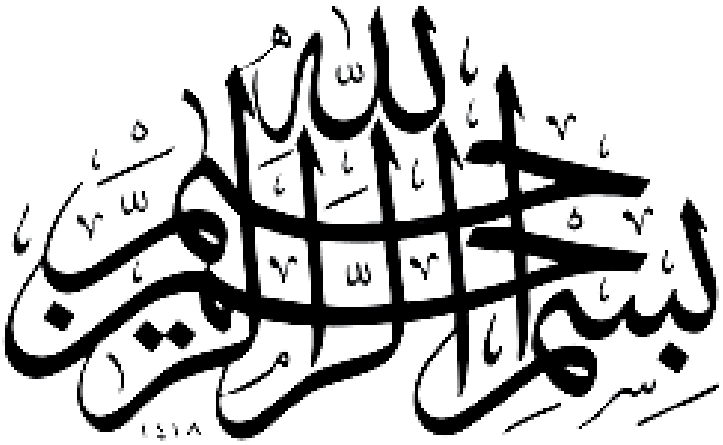
Rawalpindi Medical University

CURRICULUM

PhD PROGRAM

PHYSIOLOGY

(2024)



In The Name Of Allah The Most Beneficent And The Most Merciful

All Efforts Dedicated To

Quaid –i- Azam Muhammad Ali Jinnah

Founder of Pakistan

CURRICULUM

PhD PHYSIOLOGY

(2024)

Dr. Sidra Hamid
Assistant Professor/Focal Person of Physiology for PhD program
Rawalpindi Medical University
Rawalpindi

Prof. Dr. Sadaf Mumtaz
Professor of Physiology/Program Director
Rawalpindi Medical University
Rawalpindi

PREFACE

All esteems are due to almighty ALLAH the first and foremost, who always remained beneficent. It is the almighty Allah to whom all the praises are attributed; the kind, the merciful, the compassionate whose blessings conferred knowledge, wisdom, guidance, health and to approach this journey successfully.

Curriculum of a subject is to be quoted as the throbbing pulse of a nation. The state of intellectual development and the state of progress of the nation is quantified by the development of its curriculum. The world has turned into a global village; new ideas and information are pouring in like a stream. It is, therefore, imperative to update our curricula regularly by introducing the recent developments in the relevant fields of knowledge.

After the up gradation of RMC to RMU the undergraduatecurriculum has been shifted from Traditional to Integrated Modular Curriculum. The MPhil curriculum of different disciplines has been approved and in the process of implementation. The ten curricula of Basic Sciences PhD are in process of approval. It is hoped that this curriculum document, prepared by the respective subject specialists, would serve the needs of PGTs for proper training, and it would also provide the level of competency specified in Pakistan Qualification Framework to make it compatible with international educational standards.

Dr.Sidra Hamid

(Focal person from Department for Postgraduate University Development/Prof Physiology)

ACKNOWLEDGEMENTS

All esteems are due to almighty ALLAH the first and foremost, who always remained beneficent to me. It is the almighty Allah to whom all the praises are attributed; the kind, the merciful, the compassionate whose blessings conferred me knowledge, wisdom, guidance, health and renowned seniors to approach this journey successfully.

It is the vision of Vice Chancellor Professor Muhammad Umar that the university is flourishing day by day and education is taking its proper form formulating into curriculum.Great gratitude for Ex-Dean Basic Sciences Prof. Naeem Akhtar who guided us at every step of curriculum development.

We cannot forget the generous efforts of Riphah University in sharing their undergraduate and postgraduate programmes. In this regard we get a lot of support from Dr.Shazia Ali, Chair person of Physiology,IIMCT.

Dr.SamiaSarwar

(Focal person from Department for Postgraduate University Development/ Prof Physiology)

"WE NEED TO CONTINUALLY RE-EVALUATE CURRICULUM TO REMOVE IRRELEVANT KNOWLEDGE & MAKE ROOM FOR EMERGING KNOWLEDGE."

(Patrick Miller)

8.1.4	**Computer skills**
8.1.5	**Research Methodology**
8.2	**Semester 01**
8.2.1	**Respiration**
8.2.2	**CVS**
8.2.3	**GIT**
8.2.4	**Genitourinary**
8.2.5	**Medical education**
8.2.6	**Medical & Bioethics**
8.2.7	**Biostatistics**
8.3	**Semester 02**
8.3.1	**Nervous system and special senses**
8.3.2	**Endocrinology**
8.3.3	**Skills**
8.3.4	**Micro technique:** **Slide making, PCR, ELISA**
8.3.5	**Animal Handling**
8.3.6	**Journal clubs, seminars, workshops**
8.4	**Semester 03 onwards till completion of Reserch P**
8.4.1	**Synopsis and thesis**
9	**Section-IX**
9.1	**PG evaluation**
9.2	**PG evaluation proforma**
10	**Section-X**
10.1	**Assessment& GPA system**
11	**Section-XI**
11.1	**PGT Toolkit for formative Assessment**
11.2	**Portfolio**
11.3	**Log book with Reflective log book section**
12.1	**Semester of Clinical Rotations**
12.1.1	**Learning Objectives of Clinical Rotations**

SECTION-I

INTRODUCTION TO UNIVERSITY

RMU HISTROY

Rawalpindi Medical College was established in Faisalabad on 18th March 1974 and later shifted to Rawalpindi on 5th November 1974 in an incomplete building at Tipu Road. The founder principal of RMC, Prof. Abdul Latif, worked hard to establish the institution. The student hostels, staff colony and auditorium were built. Apart from his own specialty of anatomy he completed all the faculty. He also managed to acquire the Holy family hospital from missionary church and central Government Hospital from central Government that later became Rawalpindi General Hospital and now Benazir Bhutto Hospital. The District headquarter Hospital was also affiliated to the college as 1st teaching hospital.

Prof. Mohammad Nawaz the 2nd Principal and Prof. Mohammad Iqbal as Professor of surgery and later on Principal played pivotal as pioneer team to establish all components of RMC. Prof. Iqbal, Prof. SaadRana worked hard to establish New Teaching Block in Holy Family Hospital with help of Islamic Development Bank.

The Legacy was taken forward by respective forthcoming Principals, worth mentioning is Prof. MubashirHussain Malik who established department of of Psychiatry and worked hard to develop its international collaborations.The Department of Medical Education and the institute of Allied health sciences established in 2007 was the vision of Prof. Muhammad Musadiq Khan, he also started the new teaching block holy family hospital Rawalpindi as well as ICU and CCU.

First Rawalian Principal, Prof. Mohammad Umar after taking over the office in 2013, started working on multi-dimensional approach to further develop the institution. He restructured the undergraduate training program by establishing purpose built Department of Medical Education (DME), upgraded student libraries, Cafeteria, student section and hostels. Arranging historical meeting to develop consensus on national guidelines for the undergraduate training headed by chairman HEC, President PMDC, Vice chancellor UHS and all the principals of medical colleges is another credit to RMC in his tenure.

Regarding patient care projects ,worth mentioning are ,State of the art centre for Liver and Digestive diseases(CLD),Multi Organ Failure Centre(MOF), Medical ICU, Department of Infectious diseases (DID),Department of Emergency and Critical care(DEC) and up gradation of the affiliated hospitals.

To establish recognized postgraduate training in super specialties international conferences, Mentorship program are other important achievements.

Since 1947 more than 7900 students have graduated and are serving nationally and internationally.RMC is privileged to claim top positions in university examination several times. Best of the best graduate in UHS is also a Rawalian.

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

Rawalpindi Medical College has always occupied a unique position in the public sector, being one of the leading medical colleges in South Asia. It 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.

Now Old Campus mainly serves administrative purposes and the first two i.e. non-clinical years of the students of MBBS degree are taught there and next three in New Teaching Block Holy Family hospital.

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. Now after the successful launching of PhD/MS program by VC RMU we are struggling hard to get the M.Phil and PhD program approve.

VISION & MISSION RMU

Mission Statement:

To impart evidence based research oriented medical education

To provide best possible patient care

To inculcate the values of mutual respect and ethical practice of medicine

Vision:

Highly recognized and accredited center of excellence in Medical Education, using evidence-based training techniques for development of highly competent health professionals.

SECTION-II

INTRODUCTION TO PROGRAM

Title Of Program: PhD Physiology

Relevance of Field Of Physiology:

Physiology is the study of normal functioning of various body systems.Physiology is very important in medicine. Physiology is the study of how an organ or cell works. It is about the function of cells and how they contribute to the wholeness of the human being.

The basic goal of Physiology is to explain the physical and chemical factors that are responsible for the origin, development and progression of life. Physiology is the basis of life.All the branches of Medicine lie with their foundations in physiology like pharmacology,pathology and medicine.

The curriculum of PhD Physiology has been prepared by Dr.Sidra Hamid Assistant Professor Physiology under supervision of Dr.SamiaSarwar, Chair person Physiology Department.

Goalsof PhD Program

1. To expedite the academic growth and development in undergraduate medical education by providingproperly qualified and trained basic sciences teachers.
2. To institutionalize research by producing more PhD, particularly in the emerging fields of basic medicalsciences.
3. Better educated and trained health care professionals engaged as academician, researchers and fieldpractitioners will revamp the health care delivery system and replenish the academia in the medicaleducation set up. The community will be the ultimate beneficiary due to better health facilities.
4. To improve health standards of the community in this underdeveloped region of the world, focus ofresearch will be on regional medical issues.
5. Trained human resource will successfully execute and streamline the operations of the Institute and willfill the vacuum in the growing medical schools and industry.
6. Development of human resource, research and technology in this institute will ultimately help in thedevelopment of national economy.

Responsibilities and Competencies of PGTs

We expect our PGTs to be responsible regarding their:

- Behavior
- Discipline
- Punctuality
- Dress code
- Feedbacks

  Social media

We expect our PGTs to develop the Essential 6 core competencies of a doctor:

- Medical knowledge
- Patient care
- Interpersonal & communication skills
- Professionalism
- Practice based learning & improvement
- System based practice

Objectives Achieved At the End Of Course

Our mission is to train Post Graduates with excellent ability to teach, research and deal with daily laboratory work in the field of physiology effectively and efficiently at National, International and Regional levels. At the completion of the required period of training, the PG-trainee should be able to:

- Prove competency & clarity of concepts in all basic and allied disciplines of the subject.
- Teach, train and supervise post graduate students including BS/M.Phil/PhD.
- Develop Research proposals and conduct research independently.
- Teach, train and evaluate medical undergraduates and other health & health related professionals in the field of microbiology.
- Develop, implement, manage and monitor programs of physiology at different levels of health care delivery system.
- Identify and manage common laboratory work problems.
- Pursue continuous and self-directed professional education to keep one's knowledge and skills updated and disseminate new knowledge.
- Discharge skills of leadership.

Career Prospects in PhD Physiology & Clinical Physiology

For successful postgraduates of the course, research opportunities abound in areas such as urban disease control, formulation research, clinical research, analytical development, and new drug development. Self- employed physiologists may set up their own laboratories.

Research in the field of finds application in fields like biophysics, science, pharmaceutical, Food and drink industry, Colleges and universities, Forensic science labs, Environmental agencies, Healthcare organizations and medical colleges, Biotechnology companies, etc. They can also have jobs in research organizations and higher education institutions.

PhD Physiology & Clinical PhysiologyBiology Job Types

- Post graduate teacher
- Undergraduate medical teacher
- Research supervisor
- Clinical research physiologist

SECTION-III

AVAILABLE PROGRAM RESOURCES

DEPARTMENT OF PHYSIOLOGY

Faculty:

Department of Physiology is enriched with full-time dedicated, qualified and experienced faculty for teaching of undergraduate courses.

Location:

Physiology department is located in the old campus of Rawalpindi Medical University, Tipu Road, Rawalpindi.

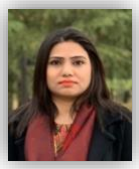
Details Of Undergraduate Courses Taught

S. NO.	PROGRAMME	TOTAL DURATION	DURATION OF PHYSIOLOGY TEACHING
1.	**MBBS:** First Professional Part-I First Professional Part-II	5 Years	2 Years
2.	**Allied Health Sciences:**		
	Doctor of Physical Therapy (DPT)	4 Years	2 Years
	B.Sc Medical Laboratory Technology (MLT)	4 Years	1 Year
	B.Sc Medical Imaging Technology (MIT)	4 Years	1 Year
	B.Sc Optometry and Orthoptics	4 Years	2 Years
	B.ScOrhtotic& Prosthetic Sciences	4 Years	2 Years

SECTION-III-A

FACULTY

Details Of Faculty Of Department Of Physiology

Name	Designation	Discipline	Qualifications with year/institute		Picture
			Qualification	Institute	
Dr. Sadaf Mumtaz	Professor	Physiology	MBBS, PhD(UK), MCPS-HPE, Commonwealth Postdoctoral Academic Fellow (UK)	University of Liverpool, UK/CPSP	
Dr. Samia Sarwar	Professor	Physiology	MBBS Bsc	Rawalpindi Medical College CPSP	
Dr. Shmyla Hamid	Associate Professor	Physiology	MBBS M.Phil	Fatima Jinnah Medical College Lahore PGMI	
Dr. Faizania Shabbir	Associate Professor	Physiology	MBBS FCPS	Rawalpindi Medical College CPSP Karachi	
Dr.Sidra Hamid	Assistant Professor	Physiology	MBBS FCPS	Rawalpindi Medical College CPSP	

Dr. Sheena Tariq	APWMO	Physiology	MBBS	Sindh Medical College	
Dr. Kamil Tahir	Senior Demonstrator	Physiology	MBBS	Rawalpindi Medical College	
Dr. Uzma Kaini	Senior Demonstrator	Physiology	MBBS	Rawalpindi Medical College	
Dr. Aneela Yasmeen	Senior Demonstrator	Physiology	MBBS	Women Medical College, Abbotabad	
Dr. Fareed Ullah Khan	Senior Demonstrator	Physiology	M.D	Jalaabad Medical College, Afghanistan	
Dr. Fahd Anwar	Demonstrator	Physiology	MBBS	Rawalpindi Medical College	

Current Methods of Teaching

1. Formal Lectures& LGIS
2. Tutorial Classes& SGDs
3. Guided Self-study & SDLs
4. Practical & OSPE Sessions
5. Skill laboratory

Current Modesof Teaching Curriculum

Integrated Modular System:1st&2ndYear MBBS

Methods of Evaluation of Undergraduate Curriculum

1. Monthly Tests & Mid Module Assessment
2. Term Tests & Module Exam
3. Send-up Examinations& Block Exam
4. Final University Examinations

