharmacology and related health Sciences through rigorous research, interdisciplinary collaboration, and innovation.
- To inculcate the values of mutual respect and ethical practice of medicine.
- To meet the requirements of Higher Education Commission (HEC) and Pakistan Medical and Dental Council (PM&DC) up to the level of satisfaction with accuracy & transparency.

Vision and Values:

- Looking forward for highly recognized and accredited center of excellence in Medical Education, using evidence based training techniques for development of highly competent health professionals.
- To overcome deficiency and enhance standards of faculty in the field of Health Sciences and Pharmacology by establishing Pharmacology Department of RMU.
- To make available highly qualified and skilled faculty Pharmacology and related Health Sciences, who can impart excellent medical education and participate in bringing up the standards of patient care.
- To upgrade the standard of undergraduate as well as graduate Medical and Dentistry teaching programs covering all aspects of the specialty of Pharmacology and allied Health Sciences and make these programs top ranking in Pakistan.
- To establish RMU as the Centre of Excellence in Pakistan for research in the field of Pharmacology and associated Health Sciences.

2. Introduction to PhD Program

2.1. Title

Doctor of Philosophy in Health Sciences (Pharmacology)

2.2. Starting PhD Health Sciences (Pharmacology) at RMU

PhD programs in any subject are designed to act as catalysts for original research to expand the frontiers of the existing body of knowledge in that subject. Award of PhD degree marks the successful culmination of an intellectual pursuit and recognition that it has contributed new knowledge to the benefit of humanity and society. Pursuing a doctoral degree requires a certain level of intellect, a great deal of dedication and sustained hard work.

Presently, very few medical institutions in Pakistan offer a PhD degree in Pharmacology and associated Health Sciences. Prof. Dr. Mohammad Umar, the worthy Vice Chancellor of RMU has taken bold steps to initiate PhD program in medical sciences, including Pharmacology. The program will not only produce doctoral-level Pharmacology educators for Academia but also give impetus to a high-quality research and scholarly work related to medical Sciences at RMU and beyond.

2.3. Scope of Pharmacology PhD Program

Pharmacology is an essential component of the clinical practice. Every physician after understanding the patient's problem and making the diagnosis has to write an appropriate prescription as an important element of patient management. Knowledge and skills in the field of basic and clinical Pharmacology enable medical graduates to practice medicine successfully and scientists to pursue a career in the discipline.

The knowledge how drugs can modify the pathological process of the patient illness and how they are being dealt in the human body is critical to prescribe most efficacious and suitable medicaments, least harmful to different body organs and systems, and yet very cost effective.

During the last few decades, with the advancements in Biomedical Sciences, particularly Immunology, Genetics and Biotechnology there has been an explosion of new medicines for the treatment various illnesses. To mention a few are immune-suppressants, genetherapy, stem cells and hormonal replacement therapies, such as human insulin, somatotropin and gonadotropins, etc.

Moreover, developments in the minimally invasive therapies, targeted to specific types of cells, tissues and organs, particularly the cancer cells, infections and autoimmune diseases, are worth mentioning. Furthermore, new techniques in research and treatment modalities, like Artificial Intelligence and Machine Learning in drug discovery, drug repurposing or repositioning, RNA-Interference (RNAi) Therapies, Monoclonal Antibodies (mAbs) Tyrosine Kinase Inhibitors (TKIs) and use of Nanoparticles for drug delivery have revolutionized the subject of Pharmacology.

As a result, the knowledge of Pharmacology and relevant medical sciences has become increasingly important, not only for the application in the patient car, but also for teaching and research. Therefore, there is a dire need to produce of highly qualified personnels who can adequately apply advanced knowledge in treatment of patients, teach undergraduate and graduates students and conduct top quality research in Pharmacology.

Ironically, at a time when knowledge of Pharmacology and Allied Health Sciences is becoming increasingly important, we are facing a crisis in Pharmacology education and an alarming shortage of experienced faculty members. Keeping in view the persistent demand from medical institutions and urgent need for experts in the field of Pharmacology, it is highly imperative to initiate PhD program in our university.

2.4. Aims/Objectives of PhD Program

Our aim is to train Post Graduates in the subject of Pharmacology, with excellent ability to teach undergraduate and post graduate medical students, conduct research and effectively carryout administrative jobs in the medical institutions, Pharmaceutical industry and the drug regulatory authorities at National, International and Regional levels.

At the completion of the required period of training, the PG-trainee should be able to:

- Prove competency and clarity of concepts in all basic and allied disciplines of Pharmacology.
- Teach, train and supervise post graduate students including M.Phil/MD/Ph.D.
- Develop Research proposals and conduct research in the field of Pharmacology.
- Teach, train and evaluate medical undergraduates and other health and allied professionals in Pharmacology.
- Develop, implement, manage and monitor programs of health care delivery systems.
- Pursue continuous and self-directed professional education to keep one's knowledge and skills updated and disseminate current knowledge.
- Discharge skills of leadership.

2.5. Goals of PhD Program

- To expedite the academic growth and development in undergraduate medical education by providing properly qualified and trained basic sciences teachers.
- To institutionalize research by producing more PhDs, particularly in the emerging fields of Pharmacology and allied Health Sciences.
- To crop better educated and trained health care professionals engaged as academician, researchers and field practitioners will revamp the health care delivery system and replenish the academia in the medical education set up.
- To improve health standards of the community in this underdeveloped region of the world, focus of research will be on regional medical issues.
- Trained human resource will successfully execute and streamline the operations of the Institute and will fill the vacuum in growing medical institutions and industry.
- Development of human resource, research and technology at RMU will ultimately help in the development of national economy.

2.6. Sites for Critical Appraisal for PhD Pharmacology

- Consultation for drug related problems in Tertiary Care Hospitals.
- Supervision of therapeutic drug monitoring services in Tertiary Care Hospitals.
- Quality assurance and drug analysis in Pharmaceutical industry.
- Determination of drug resistance and other causes of treatment failure.

2.7. Career Prospects/Job opportunities for PhD Pharmacology

- Post graduate medical teacher at medical universities.
- Undergraduate medical teacher in medical colleges.
- Academic Researcher, research supervisor in post-graduate medical institutes.
- Consultant in Pharmaceutical Industry, Clinical Pharmacology research officer Collaborating with healthcare professionals on research projects.
- Member Drug Registration Board, Ethical Review Board.
- Member/Chairperson of the drug registration/regulation authorities.
- Creating educational materials, textbooks, or scientific articles.
- Editing scientific journals by contributing in Editorial board of related journals.

2.8. Strengths of RMU PhD Pharmacology Program

- Both in country and foreign qualified faculty
- Highly experienced, energetic and Self motivated supervisors
- Excellent Teachers to Students ratio
- Transparent Admission, Registration and Recruitment policies

2.9. Weaknesses of RMU PhD Pharmacology Program

- Less than adequate research grants and funds needed to develop state of the art Pharmacology Laboratory.
- Updated Multipurpose Research lab with the availability of some latest equipment is required to improve research facilities for the students and faculty.

3. Admission Criteria for in PhD Pharmacology

3.1. Selection of candidates for admission

The selection of the scholars will be done according to desired outcomes, i.e. graduates of PhD Pharmacology and Allied shall have the attributes of a Subject specialist, Scientific Researcher, Educator, Effective Communicator and Collaborator. Selection of the scholars may be made after assessing the aptitude of the candidates for these roles.

3.2. Eligibility Criteria:

The applicant must possess MBBS/BDS or Pharm -D with M.Phil/MS/MD/MDS/FCPS-II or Equivalent Qualification (18 Years of Education).

In Addition

i. The minimum GPA should be 3.00 or 70% in M.Phil or FCPS or equivalent degree in Pharmacology/Biochemistry/Physiotherapy
ii. If applicant is a government servant, he/she needs to produce N.O.C., from the concerned department along with the study leave, where required.
iii. The candidates must get 70% marks in the subbject of Pharmacology in the university-based test for admission in PhD.
iv. Those candidates already passed GAT Subject with minimum 60% marks or having valid GRE-Subject Test (with minimum 60 percentile score) will be exempted from RMU entry test.
v. Candidates having teaching/research experience in relevant fields shall be preferred.

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3.3. Admission Process

An initial advertisement will be announced according to available slots with each potential supervisor in the Department according to the HEC rules. After an initial advertisement by the University for launching the PhD program for Health Sciences (Pharmacology), applications will be invited based on the Eligibility criteria.

- Application for admission to the PhD is made on the official application form available at RMU website (rmu.edu.pk) along with required documents.
- The required documents together with a hard copy of the duly filled in/complete admission application form along with receipt of application processing fee shall be sent through registered post or courier to the RMU Admission Office.
- Applicants will submit a “statement of Purpose” or a research proposal, along with their academic/research publications and information about their previous research & teaching experiences.
- Entry test will be conducted by the university
- The candidates in government service shall furnish no objection certificates from their competent departmental authorities for the educational activity being applied for .
- Applicant will submit valid certificate of permanent or provisional registration with Pakistan Medical & Dental Council.

- The Admission Office shall thoroughly scrutinize all the applications received for admission, shall issue written entry test date, conduct the exam and shortlist the candidates, issue /interview schedule indicating venue and date to every short-listed candidate and coordinate with the Controller of Examinations for timely smooth conduct of the scheduled interviews through the Admission Committee.
- All those cases will never be entertained to apply for admission whose registration or admission in RMU has been earlier cancelled due to any disciplinary reasons.
- No objection certificate from HEC shall be mandatory in case of foreign students. A TOEFL score of 500 or IELTS score of 5.50 as well is required.
- The foreign students under international student exchange programs may be enrolled/ admitted, subject to prior approval from the Vice Chancellor for any single or more semester(s) or course(s) subject to such conditions as may be agreed by the competent authorities under the relevant exchange programs.
- The students may take courses/ Rotation at other HEC recognized universities subject to approval by the student supervisor and the concerned Dean.

3.4. Selection Criteria

Short listed candidates will be invited for interview by the PhD admission committee of the university.

During the selection process the following elements will be considered:

- Academic record of MBBS/M.Phil /Masters/FCPS/Equivalent
- Research publications &/or statement of purpose.

3.5. Interview

- All applicants shall be required to present all their original academic credentials at the time of interview including good conduct from the Head of previous Institution/MS otherwise they shall not be eligible for appearance for interview.
- The interview will be conducted by a board constituted by the Vice Chancellor, comprising minimum of three members and shall include a subject supervisor, dean & Vice Chancellor or his nominee.
- Candidates scoring a minimum of 60% marks in interview will pass the interview.

3.6. Final Selection & Merit Computation:

Determination of Merit

- Admissions shall be made purely on merit. (Weightage; 20% for previous academic
- Performance, 50% for entry test/ GAT Subject / GRE score and 30% for interview)
- The final merit list of names of the candidates selected and recommended for admission shall be conveyed to the Registrar’s Office for seeking final approval from the Vice Chancellor.
- The finally admitted students list shall be sent to the concerned Department for enlisting the filled-in registration forms from the students and then send to the Registrar’s Office for eventual issuance of registration numbers.
- After receiving the admission letter, the selected candidates shall be required to join on the date given in the admission letter, the failure to do so shall result in cancellation of admission.

- For any unforeseen reason, when a student cannot continue with his/ her studies in the University, the student may send an official request through his HOD and Dean/ Head of institution to the Registrar for clearance and notification of release from the University.

3.7. Teachers to Students Ratio

Number of PhD Students per supervisor shall be 05 in basic sciences of any post graduate program at any given time.

4. Program Specifications – PhD Health Sciences(Pharmacology)

4.1. Summary of Course Specification & Credit Hours Distribution

Course Title	**PhD Health Sciences (Pharmacology)**
Course Duration	**Minimum 3 years (Maximum 8 years)**
Type of Study	**Full time**
Study System	**Semesters system (06 semester)**
Credit Hours (Course work)	**Credit hours: 18**
Semester Wise Distribution of Credit Hour (Course work)	**Year 1** **Semester 1=09** **Semester 2= 09**
Credit Hours (Synopsis, Research & Thesis	**30 Credit hours**
Synopsis Writing & Approval Research Work & Thesis	**Year 1** **Semester 1 = Research topic approval** **Semester 2 = Synopsis writing and Comprehensive Exam`** **Year 2 = Research work** **Year 3 = Research work & thesis writing**
Total Credit Hours (Course work, Synopsis, Research & Thesis)	**48 Credit hours**
Schedule Distribution	**Study per semester = 16 weeks** **Prep leave = 2 weeks** **Examination = 1 week** **Semester break = 1 week**

4.2. Duration of Program

The PhD program at RMU will be minimum three (03) years duration and maximum Eight (08) years duration.

4.3. Credit hours:

The student shall complete coursework of at least **48 credit hours** (**18 credit hours** of course work + **30 credit hours** of Research & Thesis).
The credit hour will be calculated as under:

- Formal Teaching (Lectures, Demonstration, Journal Club, Tutorials and Interactive Session) 01 credit hour =16 hours
- Practical Work (Lab work, Workshops, Attachments, Research) 01 credit hour=32 hours

4.4. Curriculum Breakdown

The course work consists of 18 credits hours which the student will have to complete in first year in which 6 credit hours are for teaching compulsory minor subjects

Courses

Sr.No	Courses	Course Code	Credit Hours
Subject Specific Course			
1.	General Pharmacology	PHR-801	01
2.	Cardiovacsular system and Renal Pharmacology	PHR-802	01
3.	Neuropharmacology (Autonomic Nervous System, Central Nervous System)	PHR-803	02
4.	Drugs Acting on GIT and Respiratory System	PHR-804	01
5.	Immunopharmacology & Autocoids	PHR-805	01
6.	Drugs acting on blood & Genetics & Gene therapy	PHR-806	01
7.	Hormones and Related Drugs	PHR-807	02
8.	Chemotherapy (Antibacterial, anti-mycobacterial, antifungal, antiviral, antiparasitic & anti-cancer drugs)	PHR-808	02
9.	Battery of Pharmacological Tests (Practical)	PHR-809	01
		Total Credit hours	**12**
Common Courses			
10.	Biostatistics and Research Methodology	BSR-801	02
11.	Computer Skills and Bioinformatics	CSB-801	01
12.	Medical Writing and Medical Education	MWE-801	02
13.	Biomedical Ethics	BME-801	01
		Total Credit hours	**06**

For international comparability purposes, PhD courses are usually designated a course code of "8" representing the highest level of academic achievement. Level 8 includes PhD as defined and mentioned in the National Qualifications Framework.Therefore, PhD Health Sciences (Pharmacology) is given a code of PHR 800.

