Rawalpindi Medical University Rawalpindi Rawalpindi

Integrated Undergraduate Research Curriculum (IUGRC)

Department of Community Medicine & Public Health

Rawalpindi Medical University Rawalpindi

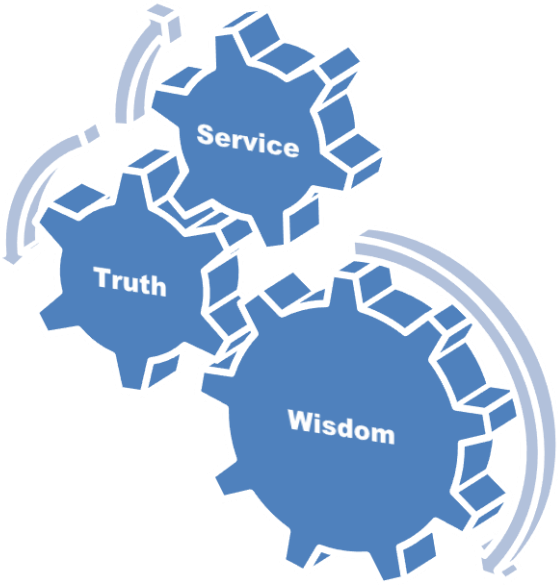
وَهُوَ الَّذِیْ مَدَّ الْاَرْضَ وَجَعَلَ فِیْهَا رَوَاسِیَ وَاَنْهٰرًا ؕ وَمِنْ كُلِّ الثَّمَرٰتِ جَعَلَ فِیْهَا زَوْجَیْنِ اثْنَیْنِ یُغْشِی الَّیْلَ النَّهَارَ ؕ اِنَّ فِیْ ذٰلِكَ لَاٰیٰتٍ لِّقَوْمٍ یَّتَفَكَّرُوْنَ (۳)

اور وہ وہی ہے جس نے زمین کو پھیلایا اور اس میں پہاڑ اور دریا پیدا کئے اور ہر طرح کے میوؤں کی دو دو قسمیں بنائیں۔ وہی رات کو دن کا لباس پہناتا ہے۔ غور کرنے والوں کے لیے اس میں بہت سی نشانیاں ہیں (۳)

And He it is Who spread out the earth and placed therein firm hills and flowing streams, and of all fruits He placed therein two spouses (male and female). He covereth the night with the day. Lo! herein verily are portents for people who take thought. ﴿3﴾

SURAH AR RAD AYAT NO. 3
AL-QURAN UL HAKEEM

Motto



Vision

- *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*

Vice Chancellor Note

As a Vice Chancellor of Rawalpindi Medical University this realization gives me immense pleasure that faculty of Rawalpindi Medical University is striving hard to take lead in public sector health institutions for academic excellence, research and innovation. Rawalpindi Medical University has taken initiative of developing integrated undergraduate research curricula in order to harmonize with latest advancement in medical education around the globe. Our aim is to create a centre of excellence for future seven-star doctors by establishing the highest standard of research and medical education, striving for implementation of innovative ways having the strong impact on clinical outcomes, population health and health care services delivery across the nation. Our mission is to improve the health of all sections of the community by preventing disease, prolonging life, promoting health and well being through the provision of quality health care by practicing evidence-based medicine in an era of professionalism, scholarship and advocacy

Prof. Dr. Muhammad Umar, *(Sitera-e-imtiaz)*
Vice Chancellor& CEO
Rawalpindi Medical University & Allied Hospitals

Foreword

Research is a supreme human function and health research has high value to human community. It is an ongoing process, which invigorates human effort to overcome ill health, live better and longer.

Undergraduate medical education in our country is mostly therapeutic and physician oriented. Increasing importance of research in healthcare practices and competency in research methods for a future doctor is highly debated, deliberated and demanded but it has not given due space in framework of medical teachings and has never been incorporated as a longitudinal theme in five years MBBS curriculum. Research has been part of fourth year teachings in most medical teaching institutions of the country without any practicable mechanism for student's learning and assurance of acquisition of research skills.