SECTION-III-B

INFRASTRUCTURE

INFRASTRUCTURE

Basic Requirements For PhD Physiology Program

S #	PARAMETER	REQUIRED	SPECIFICATION/CAPACITY	ACTUAL / OBSERVED
1	**Offices** a) Teaching Staff b) Administrative Staff	a) 5 Minimum b) 2 Minimum	5-Senior faculty members including Professor, Associate and Assistant Professors	Yes
2	Seminar/meeting room	1	25 Capacity	Yes
3	Refreshment/tea room	1	20 Capacity	Yes
4	Library for PG Students	1	a) 20 Capacity b) Equipped with at least 3 computers with internet access c) For two PG students at least one recommended Physiology book d) Availability of indexed journals	Yes
5	Basic Physiology Laboratory	1	Optimum space for equipment and researchers with an area not less than 1000 sqft	Available
6	Molecular Physiology/Biology Laboratory	1	Optimum space for equipment and researchers with an area not less than 500 sqft	In process

7	Sample Collection/Patient Access		A tertiary hospital with minimum of daily 200 outdoor patients	Available
8	Animal Research Facility/Laboratory	1	a) Animal House Rooms: 2 min with temperature and humidity monitor b) Office for Veterinary officer c) Designated space for house attendant d) Changing area e) Procedure room with proper OT light f) 01 Colony breeding room g) Cage washing area h) Feed preparation/storage room i) Corridor to accommodate extra cage racks	In process

SECTION-III-C

EQUIPMENT

ESSENTIAL FOR PhD PHYSIOLOGY PROGRAMME

Physiology (Equipment)				
	Section	**Min Required**	**Deficiency**	**Remarks Working/Not working**
1.	Spectrophotometer (visible and UV Range)	1	Initiated	----
2.	Water Bath with stirrer, temperature control and display	1	Nil	Working
3.	Incubator	1	Nil	Working
4.	Analytical balance	1	Nil	Working
5.	pH Meter	1	Nil	Working
6.	Refrigerator	1	Nil	Working
7.	Freezer (- 80°C)	1	Nil	Working
8.	Manual/Automated adjustable pipette set 0.15ul-1000ul	2	Nil	Working
9.	Tabletop Micro-centrifuge with speed upto 14000 rpm	1	Nil	Working
10.	Centrifuge for 50 ml tubes with speed upto 4000 rpm	1	Nil	Working
11.	Glass pipettes (5 & 10ml)	50	Nil	Working
12.	Pipette glass(Pyrex) graduated 10 m1	2 each	Nil	Working

13.	Glass beakers (Pyrex) (10, 100,500,1000 ml)	5 each	Nil	Working
14.	Glass cylinder (Pyrex) 100, 250, 500, 1000 ml graduated	5 each	Nil	Working
15.	Tips for pipettes (Blue, Yellow, White)	~ 1000 each	Nil	Working
16.	Ice box	2	Nil	Working
17.	Reagent Bottles (100, 500, 1000 ml)	5 each	Nil	Working
18.	Cryo Boxes	10	----	----
19.	Eppendorf tubes	~ 1000	Nil	Working
20.	Screw cap tubes	~ 1000	Nil	Working
21.	Falcon tubes (15 & 50 ml)	~ 500 each	Nil	Working
22.	Vitalograph	1	Initiated	----
23.	Power Lab(data acquisition system)	1	Nil	Working
24.	ECG Machine	1	Nil	Working
25.	Binocular microscopes	5	Nil	Working
26.	Flame photometer	1	----	----

EQUIPMENT FOR ADVANCE PHYSIOLOGY LAB

ESSENTIAL FOR PhD PHYSIOLOGY PROGRAM

Physiology (Equipment)				
	Equipment	**Min Required**	**Deficiency**	**Remarks Working /Not working**
1.	ELISA/RIA Apparatus	1	Nil	Working
2.	Fluorescent Microscope	1	Nil	Working
3.	PCR	1	Nil	Working
4.	Safety Hood	1	Nil	Working
5.	Gel Electrophoresis Apparatus	1	Nil	Working
6.	Gel Documentation System	1	----	----
7.	Centrifuge $4C^0$	1	Nil	Working

OTHER LABORATORY EQUIPMENTS

Sr.No	**Name of Equipment**	**Available Quantity**	**Working Non-working**
1.	B.P Set with stethoscope (Mercury)	20 No.	Working
2.	B.P Set Stand (Mercury)	11 No.	Working
3.	Counting Chamber	17 No.	Working

4.	Diagnostic Set	02 No.	Working
5.	E.C.G. Machine	02 No.	Working
6.	E.C.G. Machine (Multi Channel)	01 No.	Working
7.	Haemoglobinometer	43 No.	Working
8.	Haemocytometer	104 No.	Working
9.	Kymograph (Electric)	06 No.	Working
10.	Microscope Electric	43 No.	Working
11.	Microscope Electric (China)	08 No.	Working
12.	Teaching microscope (2 Person)	01 No.	Working
13.	Teaching microscope (5 Person)	01 No.	Working
14.	Ophthalmoscope	08 No	06 Working 02 Not Working
15.	Perimeter (Simple)	18 No.	Working
16.	Stethoscope	35 No.	Working
17.	Stop watch	01 No.	Working
18.	Spirometer (student)	04 No.	Working
19.	Recording Spirometer Cart Mounted	01 No.	Working
20.	E.S.R stand	11 No.	Working
21.	Edridge Green Lantern	01 No.	Working
22.	Heamatocrit Apparatus	03 No.	Working
23.	iwiorx Model PO#014230	01 No	Working
24.	Weight-height scale	01 No	Working
25.	02 Computer CPU 02 Computer Complete Set	04 No.	Working
26.	Photocopier machine	01 No.	Working
27.	Scanner	01 No.	Working
28.	Multimedia	03 No.	Working

29.	Digital tympanic thermometer	01 No	Purchase process initiated.
30.	Computer Complete Set	04 No.	Purchase process initiated.
31.	Colour Laser Printer	02 Nos.	Purchase process initiated.
32.	Laser Printer	03 Nos.	Purchase process initiated.
33.	Compound Microscope	20 Nos.	Purchase process initiated.
34.	Ophthalmoscope	10 Nos.	Purchase process initiated.
35.	Scanner	01 Nos.	Purchase process initiated.
36.	UPS for Computers	04 Nos.	Purchase process initiated.
37.	ESR Apparatus (Stand with Tubes)	30 Nos.	Purchase process initiated.
38.	Pneumograph (Stethograph)	07 Nos.	Purchase process initiated.
39.	Students Spirometer	08 Nos.	Purchase process initiated.
40.	Electric Snellan's chart with box	02 Nos.	Purchase process initiated.
41.	Multimedia	02 Nos.	Purchase process initiated.
42.	Desktop Spirometer	01 Nos.	Purchase process initiated.
43.	Patient Couch	02 Nos.	Purchase process initiated.

ADMINISTRATIVE STAFF

ESSENTIAL FOR PhD PHYSIOLOGY PROGRAMME

S.#	Categories of staff	Required	Qualification and responsibility	Actual / Observed
1	Program director	1	- Faculty member - (Professor/ Associate Professor/ Assistant Professor)	Yes
2	Librarian	1	- Graduate in library science and computer literate. - B.Sc.	Yes

3	Administrative officer /Computer technician/operator/ typist	1	- Diploma in computer - Fluent in language	Yes
4	Veterinary Officer	1	Bachelor in Veterinary Medicine	----
5	Biostatistician	1	- M.Sc Biostatistics - Minimum two years experience	Yes
6	Lab Attendant	2	F.Sc in biological Sciences with 2 year experience	Yes
7	Animal house attendant	2	Matric	Yes
8	Peon	2	- Matric	Yes
9	Security guards	1	- Matric	Yes
10	Cleaners	1	-	Yes

SECTION-III-D

AUXILIARIES

AUXILIARIES

Library

Available space including seating capacity: Eighty students

Books Available in the Library for Specialty

List of books	Edition No.	Year
Text book of medical physiology Guyton, Arther C	13th	2021
Review of medical physiology Gnaong, William F	22nd	2005
Basic and Clinical Endocrinology. Francis S. Greenspan	7th	2004
Human Physiology : Moffett, shauff	2nd	1993
Text Book of Physiology : emslie, snith Peterson	11th	1988
Anatomy & Physiology in health & illness: Kathleen, J,W. Wilson.	7th	1990
Physiological basis of Medical practice :Best & Taylor	10th	1979
Anatomy & Physiology in health & illness: Kathleen, J,W. Wilson.	7th	1990
Physiological basis of Medical practice :Best & Taylor	10th	1979
Samson wright applied Physiology	13th	1982
Acids to Physiology : T. Scratchered J Gillespie	3rd	1989
Mainpal Manual of Physiology: C.N. ChaPhDrashelar	Ist	2006
Illustrated physiology : Machenna / callander	5th	1990
Human Physiology Chatter Jee	13th	1978

Physiological Chemistry	5th	1991
Manual of Pulmonary Functional Testing Lange	12th	1991
Techniques Analysis of membrane proteins Ragan & Cherry		1986
Text book of Physiology &Biochemistry Bell & David son	8th	1977
Applied Cardio vascular Physiology Kellmann		1977
Applied PhysiologySamson Wright	12th	1980
Living SystemsFord & Monroe	3rd	1977
Structure & Function of human body	6th	1996
Membrane Bioenergetics Racker		1979
Physiological Basis of Medical Practice Best & Taylor	10th	1979
Text book of Physiology & Biochemistry Patterson	9th	1976
Quantitative Cardio vascular studies Lange		1980
Color atlas of physiology Despopoules		
Text book physiology pwers, sco		
MCQ and EMQ s in human physiology Roddie, Ian (et al)		
Physiology costanzo, Linda. S		
Principles of anatomy and physiology jortora, Gerard (et al)		
Under standing medical physiology Bijilani, R.L		
Essentials of medical physiology Taypee		
Essentials of medical physiology Johnson, Leonard. R		
Anatomy and Physiology in health Waugh, Anne (et .al)		
Respiratory physiology, the essentials		
Netter's atlas of human Physiology Haren, John.T (et al)		

Human Physiology Fox student Ira		
Human Physiology Widmaier, Eric .P (et al)		
Medical Physiology Rhoades, Rodney. A (Ed)		
Heart physiology from cell circulation opie, lionel. H		
Essential Medical Physiology Johnson, Leonard. R (Ed)		
Human Physiology Sherwood, lauralec		
Concepts of human Anatomy & Physiology Graaf, Kent. M Van De (et al)		
Concepts in Medical Physiology Seifter, Julian (et al)		
Concepts in Medical Physiology Seifter, julian (et al)		
Basic of Clinical Physiology Akram, Prof. Dr Muhammad		
Manipal Manual of Physiology shekar. C.N. Chandra		
Vanders Renal Physiology Eaton, Douglas. C(et al)		
Laboratory Experiments in Physiology Grinnell, Alan (et al)		
Basic Clinical Physiology Green,J .H		
Respiratory Physiology Hobsely, Professor. M (Editors)		
Cancer Kruse, Louise. C (Ed)		
Renal Pathology Harrington, Ayery. R (et al)		
Pre Test Physiology Ryan, james. P		
Aids to Physiology Scratcherd, T (et al)		
Board Review Series Physiology Cases Costanzo, Linda. S		
Essentials of physiology lamb, J. F (et al)		
Multiple choice Question in Physiology joshi, vijaya. D (et al)		
Physiology Berne, Robert m. (et al)		

Textbook of Physiology Emsile -Smith, Donald (et al)		
Illustrated Physiology Mackenna, B.R (et al)		
Illustrated hand Book of Medical Physiology Kirkpatrick C.T.		
Physiological Processes Stanier, M.W (et al)		
Body Fluid and Kidney Physiology Hladky, S.B (et al)		
Basic and clinical endocrinology Greenspan		
Endocrinology Hadley	5thed	
Human production at a glance Heffre		
Vander's renal Physiology of the eye Keufman		
Human Physiology Fox	9thed	
Lecture notes on human physiology Bray		
Physiology Cases and Problems Board review series Costauzo		
Biochemistry		2003
Harper,s illustrated Biochemistry		2003
Lehninger Principles of Biochemistry		2005
Modern Experimental Biochemistry		2000
Physical Biochemistry		2000
Principles of Physical Biochemistry		2006
Clinical Pathology Interpretatio		2004
Macro pathology		1985
Atlas of Human Glomerular Pathology		1974
An introduction to General pathology		1977
A ColourNeuro Pathology		1978

Multiple Choice Questions in G		1986
Diagnostic Breast Pathology		618
Clinical Pathology interpretation		1995
Forensic Pathology		2005
Forensic Neuropathology		2005
Learning physiology though MCQ s Forslin, Many. L		
Color Atlas of Physiology Wiser, Jou		
The Biology of Immunologic disease: Frank.J .Dixon & David W. Fisher.		1983
International Cardiovascular Me : Ahmad Mushtaq		2005
Medical Examination Review P: Greenspan, Kalman		1981
MCQs Physiology: Jennett, Sheile(et al)		1983
Viva In Human Physiology: Ratan, Dr,Vidy		1990
Respiratory physiology: Hobsely, Professor.		1991
Human Physiology From Cells: Sherwood Laurale		2001
Heart Physiology: opie, Lionel H		2004
Basic of Clinical Physiology : AkramProf.Dr.Muh		395
Color Atlas of Physiology :Silbernag, Stefan		2003
Color Atlas of Pathophysiology: Silbernagl, Stefan(et		2000
Textbook Physiology : Chandramouli, R		2000
Exercise Physiology: Powers, Scott;K(et at		2004

Subscription of Journals

S.#	Name of the journals	Subscribed since (month, year)
1.	Annals of Saudi Medicine	2002 – 2006
2.	Saudi journal of Kidney diseases & transplantation	2002
3.	Pakistan journal of medical research	2006
4.	Journal of the Pakistan Dental Association	2006
5.	Pakistan journal of medical sciences	2006
6.	Himont medical journal	2001
7.	Journal of the Pakistan medical association (centre)	2006
8.	Pakistan journal of pathology	2006
9.	Pakistan Armed Forces medical journal	2006
10.	Annals of Pakistan Institute of Medical science	2006
11.	The Pakistan journal of Gastroenterology	
12.	The journal of Baqai Medical university	
13.	British journal of obstetrics & gynecology	1976
14.	Journal of surgery Pakistan	2001
15.	Rawal medical journal	2006
16.	The journal of bone & joint surgery	1977
17.	The brithish journal of surgery	1993
18.	Journal of Rawalpindi Medical college	2006
19.	BMJ books catalogue	

20.	AXIOM Innovation in intervention	
21.	The Professional	
22.	Anuals of KEMU	
23.	Annals of KEMU	
24.	Pakistan Journal of chest Medicine	2007
25.	Sultan Qaboos University Medical Journal	2006
26.	Pakistan journal of Medical Ethics	2003
27.	Pakistan oral & Dental Journal	2006
28.	Pakistan journal of Medical Education	2003
29.	Pakistan journal of Medical Research	2006
30.	International journal of Pathology	2006
31.	Journal of Ayub Medical College Abbotabad	2006
32.	Journal of Surgery Pakistan	2006
33.	Pakistan journal of Physiology.	2006
34.	Journal of the CPSP	2000 &2002

- Subscription of all available journals through HEC Digital Library

SECTION-IV

CRIETERIA FOR ADMISSION

Eligibility Criteria:

Eligibility criteria for admission in PhD Physiology will be as under:-

(1) Basic Qualification: MBBS, BDS, BS MLT.