Transfer of credit hours:

- PG can be facilitated for transferring the credit hours on special grounds. However, PMDC guidelines are mandatory for all the DAI to follow at the time of transfer.
- No credit hour of a course will be transferred if the grade is less than C. Credit hours may only be transferred between recognized DAI nationally or internationally

4.5. Semester-Wise Academic and Research Activities

S. No #	Academic Activity	Research Activity*
Semester 01	• Course work (9CHrs) • Mid-Semester/End-Semester Exams (GPA ≥2.5 in each course and GPA ≥3.0/4.0 in Semester mandatory)	• Research Topic Finalization and approval from Departmental Academic and Research Supervisory Committee (ARSC)
Semester 02	• Course work (9CHrs) • Mid-Semester/End-Semester Exams (GPA ≥2.5 in each course and GPA ≥3.0/4.0 in Semester mandatory) • Passing Comprehensive Exam (60% pass marks)	• Synopsis Writing and Approval from ERB and BASAR • A Review Article on Research Topic • Arrangement for Research Funding
Semester 03	• Workshops • Conferences • Visits/Training in other Institutions	• Start of Research work including pilot study • Phase I: up to 30% of Research) ○ Procurement of Required materials ○ Sample Collection and Processing
Semester 04	• Workshops • Conferences • Visits/Training/Collaboration in other Institutions	• Phase II: up to 70% of Research) • Sample Collection and Processing • Experimental Work • Data Collection and organization
Semester 05	• Collaborative work in other Departments/Institutions • Preparation of Research Publication	• Phase III: Completion of Research • Data Collection and organization • Data Analysis
Semester 06	Research Publication	• Thesis Writing and submission

4.6 Course Outline Semester Wise

Topics		**Weeks/Credits**
Year 1		
Semester 1	**Course Code**	**16 weeks/09 credits**
General Pharmacology	PHR-801	01 credits
Cardiovascular system and Renal Pharmacology	PHR-802	01 credits
Neuropharmacology (Autonomic Nervous System, Central Nervous System)	PHR-803	02 credits

Drugs Acting on GIT and Respiratory System	PHR-804	01credit
Immunopharmacology & Autocoids	PHR-805	01 credit
Biomedical Ethics	BME-801	01 credit
Biostatistics and Research Methodolody	BSR-801	02 credits
Preparatory leave		2 weeks
End Semester Exam		1 week
Semester Break		1 week
Semester 2		**16 weeks/09 credits**
Drugs acting on blood & Genetics	PHR-806	01 credit
Hormones & related drugs	PHR-807	02 credits
Chemotherapy (Antibacterial, anti-mycobacterial, antifungal, antiviral, antiparasitic & anti-cancer drugs)	PHR-808	02 credits
Battery of Pharmacological Test(Practical)	PHR-809	01 credit
Computer Skills and Bioinformatics	CSB-801	01 credit
Medical Writing and Medical Education	MWE-801	02 credits
Preparatory leave		2 weeks
End Semester Exam		1 week
Semester Break		1 week
Preparatory leave for Comprehensive Exam		4 week
Comprehensive Exam		

Other compulsory activities

- Library & Clinical Pharmacology Seminars

4.7 Course Details of PhD Program

4.7.1. PHR-801. GENERAL PHARMACOLOGY

Course Objectives:

Upon completion of the course the students should be able to:

- Comprehend basic concepts of pharmacology, divisions of pharmacology, structure activity relationship of drugs, drugs nomenclature, pharmacopoeias, formularies and other sources of drug information.
- Describe various drug formulations, routes of administration of drugs and the drug permeation across body membranes.
- Comprehend knowledge of pharmacokinetics of drugs, i.e. their absorption, distribution, metabolism and excretion.

- Learn the bioavailability, volume of distribution, half-life and clearance, etc. of drugs.
- Understand the concepts of pharmacodynamics, i.e. the mechanisms of actions of drugs, signaling mechanisms at cellular level, G-proteins and 2nd messengers.
- Explain agonist, partial agonist, antagonist, types of antagonism and dose-response curves (Graded & Quantal).
- Discuss various types of adverse drug reactions, drug-drug interactions
- Describe the clinical picture and measures to prevent poisoning due to over dosage of drugs as well as household and environmental poisoning
- Outline the process of drug development and approval.
- Comprehend basic knowledge of how to carry out clinical trials.

Course Contents

- Definition of Pharmacology & branches of Pharmacology.
- Definition of drug and drug nomenclature, sources of drugs, active principles of drugs & structure activity relationship of drugs.
- Pharmacopoeias, National formularies, Institutional or hospital formulary.
- Dosage forms, doses of drugs &routes of drug administration.
- Pharmacokinetics: Absorption of drugs and processes involved in drug absorption, Factors modifying absorption of drugs.
- Mechanisms of transport of drugs across cell-membrane.
- Bioavailability, its clinical significance and factors affecting it.
- Drug distribution, plasma protein binding of drugs & drug, reservoirs.
- Biotransformation of drugs, liver enzyme induction & inhibition.
- Excretion of drugs, plasma half- life of drugs, its clinical importance and factors affecting it, enterohepatic recirculation.
- Pharmacodynamics: Mechanisms of actions of drugs
- Receptors, Drug receptor interactions, signaling mechanisms of drug action, G-proteins and 2nd messengers. Agonist, partial agonist, antagonist & types of antagonism.
- Dose-response curves (Graded and quantal).
- Factors modifying actions and doses of drugs
- Drug tolerance, side effects & adverse effects of drugs & drug-drug interactions.
- Signs, symptoms and diagnosis and treatment of common household and environmental poisons.
- Clinical trials (their need, design and execution) and their ethical considerations.

4.7.2. PHR-802: Cardiovascular System and Renal System

Course Objectives:

- Upon completion of the course the students should be able to:
- Comprehend basic knowledge of drugs used for treatment of common diseases of the cardiovascular and respiratory systems and kidneys
- Learn the mechanism of action, clinical application and adverse effects of drugs for various clinical problems of cardiovascular and kidneys

Course Contents:

- Antihypertensive drugs, to include Sympatholytic drugs (Centrally acting, adrenergic neuron blockers, adrenergic receptor blockers), Angiotensin Converting Enzyme (ACE) Inhibitors, angiotensin receptor blockers, calcium-channel blockers & vasodilators, etc.
- Anti-anginal drugs, including Nitrates, Beta Blockers & Calcium channel Blockers, etc.
- Cardiac glycosides and other drugs for the treatment of heart failure.
- Anti-arrhythmic drugs: Mechanisms and types of cardiac arrhythmia. Mode of action of various classes of antiarrhythmic drugs, their clinical application and adverse effects.
- Diuretics: Carbonic anhydrase inhibitors, Thiazide diuretics, Loop diuretics, K^+ sparing diuretics & Osmotic diuretics, their mode of action, uses and side effects.
- Anti-diuretics agents (Including drugs for Syndrome of Inappropriate Anti-Diuretic Hormone secretion (SIADH).

4.7.3. PHR-803. NEURO- PHARMACOLOGY

Course Objectives:

Autonomic Nervous System (ANS)

- Explain the general principles and steps in neurochemical transmission in ANS
- Characterize major neuronal systems (Parasympathetic and Sympathetic) in ANS and describe ways in which the neuronal systems may be altered by disease and drugs.
- Describe the pharmacological properties, clinical uses, adverse reactions, contraindications and drug-interactions of adrenergic agonists.
- Discuss the types of shock, physiologic responses to shock, and the use of adrenergic and other drugs in the treatment of shock.
- Explain the pharmacological properties, clinical uses, adverse reactions, contraindications and drug-interactions of adrenergic antagonists.
- Explain the pharmacological properties, clinical uses, adverse reactions, contraindications and drug-interactions of cholinergic agonists.
- Discuss the pharmacological properties, clinical uses, adverse reactions, contraindications and drug-interactions of cholinergic antagonists & ganglionic blockers (Trimetaphan).
- Comprehend the physiology of neuromuscular junction & learn the mode of action of competitive & depolarizing neuromuscular blockers, their clinical uses and side effects.
- Know the mode of action, clinical application and adverse effects of centrally acting & other muscle relaxants (or Spasmolytics).

Central Nervous System

- Describe neurotransmitters and the principles of neurotransmission in NS).
- Explain how neuronal transmission in the CNS may be altered by diseases and drugs.
- Classify with examples various types of sedative hypnotic drugs and explain their mode of action, clinical benefits and adverse effects.
- Describe the drugs used in epilepsy and the management of different types of epilepsy.
- Identify and explain the pharmacological properties of drugs used to treat Parkinson's disease and Alzheimer's disease.
- Understand the pathophysiology of Anxiety, Phobia, Insomnia, Psychosis, Schizophrenia, Depression, Mania and Bipolar disease and narrate the rational use of various groups of drugs used in these conditions, as well as discuss their mode of action, pharmacological actions and adverse effects.

- Learn various modes of general anesthesia, classification of general anesthetics, the methods of administration of anesthetic agents and the stages of anesthesia.
- Explain the types, modes of application, pharmacokinetics, pharmacodynamics and adverse drug reactions of local anesthetic agents.
- Describe the pain transmission and modulation, role of opiopeptins and opioid receptors in the pain modulation.
- Learn the mode of action of opioid analgesics; their classification, clinical applications and adverse effects.
- Describe the drug management of migraine and other types of headache.
- Learn what is drug abuse and dependence, various drugs causing abuse and dependence and how to manage such cases.

Course Contents:

Autonomic Nervous System (ANS)

- Physiology of neurotransmission of ANS; Autonomic and somatic nervous systems; Types of ANS receptors and their role.
- Cholinergic agonists (Choline esters, Natural alkaloids and Anticholinesterases).
- Antimuscarinic drugs (Natural alkaloids, i.e. atropine & hyoscine, Semi-synthetic and synthetic anticholinergic drugs).
- Ganglion blocking drugs (i.e. Trimetaphan).
- Neuro-muscular blocking drugs (Competitive & Depolarizing).
- Central muscle relaxants and other spasmolytics.
- Adrenergic agonists (Catecholamines & Non-catecholamines).
- Adrenergic receptor blocking drugs (Alpha and Beta-blockers) & Ergot alkaloids.
- Adrenergic neuron blocking drugs & central sympathoplegics.

Central Nervous System (CNS)

- Neurohumoral transmission and the CNS
- Sedative and hypnotics, their Classification, mode of action, clinical applications and adverse effects, as well as the principles of treatment of insomnia, anxiety and phobias.
- Anti-epileptic drugs, their classification, mode of action, clinical applications and adverse effects.
- Anti-Parkinsonian drugs, their classification, mode of action, clinical applications and adverse effects.
- Drugs used for the treatment of Alzheimer's disease.
- Anti- psychotics (Typical: Phenothiazines, e.g. Chlorpromazine, Butyrophenones, e.g. Haloperidol, Thioxanthenes, e.g. Thiothixene, etc. and Atypical: Clozapine, olanzapine, quetiapine,, risperidone and aripiprazole, etc.)
- Anti-depressants (Tricyclic anti-depressants, Serotonin Specific Reuptake Inhibitors, SSRIs, Monoamine Oxidase Inhibitors, MAO inhibitors).
- Drugs for Mania and Bipolar disease (e.g. Lithium carbonate, Valproic acid, etc.).
- Introduction of anesthesia and anesthetic agent and their mechanism of action.
- Pre-anesthetic medication and stages for anesthesia.
- Classification of anesthetic agents

- Pharmacokinetics and pharmacodynamics of inhalational anesthetics
- Intravenous General Anesthetics agents
- Local anesthetics, their classification, mode of action, pharmacokinetics and pharmacodynamics, clinical application and local and general adverse effects;
- Pathophysiology of pain (Pain transmission and modulation pathways, and the role of opiopeptins in the pain modulation)
- Opioid analgesics, their mode of action, clinical applications, adverse effects and opioid antagonists.
- Drug abuse and dependence, withdrawal effects, factors causing drug abuse.
- Drugs causing abuse and dependence, like CNS stimulants (Amphetamines, Cocaine, Nicotine & Caffeine , etc.), CNS depressants (Sedative-hypnotics, e.g. Barbiturates, Benzodiazepines & Alcohol, etc.), Hallucinogen (LSD & Ketamine, etc) and Marijuana;

4.7.4. PHR-804: Drugs acting on GI tract and Respiratory System

Course Objectives:

Upon completion of the course the students should be able to:

- Comprehend the basic knowledge of drugs acting on GI-tract and Respiratory System

Course Contents:

- Drugs for the management of Peptic ulcer, Gastroesophageal reflux disease (GERD) and dyspepsia (Antacids, H2 receptor antagonists, Proton pump Inhibitors and gastric mucosal protectives).
- Anti-diarrhoeals, Antiemetics and Prokinetic drugs.
- Laxatives & Purgatives. Management of constipation.
- Antitussives, Expectorants and Mucolytic agents.
- Anti-asthmatics and drugs for Chronic Obstructive Pulmonary Disease (COPD).

4.7.5 . PHR 805: Immunopharmacology & Autocoids

Course Objectives

Upon completion of the course the students should be able to:

- Learn the mode of action, clinical uses and adverse effects of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and Disease Modifying Drugs for Rheumatoid Arthritis (DMARDs)
- Explain the major autoimmune inflammatory diseases and their management
- Describe the mediators of inflammation (Including autacoids) and immune reactions.
- Comprehend basic knowledge of Histamine and Antihistamines.
- Know the patho-physiological and pharmacological properties of Serotonin (5-Hydroxytryptamine, 5-HT), Prostaglandins (PGs), their agonists and Antagonists
- Know about the vaccines and drugs affecting active and passive immunity

Course Content

- Pathophysiology of various autacoids, like histamine, bradykinin, 5-hydroxytryptemine and prostaglandins.

- Mode of action, and pharmacological actions of clinically useful agonists and antagonists of autacoids.
- Anti-histamines (Sedating and Non-sedating).
- Disease Modifying Drugs for Rheumatoid Arthritis (DMARDs)
- NSAIDs, DMARDs and other related drugs for the treatment of Osteoarthritis, Gouty arthritis, Rheumatoid arthritis, Systemic Lupus Erythematosis (SLE), Myasthenia gravis (MG) and other autoimmune inflammatory conditions.
- Vaccines & Immune modulating drugs

4.7.6. PHR 806: Drugs acting on blood & Genetics

Course Objectives

Upon completion of the course the students should be able to:

- Describe the drugs acting on coagulation cascade
- Comprehend the basic knowledge of platelet adhesion and activation and the drugs acting as anti-platelet and thrombolytic
- Explain Plasminogen-Plasmin cascade and drugs used as Plasminogen activators (Fibrinolytics) and inhibitors (Antidote for plasminogen activators)
- Know the pharmacological properties of drugs used for the improvement of hematopoiesis
- Narrate the pharmacological properties of drugs used for dyslipidemia
- Understand fundamental approaches used in modern day human and medical genetic research
- Integration of genetic approaches with biochemical and molecular techniques

Course Content

- Anti-coagulants (e.g. Heparin and Warfarin, etc.). Antiplatelet drugs. Fibrinolytic drugs.
- Heamatinics and hematopoietic colony stimulating factors
- Drugs for dyslipidemia
- Pharmacogenetics and Epigenetics
- PCR and their clinical utility

4.7.7. PHR-807: Hormones & related drugs [Hypothalamic releasing factors, Pituitary hormones, Thyroid hormones & Anti-thyroid drugs, Insulin & other antidiabetics, Gonadal Hormones & Infertility (Male & Female), Male Erectile Dysfunction & Contraceptives].

Course Objectives

Upon completion of the course the students should be able to:

- Know the classification of hormones and related drugs (Including hormone analogs and antagonists).

- Learn the mechanism of action, pharmacological properties and clinical applications of Hypothalamic releasing factors, Pituitary hormones, Thyroid hormones, Anti-thyroid drugs, Insulin & other antidiabetics and Gonadal Hormones and their antagonists.
- Learn the mode of action and pharmacological properties of drugs for the management of female and male infertility, male erectile dysfunction and female sex arousal disorder.
- Understand the mode of action and pharmacological properties of contraceptives

Course Contents:

- Hypothalamic releasing factors, pituitary hormones and related drugs
- Thyroid hormones and Anti-thyroid drugs
- Corticosteroids (Glucocorticoids and mineralocorticoids)
- Female gonadal hormones (Estrogens & Progesterone) and their synthetic analogs
- Contraceptives.
- Drugs for female infertility & female sex arousal disorder (FSAD)
- Male gonadal hormones. Anabolic steroids and drugs for male erectile dysfunction
- Management of primary and secondary hypogonadism (Male infertility).
- Doping (Abuse of anabolic steroids).
- Insulin and other antidiabetic drugs

4.7.8. PHR-808: Chemotherapy (Antibacterial, anti-mycobacterial, antifungal, antiviral, antiparasitic, & anti-cancer drugs)

Course Objectives:

Upon completion of the course the students should be able to:

1. Comprehend the basic principles of chemotherapy
2. Have good command on drugs prescribed for the treatment of various types of bacterial, mycobacterial, fungal, viral and parasitic infections and neoplasms.

Course Contents:

- General Principals of Chemotherapy. Antimicrobial resistance.
- Sulphonamides
- Trimethoprim & Co-trimoxazole
- Penicillins, Cephalosporins, other beta-lactam antibiotics
- Macrolides, Tetracyclines, Chloramphenicol, Aminoglycosides
- Quinolones. Urinary antiseptics.
- Antituberculous drugs. Treatment of Leprosy,
- Antifungal drugs, Antiviral drugs (Including treatment of HIV infection)
- Antimalarials, Anti- amoebics & other Antiprotozoal drugs
- Anthelmintics (Drugs for round worm, flukes and tape-worms).
- Cytotoxic drugs (Alkylating agents, Anti- tumor antibiotics, Anti-metabolites,Vinca alkaloids, Hormones and related drugs and Miscellaneous anticancer agents).

4.7.9. PHR-809: Battery of Pharmacological Test (Practical)

Course objectives

Upon completion of the course the students should be able to

- To develop advanced skills in designing, conducting, and interpreting preclinical pharmacological experiments using in vitro, ex vivo, and in vivo models.
- To ensure ethical and regulatory compliance in animal experimentation through the application of GLP, SOPs, and CPCSEA/OECD guidelines.
- To critically evaluate the pharmacological effects of test compounds in CNS, metabolic, inflammatory, and immunomodulatory models, using appropriate statistical methods.

Course contents

Introduction

- Definition and importance of pharmacological testing
- Classification: In vitro, ex vivo, in vivo models
- Preclinical vs. clinical testing
- Acute, subacute, chronic toxicity (OECD guidelines)
- Ethical and regulatory considerations (CPCSEA, ICH, OECD, 3Rs)
- Good Laboratory Practices (GLP)
- Standard Operating Procedures (SOPs)

II. General Principles of Pharmacological Testing

- Selection of models and species
- Dose calculation and route of administration
- Control and standard groups
- Statistical analysis and data interpretation

III. CNS Pharmacological Test Battery

Analgesic Tests

- Tail-flick and hot plate

IV. Endocrine and Metabolic Test Battery

- Streptozotocin-induced diabetes model
- Oral glucose tolerance test (OGTT)
- Models for obesity and hyperlipidemia

V. Anti-inflammatory and Immunomodulatory Tests

- Carrageenan-induced paw edema
- Freund’s adjuvant-induced arthritis

VI. Preparation of Physiological and Buffer Solutions

VII Cardiovascular Test Battery

- In vivo blood pressure and heart rate monitoring (non-invasive tail-cuff, telemetry)
- Langendorff isolated heart preparation

VIII

- UV visible spectrophotometer
- Antioxidant test by using DPPH
- Antiinflammatory test by using bovine serum albumin
- Hrbc membrane stabilization method

4.8. Recommended Reading in Pharmacology

Books:

1. Basic & Clinical Pharmacology by Katzung et al., Latest Ed.
2. Pharmacological Basis of Therapeutics by Goodman & Gillman, Latest Ed.
3. Rang & Dale's Pharmacology by H.P. Rang, M.M. Dale, R.J. Flower, Latest Ed.
4. Lippincott's Illustrated Reviews of Pharmacology by Harvey RA, Pamela C, et al., Latest Ed.

Journals:

1. European Journal of Pharmacology
2. European Journal of Clinical Pharmacology
3. British Journals of Pharmacology
4. British Journal of Clinical Pharmacology
5. Canadian Journal of Physiology & Pharmacology
6. Clinical and Experimental Pharmacology and Physiology
7. Pharmacology, Biochemistry and Behavior
8. Biomedicine and Pharmacotherapy
9. Journal Rawalpindi Medical University
10. Pakistan Journal of Pharmaceutical sciences

4.9 Program Delivery Methodology

- Interactive Lectures
- Tutorials
- Short Group Discussions
- Guided Self-study & SDLs
- Practical & OSPE Sessions
- Skill laboratory
- Presentations

The objectives of the training may be achieved through different modes, some of which are listed below:

- Assigning responsibilities of teaching the undergraduates of BS (Hons), MBBS and M.Phil.
- Seeking information through Journal clubs, library and Internet.
- Attending workshops, Seminars, conferences, lectures, small group discussions, etc.
- Arranging regular quiz sessions for students
- Completion of assignments
- Patient/case-based learning
- Flip classroom technique
- Assisting/Supervising Research projects of undergraduates of BS (Hons), MBBS and M. Phil students.
- Attachments with Federal, Provincial and District outlets to acquire technical know-how of laboratory work.
- Practical laboratory work in Diagnostic Laboratories at RMU allied hospitals.

5. Compulsory Courses for All Specialties

5.1. BSR 801- Research Methodology

Learning Objectives

Upon completion of the course the students should be able to:

- Comprehend basic concepts of research designs, sampling techniques and modes of analysis.
- Identify various sources of information for literature review and data collection
- Develop an understanding of the ethical dimensions of conducting applied research
- Appreciate the components of scholarly writing and evaluate its quality.

Course Contents

- Types of research, e.g. Surveys, Case Studies, Simulations, Subjective/argumentative research and Action research, Creative research, Descriptive research and Experimental research, etc.
- Defining the objectives and designing an appropriate method.
- Selection of suitable modes of data collection and analysis.
- Necessities of a quality research paper writing or thesis writing, e.g., collection of needed information, choosing a right title, preparation of draft, time adjustment, etc., as such;
- Measures to avoid errors in writing a scientific paper, e.g. find a colleague to read, use of computer programs for correction of spelling and grammar mistakes, etc.

5.2.BSR-801 Biostatistics

Learning Objectives

Upon completion the students will be able to comprehend basic knowledge of epidemiology and will be able to:

1. Define epidemiology and know the principles of various study designs
2. Know how to design a study and describe the validity and reliability of a study design
3. Know the fundamental concepts and methods of statistics in the areas of medical and biological research
4. Have good command on use of statistical computer software for data analysis
5. Identify and prioritize research problems with literature review.
6. Formulation of research objectives
7. Learn Data collection techniques and sampling, planning for data collection, collation and analysis.
8. Planning for pilot study followed by main study along with Budget making and plan for dissemination.
9. Identify and define the basic concepts and procedures required for data analysis and interpretation.
10. Analyze and interpret the data collected for the research project and draw conclusions related to the objectives of your study.
11. Write a clear and concise research report (paper for a peer reviewed journal) and a summary of the major findings and recommendations for each of the different parties interested in the results.

12. Present the major findings and the recommendations of your study to policy-makers managers and to the subjects of your research together with them to finalize the recommendations.
13. Prepare a plan of action for the dissemination, communication and utilization of the findings and (if required) make recommendations for additional research.

Course Contents

The course contents will include; Descriptive epidemiology, analytic epidemiology and epidemiological inference, Classification, morbidity and mortality rates, ratios, incidence, prevalence, sampling, screening, epidemiological models, Types of study design; their importance, uses, and limitations, field trials, controlled epidemiological surveys, sources of bias and causal models.

Introduction to statistics, types of statistical applications, population and samples, data analysis and presentation, variables, elementary statistical methods, tabulation, chart and diagram preparations, measures of central tendency and dispersion, sampling techniques and sample size estimation, probability and proportions, Tests of significance; normal test, t test, Chi square test etc. correlation and its applications, linear regression and multiple regression, Clinical trials and intervention studies, Measures for developing health statistical indicators: morbidity and mortality statistics, Use of latest statistical computer software for data analysis.

5.3 CSB -801 Computer Skills & Bioinformatics

Learning Objectives

Upon completion of the course the students should be able to:

- Comprehend the basic concepts of the computational skills.
- Learn the use of computer in sampling techniques and the data collection and analysis.
- Understand the application of computerized instruments for the practical work.

Course Contents

- Basic Concepts of Computer
- History of Computer
- Concept of Computer hardware
- Concept of Computer languages
- Concept of Computer Software e.g. SPSS, Microsoft Excel or similar.
- Computer applications in Biology Spreadsheet tools: Introduction to spreadsheet applications; Data storing, Statistical analysis of data, Generating charts/ graph,etc.
- Presentation tools: Introduction, features and functions, Presentation of Power Point Presentation, customizing presentation, Showing presentation, Tools – Microsoft Power Point or Similar
- Web Search: Introduction to Internet, Use of Internet and WWW, Use of search engines, Biological data basis.

5.4.BME -801 BIOETHICS

Rationale:

The **ethics curriculum** is designed to provide students with the conceptual tools that they will need to navigate the **ethical** issues that are commonly encountered in clinical practice. Program helps students to develop skills in critical reasoning and in using the basic concepts of medical ethics it also fosters the habits of critical reflection and discussion about the ethical issues. Thorough exploration of ethics is critical to developing exemplary scholars and teachers.

Course Content:

- **Professional Responsibilities**
  - Student Responsibilities/ Professionalism
  - Qualities of a Physician/Codes of Ethics
  - Should Patients Be Learning Tools?
- **Central Ethical & Legal Principles**
  - Duty to Provide Care (Trust & Fiduciary Responsibility)
  - Truth Telling and Informed Consent for Treatment
  - Confidentiality and The Duty to Warn
- **Research Ethics [Epidemiology]**
  - Ethical Dangers of Human Subject Research
  - The Importance of Research and The Development of New Therapies
  - The Common Rule: Requirements for The Ethical Conduct of Research
- **Justice and Medicine**
  - Justice in Clinical Practice
  - The Right to Health Care
  - Allocation of Transplant Organs
- **The Nature and Value of Autonomy**
  - Concepts of Autonomy
  - Concept of beneficence
  - Concept of Non-maleficence
  - Standards for Surrogate Decision Making
  - Refusal of Treatment and Justified Paternalism
  - Advance Directives and Proxies
- **Clinical Moral Reasoning: A Systematic Approach to Clinical Ethics Dilemma**
  - Critical Care -Family Meeting
  - Emergency Medicine - Confidentiality and Legal Responsibility
  - Family Practice -Adherence and Compliance
  - Geriatrics -Giving Bad News
  - Medicine -Responding to Families
  - Neurology -Disclosing a Diagnosis
  - Ob/Gyn-Reproductive Choice
  - Pediatrics -Parental Discretion
  - Psychiatry -Treatment over Objection and Confidentiality
  - Surgery -Identifying Ethical Issues
- **Animal Handling Research ethics**;

Preparation and experiments on laboratory animals, maintenance of animal house; Routine Pharmacology experiments on animals. Animal rights in experimentation.