(2) Postgraduate Qualification:

a) MPhil / FCPS in Physiology OR

b) Equivalent qualification from HEC recognized institutions.

Candidates who secured First Division in annual system or CGPA 3.0 out of 4.0 in semester system will be eligible for admission in PhD Program.

(3) RMU will conduct its own PhD entrance test and qualifying score shall be 70%.

(4) 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.

For award of PhD/M.S/Equivalent degree, candidates will need to complete 18 credit hours with 24 credit hours of course work and 6 credit hours for research work. In addition 2 year working in Basic and clinical departments for being eligible for exam

Admission Process:

(1) Applications for admission in PhD shall be applied online through RMU website portal. 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.

(2) The candidates in government service shall furnish no objection certificates from their competent departmental authorities for the educational activity being applied for.

(3) Entrance test for Ph.D. course in RMU will be conducted under the administrative supervision of the Controller of Examinations in coordination with the Examination Committee of RMU. The subjects shall be specified by three subject expert with PhD degree in line with the policy of HEC/ RMU.

(4) 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.

(5) 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.

(6) No objection certificate from HEC shall be mandatory in case of foreign students. A TOEFL score of 500 or IELTS score of 5.50 will also be included in eligibility criteria.

(7) 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.

(8) The students may take courses/ Rotation at other HEC recognized universities subject to approval by the student supervisor and the concerned Dean.

Selection and Merit Computation:

(1) Admissions in PhD courses shall be made purely on open merit lines on 70% minimum qualifying marks out of the aggregate hundred percent trifurcating its percentile into three components namely: 25% for previous academic performance, 50% for entry test/ GAT Subject / GRE score and 25% for interview.

(2) 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.

(3) 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.

(4) 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.

Duration of Course

The minimum duration of PhD program shall be of 03 years and maximum 08 years.

Date of commencements: Immediately after approval hopefully Fall 2025

SECTION-V

PROGRAM SPECIFICATION– PhDCLINICAL PHYSIOLOGY

PROGRAM SPECIFICATION– PhD PHYSIOLOGY

(Aspercurriculum/syllabusofUniversityofHealthSciences,Lahore)

COURSETITLE	PhDClinical Physiology
COURSEDURATION	Minimum3years
TYPEOFSTUDY	Fulltime
STUDYSYSTEM	Semesterssystem
TOTALCREDITHOURS	Credithours:18
CREDIT HOURSDISTRIBUTION-SEMESTER WISE(Coursework)	Credit hours distributionYear1 Semester1=09 Semester2=09
Synopsiswritingandapproval	Year 1 Semester 1 = Research topicapproval Semester2=Synopsiswritingandcomprehensiveexam` Year2=researchwork Year3=researchwork&thesiswriting
COURSETITLEWITHSTUDYHOURSDISTRIBUTION	Studypersemester=16weeksPrep leave = 2 weeksExamination=1week Semesterbreak=1week

Teaching Methodologies

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 Physiology Laboratory at RMU allied hospitals.

Semester-Wise Break-Up of Credit Hours

The total program consists of 18 credits which the student will have to complete in first year in which 6 credit hours are for teaching compulsory minor subjects. Distribution is as under:

- Formal teaching (Lectures, Demonstration, Journal Club, Tutorials and Interactive Session)

1 Credit = 16 hours

- Practical Work (Presentations, Workshops, Attachments, Research)

1 Credit = 32 hours

Topics	CreditHours
Year1	
Semester1	**16weeks/9credits**
Any of the courses with total of 2 credit hours from table 1 given below.	2 creditHours
Any of the courses with total of 1 credit hours from table 1 given below.	1 creditHours
Any of the courses with total of 3 credit hours from table 1 given below.	3 creditHours
ResearchMethodology(RM-01) andComputerSkills(CS-01)-Mandatoryworkshops	2 creditHours
Laboratorytechniquepracticesanddiagnostics (practical work andpresentationsofPhysiology)	1 creditHours
Preparatoryleave	2 Weeks
Exam	1 week
SemesterBreak	1 week
Semester2	**16weeks/9creditHours**
Bioethics/medicalethics(BE-01) Medicaleducation(ME-01)Biostatistics(BS-01),	2 creditHours
Any of the courses with total of 1 credit hours from table 1 given below.	1 creditHour
Any of the courses with total of 1 credit hours from table 1 given below.	1 creditHours

Any of the courses with total of 2 credit hours from table 1 given below.	2 creditHours
Laboratorytechniquepracticesand	3 creditHours
Preparatoryleave	2 Weeks
Semester Exam	1 week
Synopsis writing	
Comprehensive Exam	
Year 2	Research work
Year 3	Research work and thesis writing

Compulsory activities

- Library
- Laboratory training

LISTOFMANDATORYWORKSHOPS	
SEMESTER1	**Credithours**
Vision&TimeManagement=3days	01CreditHour
ResearchmethodologyandMedical/Synopsis writing=3daysworkshop(Handson)	01CreditHour
Literaturesearchandselectionofresearchtopic =1dayworkshop	01CreditHour
ComputerSkills=1day	
Referencecitation(EndNote,Medley)=1days	
	TotalCreditHours= 03
SEMESTER2	
Animalhandling/bioethics/MedicalEthics=8 Hours	CreditHour=0.5=counted inminors
Grantapplication=4hours	CreditHour=0.25

MedicalEducation: Leadership, Communication skills, Interactivelectures&Smallgroupdiscussion(SGD) =day1How to attempt postgraduate SAQs=3hours=day2 Assessment tools(Objectively structuredpracticalexaminationOSPE,Multiplechoice questionsMCQs)=3hours=day3	CreditHour=0.75 =countedinminors
	TotalCreditHour=1.5
BasicandAdvance Statisticalanalysis=3days	CreditHour=1
	TotalCreditHour=1
Articlewriting=4hours	CreditHour=0.5
Thesiswriting=4hours	
	TotalCreditHour=0.5
TotalCreditHour=06	

Year 1

Semester 1& 2

Duration: 16 weeks Each

Credit hours: 9 Each

Subjects details given as core courses details given under semester details.

SUMMARY OF COURSE WORK

SEMESTER 1	**MINORS/ COMPULSORY COURSES**	**Cr.Hours& Teaching methodology**	
	COMPUTER SKILLS (CS-01)	06	Teaching methodology=Workshops
	RESEARCH METHODOLOGY(RM-01)		
	MOLECULAR BIOLOGY (MB-01)		
SEMESTER 2			
	BIOSTATISTICS (BS-01)		
	BIOETHICS/MEDICAL ETHICS (BE/ME-01)		
	MEDICAL EDUCATION (MED-01)		
WORKSHOPS& MINORS	Semester wise breakup of workshops given in Table 1		
SEMESTER 3			
	COMPULSORY ROTATION IN DEPARTMENT SPECIFIC TO RESEARCH WORK	03	Teaching methodology=SGDs & Laboratory work
CORE COURSES		25	Teaching methodology=Specified course wise
RESEARCH		8	Thesis writing
TWO YEARS TEACHING IN UNDERGRAUATE MBBS SECTION	ONE YEAR ;FIRST YEAR MBBS ONE YEAR;SECOND YEAR MBBS	32	INCLUDING LGIS, SGDs, SKL

ALONG WITH RESERCH AND THESIS			

Table 1:LIST OF MANDATORY WORKSHOPS	
FIRST SEMESTER	**Credit hours**
• Vision & Time Management=3days	01 Cr. Hour
• Research methodology and Medical/Synopsis writing=3 days workshop (Hands on)	• 01 Cr. Hour
• Literature search and selection of research topic =1 day workshop	• 01 Cr. Hour
• Computer Skills=1 day	
• Reference citation (End Note, Medley)=1 days	
	Total Cr. Hour=03
SECOND SEMESTER	
• Animal handling/bioethics/Medical Ethics =8 hours	• Cr. Hour=0.5=counted in minors
• Grant application=4 hours	• Cr.Hour=0.25
• Medical Education : ➢ Leadership, Communication skills, Interactive lectures & Small group discussion (SGD)=day 1 ➢ How to attempt postgraduate SAQs=3 hours= day 2 ➢ Assessment tools(Objectively structured practical examination OSPE, Multiple choice questions MCQs)=3 hours= day 3	• Cr.Hour=0.75 =counted in minors
	• **Total Cr.Hour=1.5**
THIRD SEMESTER	
• Basic and Advance Statistical analysis=3 days	Cr.Hour=1
	• **Total Cr.Hour=1**
FOURTH SEMESTER	
• Article writing=4 hours	Cr.Hour=0.5
• Thesis writing=4 hours	
	• **Total Cr.Hour=0.5**
Total Cr.Hour=06	

CORE COURSE OUTLINE SEMESTERWISE :

1st SEMESTER: COURSE CODE:(PHY:01)

S. No.	Topics= 0.5 Credit Hour
1	Functional organization of human body
2	Homeostasis
3	Control system in body
	Cell Biology & Genetics = 2.5 Credit Hour
1	Introduction to cell theory and structure of cell
2	Structure of cell: ➢ Structure and functions of membranous organelle ➢ Structure and functions of non-membranous organelle
3	Cell Genetics,Cell cycle (stages and control of cell cycle),PCR,DNA Handling
4	Membrane dynamics
5	Pathophysiology of cell injury and chromosomal abrasion
	Musculoskeletal system= 2 Credit Hour
1	Physiology of resting membrane potential and action potential
2	Conduction of nerve impulse
3	Neuromuscular transmission and neuromuscular blockers
4	Concept of myelin degeneration and myasthenia gravis
5	Skeletal and smooth muscles: ➢ Physiological anatomy of smooth and skeletal muscles ➢ Skeletal and smooth muscle contractile mechanisms
6	Clinical relevance: ➢ Cancer ➢ Aging

	➢ Cloning
7	Skill Labs: ➢ Study of kymograph and components of nerve muscle preparation ➢ Simple muscle twitch in gastrocnemius sciatic nerve preparation ➢ Two successive stimuli on nerve muscle preparation ➢ Phenomenon of fatigue in a nerve muscle preparation ➢ Phenomenon of tetanization on nerve muscle preparation ➢ Effect of temperature on muscle contraction
Blood= 3 Credit Hour	
1	Composition and general functions of blood
2	Structure and functions of: ➢ Erythrocytes ➢ Leukocytes ➢ Platelets
3	Hematopoiesis and its regulation
4	Clinical relevance of red blood cells and hemoglobin: ➢ Anemia ➢ Polycythemia and hemoglobin disorders ➢ Blood indices and their variation in different conditions
5	Blood groups and transfusion
6	Hemostasis
7	Clinical relevance: ➢ Immune system of body ➢ Leukemia ➢ Thrombocytopenia and familial blood disorders ➢ Tissue transplantation ➢ Hypersensitivity reactions ➢ Reticuloendothelial system
8	Skill labs: ➢ Estimation of hemoglobin

	➢ Estimation of hematocrit ➢ Neubauer's chamber ➢ Estimation of Red blood cell count (RBCs) count ➢ Estimation of erythrocyte sedimentation rate (ESR) ➢ Estimation of white blood cell count ➢ Estimation of differential leucocyte count ➢ Estimation of platelet count ➢ Estimation of bleeding time and clotting time ➢ Identification of blood groups by ABO and RH typing

Cardiovascular system, Respiratory system, Genitourinary system, Gastrointestinal system	
Cardiovascular system= 2 Credit Hour	
1	Cardiac muscle and its properties
2	Cardiac cycle
3	ECG recording and interpretation
4	Heart sounds and murmurs
5	Apex beat
6	Ischemic heart disease and heart failure
7	Congenital heart anomalies and Echocardiogram
8	Clinical relevance: ➢ Arrhythmia ➢ Flutter ➢ Fibrillations
9	Jugular venous pulse examination
10	Coronary circulation
11	Pulmonary circulation

12	Cerebral circulation
13	Physiology of shock
14	Exercise, muscle blood flow
15	Hypertension
16	Skill Labs: ➢ Electrocardiography(ECG) ➢ Radial pulse examination ➢ Blood pressure recording ➢ Heart sounds ➢ Apex beat ➢ Jugular venous pulse examination
Respiratory system= 2 Credit Hour	
1	Organization and function of respiratory tract
2	Mechanics of breathing
3	Lung volumes, capacities
4	Diffusion of gases
5	Ventilation perfusion ratio
6	Transport of oxygen and carbon dioxide in blood
7	Regulation of respiration (chemical and neural control)
8	Abnormal breathing patterns
9	Asphyxia, cyanosis, dyspnea ,hypoxia and its types
10	Obstructive and restrictive lung disease (FEV_1/FVC ratio)
11	Respiration in unusual environment(High Altitude, Deep sea, Exercise)
12	Cough and sneeze reflex
13	Skill labs

	➢ Study of spirometer ➢ Lung function test
Genitourinary system= 2 Credit Hour	
1	Compartment of body fluid/Measurements
2	Water balance
3	Tissue fluid
4	Lymphatics
5	Clinical relevance: ➢ Pathophysiology and types of edema
6	General functions of kidney
7	Structure of kidney and nephron
8	Formation of urine: ➢ GFR and its regulation ➢ Tubular reabsorption and secretion
9	Urine concentrating and diluting mechanisms
10	ADH and its function
11	Acid base balance
12	Metabolic acidosis and alkalosis
13	Micturition reflex
14	Renal function tests
15	Urine analysis
16	Fluid excess and depletion (dehydration and over hydration)
17	Renal failure
18	Male reproductive system (hormones and spermatogenesis)