Learning Objectives

- At the end of the course the student should be able to:

- Describe Student Responsibilities/ Professionalism
- Enlist Qualities of a Physician
- Discuss Codes of Ethics
- Elaborate Trust & Fiduciary Responsibility
- Describe importance of Truth Telling and Informed Consent for Treatment
- Know Confidentiality and The Duty to Warn
- Discuss Ethical Dangers of Human Subject Research
- Describe importance of Research and The Development of New Therapies
- Elaborate the Common Rule: Requirements for The Ethical Conduct of Research
- Explain Justice in Clinical Practice
- State the Right to Health Care
- Discuss Allocation of Transplant Organs
- Describe Concepts of Autonomy
- Enlist Standards for Surrogate Decision Making
- Discuss Refusal of Treatment and Justified Paternalism
- Describe Advance Directives and Proxies
- Explain Confidentiality and Legal Responsibility, Adherence and Compliance, Geriatrics -Giving Bad News
- Analyze bioethics literature critically and comprehend the foundations of Bioethics theory
- Understand ethical issues regarding handling of research animals.
- Sacrifice research animals according to ethical principles.
- Comprehend basic knowledge of the ethical issues in biomedical research
- Comprehend ethical considerations in using animals for research experiments
- Prepare an animal model for research
- Exhibit attitude towards research on human volunteers, experimental animals and ethical aspects
- Understand 3 R rule regarding animals
- Learn the efforts to minimize the discomfort, infection, illness and pain of animal subjects.
- Interpret the results and draw inference

5.5. MWE -801 Medical Writing and Medical Education

Rationale:

Due to the advancement & development of innovative educational strategies with implementation of E. Learning environment, technology zenith and advance scientific research in medical & allied health, the health professionals (Basic sciences & clinical teachers) require to be acquaint with all these innovations and demonstrate essential skills & competencies as a physician, teacher, scholar, researcher and leader. This means that training of health professionals requires high standards of education at par with the realities of the practical world. Along with the expansion of health professionals as a need, a reform in health professions education is taking place world over e.g. Curriculum integration, implementation of PBL/CBL, use of simulator in teaching, virtual patients, OSCE/OSPE as an assessment tools etc. Therefore, this course is designed keeping in mind the basic requirements for a medical teacher (Basic

sciences) in Health Profession Education to demonstrate the competencies of an effective medical teacher.

Course Goal:

The course is endeavors to train post graduate students (basic medical sciences) in basics of health profession education to produce competent health profession teacher.

Course Outcomes:

By the end of the course the students will be able to:

- Adept in basic knowledge and its application in the core areas of medical education i.e. educational environment & students, teaching and learning, curriculum development including educational strategies & curriculum themes, Students assessment and Program evaluation.
- Acquire knowledge, skills and attitude requires for a competent health profession educator by understanding & applying the theoretical and empirical literature in medical education
- Critically examine the preparation requires for their role as educators of their profession through enhancing students understanding and implementation of principles of adult learning and teaching in relation to their target group.
- Apply the educational theories and cognitive psychology in support of their role as an educator in practice.
- Use knowledge and skills require for Designing & developing an integrated curriculum/Module at an undergraduate level.
- Understand and apply the fundamentals of educational methodologies (Learning and Teaching); "Teaching to learn and learning to teach".
- Understand and apply the fundamental principles in 'Assessment' while designing an assessment plan and assessment tools.
- Design a plan with tools for evaluating a teaching program.
- Demonstrate effective communication skills (active participation, Pro-activeness, professionalism, group dynamics, team building, conflict resolution, negotiation skills, leadership skills etc) while working in the group/team tasks.

Course Overview and description:

The whole course is based on principles of constructive cognitive philosophy and follows the FAIR criteria to improve learning. According to constructive philosophy the teacher is more than a transmitter of information and has responsibility for managing the student's learning. Hence, this course has four key features identified for effective learning – the FAIR criteria:

F	Feedback to the learner as to progress
A	Active rather than passive learning
I	Interest or motivation of the learner
R	Relevance to the perceived and real needs of the learner

This course is designed for the post gradates medical students to develop them as an effective team member and effective teacher in an Integrated Curriculum development, its implementation and evaluation. The students will understand and apply the basic core concepts in medical education while working as Task Force member, conducting an integrated session for instance '**Problem Based Learning Sessions' etc.** and assessing the students**.** The essential Core area

and themes in medical education in which students will be trained are 1) educational environment & students, 2) teaching and learning strategies, 3) curriculum development including educational strategies & curriculum themes, 4) Students assessment and 5) Program evaluation. The course curriculum is structurally organized in these **five Themes.**

Instruction strategies:

- Interactive lectures by the teacher followed by the group discussions/activity weekly 1 hrs.
- Self-study and literature search- for assignment.
- Assignments (Students are expected to submit 02 evidence-based written assignment-01 major & 01 minor)

Assessment strategy:

1. **Formative assessment**- there will be continuous assessment on the ongoing small group activities and attitude of each student and that will be recorded through an evaluation performas (checklists, rating scales) used during the sessions. Constructive Feedback will be provided on it by the teachers. Students, who will score satisfactory and achieve the minimum required standard, will be allowed to sit in end of course/semester assessment.
2. **Summative assessment**:

Assessment modalities:

For Knowledge:

- Students are expected to submit 02 evidence-based written assignments (01 major & 01 minor related to major themes).
- Final end of Semester Exam: At the end of the course there will be a Theory Exam comprises of MEQ (Modified Essay Questions).

For Skill and attitude:

- It will be assessed through ongoing continuous assessment in small group activities, presentations and mini projects assigned during the classes and that will be recorded through an evaluation performas (checklists, rating scales).

Learning Resources:

- A practical Guide for Medical Teacher by John A. Dent & Ronald M. Harden. (4^{th} edition, A Book)
- Journal Articles will be provided from the latest medical education journals.
- Other reading materials from renowned author's books, research work, or websites.

Logistics / Training Resources for the course:

- Photostat facility for handouts and readings.
- Room for classes with multimedia.
- OHP and markers.
- Transparencies.
- Flip charts/stand and markers.
- Pointer.
- Paper reams (02).
- Folders to document course teaching and learning materials.

Course Sequencing, Time Planning and TOS

Total 18 hours of teaching: Each session will be of 01 hour

Sr. #	Theme #1	Theme #2	Theme #3	Theme #4	Theme #5	Total
Topic	Introduction to HPE& Educational Environment	Teaching and Learning	Curriculum: structural concepts and development	Assessment	Program Evaluation	
Duration	4hrs	4hrs	4hrs	4hrs	2hrs	18hrs
Marks	20	25	25	20	10	100

Course Content and Learning Objectives

THEME # 1:

Introduction to HPE& Educational Environment

Number of Lectures: 04

Content:

1. Introduction to HPE and competencies required in HPE
2. Educational environment which effect the students learning- factors that enhance or inhibit the learning the learning.
3. Various learning styles and merits and demerits- superficial and deep learning.

Learning Objectives:

1. Introduce with the themes of HPE, trend, Issues & Challenges IN HPE& Competencies required in HPE.
2. Discuss the competencies of a Medical Teacher.
3. Identify the factors which constitute the educational environment and effect the students learning i.e. the factors that enhance or inhibit the learning.
4. Identify various learning styles, its merits and demerits- superficial and deep learning.

THEME # 2:

Teaching & Learning

Number of Lectures: 04

Content:

1. The characteristics of adult learners- the principles of adult learning.
2. Different instructional methodology or modes of information transfer.
3. Teaching and Learning in large group: Interactive lecturing.
4. Teaching and Learning in small groups teaching and learning: PBL, CBL why? How? Its principles, process – tutors and students role.

Learning Objectives:

1. Identify the characteristics of adult learners, and the principles of adult learning.
2. Link principles of adult learning with characteristics of modern curriculum.
3. Identify different modes of instruction and its strength and weakness.
4. Use the process of planning while designing & conducting large group teaching (Interactive lectures) session.
5. Use the process of planning while designing & conducting small group discussion session.
6. Discuss the principles process, role of tutors and students, student's assessment in a PBL& CBL session.

7. Demonstrate effective communication skills (active participation, Proactiveness, professionalism, group dynamics, team building, conflict resolution, negotiation skills, leadership skills etc) while working in the group/team tasks.

THEME # 3:
Curriculums: structural concepts and development
Number of Lectures: 04
Content:
The curriculum and its components.
Various curricular philosophies & Perspectives- curricula past, present, future.
Innovative trends in curriculum, educational strategies, curriculum themes, emphasis on integration.
The Hardens 10 questions for curricular planning.
Differentiation between the aims, goals, outcomes, objectives
Writing Learning objectives and Levels in Bloom's taxonomy of objectives for a course.
The selection of core content while integrated curriculum development.
Steps of Integrated Modules planning & development.
Learning Objectives:
1. Define curriculum.
2. Differentiate between the different components of a curriculum.
3. `Enlist Harden's 10 questions for curricular planning &WFME standards
4. Discuss various curricular philosophies & Perspectives - curricula past, present, future.
5. Identify the trends in curriculum development, educational strategies and curriculum themes.
6. Discuss integrated curriculum and broad categories of integration in curriculum
7. Differentiate between the aims, goals, outcomes, objectives
8. Differentiate between the different levels in Bloom's taxonomy of objectives.
9. Write learning objectives of 3 different domains for an integrated module and match it with the teaching and learning strategies.
10. Steps of Integrated Modules planning & development
11. Select core content while designing an integrated curriculum development.

THEME # 4:
Assessments
Number of Lectures: 04
Content:
1. Definition of assessment and evaluation.
2. Differentiation between the formative &summative assessment, Criterion referenced and norm referenced.
3. Characteristics of a good examination and definitions of validity and reliability of exams. Matching of learning objectives with the assessment tools
4. Design various assessment tools for knowledge, skill & attitude-MCQs, SEQs, & OSCE/OSPE
5. Importance and Contents of a table of specification.

Learning Objectives:
1. Differentiate between assessment and evaluation

2. Differentiation between formative & summative assessment, Criterion referenced and norm referenced.
3. Discuss the characteristics of a good examination.
4. Match learning objectives with the assessment tools (Miller's Pyramid).
5. Construct various assessment tools e.g. M.C.Qs, SEQ, OSCE/OSE
6. Match the objectives with the assessment tools.
7. Develop a table of specification for a module.

THEME # 5:
Program Evaluations
Number of Lectures: 02
Learning Objectives:
1. Discuss the importance of evaluating a teaching session/ course/ program.
2. Identify the ways of assessing the effectiveness of an educational program.

5.6. Recommended Readings (Compulsory courses for all)

Bioethics and Medical Ethics

1. John Arras and Bonnie Steinbock. Ethical Issues in Modern Medicine, Mayfield, Latest Ed.
2. Françoise Baylis, Jocelyn Downie, Benjamin Freedman, Barry Hoffmaster, and Susan Sherwin. Health Care Ethics in Canada. Harcourt Brace, Latest Ed.
3. Tom L. Beauchamp and James F. Childress. Principles of Biomedical Ethics. Latest Ed. Oxford University Press.
4. Glenn C. Graber and David C. Thomasma. Theory and Practice in Medical Ethics. Continuum, Latest Ed.

Biostatistics:

1. Gordis, L. Epidemiology. Pennsylvania: W.B. Saunders Company. Latest Ed.
2. Rothman KJ. Modern Epidemiology. Boston: Little, Brown and Company, Latest Ed.
3. Kelsey JL, Thompson WD, Evans AS. Methods in Observational Epidemiology. New York: Oxford University Press, Latest Ed.
4. Kleinbaum DG, Kupper LL, Morgenstern H. Epidemiologic Research: Principles and Quantitative Methods. Belmont, CA: Lifetime Learning Publications, Latest Ed.
5. Lilienfeld DE, Stolley PD. Foundations of Epidemiology. New York: Oxford, Latest Ed.
6. Daniel WW. Biostatistics: A Foundation for Analysis in the Health Sciences. Latest Ed. John Wiley & Sons. Inc. New York.
   Larson R and Farber B. Elementary Statistics: Picturing the World. Latest Ed, Prentice Hall Publications. New Jersey USA.

Computer Skills

1. Hochreiter, Sepp; Wagner, Roland. Bioinformatics Research and Development. Series Lecture notes in Computer Science, Springer, Latest Ed.
2. Mandoiu, Ion; Narasimhan, Giri; Zhang, Yanqing. Bioinformatics Research and Applications Series: Lecture Notes in Computer Science. Springer, Latest Ed.

Journals:

Computer skills

1. Journal of Bioinformatics and Computational Biology (JBCB)
2. BMC Bioinformatics

Bioethics

1. Cambridge Quarterly of Healthcare Ethics
2. Hastings Center Report
3. Journal of Clinical Ethics
4. Journal of Medical Ethics
5. Journal of Medicine and Philosophy
6. Kennedy Institute of Ethics Journal
7. Nursing Ethics

Biostatistics

1. Cancer Epidemiology
2. Epidemiologic Reviews
3. Annals of Epidemiology
4. American Journal of Epidemiology
5. International Journal of Epidemiology

6. Methods of Evaluation of Trainee and Training Program

6.1. Traine's Performance Evaluation

PhD scholar's Performance throughout the program will be assessed through:

- Formative Assessments (through regular feedback)
- Summative Assessment (through examination)

6.2. Formative Assessment Procedure

- Attendance record (at least seventy-five percent for each year of study).
- Performance of the scheduled / desired activity
- Participation in discussion (tutorial and seminar etc.)
- Efficiency and effort put in the assignment (lectures, demonstration, Computer training, etc.)
- Presentaion and computer skills

6.3 Summative Assessment Procedure

6.3.1 Continuous Internal Assessment

- Assignments/tests/logbook
- (The performance of every student shall be continuously monitored and assessed throughout the semester. During the semester a student's performance shall be evaluated by taking quizzes, assignments, mid-semester examination, laboratory reports, project presentations etc and will be maintained as "LOG BOOK")
- There will be Continuous Internal Assessments of each candidate during the training period. These Continuous Internal Assessments will include Assessments/Quiz/assigned tasks and supervisor's Review Report.
- There shall be two examinations for each course during each semester. These examinations shall be termed as Mid semester and End semester examination. In addition to these examinations, the instructor may give home assignments, demonstrations and class presentations.

6.3.2 Mid-semester and End-Semester Assessment

- Mid-semester and End-Semester exams shall also be taken during each semester covering the entire syllabus including theory and practical. The course teacher shall be responsible for the evaluation of work/performance of the students of his class and for the award of grades to them based on such evaluation.
- Mid-semester examination will primarily comprise of theory component comprising of MCQs, SAQs and Essay Questions. Viva voce can also be a component.
- End-semester examination will have theory component comprising of MCQs, SAQs and Essay Questions and practical examination. Viva voce will also be a component.

6.3.1. Evaluation Components /Assessment Type for Semester Course work

a. Theory Course

i) Quizzes/Assignments/Projects/ Presentations:

There shall be an appropriate number of quizzes/ assignments/ course project/ presentations etc. as maintained on logbook dually marked by teacher/instructor.

ii) Mid Semester Examination

There shall be one mid Semester examination of 2 hours duration for each theory course in a Semester after 8th week of teaching.

iii) End Semester Examination

There shall be separate End-Semester Examination for every subject. The duration of this exam will be 3 hours covering the entire course at the end of each Semester. The examination shall be held in the last 3 weeks of each regular Semester.

iv) Weightage of Evaluation Components /Assessments

The final grades shall depend on the marks obtained in each of the evaluation components listed above. The weightage given to each component is as follows:

Evaluation Component/ Assessment Type	**Weightage**
Quizzes/Assignments/Projects/ Presentations/Logbook etc.	25%
Mid Semester Examination	25%
End Semester Examination	50%

b. Viva & practical examination

The end Semester viva & practical examination will also be conducted jointly by the course teacher (i.e. Internal Examiner) and External/Neutral Examiner as notified by the relevant Chairman.

c. Combined Theory & Lab	**Weightage**
Quizzes/Assignments/ Lab Projects/ Lab Report/Presentations etc.	25%
Mid Semester Examination	25%
End Semester Examination + Practical+ Viva Voce etc.	50%

Time of Specification for Semester Examination

Each 1 Credit Hour Course:

- Total Marks = 60 marks
- Theory = 40 marks (MCQs = 20 marks, 1 LEQ = 10 marks, 2 SEQs = 10 marks; 5 marks each)
- Viva = 20 marks

The transcript however will represent one credit hour course out of 20 marks

Re-mid Examination:

A student who fails to take his Mid Semester examination due to some unavoidable reasons shall apply in writing to the Chairman/VC for retaking mid Semester examination before the End Semester Examination. In case a student is allowed to retake Mid Semester Examination, the examination will be conducted by the concerned course teacher before the End Semester Examination on the payment of prescribed fee by the student.

6.4. Pass Marks

The minimum pass marks for each course shall be 60%/2.5 GPA (Grade C) and CGPA ≥3.0/4.0 in Semester which will be calculated using university criteria as follows.

RMU Grading System

It will be based on GPA – 4 system

Marks obtained in Percentage range	Numerical Grade	Alphabetical Grade
80-	4.0	**A+**
75-	4.0	A
70-	3.7	**A-**
67-	3.3	**B+**
63-	3.0	B
60-	2.7	**B-**
56-	2.3	**C+**
50-	2.0	**C**
<50 Un-grade-able	0	**U**

A candidate obtaining GPA less than 2.00 (50%) is declared un-graded (fail).

Cumulative transcript is issued at the end of clearance of each semester.

6.5. Failure/Improvement in a Course

a) A student obtaining less than 60%/2.5 GPA (Grade C) in any course shall be deemed to have failed in that course and will be awarded "F" grade.
b)If a student fails to appear in the final theory examination of a course he/she shall be treated as absent and declared to have failed in that course with "F" grade.
d)The candidate can improve the course already passed with grade "C" or below.
e) A student obtaining "F" grade in core course has to re- register for the course on the advice of Chairman/VC to pass it.

6.6. Dismissal from Program

If a student obtains "F" (Failing) grade in more than one courses at the end of first year of enrolment, he will be dropped from the degree program.

6.7. Comprehensive Examination

The Comprehensive Exam assesses the student's competency in the subject of Pharmacology and determines if the student is prepared to begin thesis research.
a) Comprehensive Exam must be conducted at the end of one year of enrolment (Annex 3.7 of HEC policy *)
b) To be eligible to appear in comprehensive examination, student must have passed 18 credit hours course work with a CGPA of minimum 3.0 out of 4.0 with evidence.
c) Paper of the comprehensive examination will be set by the Director of post graduate program, in consultation with the course teachers. One External Faculty member expert in the field of study can also be a paper setter who can be from other department of the university or from other university.

A certificate of satisfactory completion of the program by the Supervisor shall be mandatory for the eligibility to sit for course examinations. (Annex part 8 -2a of PMDC policy **)
d)Comprehensive examination will comprise of:
Two theory papers of 100 marks each:
i. Paper A: Major and Minor specific subjects (10 Essay Questions 10 marks each)
ii.Paper B: Major and minor specific subjects (10 Short Essay Questions of 05 marks each and 50 MCQs 01 mark each)
iii.The weightage of courses in the theory paper will be as per credit hours
e) Viva Voce Exam of 100 marks: Major and minor specific subjects. The viva voce exam will comprise of all the courses of major and minor specific subjects studied during the course work. Emphasis will be given to research
aptitude of the scholar.
f) The viva will be conducted by the department through a panel of examiners with at least one examiner from one of the other relevant departments of the University or another University as approved by The Vice Chancellor, RMU.
g) Passing marks for PhD Comprehensive examination will be 60%.
h) PhD Candidates will only be allowed a maximum of two chances to clear comprehensive examination within two years of enrolment in the PhD program as per HEC policy.
i)In case of not qualifying the comprehensive examination in two (02) attempts student will no longer retain the status of "PhD candidate" of the university.
j) The comprehensive examination mentioned for the scholar will be prepared and conducted by PhD Research Monitoring Committee & ARSC .

6.8. Standard of Passing the course work

- Cleared the semester exams.
- Cleared the comprehensive exam

6.9. Evaulation of the Program

The evaluation of the training program will be done by
a. The Students
b. The Faculty members (Program team Members)
c. The Supervisor/s
d. Self Assessment with External and Internal Evaluators
This will be carried out by filling the HEC Program Evaluation Proforma by the concerned member followed by analysis and reporting.

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7. RESEARCH (SYNOPSIS AND THESIS)

7.1. Preparation and Approval of Synopsis by BASR

a) In consultation with the supervisor/co-supervisor, the candidate will finalize research topic during first semester of the doctoral studies and positively will get it approved from his Academic and Research Supervisory Committee (ARSC)
b) As per approved research topic, the candidate will prepare the synopsis as per format of the university, in consultation with the supervisor/co-supervisor, during second semester of the doctoral studies and positively will get it approved from his Academic and Research Supervisory Committee (ARSC), Ethical Review Board (ERB) and Board of Advanced Study and Research of the university (BASR).
c) After completion and passing of course work with CGPA of ≥3.0/4.0 and of scholar, and passing Comprehensive Examination with 60% marks, the student can start the research work

7.2. Registration

To be registered as a "PhD Scholar" with the RMU, candidates must submit following documents to the Dean:
i. Completion of 18 Credit Hour Coursework
ii. Passing the Comprehensive Examination
iii. Approval of Synopsis by ERB & BASAR of the University

7.3. Suspension of Registration:

Where a PhD Scholar is unable to continue with their research program because of severe issues like health, family problems and financial reasons, BASAR may suspend their registration for a specified period of maximum up to 1 year.

7.4. Progress Report

a) There will be a bi-annual review of research progress of the PhD Scholar by the Supervisor
b) At the end of every six months after confirmed registration, PhD scholar would submit a summary of the progress of the research work through the Supervisor to dean.
c) In case of more than two unsatisfactory reports forwarded to the PhD Committee, the scholar will be notified in written and given reasonable opportunity to respond to the PhD Committee. In Case PhD Scholar fails to satisfy the committee, the committee shall recommend removal of his/her name from university register.
d) There will be a time of 15 days given to the scholar to appeal to the BASAR through the Vice Chancellor against the decision and final decision BASAR will be implemented.

7.5 THESIS

7.5.1. Thesis Supervision

a) Supervisor & co-supervisors should be the full-time faculty members of the university and must be from the specialty that the student is enrolled in.
b) Eligibility of the Supervisor/co-supervisor will be in line with the HEC/PM&DC guidelines.

c) DEAN may also appoint a co-supervisor from any other related department to provide the link if the research is of an interdisciplinary nature or if the research is being undertaken in collaboration with another organization.

7.5.2. Modification /Change of Research Topic

a) A candidate may modify/change the topic of his/her research with the approval of the BASAR by submitting an application, duly supported by the Supervisor, DEAN and recommended by the PhD Committee.
b) The students can perform research/experiments at other HEC recognized universities/multidisciplinary Laboratories, subject to approval by the student supervisor, Dean & VC RMU.

7.5.3. Freezing of Registration/Discontinuation of PhD Research

HEC/PM&DC rules will be followed for termination or freezing of PhD program:
a) Where a PhD Scholar is unable to continue with their research program because of severe issues like health, family problems and financial reasons, BASR may suspend their registration for a specified period of maximum
up to 1 year.
b) The Scholar must be able to satisfy the BASR of the University that any period of freezing will not adversely affect the viability of the candidate's research after consultation with the Supervisory Committee and DEAN.
c) Any period of freezing will be excluded from the calculation of the final submission date.
d) While registration is suspended, a Scholar is exempted from fees, and is not entitled to any tuition or supervision, or to the use of any other research resources of the University.

7.5.4. Thesis Submission

a) The supervisory committee advises the student throughout the conduct and completion of the doctoral research project, including the writing and defence of a Dissertation.
b) Thesis submission should be done within three to eight years of enrolment in the program.
c) Submitted thesis must accompany the plagiarism report along with all other documents prescribed by the Examination department of RMU
d) At the time of thesis submission, the supervisor would submit a list of the suitable local & foreign examiners that have relevant subject expertise through the DEAN to Controller of examination for approval.

7.5.5 Policy for PhD Thesis Writing

The thesis submitted by a PhD candidate shall comply with the following conditions:
a) It shall form a distinct contribution to knowledge and afford evidence of originality, shown by the discovery of new facts, by the exercise of independent critical judgment, and/or by the invention of new methods of investigation.
b) It shall not include research work for which a degree has already been conferred in this or any other university.
c) It shall be written in English and the presentation must be satisfactory for publication.
d) Any part of the thesis which has been published before submission of the thesis may be appended at the end of the thesis.

e) If a student who is re-admitted to PhD program and had previously spent the minimum period of three years as a PhD student, he/she may be allowed to submit the thesis after one year from the date of his/her readmission.

7.5.6. Guidelines for Thesis Format

All thesis presented in typescript for the degree of PhD should comply with the following specifications unless permission to do otherwise is obtained from the relevant authority.

- SIZE OF PAPER. A4 size be used, no restriction is placed on drawings and maps.
- PAPER SPECIFICATION. Six copies on good quality paper (minimum 80g).
- METHOD OF PRODUCTION. The text must be typewritten in acceptable type face and the original typescript (or copy of equal quality) must normally be submitted as the first copy. The second and subsequent copies may be produced by means of other acceptable copying methods.
- LAYOUT OF TYPESCRIPT. Typescript should appear on one side only, lines; at least one-and-a-half spaced. Footnotes, quotations, references and photographic captions may be single spaced. Where appropriate, these should contain lists giving the locations of figures and illustrations.
- FONT SIZE Title Page Headings / subheadings, Text, Footnotes, Footnotes be given on the same page where reference is quoted
- TYPE STYLE. Times New Roman / Arial / Courier New
- MARGINS. At least 1⅓4 -1⅓2 inches (3.17-3.81cm) on the left-hand side, 3/4 - 1 inch (2 - 2.54cm) at the top and bottom of the page, and about ⅓2 - 0.75 inches (1.27 - 1.90cm) at the outer edge. The best position for the page number is at top-centre or top right ⅓2 inch (1.27 cm) below the edge. Pages containing figures and illustration should be suitable paginated.
- The thesis shall be hard bound with maroon cloth cover and golden lettering on the front and the spine.
- Spine of the thesis should show "PhD thesis" on top across the width of spine, name of the candidate in the middle along the length of spine, and the year of submission across the width at the bottom. Lettering on spine should be in 18 pt. and may be in boldface.

7.5.7. General Layout of Thesis

- Title page
- Abstract / Summary
- Acknowledgements
- Abbreviations
- Contents
- List of Tables (where applicable)
- List of Figures (where applicable)
- Introduction (including literature review)
- Material and Methods
- Results May be comprised of one chapter or a number of chapters depending upon the subject matter/ requirements
- Discussion (including Conclusion(s),

- Limitations of the study
- Recommendation(s)
- References / Bibliography / Literature Cited
- Appendices (where applicable)
- Any other information specific to the respective discipline

7.5.8. Evaluation of Thesis

a) The thesis will be presented by the student in Thesis Review Committee (TRC) to be notified by the Dean ofFaculty/Director BASAR.

b) After satisfactory report of the TRC, the scholar shall submit six unbound copies of his/her thesis written on a prescribed format to the Dean's office through Supervisor and Chairman of the Department.