19	Female reproductive system (hormones and oogenesis)
20	Puberty (male and female)
21	Menstrual cycle
22	Fertility regulation and contraception
23	Female infertility
24	Male infertility
25	Pregnancy
25	Neonatal Physiology
Gastrointestinal system= 2 Credit Hour	
1	Structure of following components of GIT: ➢ Stomach ➢ Small intestine ➢ Large intestine
2	Mechanism of swallowing and its control
3	Gastrointestinal motility (propulsion and mixing of food in the alimentary tract)
4	GIT secretion and their control: ➢ Saliva ➢ Gastric secretion ➢ Pancreatic secretion
5	Physiological anatomy and functions of: ➢ Liver ➢ Gall bladder and spleen
6	Enterohepatic circulation & jaundice
7	Functions of GIT (digestion and absorption): ➢ Stomach ➢ Small intestine ➢ Large intestine
8	Immune functions of GIT

9	Vomiting reflex
10	Defecation reflex and its pathway
11	Clinical relevance: ➢ Dysphagia ➢ Diarrhea ➢ Constipation

2nd SEMESTER COURSE CODE: (PHY:02)

Central nervous system, Special senses, Endocrinology	
Central nervous system= 3 Credit Hour	
1	Organization of nervous system
2	Properties of nerves, synapses
3	Properties of neurotransmitters
4	Types and functions of sensory receptors
5	Sensory pathways
6	Pain perception
7	Pain control theories and headache
8	Sensory cortex
9	Motor cortex
10	Motor pathways (pyramidal and extrapyramidal)
11	Motor functions of spinal cord (organization of spinal cord and postural reflexes)
12	Muscle spindle and Golgi tendon organ
13	Basal ganglia
14	Cerebellum and its function
15	Cerebellar disorders
16	Reticular formation
17	Physiology of sleep
18	Physiology of EEG
19	Physiology of memory

20	Physiology of speech
21	Abnormalities of speech
22	Hypothalamus and limbic system
23	Regulation of body temperature
24	Functions of skin
25	Autonomic nervous system
26	Upper motor neuron lesion
27	Lower motor neuron lesion
28	Clinical relevance: ➢ Hemiplegia ➢ Paraplegia ➢ Parkinsonism
29	Skill labs: ➢ Superficial reflexes ➢ Deep reflexes
Special senses= 2 Credit Hour	
1	Optical principles
2	Accommodation
3	Errors of refractions
4	Visual cycle
5	Dark and light adaption
6	Visual pathway
7	Color vision and night blindness
8	Fluid system of eye
9	Function of external and middle ear

10	Function of inner ear
11	Auditory pathway
12	Vestibular apparatus
13	Deafness
14	Taste sensation and abnormalities
15	Sense of smell
16	Abnormalities of olfaction
17	Skill Labs: ➢ Visual acuity ➢ Perimetry ➢ Color blindness ➢ Hearing tests ➢ Sense of taste ➢ Sense of smell
Endocrinology= 3 Credit Hour	
1	General principles of endocrinology (Classification)
2	General principles of endocrinology (Mechanism of action)
3	Hypothalamic peptide hormones
4	Pituitary hormones
5	Thyroid and parathyroid hormones
6	Cortical hormones
7	Medullary hormones
8	Endocrine functions of pancreas
9	Hormones of GIT, thymus, pineal gland

10	Clinical relevance: ➢ Acromegaly, gigantism and dwarfism ➢ Thyrotoxicosis ➢ Myxedema ➢ Cretinism ➢ Pan hypopituitarism ➢ Sheehan syndrome ➢ Turner syndrome ➢ Diabetes mellitus ➢ Cushing syndrome ➢ Pheochromocytoma ➢ Addision disease ➢ Conn syndrome ➢ Diabetes inspidus ➢ Syndrome of inappropriate Anti Diuretic hormone secretion (SIADH)
4thSEMESTER COURSE	
	Research and thesis
	5thSEMESTER COURSE
	Research and thesis Teaching of First year MBBS (LGIS,SGD,SKL)
	6thSEMESTER COURSE 8 Credit Hours
	Research and thesis Teaching of First year MBBS (LGIS,SGD,SKL)
	7thSEMESTER COURSE
	Research and thesis Teaching of Second year MBBS (LGIS,SGD,SKL)
	8thSEMESTER COURSE
	Research and thesis

	Teaching of Second year MBBS (LGIS,SGD,SKL)

SECTION-VI

PROGRAM OUTLINE

<table>
<tr><th>Semester &Duration</th><th>Courses</th><th>Credit hours</th><th>Research work</th><th>Workshops</th><th>Cr. Hours</th></tr>
<tr><td rowspan="5">First Semester (6 months)</td><td rowspan="2"><u>Basic:</u>
• Physiology: Homeostasis (0.5 Cr.Hr), Cell physiology Cell Biology and Genetics (2.5Cr.Hr), Blood(3Cr.Hr), Musculoskeletal system(2 Cr.Hr)
• (teaching strategy =presentations by students =6 hours presentations and assignments by PGT/week and 2 hours Lecture or Journal Club /week for PGTs)</td><td rowspan="2">8Cr.Hr</td><td rowspan="5">Literature search

Selection of research topic</td><td>Vision & Time Management= 3days</td><td>01
Cr. Hour</td></tr>
<tr><td>Research methodology and Medical/Synopsis writing=3 days workshop (Hands on)</td><td>01
Cr. Hour</td></tr>
<tr><td rowspan="3"><u>Allied:</u>
• Computer Skills
• Research methodology</td><td rowspan="3">2 Cr.Hr</td><td>Literature search and selection of research topic =1 day workshop</td><td rowspan="3">01
Cr. Hour</td></tr>
<tr><td>Computer Skills=1 day</td></tr>
<tr><td>Reference citation (End Note, Medley)=1 days</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Total Cr.Hour Per semester =11</td></tr>
</table>

Second semester (6 months)	Basic: • **Physiology:** Cardiovascular system (2 Cr. Hr), Respiratory system (2 Cr. Hr), Genitourinary physiology (2 Cr. Hr), Gastrointestinal tract (2 Cr. Hr) Allied: • **Medical Education=**lectures and workshops • **Bio Ethics/Medical Ethics** • **Biostatistics**	8 2	Synopsis writing presentation and submission Synopsis approval from Ethics Review Committee (ERC) and Institutional Research Forum	Animal handling/bioethics/Medical Ethics =8 hours	Cr. Hour=0.5 =counted in minors
				Grant application=4 hours	Cr.Hour=0.25
				Medical Education : Leadership, Communication skills, Interactive lectures & Small group discussion (SGD)=day 1 How to attempt postgraduate SAQs=3 hours= day 2 Assessment tools(Objectively structured practical examination OSPE, Multiple choice questions MCQs)=3 hours= day 3	Cr.Hour=0.75 =counted in minors
					Total Cr.Hour/semester= 10.5
Third semester (6 months)	• **Research and thesis**	8	Grant application submission to HEC	Basic and Advance Statistical analysis=3 days	Cr. Hour =1

	• Rotation in Chemical Pathology or rotation according to the topic of research dissertation (hematology,histopathology or clinical rotation) in first 3 weeks of second semester	3	Procurement of research materials		
					Total Cr.Hour/ semester= 12
Fourth semester (6 months)	• **Research work** • **Thesis writing**	8	Presentation of thesis Submission of thesis	Article writing=4 hours Thesis writing=4 hours	Cr.Hour=0 .5
					Total Cr.Hour/semester= 8.5
Fifth semester (6 months)	• **Research work** • **Thesis writing**	8Cr.Hr			8Cr.Hr
Sixth semester (6 months)	• **Research work** • **Thesis writing**	8Cr.Hr			8Cr.Hr

SECTION-VII
EDUCATIONAL METHODOLOGY

EDUCATIONAL METHODOLOGY

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) and MBBS.
- 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) and MBBS.
- Practical laboratory work at RMU allied hospitals.

SECTION-VIII

LEARNING OBJECTIVE OF COURSES SEMESTER WISE

SEMESTER 01

SUBJECT RELATED /CORE COURSESCELL BIOLOGY AND GENETICS COURSE

Rationale

The foundation module is designed to impart basic knowledge about the normal structure, organization, functions and development of human body. Starting from cell to system this knowledge will serve as a base on which the student will construct further knowledge about the etiology, pathogenesis and prevention of diseases; the principles of their therapeutics and management.

Course contents: will include; Cell PhysiologyDNA - the Genetic Code, Structure, Replication, and Manipulationof DNA, Transmission Genetics, Basic and Advanced Principles of Heredity, The ChromosomalBasis of Heredity, Gene Linkage and Genetic Mapping, Human Karyotypes and Chromosome
Behavior, The Genetics of Bacteria and Viruses, Molecular Mechanisms of Prokaryotic GeneRegulation, Genetic Engineering and Genomics, Mechanisms of Mutation, Cancer, The Basics ofPopulation Genetics

Course Objectives

Each student will be able to:

- Acquire the basic science knowledge and terminology necessary to understand the development and functioning of normal structures of human body starting from biochemical level to organ system level, as well as the concepts of diseases in the community and drug dynamics.
- Identify various apparatus used in lab.
- Preparation and identification of microscopic slides.

Recommended Readings:

1. Karp, Gerald. Cell and Molecular Biology: Concepts and Experiments with Student Study Guide John Wiley &Sons, Latest Ed.
2. David S. Latchman. Basic Molecular and Cell Biology Wiley Blackwell, Latest Ed.
3. Stephen L. Wolfe. Introduction to Cell and Molecular Biology. Wiley Blackwell, Latest Ed.

4. Lizabeth A. Allison. Fundamental Molecular Biology. Wiley Blackwell, Latest Ed.
5. Hart, D. L. and E. W. Jones. Essential Genetics: A Genomics Perspective. Sudbury, MA: Jones and
Bartlett Publishers, Latest Ed.
6. Benjamin Pierce. Genetics. W. H. Freeman, Latest Ed.
7. Jeremy W. Dale, Malcolm van Schantz. From Gene to Genome. John Wiley & Sons Ltd, Latest Ed.
8. A Miches.Genetic Techniques for Biological Research. John Wiley & Sons Ltd, Latest Ed.

Journals:

1. Biology of the Cell
2. Nature Cell Biology
3.Cell & Tissue Research
4.Journal of Cellular Physiology
5.Journal of Cellular Biochemistry
6.Journal of Molecular Cell Biology
7.Molecular and Cellular Endocrinology
8.Cellular Physiology and Biochemistry
9. Nature Reviews Molecular Cell Biology
10. International Journal of Biochemistry and Cell Biology
11. Chromosome Research
12. Molecular Genetics & Genomics
13. JIIMCT
14. JRMC
15. JCPSP
16. Professional Medical Journal
17. JPMA

MUSCULOSKELETAL COURSE

Rationale: This module describes the structural organization, functions, and congenital anomalies of musculoskeletal system. It explains the mechanism of neuromuscular transmission, its biochemical basis and the importance of Ca++ in the body. It depicts structure and function of joints in upper and lower limb. It elaborates identification of common fractures of long bones on radiograph.

Course Content:

The course will include: Physiology cell membranes, membrane potential, action potential;Structure and functions of nerve and muscle, neuromuscular transmission, contraction of muscles, neuromuscular blockers, tetanization, fatigue, pathophysiology of skeletal system

Course Objectives

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

1. Understand the structure ofmusculoskeletal system.
2. Explain the physiological and biochemical factors affecting neuromuscular transmission

Recommended Readings:

1. Benjamin Cummings: Interactive Physiology 10-System Suite. Benjamin-Cummings PublishingCompany, Subs of Addison Wesley Longman, Inc. Latest Ed.
2. Best and Taylor: Text Books of Physiology Latest Ed.
3. Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Ed.
4. Dee UndglaubSilverthorn: Human Physiology: An Integrated Approach. Benjamin Cummings, LatestEd.
5. Ganong WF: Review of Physiology Latest Ed.
6. Guyton AC: Textbook of Physiology Latest Ed.
7. Samson Wright's Applied Physiology

Journals:

1. APS Journals: Cell Physiology
2. APS Journals: Journal of Neurophysiology
3. Canadian Journal of Applied Physiology Reviews
4.Cellular Physiology and Biochemistry
5.European Journal of Applied Physiology
6.Journal of Applied Physiology
7.Pakistan Journal of Physiology
8. The Journal of Physiology
9. JIIMCT
10. JRMC
11. JCPSP
12. Professional Medical Journal
13. JPMA

BLOOD COURSE

Rationale

Blood is categorized as specialized connective tissue that delivers essential substances and transports metabolic waste products away from the cells. White blood cells are part of the body's immune system. The rationale is to introduce the students with the basic constituents , functions and transport of various substances through blood and how immune system protects the body.

Course Objectives:

By the end of the course the student should be able to;

- Understand the constituents and functions of human blood
- Describe the process of development of RBC, WBC and Platelets from stem cell
- Elaborate blood grouping systems
- Describe the sequence of events involved in homeostasis
- Discuss the. process of immunity
- Perform the steps to determine the normal blood Cell count And RBC indices
- Identify primary and secondary lymphoid tissue under microscope
- Demonstrate the differences between live attenuated vaccine and toxoids
- Perform, the steps to identify typing of Blood groups
- Demonstrate the effective attitude towards the simulators/subjects.

Recommended Readings:

1. Benjamin Cummings: Interactive Physiology 10-System Suite. Benjamin-Cummings Publishing
Company, Subs of Addison Wesley Longman, Inc. Latest Ed.
2. Best and Taylor: Text Books of Physiology Latest Ed.
3. Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Latest Ed.
4. Dee UndglaubSilverthorn: Human Physiology: An Integrated Approach. Benjamin Cummings, LatestEd.
5. Ganong WF: Review of Physiology Latest Ed.
6. Guyton AC: Textbook of Physiology Latest Ed.
7. Samson Wright’s Applied Physiology
8. West JB: Respiratory Physiology–The essentials

Journals:

1. APS Journals: Heart and Circulatory Physiology
2. APS Journals: Lung Cellular and Molecular Physiology
3. Canadian Journal of Applied Physiology Reviews
4. European Journal of Applied Physiology
5. Journal of Applied Physiology
6. Pakistan Journal of Physiology
7. The Journal of Physiology
8. JIIMCT
9. JRMC
10. JCPSP
11. Professional Medical Journal
12. JPMA

COMPUTER SKILLS

(Teaching Strategy-Hands On Workshop)

Course Contents:

The course contents will include:

Programme Microsoft:

- Word
- Power point
- Excel

Course Objectives:

Upon completion of course the students will be able to:

1. Develop basic skills in operating computer
2. Comprehend the basic principles of presenting scientific data at national and internationalplatforms using computer and IT technology

Recommended Readings:

1. Hochreiter, Sepp; Wagner, Roland. Bioinformatics Research and Development. Series Lecture notes inComputer 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:

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

RESEARCH METHODOLOGY

Course Rationale:

Research Methodology is a hands on course designed to impart education in the foundational methods and techniques of academic research in social sciences and business management context. Research scholars would examine and be practically exposed to the main components of a research framework i.e., problem definition, research design, data collection, ethical issues in research, report writing, and presentation. Once equipped with this knowledge, participants would be well placed to conduct disciplined research under supervision in an area of their choosing. In addition to their application in an academic setting, many of the methodologies discussed in this course would be similar to those deployed in professional research environments.