- *03 for external*
- *01 for examination section*
- *01 for department office*
- *01 for the supervisor*

c) External Evaluation is one of the main elements for PhD research work as per HEC policy to get confidence of research work. The PhD thesis must be evaluated by:

At least two external experts who shall be:

i. PhD faculty member from the world top 500 universities ranked by the Times Higher Education or QS World Ranking in the year corresponding to dissertation evaluation year OR

ii. Pakistan-based Distinguished National Professors, from any national university with PhD degree.

d)The supervisor shall suggest a panel of at least six external examiners from approved list.

e)The vice-chancellor shall appoint three external examiners from the suggested panel to evaluate the thesis.

f) Each examiner will be provided with an electronic copy of the thesis and, acting independently, is required to provide the Controller of Examinations within two months of receipt of the thesis, with a written report on the quality of the thesis. If there is no response from examiner in two months after two reminders, the examiner will be replaced.

g) The examiners can suggest either of the following option:

• To award the degree, subject to satisfactory performance at the oral examination.

• To award the degree after specified "minor corrections" have been made to the thesis, to the satisfaction of the oral examiner, by a specified date, and subject to satisfactory performance at the oral examination.

• To permit the candidate to revise the thesis to incorporate the major changes suggested and resubmit it for examination.

h)If the thesis is adjudged as adequate by two of the three examiners, the research board shall allow the candidate to appear in the viva-voce (thesis defense) examination.

i)If two of the three examiners find that the thesis is wholly inadequate it may be rejected by the research board.

j) In case of recommendations of minor or major corrections, the scholar would be asked to submit the correction within a specific period for further evaluation.

k)The revised version of the thesis shall be approved by the same examiner who suggested modification/revision of the thesis.

l) After corrections have been incorporated in accordance with the comments of external examiners; two copies of thesis in loose binding, to be sent to viva-voce examiners.
m) The evaluation reports of the examiners would be considered in the BASAR.
n) The scholar would be allowed to proceed to the oral examination if the evaluation reports approve her/his thesis.

A copy of PhD Dissertation (both hard and soft) must be submitted to HEC for placing/including in PhD Country Directory and for attestation of the PhD degree by the HEC in future.

7.5.9. Public Defense & Oral Examination:

a. An open defense of Dissertation after positive evaluation of Dissertation is essential part of PhD Program.
b. The Controller of Examinations will arrange thesis examination.
c. Two external examiners will be appointed by the vice-chancellor from the panel approved by the research board, the supervisor and the chairman of the department concerned.
d. The viva-voce examination shall be open to the public but the evaluation will be done only by the panel of examiners.
e. Before the Oral examination, thesis will be presented by the scholar for public defense.
f. Public defense will be open for the entire faculty and student participation will be compulsory.
g. The examination must be attended by the Candidate, the Oral Examiners, and the DEAN or his Nominee.
h. The main supervisor or co-supervisor will also be present.
i. The examiners will be provided the evaluation report of the thesis by foreign and local examiners.
j. If the candidate fails to satisfy the examiners in viva-voce examination he/she may be given a chance to defend thesis for second and final time within a period of six months.
k. On completion of the oral examination, the DEAN will provide a written report endorsed by the Examiners.

The report can include following recommendations:

1. To award the degree, subject to satisfactory performance at the oral examination.
2. To award the degree after specified “minor corrections” have been made to the thesis, to the satisfaction of the oral examiner, by a specified date, and subject to satisfactory performance at the oral examination.
3. To permit the candidate to revise the thesis to incorporate the major changes Suggested and resubmit it for examination.
4. An open defense of the dissertation will be conducted after positive evaluation of the dissertation by the committee members.
5. After considering all the reports of the examiners, the DEAN will make the final decision as to the award of the PhD degree.

i. After viva-voce examination; four copies of final hard-bound thesis be submitted:
    i. 01 for examination section
    ii. 01 for central library

iii. *01 for departmental office*
iv. *01 for supervisor*

7.5.10 Support and counselling of PhD Scholars:

The University in collaboration with the profession, will ensure that a system for support, counselling and career guidance of trainees. Counselling shall be provided based on monitoring the progress in training and program.

7.5.11 Leave Rules for PhD Scholars:

Casual leave not exceeding 24 days per year shall be admissible. More than 10 days leave at one time shall not be allowed. Leave on medical grounds shall be admissible on production of medical certificate by the Medical Officer as per Punjab Medical Attendance Rules. However, if medical leave is continued and exceeds one month, the scholar may have to freeze that semester.

8. Criteria for Award of PhD Degree

- Completion of 18 credit hours of course work along with 30 hours of research work
- **Cleared all semester exams**
- **Cleared the comprehensive exam** If yes, then the evidence of clearing the comprehensive exam
- **The dissertation examined or to be examined by at least two foreign examiners and one national examiner.** If the scholar has completed his/ her dissertation then the dissertation has to be examined by minimum of two foreigner examiners preferably from technologically advanced countries and one national examiner.
- **Has the dissertation been defended** If yes, then provide the details including date of defense, whether it was an open defense, notification of the defense etc.
- **Submitted paper for publication in HEC approved journals.** The scholar has to publish at least 2 research papers in HEC approved journal for the purpose to attain Ph.D. Degree. For this purpose, if the paper is published then the evidence of publication is to be submitted; if the paper is accepted for publication, then the documentary proof of acceptance from the journal will be submitted.

  RMU PhD Publication Policy:

  For award of PhD degree, a PhD researcher shall be required to publish research articles meeting the following criteria:

  a. At least one research article in W category journal or two research articles in X category journals (HEC policy 2023)*
  b. The PhD researcher shall be the first author of these publications. That will be followed by supervisor, cosupervisor and any other contributor.
  c. The research article shall be relevant to the PhD research work of the PhD researcher.
  d. The article shall be published after approval of the research synopsis.
  e. The article shall be published in a relevant research journal.

- A candidate who successfully completes all the requirements shall be awarded, with the approval of the research board and syndicate, degree of Ph.D under the seal of university.
- The vice-chancellor may approve the recommendations of the research board on behalf of the syndicate regarding the award of Ph.D degree to the candidate.

8.1. HEC Requirements at completion of Degree:

The following documents will be submitted to the HEC following the completion of studies:
a) A duly filled completion form will be sent to the HEC from the Office of the Controller of Examinations of the university notifying the HEC that the PhD scholar has completed all the requirements for the award of the PhD degree.
b) A Copy of PhD Dissertation for including in PhD Country Directory and for attestation of the PhD degree by the HEC.
c) A duly filled Performa for the PhD Country Directory signed by the Principal Supervisor, Controller of Examination and the Vice Chancellor.

8.2. PMDC Requirements at completion of Degree:

All PG students after completing their PhD degree shall be registered by the Council (PMDC policy 2023) **

9. Pharmacology Department & PhD Program Resources

10.1. Introduction to Pharmacology Department

A dynamic and rapidly developing field, Pharmacology is the knowledge of drugs, or more generally, the study of the effects of drugs on living organisms, including humans. As an intellectual discipline, Pharmacology bridges basic and clinical sciences. It is based on the biochemical changes the drugs can produce in physiological systems and reverse the abnormalities occurring in the pathological states, e.g. injury, allergy, infections and neoplasms, etc. The drugs tend to eradicate the causative factors and to control the adverse symptoms produced by various noxious stimuli and help to replenish the physiological conditions. Thus the study of Pharmacology is involved in bringing abnormalities of Pathology back to Physiology.

The Department of Pharmacology at Rawalpindi Medical University is involved in teaching in different phases of undergraduate and postgraduate programs (MBBS, MD, MS and FCPS, etc.). Our goal is to advance the fundamental understanding of the pharmacological basis of treatment of diseases. In fact the patho-physiologic mechanisms of many clinical problems became evident because of the pharmacological studies related to the effects of drugs on the biochemical processes in such conditions. Besides, the sound knowledge of Pharmacology is mandatory for the appropriate application of medicaments in the treatment of diseases.

Rawalpindi Medical University is offering an ongoing M. Phil Programs in Biochemistry, Microbiology and Pharmacology, and has been recently approved by HEC, Islamabad for the PhD program in Microbiology, Biochemstry, Chemical Pathology and Molecular Pathology, as well as Pharmacology. It is hoped that the launching various PhD programs at RMU would develop a culture of teaching, research and team work, and further potentiate our efforts to upgrade the level of medical education, research and ultimately the patient care in the institution.

9.2. Faculty and Teaching Staff of Pharmacology Department

Designation	Name	Qualifications
Professor	Dr. Mohammad Akram Randhawa	MBBS, M Phil (Gold Medalist), PhD, Fellowship Clinical Pharmacology (UK)
Associate Professor	Dr. Zunera Hakim	MBBS, M Phil, CHPE, PhD
Assistant Professor	Dr. Attiya Munir	MBBS, M. Phil (Gold Medalist)
Assistant Professor	Dr. Haseeba Talat	MBBS, M. Phil
Lecturer	Dr. Omaima Asif	MBBS, CMT
Lecturer	Dr. Arsheen Arshad	MBBS
Lecturer	Dr. Uzma Umar	MBBS, MPhil Trainee
Lecturer	Dr. Zoefishan Fatima	MBBS
Lecturer	Dr. Maimuna Kanwal	MBBS
Lecturer	Dr. Zaheer Sheikh	MBBS
Lecturer	Dr Saba Sarfraz	MBBS
Lecturer	Dr Ayesha Anwar	MBBS

9.3. List of Equipment in Pharmacology Department

S. No	Name of Equipment	Quantity
1	Personal computers with printers	02
2	Multiple Power lab with accessories for all kind of experiment related to GIT, CVS, Respiration, CNS and Skeletal Muscle on isolated tissues and intact subject	01
3	Kymograph (3CF Plamer + 4 SRI + 2 Howard)	25
4	Howard tissue Bath	08
5	Oscillograph (4 Channel + 2 Channel)	03
6	Spectrophotometer	01
7	Automatic Pipettes	03
8	Hot Air Oven	01
9	pH Meter	01
10	Water Distillation Machine apparatus	03
11	Electronic Balance	04
12	Analytical Balance	01
13	Centrifuge Machine (Hermle)	01
14	Computer with HP Laser printer	02
15	Oxygen Gas cylinder	10
16	Magnetic Stirrer with Hot Plate	01

9.4 Facilities

Animal House: At RMU ;In process.
MOU signed with NIH
Library

- Available space including seating capacity: Eighty students
- Total No. of Books = More than 21 thousand
- Total Journals: 133 (Pakistani: 41 & Foreign: 92)

March 2023 onwards Digital library is accessible to all students & faculty (24 hours service via digital Library).
Books Available in the Library for Specialty

LIST OF BOOKS

Author	TITLE OF BOOKS
H.P.RANG	PHARMACOLOGY
D.R.LAURENCE	CLINICAL PHARMACOLOGY
P.N. BENNETT	CLINICAL PHARMACOLOGY
B.G. KATZUNG	BASIC & CLINICAL PHARMACOLOGY

JAMES CROSLAND	LEWIS'S PHRAMACOLOGY
GOODMAN & GILMAN'S	THE PHARMACOLOGICAL BASIS OF THERAPEUTICS
LAUREENCE BRUNTON	GOODMAN & GILMAN'S THE PHARMACOLOGICAL BASIS OF THERAPEUTICS
KAREN WHALEN	LIPPINCOTT'S ILLUSTRATED REVIEWS PHARMACOLOG (SAE)
ANTHONY J.TREVOR	KATZUNG & TERVOR'S PHARMACOLOGY INTERNATIONAL EDITION (EXAMINATION & BOARD REVIEW)
RICHARD A. HARVEY	LIPPINCOTT'S ILLUSTRATED REVIEWS PHARMACOLOG
VISOVSKY	INTRODUCATION TO CLINICAL PHARMACOLOGY
ED.ROGER WALKER	CLINICAL PHARMACOLOGY AND THERAPEUTICS
GOBIND RAI GARG	EXPERIMENTAL PHARMACOLOGY FOR UNDERGRADUATE STUDENTS
GOBIND RAI GARG	REVIEW OF PHARMACOLOGY
SUSAN M.FORD	ROACH'S INTRODUCTORY CLINICAL PHARMACOLOGY INTERNATIONAL EDTION
SUSAN E. RALSTON	REVIEW AND APPLICATION OF CLINICAL PHARMACOLOGY
GEORGE M BRENNER	PHARMACOLOGY
LYNN WECKER	BRODY'S HUMAN PHARMACOLOGY MOLECULAR TO CLINICAL
JOYCE L.KEE	PHARMACOLOGY(A NURSING PROCESS APPROACH)
H.P.RANG	RANG AND DALE'S PHARMACOLOGY INTERNATIONAL EDITION
OSOL	REMINGTONS PHARMACOLOGY SCIENCES
ED.ALFONSO R. GENNARO	REMINGTON
RUTH WOODROW	ESSENTIALS OF PHARMACOLOGY FOR HEATH OCCUPATIONS
LOYD V. ALLEN	PHARMACEUTICAL DOSAGE FORMS AND DRUG DELIVERY SYSTEMS(INTERNATIONAL EDITION)
NORMAN HOLLAND	CORE CONCEPTS IN PHARMACOLOGY
ENID A. NEIDLE	PHARMACOLOGY AND THERAPEUTICS FOR DENISTRY
BERTRAM G. KATZUNG	PHARMACOLOGY EXAMINATION AND BOARD REVIEW
KD TRIPATHI	ESSENTIALS OF MEDICAL PHARMACOLOGY
KD TRIPATHI	KD TRIPATHI'S MCQ IN PHARMACOLOGY
VIJAYA M. WAGHULKAR	GRADUATE PHARMACY APITUTE TEST
SUZANNE J. BARON	PHARMACOLOGY FLASH CARDS (189 HIGH YIELD CARDS EVERY ONE WITH A CLINICAL VIGNETT)