Course objectives:

The primary objective of this course is to develop a research orientation among the scholars and to acquaint them with fundamentals of research methods. Specifically, the course aims at introducing them to the basic concepts used in research and to scientific social research methods and their approach. It includes discussions on sampling techniques, research designs and techniques of analysis. Some other objectives of the course are:

To develop understanding of the basic framework of research process
To develop an understanding of various research designs and techniques

To identify various sources of information for literature review and data collection
To develop an understanding of the ethical dimensions of conducting applied research
Appreciate the components of scholarly writing and evaluate its quality.

Course Contents:

1. Introduction to research – The role of research, research process overview
2. Philosophies and the language of research theory building – Science and its functions, What is theory? and the meaning of methodology .
3. Thinking like a researcher – Understanding Concepts, Constructs, Variables, and Definitions
4 Problems and Hypotheses – Defining the research problem, Formulation of the research hypotheses, The importance of problems and hypotheses

5. Research design – Experimental and Non experimental research design, Field research, and Survey research

6. Methods of data collection – Secondary data collection methods, qualitative methods of data collection, and Survey methods of data collection

7. Attitude measurement and scaling – Types of measurement scales; Questionnaire designing – Reliability and Validity

8. Sampling techniques – The nature of sampling, Probability sampling design, Non-probability sampling design, Determination of sample size

9. Processing and analysis of data

10. Ethical issues in conducting research

11. Report generation, report writing – Title page, Abstract, Introduction, Methodology, Results, Discussion, References, and Appendices

EDUCATIONAL/TEACHING METHODOLOGY

1. Interactive Lectures
2. Small group discussions
3. Presentations
4. workshops
5. Assignments
6. Seminars

ASSESMENT PROCEDURE:

1. Assignments/tests/log book/portfolio 30 percent marks
2. Semester Exam
   Viva/practical OSPE 30 percent marks
   Written Examination 40 percent marks
3. Calculate GPA as per University rules.

CVS COURSE

RATIONALE

The cardiovascular system consists of pumping organ the heart and the blood vessels.This module will confer knowledge of basic sciences of CVS in an integrated manner and relate this knowledge with diseases of cardiovascularsystem .This module wills discuss prevention and radiological findings associated with CVS.

Course Objectives

By the end of the course the student should be able to:

- Explain the structural & developmental organization of CVS.
- Understand the physiology of conductive system of heart, cardiac cycle and principles of blood flow.
- Explain ECG.
- Must understand the pathophysiology of CVS diseases.
- Demonstrate steps of measuring normal JVP and blood pressure.
- Demonstrate affective attitude during examination of subjects.

Recommended Readings:

1. Benjamin Cummings: Interactive Physiology 10-System Suite. Benjamin-Cummings Publishing
Company, Subs of Addison Wesley Longman, Inc. Latest Ed.

2. Best and Taylor: Text Books of Physiology Latest Ed.
3. Dee UndglaubSilverthorn: Human Physiology: An Integrated Approach. Benjamin Cummings, LatestEd.
4. Ganong WF: Review of Physiology Latest Ed.
6. Guyton AC: Textbook of Physiology Latest Ed.
7. Samson Wright's Applied Physiology

Journals:

1. APS Journals: Heart and Circulatory Physiology
2. APS Journals: Lung Cellular and Molecular Physiology
3. Canadian Journal of Applied Physiology Reviews
4.European Journal of Applied Physiology
5.Journal of Applied Physiology
6.Pakistan Journal of Physiology
7. The Journal of Physiology
8. JIIMCT
9. JRMC
10. JCPSP
11. Professional Medical Journal
12. JPMA

RESPIRATORY COURSE

Rationale

Respiratory system includes airways, lungs, and the respiratory muscles. Molecules of oxygen and carbon dioxide that are exchange between the gaseous external environment and the blood which occurs in the alveolar region of the lungs. The module explains the physiological anatomy, control, gases exchange, reflexes of respiratory system. It includes the radiological examination of the respiratory system.

Course Objectives

By the end of the course the student should be able to;

1. Describe the Physiological anatomy of respiratory system.
2. Correlate between histological structure of respiratory membrane and its role in diffusion of gases.
3. Describe the pathogenesis of common respiratory disorders

4. Comprehend basic knowledge of aviation, Physiology at high altitude and deep sea diving
5. Discuss hazards of space flight, physiological adjustments to weightlessness
6. Describe and distinguish the long-term effects of high altitude on body and its readjustments
7. Comprehend knowledge of deep sea physiology and principles of management in Dysbarism
    - Demonstrate examination of respiratory system
    - Interrupt common acid base disorders
    - Compare respiratory and conducting parts of respiratory system

Recommended Readings:

1. Benjamin Cummings: Interactive Physiology 10-System Suite. Benjamin-Cummings Publishing
Company, Subs of Addison Wesley Longman, Inc. Latest Ed.
2. Best and Taylor: Text Books of Physiology Latest Ed.
3. Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Latest Ed.
5. Ganong WF: Review of Physiology Latest Ed.
6. Guyton AC: Textbook of Physiology Latest Ed.
7. Samson Wright's Applied Physiology
8. West JB: Respiratory Physiology–The essentials
9. Benjamin Cummings: Interactive Physiology 10-System Suite. Benjamin-Cummings Publishing
Company, Subs of Addison Wesley Longman, Inc. Latest Ed.
10 Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Latest Ed.
1112. Ganong WF: Review of Physiology Latest Ed.
13. Guyton AC: Textbook of Physiology Latest Ed

Journals:

1. APS: Journal of Applied Physiology
2. APS: Physiological Reviews
3. Aviation, Space and Environmental Medicine
4.European Journal of Applied Physiology
5.Exercise and Sport Sciences Reviews

6.High Altitude Medicine & Biology

7. Pakistan Journal of Physiology

9. Recent Advances in Physiology

10. The Journal of Physiology

11. APS Journals: Heart and Circulatory Physiology

12. APS Journals: Lung Cellular and Molecular Physiology

13. Canadian Journal of Applied Physiology Reviews

14.European Journal of Applied Physiology

15.Journal of Applied Physiology

16.Pakistan Journal of Physiology

17. The Journal of Physiology

18.JIIMCT

19. JRMC

20. JCPSP

21. Professional Medical Journal

22. JPMA

GASTRO INTESTINAL TRACT

Course Contents:

Structure and general organization, Enteric nervous system, Mastication and swallowing, Functions of stomach, Functions and movements of small and large intestine, Functions and regulation of Hormones of GIT, Functions of the Liver and biliary tract, Defecation and its control, Pathophysiology of Vomiting and Diarrhoea.

Course Objectives:

Upon completion of course the students will be able to comprehend:

1. General structure and organization of gastro-intestinal tract
2. Functions of stomach, small and large intestine
3. Regulation of the GIT function
4. Enteric nervous system and hormones of GIT

Recommended Readings:

1. Benjamin Cummings: Interactive Physiology 10-System Suite. Benjamin-Cummings Publishing

Company, Subs of Addison Wesley Longman, Inc. Latest Ed.

2. Best and Taylor: Text Books of Physiology Latest Ed.
3. Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Latest Ed.
4. Dee UndglaubSilverthorn: Human Physiology: An Integrated Approach. Benjamin Cummings, LatestEd.
5. Ganong WF: Review of Physiology Latest Ed.
6. Guyton AC: Textbook of Physiology Latest Ed.
7. Samson Wright's Applied Physiology

Journals:

1. APS Journals: Gastrointestinal and Liver Physiology
2. Canadian Journal of Applied Physiology Reviews
3. European Journal of Applied Physiology
4. Journal of Applied Physiology
5. Pakistan Journal of Physiology
6. The Journal of Physiology
7. JIIMCT
8. JRMC
9. JCPSP
10. Professional Medical Journal
11. JPMA

GENITOURINARY

RATIONALE

The genitourinary system comprises of two structurally and functionally different systems, although both lying close to each other in the pelvis. The urinary system comprises of a pair of kidneys, which form urine, carried by the ureters to the urinary bladder. Urine is stored in the bladder and then excreted to outside, periodically, through the urethra. The kidneys perform many other functions leading to the maintenance of homeostasis, includingthe stability of ECF volume, electrolyte composition, and plasma osmolarity. By adjusting the quantity of water and various plasma constituents that are either conserved for the body or eliminated in the urine, the kidneys can maintain water and electrolyte balance within the very narrow range compatible with life. Overall regulation of body fluid volume, constituents of the extracellular fluid, acid-base balance, and control of fluid exchange between

extracellular and intracellular compartmentsis essential for homeostasis.Most common and important problems in clinical medicine arise because of abnormalities in the control systems that maintain this constancy of the body fluids. Kidneys serve multiple functions, including the excretion of metabolic waste products and foreign chemicals, regulation of arterial pressure, regulation of acid-base balance, secretion, metabolism, and excretion of hormones &gluconeogenesis.Inability of renal function due to diseases of the kidneys is among the most important causes of death and disability in many countries throughout the world.

The reproductive system is not necessary for survival of individual, but it is essential for continuationand survival of the species. The reproductive functions of the male include spermatogenesis, performance of the male sexual act and regulation of male reproductive functions by the various hormones. Associated with these reproductive functions are the effects of the male sex hormones on the accessory sexual organs, cellular metabolism, growth, and other functions of the body. Female reproductive functions include preparation of the female body for conception and pregnancy, and period of pregnancy itself, followed by lactation.It also includes the fetal development, functioning of the child immediately after birth, and growth and development through the early years of life. Diseases of the reproductive system lead to infertility and hormonal imbalance in males & females.

CourseContents:

Body fluid compartments, Intracellular, extracellular, and interstitial fluid, lymph and its drainage;Functional Structure of the kidney and nephron, General functions of the kidney, Formation of urine, Formation of concentrated and dilute urine, Endocrine and regulatory functions of the kidney,role in Acid-base balance, defence of volume and tonicity of the ECF, Micturition and its abnormalities, oedema formation Functional anatomy of male and female reproductive systems, Hormonal and neural control, Spermatogenesis, Oogenesis and Ovulation, Puberty, Functions and regulation of Oestrogen, Progesterone, Leutinizing Hormone; Menstrual cycle, Pregnancy and Lactation, Functions of Placenta, Neonatal physiology, changes taking place in foetal circulation after birth;Physiological principles and methods of contraception

Course Objectives:

Upon completion of course the students will be able to comprehend:

1. Body fluid compartments, ICF, ECF, Interstitial fluid, Lymph
2. Basic structure and function of the kidney
3. Glomerular Filtration, Tubular Function and urine formation
4. Endocrine and Regulatory functions of the kidney
5. Defence of Osmolality, Volume and composition of body fluids

Recommended Readings:

1. Benjamin Cummings: Interactive Physiology 10-System Suite. Benjamin-Cummings Publishing
Company, Subs of Addison Wesley Longman, Inc. Latest Ed.
2. Best and Taylor: Text Books of Physiology Latest Ed.
3. Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Latest Ed.
4. Dee UndglaubSilverthorn: Human Physiology: An Integrated Approach. Benjamin Cummings, Latest
Ed.
5. Ganong WF: Review of Physiology Latest Ed.
6. Guyton AC: Textbook of Physiology Latest Ed.
7. Samson Wright's Applied Physiology

Journals:

1. APS Journals: Renal Physiology
2. Canadian Journal of Applied Physiology Reviews
3. European Journal of Applied Physiology
4. Journal of Applied Physiology
5. Pakistan Journal of Physiology
6. The Journal of Physiology
7. JIIMCT
8. JRMC
9. JCPSP

BIO STATISTIC

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 testetc, 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.

Course Objectives:

Upon completion of course 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. Approaches for data analysis, Parametric, non-parametric and semi-parametric methods, Qualitative Methodologies and interpretation of results, validity of conclusions.
6. Identify and proterize research problems with literature review.
7. Formulation of research objectives
8. Learn Data collection techniques and sampling,planning for data collection,collation and analysis.

9.Planning for pilot study followed by main studyalong with Budget making and plan for dissemination.

10. Identify and define the basic concepts and procedures required for data analysis and interpretation.

11. Analyse and interpret the data collected for the research project and draw conclusions related to the objectives of your study.

12.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.

13.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 finalise the recommendations.

14. Prepare a plan of action for the dissemination, communication and utilization of the findings and (if required) make recommendations for additional research.

(Objective 10 -14 will also be covered in 3rd semester SPSS workshop)

Recommended Readings:

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 UniversityPress, 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.

7. Larson R and Farber B. Elementary Statistics: Picturing the World. Latest Ed, Prentice Hall Publications.NewJersey USA.

8. Oliver, M. and Combard MS. Biostatistics for Health Professions. Latest Ed. Prentice Hall Publications, NewJersey USA.

9. Statistical Software: SPSS; EPIINFO; STATA; SAS

10.Material provided as Health Services Course

Journals:

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

BIOETHICS

Course Objectives

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. Focusing on discussion, curriculum considers central ethical and legal principles, and research ethics.

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**; reproduction and fertility; genetics and the human future.Animal preparation and experiments on laboratory animals, maintenance of animal house; Routine physiology experiments on animals and humans.Animal rights in experimentation.

- **Learning Objectives Of Course**

  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
  - StateThe 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
    a. Confidentiality and Legal Responsibility
    b. Adherence and Compliance
    c. 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

Recommended Readings:

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.HealthCare Ethics in Canada. Harcourt Brace, Latest Ed.
3. Tom L. Beauchamp and James F. Childress.Principles of Biomedical Ethics.Latest Ed. OxfordUniversity Press.
4. Jonathan Glover, Causing Death and Saving Lives. Penguin Books, Latest Ed..
5. Glenn C. Graber and David C. Thomasma. Theory and Practice in Medical Ethics. Continuum, LatestEd.
6. Thomas A. Mappes and David Degrazia. Biomedical Ethics, 4th ed. McGraw-Hill, Latest Ed.
7. Ronald Munson and Christopher A. Hoffman. Intervention and Reflection: Basic Issues in MedicalEthics. Latest Ed. Wadsworth.
8. Gregory E. Pence. Classic Cases in Medical Ethics.2nd ed., McGraw-Hill, 1990.
9. Michael Yeo. Concepts and Cases in Nursing Ethics. Broadview, Latest Ed.
10. Françoise E. Baylis. The Health Care Ethics Consultant. Humana Press, Latest Ed.
11. Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Latest Ed.
12. Dee UndglaubSilverthorn: Human Physiology: An Integrated Approach. Benjamin Cummings, LatestEd.
13. Ganong WF: Review of Physiology Latest Ed.

Journals:

1. Bioethics
2. Cambridge Quarterly of Healthcare Ethics
3. Hastings Center Report
4. Journal of Clinical Ethics

5.Journal of Medical Ethics

6.Journal of Medicine and Philosophy

7.Kennedy Institute of Ethics Journal

8. Nursing Ethics

Educational Methodology

- Interactive lectures
- Group Discussions
- Assignments
- Seminars

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.

Outcomes of Course:

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)
  while "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 transmitterof information and has responsibility for managing the student's learning. The reflective teacher has an understanding of the principles of learning. Hence, this course has four key features identified for effective learning – the FAIR criteria:

F	**F**eedback to the learner as to progress
A	**A**ctive rather than passive learning
I	**I**nterest or motivation of the learner
R	**R**elevance 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 basedLearning Sessions' etc**and assessing the students**.** The essential Core area and themes in medicaleducation 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 activitiesand 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:Assessm ent modalities:

For Knowledge:

a) Students are expected to submit 02 evidence-based written assignments (01 major & 01 minor related to major themes).
b) 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:

a) 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. (4th edition, A Book)
- Journal Articles will be provided from the latest medical education journals.
- Other reading materials from the renowned author's books and research work, some good 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

S. no	Theme # 1		Theme # 2		Theme # 3	Minor Assignment	Theme # 4	Major Assignment	Theme # 5	Formative assessment	End
THEMES	Introduction to HPE & Educational Environment		Teaching and Learning		Curriculum: structural concepts and development		Assessment		Program Evaluation		
Time in hrs	4hrs		4hrs		4hrs		4hrs		2hrs		18 hrs
TOS for Final Exam	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 # 3Curriculums: structural concepts and development

Number of Lectures: 04

Content:

1. The curriculum and its components.
2. Various curricular philosophies & Perspectives- curricula past, present, future.
3. Innovative trends in curriculum, educational strategies and curriculum themes with emphasis on integration.
4. The Hardens 10 questions for curricular planning.
5. Differentiation between the aims, goals, outcomes, objectives
6. Writing Learning objectives and Levels in Bloom's taxonomy of objectives for a course.
7. The selection of core content while integrated curriculum development.
8. 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 # 4Assessments

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- M.C.QsSEQ, &
   OSCE/OSPE
5. Importance and Contents of a table of specification.

Learning Objectives:

1. Differentiate between assessment and evaluation
2. Differentiation between the 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.

EDUCATIONAL METHODOLOGY

- Interactive Lectures
- Small group discussions
- Presentations
- workshops
- Assignments
- Seminars

ASSESMENT PROCEDURE:

- Assignments/tests/log book/portfolio 30 percent marks
- Semester Exam
    - Viva/practical OSPE 30 percent marks
    - Written Examination 40 percent marks
- Calculate GPA as per University rules.

SEMESTER 02

Nervous System and Special Senses

Rational

Nervous system is the most essential system of our body, controlling all the functions of body, cognitive and psychomotor roles, language,speech, memory which are classified higher mental function.

Head and neck is the important part of body as it lodges supreme commander of body i.e brain. Vital organs such as vision, hearing, equilibrium controlled by ear, taste and smell also have a very important role in human life. Cranial nerves in the region have pivotal role and they supply all the organs and structures in the region of head and neck. These region directly effects the quality of life of an individual. Injuries to the region of head, face and neck are associated with high morbidity and mortality. Injuries or pressure on neck can cause massive bleeding by the great vessels, compromise the airways & threaten an individual due to massive bleeding. Hence It is very important for undergraduate students of medicine to have basic knowledge about the structure, function & biochemical aspects as well as diseases of this region (housing vital organs) and their management

Course Contents:

Structure and functions of nerve, nervous system, synapse and synaptic transmission, types and functions of sensory receptors, organization and functions of spinal cord and reflexes, ascending and descending tracts, muscle spindle and normal muscle tone, functions of thalamus, structure and functions of Cerebral Cortex, Cerebellum, Classification and functions of Basal Ganglia,Hypothalamus and Limbic system, Intellectual functions of Brain, Autonomic nervous system;physiology of sleep, memory and epilepsy; Physiology of smell, taste, hearing and vision, optics of vision, errors of refraction and their correction, colour vision, hearing tests; pathophysiology of the nervous system and special senses.

Course Objectives:

Upon completion of course the students will be able to comprehend:

1. Functions of cells, cell membranes and its organelles
2. Membrane potential, mechanism of action of nerves and muscles
3. Parts of central and peripheral nervous system and their physiology
4. knowledge of autonomic nervous system
5. Physiology of somatic and special senses

Recommended Readings:

1. Benjamin Cummings: Interactive Physiology 10-System Suite. Benjamin-Cummings Publishing
Company, Subs of Addison Wesley Longman, Inc. Latest Ed.
2. Best and Taylor: Text Books of Physiology Latest Ed.
3. Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Latest Ed.
4. Dee UndglaubSilverthorn: Human Physiology: An Integrated Approach. Benjamin Cummings, LatestEd.
5. Ganong WF: Review of Physiology Latest Ed.
6. Guyton AC: Textbook of Physiology Latest Ed.
7. Samson Wright's Applied Physiology

Journals:

1. APS Journals: Cell Physiology
2. APS Journals: Journal of Neurophysiology
3. Canadian Journal of Applied Physiology Reviews
4.Cellular Physiology and Biochemistry
5.Clinical Neurophysiology
6.European Journal of Applied Physiology
7.Journal of Applied Physiology
8.Pakistan Journal of Physiology
9.Physiology and Behaviour
10. The Journal of Physiology
11. JIIMCT
12. JRMC
13. JCPSP
14. Professional Medical Journal
15. JPMA

ENDOCRINOLOGY

Course Contents:

General principles (classification, mechanism of action and feedback control), transport,metabolism, actions and control of secretion of the Endocrine system;

Course Objectives:

1. Comprehend the functional anatomy of male and female reproductive systems
2. Comprehend the physiological processes involved in spermatogenesis, ovulation, menstrual cycle,conception and pregnancy, functions of placenta, lactation and neonatal physiology

Recommended Readings:

1. Benjamin Cummings: Interactive Physiology 10-System Suite. Benjamin-Cummings Publishing
Company, Subs of Addison Wesley Longman, Inc. Latest Ed.
2. Best and Taylor: Text Books of Physiology Latest Ed.
3. Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Latest Ed.
4. Dee UndglaubSilverthorn: Human Physiology: An Integrated Approach. Benjamin Cummings, LatestEd.
5. Ganong WF: Review of Physiology Latest Ed.
6. Guyton AC: Textbook of Physiology Latest Ed.
7. Samson Wright's Applied Physiology

Journals:

1. APS Journals: Endocrinology and Metabolism
2. APS Journals: Physiological Reviews
3. Canadian Journal of Applied Physiology Reviews
4.European Journal of Applied Physiology
5.Journal of Applied Physiology
6.Pakistan Journal of Physiology
7.Physiology
8. The Journal of Physiology
9. JIIMCT
10. JRMC
11. JCPSP
12. Professional Medical Journal

13. JPMA

COMPULSORY ROTATION

SKILLS

Micro-techniques

Course contents:

will include:

Fixation of tissues: Phenomenon, Common fixatives used or available: composition, advantages and disadvantages. Clearing agents; Paraffin Embedding process; Sectioning Process: Microtomes and knives, their
types and uses, Sharpenning of knives, Problems encountered and their remedies. Staining: Procedure, uses and interpretation of: Routine Haematoxylin and Eosin, Cresyl Violet for Nissl substance, Sudan Black B for Lipids, Mallory's connective tissue stain, Gomor's Aldehyde
Fuchsin Stain for pancreas, Feulgen method for DNA, Periodic Acid Schiff (PAS) for glycogen,ModifiedHalmi's method for Pituitary gland, Some latest techniques. Mounting; Vital and supravital dyes and study of cells; Freezing microtome and frozen sections of fresh tissues; Microscopes: Components, phenomenon and uses of: Simple and compound opticalmicroscopes, Florescent microscope, Polarizing microscope, Dark field microscope, Electron
microscope; Micrometry; Microphotography; Maintenance of microscopes.

Course Objectives:

Upon completion of the course students should be able to:

1. Understand the phenomenon of fixation, dehydration, clearing, embedding.
2. Comprehend the knowledge of sectioning
3. Comprehend the knowledge of indications, procedures and correction of abnormal deviations of various staining methods.
4. Perform the above proceduresand sample transportation and storage.

Animal handling & others Course Contents:

Study of various equipment in a physiology research laboratory, using the modern equipment like:

PowerLab®, Physiographs, use of transducers, Spirometry, blood gas analysis, treadmill exercise experiments, ECG recording in resting and exercise, hearing tests on audiograph, tuning fork tests, animal preparation and experiments on

laboratory animals, maintenance of animal house; Routine physiology experiments on animals and humans.ELISA,PCR and other techniques related with hormone analysis.

Course Objectives:

Upon completion of course the students will be able to:

1. Comprehend ethical considerations in using animals for research experiments
2. Use the equipment in a physiology research laboratory
3. Prepare an animal model for research
4. Exhibit attitude towards research on human volunteers and ethical aspects
5. Interpret the results and draw inference

Recommended Readings:

1. Cindy L. Stanfield: Principles of Human Physiology. Benjamin Cummings, Latest Ed.
2. Dee UndglaubSilverthorn: Human Physiology: An Integrated Approach. Benjamin Cummings, LatestEd.
3. Ganong WF: Review of Physiology Latest Ed.

Journals:

1. Canadian Journal of Applied Physiology Reviews
2. European Journal of Applied Physiology
3. Journal of Applied Physiology

Journal Club and Seminars/Symposia/Conferences/Workshops

Course Objectives:

Upon completion of Seminars/Workshops etc. the students will be able to:

1. Collect information from the available resources
2. Prepare a presentation on a given topic
3. Deliver a lecture and manage a question-answer session
4. Work as a productive member of a task force

5.Journal Club will be organized per two months and will be mandatory for all the PGTs.

Course Contents:

The student will attend regular Journal Club Meetings and actively participate with presentationsand lectures, discussions, and question-answer sessions;

Participation in academic workshops will be mandatory;

Attendance in the relevant conferences will be appreciated;

Due credit will be given to publications by the student according to PPHDC/HEC criteria

Recommended Activities:

1. Compulsory Journal Clubs
2. EssentialSeminars
3.Conferences
4. Mandatory Workshops

Resources:

1. Internet
2. Libraries
3. Peer Advice

EDUCATIONAL METHODOLOGY

- Interactive Lectures
- Small group discussions
- Presentations
- workshops

- Assignments
- Seminars

ASSESMENT PROCEDURE:

- Assignments/tests/log book/portfolio 30 percent marks
- Semester Exam

Viva/practical OSPE 30 percent marks

Written Examination 40 percent marks

- Calculate GPA as per University rules.

SEMESTER 03 onwards

SYNOPSIS AND THESIS

GUIDELINES FORPHD SYNOPSIS

Synopsis is the brief out line of PGTs planned research project submitted for approval from Ethics Review Committee. It gives a panoramic view of PGTs research for quick analysis by the reviewers. Mresearch synopsis writing is an active part of the academic life of the Rawalpindi Medical University.

A synopsis should be constructed in a manner that facilitates the reviewer to understand the research project at a glance. It should be brief but precise. A synopsis must have the following headings:

TITLE:

The title of the research project should be brief but informative. It should reflect the objectives of the study. It must be written after the whole synopsis has been written so that it is a true representative of the plan. It should neither be too short nor too long. It should not include any name of the institution or the number of cases to be studied.

INTRODUCTION:

It should provide a brief description of the selected topic. It must highlight the importance of study, its relevance and applicability of results on general population. The purpose of the study must be evidently stated in the introduction.

HYPOTHESIS:

A hypothesis is a statement which is to be tested for possible acceptance or rejection. It is mentioned as a tentative prediction or explanation of the relationship between two or more variables. Hypothesis are of two types i.e. Null (Ho) and Alternative (H1). Null hypothesis is tested for possible rejection, where as alternative hypothesis is tested for possible acceptance. Hypothesis can be formulated by understanding the problem, reviewing the literature on it, and considering other factors. A hypothesis is needed in the following study designs:

All interventional studies

Cohort

Case control

Comparative cross sectional.

AIMS AND OBJECTIVES:

An objective is indication of what the researcher wants to study. It should be stated in clear measurable terms and should be itemized.The objectives and aims should be only a few (2-3). They must pertain to the study problem. Usages of terms like "first study", "the only study", etc. should be avoided.

OPERATIONAL DEFINITION:

It may be required in some synopsis. It is the definition of the exposure and outcome variables of interest in context to objective in a particular study and their means of measurement/determination?

Examples:

Anemia

Effectiveness

PPH

Wound healing

MATERIAL AND METHODS:

STUDY DESIGN:

Mention the name of the appropriate study design.

SETTING:

Name and place where the research work is to be conducted

DURATION OF STUDY:

How long will the study take?

SAMPLE SIZE:

How many patients will be included? If there are groups how many per group?

SAMPLING TECHNIQUE:

Type of sampling technique employed.

SAMPLE SELECTION:

Inclusion criteria: On what basis will patients be inducted in the study?

Exclusion criteria: On what basis will patients be excluded from the study?