M.M.DALE	RANG AND DALE'S PHARMACOLOGY REVIEW FIRST SAE
LEONARD S. JACOB	PHARMACOLOGY (THE NATIONAL MEDICAL SERIES FOR INDEPENDENT STUDY
SUSHAMA TALEGAONKAR	PHARMACEUTICAL TECHNOLOGY A PRACTICAL MANUAL
COOPER AND GUNN'S	TUTORIAL PHARMACY
ED. MICHAEL E. AULTON	AULTON'S PHARMACEUTICS (THE DESIGN AND MANUFACTURE OF MEDICINE) INTERNATIONAL EDITON
BERTRAM G. KATZUNG	BASIC & CLINICAL PHARMACOLOGY
BERTRAM G. KATZUNG	BASIC & CLINICAL PHARMACOLOGY
H.P.RANG	PHARMACOLOGY
D.R LAURENCE	CLINICAL PHARMACOLOGY
ANDRES GOTH	MEDICAL PHARMACOLOGY
CHARLES R. CRAIG	MODERN PHARMACOLOGY APPLICATIONS
LEON SHARGEL	APPLIED BIOPHARMACEUTICS & PHARMACOKINETICS
ED.E.A RAWLINS	BENTLEY'S TEXTBOOK OF PHARMACEUTICS
MICHAEL D RANDALL	DISEASE MANAGEMENT (A GUIDE TO CLINICAL PHARMACOLOGY
PRASUN K DAS	PHARMACOLOGY
DR.U.N.PANDA	ESSENTIALS OF PHARMACOLOGY
FRANK HARTLEY	BRITISH PHARMACOPOEIA VOL-I
D GANDERTON	BRITISH PHARMACOPOEIA VOL-I INTERNATIONAL EDITION
ED.RICHARD A. HARVEY	LIPPIONCOTT'S ILLUSTRATED REVIEWS SAE
DAVID E. GOLAN	PRINCIPLES OF PHARMACOLOGY THE PATHOPHYSIOLOGIC BASIS OF DRUG THERAPY (INTERNATIONAL EDITION)
MICHAEL D.KATZ	PHARMACOTHERAPY PRINCIPLES & PRCTICE (STUDY GUIDE
DR. MUHAMMAD NAUMAN SHAHID	NAUMAN'S TEXTBOOK OF PHARMACOLOGY
GEORGEM.BRENNER	BRENNER AND STEVENS' PHARMACOLOGY (STUDY SMART WITH STUDENT CONSULT
BIREN SHAH	TEXTBOOK OF PHARMACOGNOSY &
PAMELA FLOOD	STOELTING'S PHARMACOLOGY & PHYSIOLOGY IN ANETHETIC PRACTICE
PROF.MAQSOOD AHMAD CHEEMA	LECTURE ON PHARMACOLOGY & THERAPEUTICS ON DRUGS ACTING ON CNS & CVS
PROF.MAQSOOD AHMAD CHEEMA	MULTIAUTHOR TEXTBOOK OF PHARMACOLOGY AND THERAPEUTICS VOL-I
ED.JAMES E. F.REYNOLDS	MARTINDALE THE EXTRA PHARMACOPEIA
BERGERSEN	PHARMACOLOGY IN NURSING

REYNOLD SPEETOR	THE SCIENTIFIC BASIS OF CLINICAL PHARMACOLOGY PRINCIPLE AND EXAMPLES
M.J.NEAL	MEDICAL PHARMACOLOGY AT A GLANCE
CURTIS D. KLAASSEN	CASARETT ESSENTIALS OF TOXICOLOGY
JOANNE I.MOORE	PHARMACOLOGY
ED. VANDANA B. PATRAVALE	PHARMACEUTICAL PRODUCT DEVELOPMENT (INSIGHTS INTO PHARMACEUTICAL PROCESSES
VIKAS DHIKAV	SMART STUDY SERIES PHARMACOLOGY
CESARE IRTORI	CLINICAL PHARMACOLOGY (MCGRAW-HILL CLINICAL MEDICINE SERIES
JANE A. FOX	PRIMARY HEALTH CARE OF YOUNG
HOWARD C. ANSEL	PHARMACEUTICAL CALCULATIONS
CHARLES D. CICONE	PHARMACOLOGY IN REHABILITATION
ED.HARRY DYM	CLINICAL PHARMACOLOGY FOR DENTIST (CLINICS REVIEW ARTICE DENTAL CLINICS OF NORTH AMERICA)
GARY C. ROSENFELD	BRS PHARMACOLOGY (SAE BOARD OF REVIEW SERIES)
GARY C. ROSENFELD	ASSESSMENT
GARY C. ROSENFELD	BRS PHARMACOLOGY (SAE BOARD OF REVIEW SERIES)
BIKASH MEDHI	PRACTICAL MANUAL OF EXPERIMENTAL AND CLINICAL PHARMACOLOGY
H L ELLIOTT	SELF- ASESSMENT IN CLINICAL PHARMACOLOGY
DR.Y.K. GUPTA	PHARMACOLOY & THERAPEUYICS (WITH EXPLANATORY ANSWERS)
D.G HELATH	PAKISTAN PHARMACOPEIA
JAMES H. LEWIS	A PHARMACOLOGIC APPROACH TO GASTROINTESTINAL DISORDERS
ERIC T. HERFINDAL	CLINICAL PHARMCY AND THERAPEUTICS
MARGARET A. OHLSON	EXPERIMENTAL AND THERAPEUTIC DIETETICS
CHARLES R. CRAIG	MODERN PHARMACOLOGY
HEINZ LULLMANN	COLOR ATLAS OF PHARMACOLOGY
ROEMARIE EINSTEIN	PHARMACOLOGY SELF-ASSESSMENT QUESTION FOR STUDENTS
JAMES M.RITTER	A TEXTBOOK OF CLINICAL PHARMACOLOGY
ANDREW WISON	APPLIED PHARMACOLOGY LOW PRICE EDITION
ED. SJ CARTER	COOPER & GUN'S DIPENSING OR PHARMACEUTICAL STUDENTS
LOUIS S. GOODMAN	THE PHARMACOLOGICAL BASIS OF THERAPEUTICS VOL-II
LOUIS S. GOODMAN	THE PHARMACOLOGICAL BASIS OF THERAPEUTICS
ED.HAROLD KALANT	PRINCIPLES OF MEDICAL PHARMACOLOGY
CLARK BRATER JOHSON	GOTH'S MEDICAL PHRAMACOLOGY

M.M.DALE	COMPANION TO PHARMACOLOGY (A STUDY GUIDE FOR SELF ASSESSMENT AND REVISION
ANDRES GOTH	MEDICAL PHARMACOLOGY INTERNATIONAL STUDENT EDITION
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D.B. CRIGHTON	CONTROL OF OULATION
ED.DAVID R MORGAN	THEBMA GUIDE TO PESTICIDES, CHEMICALS AND HEALTH
P.D SETHI	QUANTITATIVE ANALYSIS OF DRUG IN PHARMACEUTICAL FORMULAITON
BV ROBINSON	MULTIPLE CHOICE QUESTION IN PHARMACOLOGY
MARSHAL SHALFER	PRE TEST PHARMACOLOGY
PRATIBHA NAND	PHARMACEUTICAL DISPENSING
V.N.RAJA	PHARMACEUTICAL CHEMISTRY I FOR 1ST YEAR DIPLOMA IN PHARMACY
AMTESWAR SINGH JAGGI	VIVA VOCE IN EXPERIMENTAL PHARMACOLOGY
JANET L. STRINGER	BASIC CONCEPTS IN PHARMACOLOGY WHAT YOU NEED TO KNOW FOR EACH DRUG CLASS
ED. RONALD H. GIRDWOOD	CLINICAL PHARMACOLOGY
ED.MICHAEL PECKHAM	SCIENTIFIC BASIS OF HEALTH SERVICES
MICHAEL D.DAY	AUTONOMIC PHARMACOLOGY
ED.MICHAEL BRIGG	PROGRESS IN HORMONE BIOCHEMISTRY AND PHARMACOLOGY VOL-I
WILLIAM A. SATARIANO	EPIDEMIOLOGY OF AGING AN ECOLOGICAL APPROACH
KESHAB MUKHOPADHYAY	PRACTICAL PHARMACOLOGY FOR UNDERGRADUATE WITH MCQs
G McCARTHY	MCQ FOR HIGHER EXAMINATION IN CLINICAL PHARMACOLOGY
DARYL CHRIST	HIGH YIELD PHARMACOLOGY
ED.RONALD H. GIRDWOOD	CLINICAL PHARMACOLOGY
DR.V. SREENIVASULU	PHRAMACEUTICAL BIOTECHNOLOGY
ED.MARGARET HARVEY	DOSAGE CALCULATION MADE INCREDIBLY EASY
HOWARD ABAFINDKY	DRUG USE AND ABUSE A COMPREHENSIVE INTRODUCTION
PATRICIA E. MOLINA	DRUG INFORMATION A GUIDE FOR PHARMACISTS
ED.LI DI KERNS	BLOOD- BRAIN BARRIER IN DRUG DISCOVERY
KD TRIPATHI	PHARMACOLOGICAL CLASSIFICATION OF DRUG WITH DOSES AND PREPARATION
ALISTAIR HOWARD GRAY	POCKET COMPANION CLINICAL PHARMACY
RICHARD FIELDS	DRUGS IN PERSPECTIVE
ED. JENS T. CARSTENSEN	DRUG STABILITY PRINCIPLES AND PRACTICE
JP GRIFFIN	ADVERSE DRUG INTERACTION

NORMAN F. BILLUPS	AMERICAN DRUG INDEX
KENNETH A. CONNORS	A TEXTBOOK OF PHARMACEUTICAL ANALYSIS
MARK ALLEN	THE CERTIFIED PHARMACEUTICAL GMP PROFESSIONAL HAD BOOK
JHON L. REID	LECTURE NOTES ON CLINICAL PHARMACOLOGY
DR.JAGJEET SINGH	DRUG AND POISONS
ED.LINDA J DODDS	DRUGS IN USE CASE STUDIES FOR PHARMACISTS AND PRESCRIBERS
VIKAS DHIKAV	DRUG CLASSIFICATION IN PHARMACOLOGY
DAVID SCHLOSSBERG	ANTIBOTICS MANUAL A GUIDE TO COMMONLY USED ANTIMICROBIALS
UN PANDA	MANUAL OF MEDICAL THERAPEUTICS
DONALD J BIRKETT	POCKET GUIDE PHARMACOKINETICS MADE EASY
VIKAS DHIKAV	SMART STUDY SERIES PHARMACOLOGY
VIKAS DHIKAV	LAST MINUTE REVISION IN PHARMACOLOGY 2ND
GEORGE M BRENNER	PHARMACOLOGY FLASH CARD
ROSENBAUM	BASIC PHARMACOKINETICS AND PHARMACOKYNAMICS
ED. DAVID G WATSON	PHARMACEUTICAL CHEMISTRY
H.P.RANG	RANG & DALE PHARMACOLOGY INTERNATIONAL EDITION
ED.STEFAN R. SCHMIDT	FUSION PROTEIN TECHNOLOGIES FOR BIOPHARMACEUTICALS APPLICATION AND CHALLENGES
MUHAMMAD SHAMIM	REVISED EDITION CINCO BASIC PHARMACOLOGY A RAPID REVIEW FOR UNDERGRADUATE & POSTGRADUATE
MUHAMMAD MUNIR AHMED	HANDBOOK OF APPLIED PHARMACOLOGY
HL SHARMA	PHARMACOLOGY FOR PHYSIOTHERAPIST
VISOVSKY	INTRODUCTION TO CLINICAL PHARMACOLOGY
R.W. FOSTER	BASIC PHARMACOLOGY
ED.DAVID ROBERSON	MANUAL OF CLINICAL PHARMACOLOGY
MITCHELL J. STOKLOSA	PHARMACEUTICAL CALCULATIONS
DAVID R. BICKERS	MONOGRAPHS IN CLINICAL PHARMACOLOGY OF SKIN DISEASE
DR. AMNA IQBAL	PASTTEST OF UHS PHARMACOLOGY (PATHOLOGY, FORENSIC MED.)
ED. MICHAEL BRIGGS	PROGRESS IN HORMONE BIOCHEMISTRY AND PHARMACOLOGY VOL-I
R.W. RYALL	MECHANISMS OF DRUG ACTION ON THE NERVOUS SYSTE
ZANKHANA P. SHETH	PHARMACEUTICAL MICROBIOLOGY I
B.V. ROBISON	MULTIPLE CHOICE QUESTION IN PHARMACOLOGY

SOLOMON H. SNYDER	THE ENCYCLOPEDIA OF PSYCHOACTIVE DRUGS SUBSTANCE ABUSE PREVENTION & TREATMENT
VANESSA BROTTO	CLINICAL DOSAGE CALCULATION FOR AUSTRALIA & NEW ZELAND
ED.M.QUAISAR NEESHAT	PEDIATRIC PHARMA GUIDE
SUNIL NATHA MHASKE	PEDIATRIC DRUGS DOSAGES
IAN KITCHEN	TEXTBOOK OF VIRTO PRACTICAL PHARMACOLOGY
B.V. ROBISON	MULTIPLE CHOICE QUESTION IN PHARMACOLOGY
CHRISTOPHER WALSH	ANTIBOTICS CHALLENGES,MECHANISM, OPPOURTUNITIES