DATA COLLECTION PROCEDURE:

A detailed account of how the researcher will perform research; how she/he will measure the variable. It includes:
Identification of the study variables
Methods for collection of data
Data collection tools (proforma/questionnaire)

VARIABLES:

Variables are the factors that can change. These changes can affect the outcome of a research project. Thus, it is important to identify the variables at the planning stage. They should be quantified with a measurable unit. Knowledge of the various variables in a research project will assist in refining the objectives. Usually, objectives of a research will be to see the effect of independent variables on dependent variables

DATA ANALYSIS PROCEDURE:

Data analysis is an important part of a research project. A good analysis leads to good results. Relevant details naming software to be used, which descriptive statistics and which test of significance if and when required, specifying variables where it will be applied. A general statement "appropriate statistical methods will be used." must be avoided.

ETHICAL CLEARANCE:

Wherever necessary, ethical committee clearance from the institute should be obtained. The certificate must be attached. Ethical clearance is required in all human and animal studies.

DATA COLLECTION INSTRUMENT:

The researcher must attach, as an annex, the proforma or questionnaire with the help of which he/she intends to collect data. The proforma/questionnaire must match the objectives and must not contain irrelevant sections like inclusion and exclusion criteria etc.

ESTIMATED COST OF THE PROJECT:

It includes the funds required for all chemicals / reagents, laboratory equipments / materials or study animals (if any) to be utilized in the research needs.

OUTCOME & UTILIZATION:

It describes the way in which the expected results of your study can be useful in designing and delivery of health care system

REFERENCES:

All references quoted in review of literature and anywhere else in the synopsis should be listed here. There are two styles for writing references, Vancouver style and Harvard style. Vancouver style is easy to follow as it depends on the numbers as quoted in text.

PROCESS OF SUBMISSION& APPROVAL

Synopsis will be approved by university Institutional Research Forum and Ethical Review Board. Final approval will be given by University Board of Advance Studies and Research.

GUIDELINES FOR PHD THESIS

Thesis is a detailed discourse on a subject especially submitted for a higher degree in auniversity. Itresults from original research, especially when submitted by a candidate for a masters degree.

The thesis is a document that contains relevant details of the research work conducted by the post-graduate trainee relating to the problem. It emphasizes on developing skills in post-graduate trainees for:collection and compilation of data, analyzing and reviewing relevant literature available on the subject& developing medical writing habits. A thesis must have the following headings:

TITLE PAGE:

It must include the title (including subtitle), author, institution, department&date of delivery.

SUPERVISOR'S CERTIFICATE:

A thesis is to be submitted for the purpose of examination. It must obtain prior declaration by the supervisor on the standard and quality of the thesis.

ACKNOWLEDGEMENTS:

The student may acknowledge the assistance of various individuals or organizations in-successfully producing the thesis. This should be written in one page.

LIST OF SYMBOLS/ABBREVIATIONS:

All symbols or abbreviations found in the text should be listed on this page in alphabetical order.

TABLE OF CONTENTS:

The Table of Contents page must start on a new page. It should list all sections, chapters and sub-headings. The titles must be written using the same words as those written in the text.

LIST OF TABLES:

This page should list all the tables found in the thesis. The page number of the table must also be included. The table numbers should be arranged according to the chapters.

LIST OF FIGURES:

Diagrams, photographs, drawings, graphs, charts and maps are included as figures. The list should be written similar as the List of Tables

LIST OF APPENDICES:

All appendices should be listed on this page.

ABSTRACT:

A good abstract explains the importance of the research in one line. It then goes on to give a summary of your major results. The closing sentences explain the major inferences of your work. A good abstract is concise, readable, and quantitative. Length should be ~ 1-2 paragraphs, approx. 400 words. Information in title should not be repeated. Use numbers where appropriate. Abstract must tell why & how you performed the study &what did you learned by the results of the study.

INTRODUCTION:

For writing a good introduction PGTs must know what the body of the paper says. Preferably the introductory section(s) should be written after PGTs have completed the rest of the paper, rather than before.Be sure to include a sufficiently interesting statement at the beginning of the introduction to motivate PGTs reader to read the rest of the paper.This is the scientific problem that PGTs paper either solves or addresses. PGTs should attractthe reader in and make them want to read the rest of the thesis.

The next paragraphs in the introduction should quote previous research in this field. It should cite those who had the idea or ideas first, and should also cite those who have done the most recent and relevant work. PGTs should then go on to explain why more work was necessary (PGTs work, of course.)

PGTs should also state the goal of the paper: why the study was undertaken, or why the paper was written. Do not repeat the abstract. Provide sufficient background information to allow the reader to understand the context and significance of the question PGTs are trying to address. Mention proper acknowledgement of the previous work on which they building their thesis. Give sufficient references at the end. The introduction should be focused on the thesis question(s). All cited work should be directly relevant to the goals of the thesis.

AIMS AND OBJECTIVES:

An objective is indication of what the researcher wants to study. It should be stated in clear measurable terms and should be itemized. The objectives and aims should be only a few (2-3). They must pertain to the study problem.

MATERIAL AND METHODS:

It should be same as stated in the synopsis. It includes:

- STUDY DESIGN:

Mention the name of the appropriate study design.

- SETTING:

Name and place where the research work is to be conducted

- DURATION OF STUDY:

How long will the study take?

- SAMPLE SIZE:

How many patients will be included? If there are groups how many per group?

- SAMPLING TECHNIQUE:

Type of sampling technique employed.

- SAMPLE SELECTION:

Inclusion criteria: On what basis will patients be inducted in the study?

Exclusion criteria: On what basis will patients be excluded from the study?

- DATA COLLECTION PROCEDURE:

A detailed account of how the researcher will perform research; how she/he will measure the variable. It includes:

Identification of the study variables

Methods for collection of data

Data collection tools (proforma/questionnaire)

- DATA ANALYSIS PROCEDURE:

Data analysis is an important part of a research project. A good analysis leads to good results. Relevant details naming software to be used, which descriptive statistics and which test of significance if and when required, specifying variables where it will be applied. A general statement "appropriate statistical methods will be used." must be avoided.

RESULTS:

The results are actual statements of observations, including statistics, tables and graphs. Results indicate information on range of variation.Mention negative results as well as positive. Do not interpret results - save that for the discussion. Use S.I. units (m, s, kg, W, etc.) throughout the thesis. Break up their results into logical segments by using subheadings. Key results should be stated in clear sentences at the beginning of paragraphs. It is far better to say "X had significant positive relationship with Y than to start with a less informative like "There is a significant relationship between X and Y". Describe the nature of the findings; do not just tell the reader whether or not they are significant.

TABLES & FIGURES:

All tables must be numbered. A caption should be positioned at the top of the table. If the caption is written in a single line, it should be centered. If the caption is written more than one line, it should be aligned to the left. Tables must be numbered with respect to the chapter.Illustrations such as maps, charts, graphs, drawings, diagrams, and photographs are referred as figures. All figures must be clear and of high quality. Figures must benumbered. A caption should be located at the bottom of the figure. If the caption is written in a single line, it should be centered. If the caption is written in more than one line, it should be align to the left. Figures are numbered with respect to the chapter.

DISCUSSION:

Discussion should be started with a few sentences that summarize the most important results. The discussion section should be a brief essay in itself. It should emphasize on the major patterns in the observations, the relationships, trends and generalizations among the results.The exceptions to these patterns or generalizations should also be mentioned. Describe the likely causes (mechanisms) underlying these patterns resulting predictions. Explain the agreement or disagreement with previous work. Interpret results in terms of background laid out in the introduction. Mention the implications of the present results.Include the evidence or line of reasoning supporting each interpretation.This section should be rich in references to similar work and background needed to interpret results. However, interpretation/discussion section(s) are often too long and verbose. Break up the sections into logical segments by using subheads.

CONCLUSION:

Conclusions include the strongest and most important statement that PGTs can make from his/her observations. Refer back to problem posed, and describe the conclusions that PGTs reached fromcarrying out this investigation, summarize new observations, new interpretations, andnew insights that have resulted from the present work.Include the broader implications of your results. Do not repeat word for word the abstract, introduction or discussion. The conclusions should be linked with the objectives of the study.

APPENDICES:

Appendices are supplementary materials to the text. These include tables, charts,computer program listings, and others.

REFERENCES:

References are detailed description of items from which information were obtained in preparing the thesis. All references must be listed at the end of the text.

POLICY FOR PhD THESIS WRITING AND SUBMISSION:

- Student will select topic and get it approved in first semester.
- Student will write synopsis and get it approved in 2nd semester.
- In the 3rd semester student will do research work.
- In the 4th semester student will complete research work and write down the thesis.

The thesis submitted by 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.

Plagiarism Undertaking

I solemnly declare that research work presented in the thesis titled "…….
……."
is solely my research work with no significant contribution from any other person. Small contribution/help wherever taken has been duly acknowledged and that complete thesis has been written by me.
I understand the zero tolerance policy of the HEC and University
…… (Name of University)……

towards plagiarism. Therefore I as an Author of the above titled thesis declare that no portion of my thesis has been plagiarized and any material used as reference is properly referred/cited.

I undertake that if I am found guilty of any formal plagiarism in the above titled thesis even after award of PHD degree, the University reserves the rights to withdraw/revoke m degree and that HEC and the University has the right to publish my name on the HEC/University Website on which names of students are placed who submitted plagiarized thesis.

Student /AuthorSignature:_____Name:_____

SECTION-IX

PGT EVULATION

360 Degree evaluation of PGTs:

- PGTs will be evaluated by
- Students
- Lab Staff
- Mentors
- Supervisors

EVALUATIONS

- To make sure that residents/students are evaluated fairly, the evaluators will attend workshops on evaluation methodologies.
- There will be structured viva and written assessments
- Keys will be provided to evaluators for checking written papers/viva
- For annual confidential written evaluations of thePGT by the students, Feedback proforma will be designed in which all aspects related to teaching like Knowledge, punctuality, tolerance level, professionalism, communication skills and behavior with student will be covered.
- To ensure confidentiality students will be asked to fill proforma without showing their identity, different students will be asked to fill proforma at different times
- All data will be computerized and a, passcode will be generated so only concerned person will be able to access these feedback proforma
- A confidential letter will be written to PGT in which details of his/her annual Feedback will be told including all positive and negative aspects
- He /she will be called in HOD office to discuss areaswhere improvement is required
- He/she will be encouraged to convert weaknesses into strengths by addressing his problems

DEPARTMENT OF PHYSIOLOGY RAWALPINDI MEDICAL UNIVERSITY, RWP

PGT EVULATION PROFORMA BY SUPERVISOR

NAME: _____SESSION: _____

PROGRAMME:_____COURSE TITLE: _____

ATTENDANCE		
PRESENTATIONS		
LECTURES		
SGD		
TUTORIALs/Guided self Study		
Practical		
PROFESSIONALISM		
CONDUCT		

TEST RESULTS		
WRITTEN		
VIVA		
TOTAL		
REMARKS		

SUPERVISOR SIGNATURE :_____

PGT EVALUATION BY STUDENTS

Proforma

Teacher Evaluation Form

(To be filled by the student)

Course Title and Number: _____

Name of Instructor: _____ Semester _____

Department: _____ Degree _____

Use the scale to answer the following questions below and make comments

A: Strongly Agree B: Agree C: Uncertain D: Disagree E: Strongly Disagree

Instructor:					
1. The Instructor is prepared for each class	A	B	C	D	E
2. The Instructor demonstrates knowledge of the subject	A	B	C	D	E
3. The Instructor has completed the whole course	A	B	C	D	E
4. The Instructor provides additional material apart from the textbook	A	B	C	D	E
5. The Instructor gives citations regarding current situations with reference to Pakistani context.	A	B	C	D	E
6. The Instructor communicates the subject matter effectively	A	B	C	D	E
7. The Instructor shows respect towards students and encourages class participation	A	B	C	D	E
8. The Instructor maintains an environment that is conducive to learning	A	B	C	D	E
9. The Instructor arrives on time	A	B	C	D	E
10. The Instructor leaves on time	A	B	C	D	E
11. The Instructor is fair in examination	A	B	C	D	E
12. The Instructor returns the graded scripts etc, in a reasonable amount of time	A	B	C	D	E
13. The Instructor was available during the specified office hours and for after class consultations	A	B	C	D	E

Course:					
14. The Subject matter presented in the course has increased your knowledge of the subject	A	B	C	D	E
15. The syllabus clearly states course objectives requirements, procedures and grading criteria	A	B	C	D	E
16. The course integrates theoretical course concepts with real-world applications	A	B	C	D	E
17. The assignments and exams covered the materials presented in the course	A	B	C	D	E
18. The course material is modern and updated	A	B	C	D	E

Comments:

Instructor:_____

_____

_____

Course:_____

_____

_____

Proforma-2

Faculty Course Review Report

(To be filled by each teacher at the time of Course Completion)

Part-I

Department:			**Faculty:**		
Course Code:		**Title:**			
Batch:		**Term:**		**Year:**	
Credit / Contract hr/Week:	**Th**	**Pr**	**No. of Lectures Conducted**	**Th**	**Pr**
Name of Course Teacher			**No. of Students enrolled**		
Designation					
Assessment Methods please give precise details (no & length of assignments, tests and presentations)					

Comments: _____

_____

_____

Overview/ Evaluation (Course Co-coordinator's Comments)

Feedback: first summarize, and then comment on feedback received form:

1) **Student (Course Evaluation) Questionnaires(filled by QEC)**

2) **External Examiners or Moderators (if any)**

(comments of External examiner if any)

3) **Curriculum:** comment on the continuing appropriateness of the Course curriculum in relation to the intended learning outcomes (course objectives) and its compliance with the HEC Approved / Revised National Curriculum Guidelines**(comments by the course teacher)**

4) **Assessment:** comment on the continuing effectiveness of method(s) of assessment in relation to the intended learning outcomes (Course objectives)

(comments by the course teacher)

5) **Enhancement:** comment on the implementation of changes proposed in earlier Faculty Course Review Reports**(comments by the course teacher)**

6) **Outline:**any changes in the future delivery or structure of the Course that this semester/term's experience may prompt**(by the course teacher)**

Name/ Signature _____Date_____

(Course Instructor)

Name/ Signature _____Date_____

(Head of Department)

Part-II

Faculty Course review report

Grades secured and other outcomes (to be provided by controller of Examination)

Name of Teacher:	**Course Taught**		**Term:**	
Session / Batch:	**Date of completion of term.**			

Section-X

Assessment

Formative assessment

Summative assessment

ASSESMENT PROCEDURE:

- Assignment 20 marks percent marks
- Test 30 marks percent marks
- Total / Number of all percent marks Weight age 40%(Internal assessment)
- End semester Examination
  a. MCQs 100 marks
  b. SAQs 100 marks
  c. Viva & OSPE 200 marks
  Total 400 marks Weight age 60 %
- Thesis marks 100 Marks Approved by three local examiners

3. Calculate GPA as per University rules.

ASSIGNMENTS:

- Trainees/students will be informed about their assignments/duties by putting their duty rosters and teaching schedules on notice boards on weekly basis
- By keeping academic log books
- By maintaining and displaying annual academic calendars
- All schedules will be readily available on college website

STANDARD OF PASSING:

1. **Cleared semester exams**A comprehensive exam would be held on the minor subject related to the research topic at the end of 3rd semester alongwith the semester exam of course work.

2. **The dissertation examined or to be examined by at three examiners.** If the scholar has completed his/ her dissertation then the dissertation has to be examined by minimum of three examiners preferably from technologically advanced universities.

3. **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.

Defense Examination

a. There shall be a standing list of external examiners for respective department consisting of persons of eminence in the field of research. The list shall be suggested from time to time by the board of studies of faculty concerned and approved by the research board. The external examiners will be requested to critically examine the thesis for its suitability for the award of PhDdegree.

b. There shall also be a standing list of local examiners for department consisting of eminent persons engaged in research. The list shall be suggested from time to time by the board of studies of the department/board of faculty concerned and approved by the research board. The local examiners will be requested to conduct the final viva-voce examinations of thesis.

c.
i. The candidate shall in the first instance submit six unbound copies of his/her completed thesis along with an application on prescribed form for the evaluation of his/her thesis, duly forwarded by his/her supervisor and the chairman of the department:-
Three for external
One for examination section
One for department office
One for the supervisor
ii. 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.
iii. After the viva-voce examination; four copies of the final hard-bound thesis be submitted:-
i. One for examination section
ii. One for central library
iii. One for departmental office
iv. One for supervisor

d. The supervisor shall suggest a panel of at least six external examiners from the approved list. The vice-chancellor shall appoint three external examiners from the suggested panel to evaluate the thesis.

e. The reports of the examiners shall be placed before the research board for consideration.

f. 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.

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

h. If any of the examiners suggests modification/revision of the thesis, the candidate shall be required to resubmit a revised version of the thesis, duly certified by the supervisor, within one year.

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

j. If any of the examiners finds the thesis adequate but suggests minor modifications/revision, this may be incorporated without referring again to the examiner as required in clause (i).

k. The viva-voce examination shall be conducted by the two external examiners appointed by the vice-chancellor from the panel approved by the research board, the supervisor and the chairman of the department concerned.

l. The viva-voce examination shall be open to the public but the evaluation will be done only by the panel of examiners.

m. If the candidate fails to satisfy the examiners in the viva-voce examination he/she may be given a chance to defend the thesis for the second and final time within a period of six months.

n. A candidate who successfully completes all the requirements shall be awarded, with the approval of the research board and the syndicate, the degree of PHDunder the seal of the university.

The vice-chancellor may approve the recommendations of the research board on behalf of the syndicate regarding the award of PHDdegree to the candidate.

RMU GradingSystem

It will bebasedon GPA–4system

Marks obtained in Percentage range	Numerical Grade	AlphabeticalGrade
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**
<50Un-grade-able	0	**U**

A candidateobtaining GPAlessthan2.00(50%)isdeclared un-graded (fail).

Cumulativetranscriptisissued attheendofclearanceof each semester.

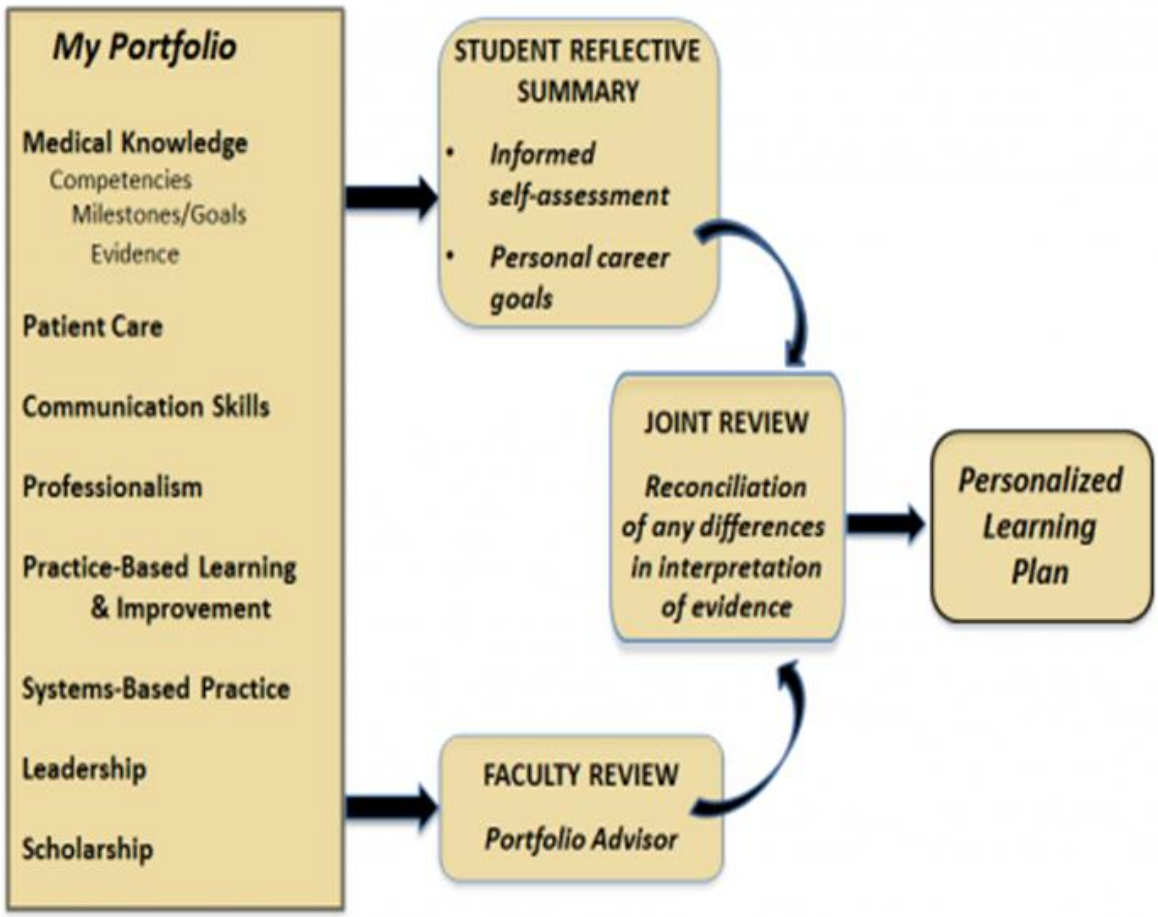
Section-XI

PGT Toolkit for formative Assessment

Portfolio

MAINTANENCE OF RECORD

Portfolio



PORTFOLIO

PGTs will maintain a portfolio that takes the portfolio resume concept one step further in a multiple-page document that thoroughly covers PGTs career to date. Portfolio will contain:

- Table of contents
- Copy of standard resume
- Education: degrees, certifications, etc.
- Skills and achievements
- Career goals
- Mission statement or guiding principles
- Professional summary
- Personnel Essay
- Previous Work samples
- Evaluations or recommendations
- Publications and research
- Volunteer work
- Awards and acknowledgements
- List of references
- Cover Letter
- Critical Choices
- Senior Memory Book
- Two-Year Plan
- Academic Work samples
- Projects, examples, posters
- Student reflections (either weekly, monthly, or bi-monthly)
- Pivotal Points
- Charts, graphs created
- CPC attendance
- Assignments

  PGTs will organize portfolio into sections. Use page numbers and a table of contents to make the information easy to find, as well as tabs or dividers between sections.

Reflexive Log

Example – Reflexive Log

1. Describe a learning/teaching experience that was significant for PGTs.
2. Reflect on why this experience was significant for PGTs. How did PGTs feel/react? What were they thinking then?
3. Think about what this experience means. What do PGTs think made them feel/think/react in this way?
4. What do you think you learnt from this experience?
5. What would PGTs do differently in the future if PGTs found yourself in a similar situation?

Example –Learning Activity Diary

Date:

Learning Activity:

Participants involved (students/teachers/tutors etc):

What did you understand to be the purpose of the learning activity?

At the start of the activity, what did you think you were required to do to successfully complete it?

What learning resources did you use to help you? (e.g. books, equipment, internet resources the advice and help of others including fellow students)

What did you learn?

Did you find the learning activity straightforward or difficult? Why?

If you were asked to do the activity again, what would you do differently?

Making Plans to Achieve your Goals

PGTs will use this template to break down your goals, whether they're academic, career-orientated or personal, into specific and achievable steps. Set target dates for short-, medium- and long-term goals to keep yourself motivated, but don't worry if you have to adjust these dates as you progress.

Goal:	
How will I benefit from reaching this goal?	
What obstacles and difficulties might I face?	
Whom can I approach to help me reach my goal?	
What resources might I need?	

What incremental steps do I need to take to achieve my goal?

Action Needed	Date to Complete	Completed
		❑ (*date*)
		❑
		❑
		❑
		❑

What lessons have you learnt from this process that might be useful next time?

FORMATIVE ASSESSMENT / Progress Review

PGTs willuse this form to reflect on progress since last meeting with their personal mentor. This is an opportunity to think about how they performed in different units over the last teaching block: not just what marks received, but how wellthey got to grips with the subject matter and the skills involved and what lessons drawn from the experience for work in future.

They will take the form to mentor, in advance as a basis for the discussion.

(1) How would you sum up your experiences over the last teaching block?
(2) What have been the main strengths in your performance?
(3) What are the main skills which you have acquired or developed?
(4) What have been the most important points raised in the feedback you have received?
(5) What are the main areas where you feel you can improve your performance?
(6) Are there any skills that you need to develop to do this?
(7) What are your key aims for your work over the next teaching block?
(8) Is there anything that you feel is holding you back in achieving these aims?

Semester of Clinical Rotations depending upon the research topic
Learning Objectives of Clinical Rotations

SKILLS TO BE ACQUIRED DURING THE CLINICAL ROTATIONS:-

I. **MEDICAl WARD POSTINGS** :

1) General examination and Examination of a diferent systems in patient. Learning the pathophysiology of common medical problems

2) Should learn to carry out all investigative procedures

a) Drawing of Blood

b) Pleural tap

c) Lumbar Puncture

3) Interpretation of Data

a) X-rays

b) ECG

c) Special investigative procedures

II. **CARDIOLOGY DEPARTMENT**

1) Learn to record and interpret E.C.G., Echo, Doppler, Cardiac Monitor.

2) Learn the procedure of Cardiac Catheterisation, Resuscitation technique.

III. **NEUROLOGY DEPARTMENT**

1) Clinical Examination of neurology patient

2) Principles of EEG, EMG, ENMG, Evoked potential

3) Interpretation of EEG, EMG, ENMG, Evoked potential

4) Nerve conduction studies

IV. **CHEST MEDICINE**

(Pulmonary function Laboratory)

1) Pleural tapping

2) Spirometry - procedure & Interpretation

3) Bronchoscopy

4) ICD

V. **MEDICAL GASTROENTEROLOGY**

1) Endoscopy Technique

2) MRCP and other procedures

VI. **ENDOCRINOLOGY INCLUDING DIABETOLOGY**

1) Clinical Examination of endocrinology disorder patients

2) Discussion and treatment guidelines.

3) Radio immuno assay techniques

VII. **CLINICAL BIOCHEMISTRY**

1) Learn the methodology of all clinical Biochemical tests and basis of operation of various equipments and interpretation of data.

VIII. **HAEMATOLOGY DEPARTMENT - CLINICAL PATHOLOGY**

1) Procedure and discussion of results

2) Haematology Investigations

IX. BLOOD BANK

1) Collection, Storage, transfusion of blood.

2) Transfusion Reaction (Lecture) - 2 hrs

3) Blood grouping and cross matching

X.ANATOMY

(Histology Laboratory)

1) Section cutting, slide preparation, staining techniques, mounting of specimens.

2) Histology of normal structure, study of human body at various levels particularly Head, Neck, Thorax and Abdomen.

XI. COMMUNITY MEDICINE

A postgraduate candidate should BE TRAINED IN Basic Medical Statistics

XII. UROLOGY

1) Urodynamic study

2) Stenting

3) IVU

XIII. OBG

1) Fertility tests

2) HSG, USG Including FOLLICULAR STUDY

3) Tests for infertility

XIV. PAEDIATRICS

1) Nutrition problems in children

XV. ENT

Audiometry, Vertigo clinic, ENT prodedures

XVI. ICU

Manging Acid-base disorders

XVII. OPTHALMOLOGY

All Opthalmic Procedures

XVIII. STUDY AND TRAINING IN THE DEPARTMENT OF PHYSIOLOGY

DETAILS OF PRACTICALS

MAMMAlIANEXPERIMENTS :

(Rabbit/Guinea Pig/Rat)

1) In vitro experiments

- Intestinal movements

AMPHIBIAN EXPERIMENTS: (Frog)

1) Vagal stimulation & action of atrophine& nicotine

2) Perfusion Experiments on isolated heart

3) Isometric contraction

4) Frogs skeletal muscle contraction experiments

5) Cardiac muscle experiments

SLIDES:

HISTOLOGY slides of all tissues and organs of the body

CHARTS:

Interpretation of recordings: ECG, EEG, EMG, ERG, AUDIOGRAM, SPIROGRAPH, FTM, GTT, Electrophoresis, Blood Gas Analysis, Flow-Volume Curves

HAEMATOLOGY:

1) Red blood Cell count

2) Total White Cell count

3) Differential Leucocyte count

4) Reticulocyte count

5) Platelet count

6) Eosinophil count

7) Arneth index

8) Blood grouping & typing

9) Hb% estimation

10) BT & CT

11) ESR & PCV

HUMAN EXPERIMENTS :

I. Examination of :

1. Respiratory system

2. Cardiovascular system

3. Nervous System

II .Perform or record & interpret the data or finding:

1) Autonomic Function Tests

2) ECG, EMG, EEG

3) Spirometry

4) Perimetry

5) Stethography

6) Respiratory efficiency & endurance

7) Recording of respiratory movements using stethograph and effects of: Hyperventilation, swallowing, speech, breath holding, exercise.

PEDAGOGY :

The teaching skills of the candidate will be assessed. The candidate will be given a topic by the 4 Examiners at the end of the first day of the practical examination for a Lecture presentation on the next day to an imaginary audience. The Examiners self evaluate the candidate's ability (Trial class room lecture for under graduate students)