LIST OF JOURNALS

1	RAWAL MEDICAL JOURNAL (RMJ)
2	PAKISTAN JOURNAL OF MEDICAL SCIENCE
3	JOURNAL OF BAHRIA UNIVERSITY MEDICAL & DENTAL COLLEGE (JBUMDC)
4	JOURNAL OF SAIDU MEDICAL COLLEGE, SWAT (JSMC)
5	ISRA MEDICAL JOURNAL
6	JOURNAL OF THE COLLEGE OF PHYSICIANS AND SURGEONS PAKISTAN (JCPSP)
7	PAKISTAN JOURNAL OF PATHOLOGY
8	JOURNAL OF HAEMATOLOGY & STEM CELL RESEARCH (JHSCR)
9	MONTHLY THE PROFESSIONAL MEDICAL JOURNAL
10	JUMDC
11	PEER REVIEWED JOURNAL FROM PAKISTAN

9.5. Current Research Projects of Pharmacology Department

S. No.	Investigators & Department	Title	Status
1	**Prof. Mohammad Akram Randhawa (Pharmacology)**	**Evaluation of a new life-style change, two meals a day with only liquids in between, for the management of GERD**	**Approved by ERB, RMU** **Phase-1:** Completed. Presented in World

	Dr. Sadia Khan, (Family Medicine) Dr. Tayyab Saeed Akhtar (Gastroenterology) Prof. Bushra Khaar (Medicine, Gastroenterology) Prof. Mohammad Umar (Medicine, Gastroenterology)	**Phase-1:** Preliminary study on 60 patients by clinical evaluation of patients after 4 weeks. **Phase-II:** Evaluation by endoscopy, Pre & 2 months post intervention (n=50). **Phase-III:** Evaluation of patient by pH monitoring before and 2 weeks after intervention (n=20).	Clinical Pharmacology (WCP), 2-7 July 2023, Glasgow, UK. Article published in JFCM, Dammam, Saudi Arabia **Phase-1I:** In process **Phase-III:** In process
2	**Prof. Mohammad Akram Randhawa (Pharmacology)** Dr. Khaula Noreen (Community Medicine) Dr. Javeria Malik (Medicine, DHQ) Dr. Tabinda Khalid, Dr. Sobia Nawaz, Dr. Sadia Khan (Gynecology, DHQ)	**Determination of prevalence, knowledge and attitude of Female Sex Disorders (FSD) in elderly women.** **Phase-I:** Pilot study on 30 patients. **Phase-II:** Full study on 150 patients.	**Approved by ERB, RMU** **Phase I:** Completed. Presented in Annual Medical Conference of RMU, 17-18 December, 2022. **Phase-II:** Completed. Published in JRMC.
3	**Prof. Mohammad Akram Randhawa (Pharmacology)** Dr. Khaula Noreen (Community Medicine) Dr. Lubna Mehraj, (Medicine, BBH) Farah Ayyaz, Sadia Khan (Gynecology, BBH)	**A clinical study for the evaluation of efficacy of N. sativa seed oil for FSD in elderly women.** **Phase-I**: Pilot study (40 patients) for evaluation of effectiveness of Black seed (BS) & BS oil in FSD. **Phase-II:** Complete study on 150 patients for evaluation of the effectiveness of BS & BS oil in FSD.	**Approved by ERB, RMU** **Phase-I**: Completed Presented in British Pharmacology Society (BPS) meeting, 2024, Harrogate, UK, 10-12 December 2024 Article submitted in Journalof Khyber University **Phase-II:** In process.
4	**Prof. Mohammad Akram Randhawa (Pharmacology)** Dr. Saima Ambreen , & Dr. Iqra (Medicine Unit-I, HFH), Dr. Ahmed Shoab (MO, Aziz Bhatti Shaheed Hospital, Gujrat). Dr. Asma Umer Khayyam	**Assessment of beneficial interaction of *Nigella sativa* seed (black seed) with antihypertensive drugs in patients with mild to moderate hypertension** **Phase-1:** Cases report: **Phase-II:** Pilot study on 20 patients	**Being submitted for ERB, RMU approval.** **Phase-I:** Completed and presented BPS meeting, Liverpool, UK on 14-9-2022. **Phase-II:** Completed Abstract submitted for presentationat Canadian

	(Health Services Academy, Islamabad).	**Phase-III:** Complete study on 150 patients	Pharmacology & Therapeutic Annual Conference, 2-5 June 2025. An relevant article is being submitted in an International Journal. **Phase-III.** I process **Note:** For PhD students, determination of mode of action in vivo animal study
5	**Prof. Mohammad Akram Randhawa (Pharmacology)** Lubna Mehraj, (Medicine, Ubit-1, BBH) Dr. Saima Ambreen & Dr. Iqra (Medicine Unit-I, HFH). Dr. Asma Umer Khayyam (Health Services Academy, Islamabad)	**Assessment of beneficial interaction of *Nigella sativa* seed (black seed) in diabetes type-2 patients with mild to moderate hyperglycemia** **Phase-I**: Pilot study (n=30) **Phase-II.** Complete study on 150 patients	**Being submitted for ERB, RMU approval.** **Phase-I:** In process **Phase-II:** To be commenced after completion of pilot study. **Note:** For PhD students, determination of mode of action in vivo animal study
6	**Prof. Mohammad Akram Randhawa (Pharmacology)** Dr. Shawana, Sharif, Dr. Nausheen Randhawa, (Dermatology, BBH) Dr. Asma Umer Khayyam (Health Services Academy, Islamabad)	**Clinical study for the evaluation of Black Seed oil for the treatment of dermatology conditions (Tinea, eczema, impetigo)** **Phase-I:** Pilot study on 50 patients **Phase-II:** Full studies on 150 patients for each problem, based on results of pilot study.	**Being submitted for ERB, RMU approval.** **Phase-I:** In process **Phase-II.** To be commenced after completion of pilot study. **Note:** For PhD students, determination of in vitro microbiological assay and mode of action.

9.6. Recent Research publications of Faculty of the Dept. (2018-2024)

1. Talat, H., Khayam, A. U., Randhawa, M. A. Nutraceutical Synergy in the Treatment of Polymorbid Pathology: Black Seed Supplementation in Hypertension, Diabetes, Knee Osteoarthritis and Anxiety - A Case Study. Futur Med [Internet]. 2024;3(4): 50-56. Available from: https://doi.org/10.57125/FEM.2024.12.30.05.

2. Shah SMT, **Randhawa MA**. Medical Ethics in Perspective of Islamic Teachings: An Analytical Study. JRMC [Internet]. 2024 Mar. 28 [cited 2024 Apr. 16]; 28(1). Available from: https://journalrmc.com/index.php/JRMC/article/view/2366

3. **Randhawa MA**, Khan SA, Naseer A, Baqai MT. Non-Pharmacological approach for the management of gastroesophageal reflux disease. Pak J Med Sci. 2024 Jan-Feb;40 (3 Part-II):549-551. doi: 10.12669/pjms.40.3.7291. PMID: 38356802; PMCID: PMC10862460.

4. Mehreen S, Usman M, Rauf K, Naz S, Sultan MARF, **Randhawa MA.** The Validity Of 75gms OGTT For Detection Of GDM Keeping 100gms OGTT As Gold Standard. JRMC [Internet]. 2023 Sep. 26 [cited 2023 Oct. 23]; 27(3).

5. Shahadas Channa, Elhassan Hussein Eltom, **Mohammad Akram Randhawa**. Quaternary amines affect the pupil size comparable to their tertiary amine counterparts. Ann Clin Anal Med 2021, 12(3):254-256; DOI: 10.4328/ACAM.20254.

6. Elhassan Hussein Eltom, Bandar Alenezi, Rahma Hamayun, Jawza Sulaiman Alenezi, Hajar Ghdab Alruwaili, **Muhammad Akram Randhawa**. Knowledge and awareness of doctors about herbal drugs in the Northern Border Region of Saudi Arabia. Ann Clin Anal Med 2021;12(1):78-82

7. **Mohammad Akram Randhawa,** Mohammad Tariq Baqai. An update on epidemiology, pathophysiology and management of dyspepsia. Pakistan Journal of Pharmacology, Vol.37, No.2, July, 2020, pp.115-123.

8. Abdulhakim Bawadekji, Mohd. Imran and **Mohammad Akram Randhawa**. Antimicrobial Effects of the Water Immiscible Solvent Extracts of Olive Tree Leaves. J Pure Appl Microbiol., 2019; 13(4):2189-2194. https://doi.org/10.22207/JPAM.13.4.31

9. Majed Gorayan Alrowaili, **Mohammad Akram Randhawa,** Elhassan Hussein Eltom, Ahmed Hashash Alruwaili, Alwaleed Oqab Altimyat, Fatimah Yousef Albedaiwi, Mona salah Alenzi, Nujud Mohammed Alghasham. Awareness of uses and risks of Paracetamol in students of Northern Border University, Saudi Arabia. Indo-American Journal of Pharmaceutical Sciences (IAJPS), 2019 (06); 11901-11907.

10. Alakloby OM, Alabdulkareem AS, Aljabre SH, **Randhawa MA**, Alakloby EO, Aljabr AS, et al. Clinicopathological correlation of leprosy and response to treatment in Eastern Saudi Arabia. J Dermatol Dermatol Surg, 2019; 23:30-34.

11. **Mohammad Akram Randhawa**, Abdulhakim Bawadekji, Mouhanad Al Ali, Mohamed Habib Oueslati, Jamith Basha. "Antimicrobial Effects of Methanolic Extract of Salvia Officinalis L, Including MRSA and Multidrug Resistant Acinetobacter Baumannii" International Journal of Pharmaceutical and Phytopharmacological Research, 2018, 8(4), 1-5.

12. **Mohammad A. Randhawa,** Mohamed Soliman. A Review of the Developmental, Structural, Biochemical, Pathophysiological and Pharmacological Similarities between Male & Female Genitals. Journal of the North for Basic and Applied Sciences (JNBAS). (2018/1439 H), Vol. (3), Issue (1), 71-90.

9.7. Research Presentations (Mostly in International Scientific Conferences):

1. **Mohammad A. Randhawa**, Sadia A. Khan, Tayyab S. Akhter. Akram's Lifestyle, a Novel Remedy for Gastroesophageal Reflux Disease-Mini Review. Presented at BPS meeting, 10-12 Decmber 2024, Harrogate, UK.

2. Khaula Noreen, Farah Ayyaz, Lubna Meraj and **Mohammad Akram Randhawa.** Evaluation of oral black seed (Nigella sativa) and topical black seed oil for management of Female Sex Disorders - pilot study. Presented at BPS meeting, 10-12 Decmber 2024, Harrogate, UK.
3. **Mohammad Akram Randhawa**, Haseeba Talat, Ahmed Shoab, Saima Usman Qureshi. Benefits of black seed supplementation with allopathic medicines in patient having hypertension, diabetes, knee osteoarthritis and anxiety - case report. 16th Congress of European Association for Clinical Pharmacology and Therapeutics (EACPT) 8-11 June, 2024, Rotterdam, The Netherlands.

4. Hasseba Talat, Saima Ambreen, Ahmad Shoaib Perwaiz, Sadia Aziz, **Mohammad Akram Randhawa.** Effect of *Nigella sativa* supplementation with allopathic medicines in control of hypertension. 6th RMU International Scientific Conference, 17th to 24th December 2023.

5. **Randhawa MA,** Khan S and Khan J. Clinical study for the evaluation of a new life-style for management of GERD, 19th World Congress of Basic and Clinical Pharmacology (WCP2023), 2-7 July 2023, Glasgow, UK.

6. **Mohammad A Randhawa,** Rubina Kausar and Sadia Khan. Beneficial Interaction of black seed with allopathic medicines in hypertensive patients -cases report. British Pharmacological Society meeting, 14 Sep 2022, Liverpool, UK.

7. Sadia Khan **Mohammad Akram Randhawa** and Mohammad Tariq Baqai. Beneficial Interaction of black seed with allopathic medicines in hypertensive patients-cases report. British Pharmacological Society meeting, 13 Sep 2022, Liverpool, UK. 5.

8. Mohammad Akram Randhawa. A new life-style change for management of Gastro-esophageal Reflux Disease (GERD). Troopers Research Day, 13 June, 2022, Core Commander Headquarter, Lahore Cantt.

9. Mohammad Akram Randhawa, Sadia Khan, Aqsa Naseer and Javeria Khan. An update on management of gastroesophageal reflux disease (GERD), with particular reference to a new intervention. Annual Research Day, 27th May, 2022, CMH Lahore Medical College & Institute of Dentistry, Lahore.

10. Khaula Noreen, Tabinda Khalid, Sobia Nawaz, Sadia Khan, Javeria Malik and **Mohammad A. Randhawa**. Estimation of prevalence, awareness and feelings of middle aged and elderly ladies regarding Female Sex Disorders-a pilot study. 5th International Scientific Conference, 22-23 December 2021, Rawalpindi Medical University, Rawalpindi.

11. **Mohammad A Randhawa** and Salman A Malik (2020). Ionization status of drugs has poor association with their transmembrane diffusion. CSPT 2020 Virtual Conference of Canadian Society of Pharmacology & Therapeutics, June 10 to 12, 2020.

12. **Mohammad A Randhawa**, and Mohammad T Baqai. Long term benefits of a new life-style change for the management of GERD – A case report. CSPT 2020 Virtual Conference of Canadian Society of Pharmacology & Therapeutics, June 10 to 12, 2020.

13. **Mohammad Akram Randhawa** and Qiuwei (Abdullah) Pan. Historical aspects of Black Seed (Nigella sativa) and their link to present day scientific investigations. Abstract of oral presentation published in the abstract book of International Meeting on Traditional & Alternative Medicine (Traditional Medicine 2018). July 23-24, 2018 at Osaka, Japan.

14. **Mohammad Akram Randhawa**, Abdulhakim Bawadekji, Mouhanad Al Ali, Jamith Basha. Methanolic extract of Salvia officinalis L. (Maramia) possesses antimicrobial activity against MRSA, Enterococcus faecalis, multidrug resistant Acinetobacter baumannii and Candida albicans. Poster presented at the "The 18th World Congress of Basic and Clinical Pharmacology (WCP2018), July 1 - 6, 2018; Kyoto, Japan.