Earlier, health research did not exist separately as a part of medical undergraduate curriculum but for last two decade it slackly appeared in medical UG program as a part of lecture based teachings of the Community Medicine. Theoretical aspects of research including study designs, biostatistics were covered under discipline of epidemiology, then some concepts of research methodology was introduced. Later on, it was made compulsory for students to undertake a research projects and conduct community health survey (House Hold Survey). Currently a total number of 15 marks are reserved for student's performance assessment in research & HHS in practical exam in community medicine in 4th Prof. But no uniform guidelines exist for undertaking research projects and households survey.

Research oriented healthcare providers are able to practice evidence based medicine with more promising treatment outcomes and a positive impact on overall wellbeing of the people. Research is the only portal to provide "evidence" to human health development efforts. Medical profession is by default obligatory to health research. The beginners in health sciences are needed to be invited and equipped with research skills to take up this legacy. Since research plays a key role in the practice of medicine as a profession; a multi-pronged approach spanning the entire undergraduate curriculum needs to be exercised, to best address the health needs of a community

The accreditation councils, regulatory licensing bodies and medical associations all over the world have emphasized the incorporation of research in medical curriculum. The World Federation of Medical Education (WFME, 2015) has highlighted that medical students graduating till 2023 must have undergone through modern teaching-learning stratagem including research and community based education as a mandatory component.

Keeping in consideration the current trends worldwide, Pakistan Medical & Dental Council (PMDC, 2015) has made it mandatory for all medical schools to incorporate research into their undergraduate curriculum. Despite of obligatory condition by PMDC only few medical schools across the country have incorporated the research in undergraduate curriculum. Currently undergraduate medical curriculum taught at Rawalpindi Medical University is not research oriented over five years course and practical components of research are not learnt by workable study plans with exposure

to the community. There is an urgent need for incorporating research component as the longitudinal theme in the undergraduate medical curriculum under the domain of Community Medicine at Rawalpindi Medical University. PMDC (2015) has prescribed outcomes and desired competencies to produce community oriented and companionate doctors who are able to respond to pressing health issues of communities, nation and region they have the mandate to serve. PMDC has highlighted research as one of the seven competencies required of a graduating medical doctor including care provider, decision-maker, communicator, community leader, manager, lifelong learner and researcher.

Rawalpindi Medical University leads the way of adopting integrated modular curriculum as teaching strategy among all public sectors medical institutions in the region. Development of integrated undergraduate research curriculum (IUGRC) is next mile stone to be achieved under visionary leadership of Vice Chancellor of Rawalpindi Medical University. In phase of some sever barriers including overwhelming MBBS schedule, overburdened faculty, high workload on students, absence of research teachings guidelines form the statutory body, lack of research funds and research prone infrastructure it was great challenge to develop this strategic change.

The undergraduate medical curriculum of RMU has undergone extensive mapping to establish what learning outcomes have to be initiated, developed and attained, then drafted to multiple & multi hands assessment to incorporate research as longitudinal theme over all years of undergraduate teachings. Explicit and measurable research-related curricular outcomes have been formulated which were also mapped and aligns closely to desired competencies of PMDC Seven-star doctors.

It has been tried hard to synchronize the undergraduate curriculum close to international standards, and various options were considered in this regard. Various models of curricular change were studied in depth. Our effort is highly influenced by the innovative approach adopted by University of Edinburgh (UK) in form of Student Selective components (SSC's) proposed by General medical council (GMC) but modified under our need, issues and resource constraint environment. The student selective components proposed by GMC have been applied to drive the curricular changes and to incorporate research as longitudinal theme along with separate assessment window spanning across first year to final year MBBS

The integrated undergraduate research curriculum(IUGRC) of RMU occupies a definite space in schedule of each of the five years in rational and incremental way. It has horizontal harmonization as well as multidisciplinary research work potentials. In the first year teachings are more introductory & inspirational rather than instructional. The teachings explain what & why of research and what capacities are minimally required to comprehend research & undertake research. Some research dignitaries' lecture arespecifically arranged for sharing their experiences and inspiring the students. Students are specifically assessed through their individual compulsory written feedback (reflection) after the scheduled teachings end.

In 2nd and 3rd years students are exposed to "basics of health research" encompassing Biostatistics and other pre-requisites of undertaking a research study. It includes all theoretical aspects of

research proposal generation and execution a research project. Teachings covers hands on practices on use of computer software's for literature search & citation, SPSS for data analysis in additions to exercises on data collection tool development & data capturing techniques, sampling& sample size calculation and using statistical measures for data analysis.

Other pertinent workshops are also offered to the students through informal system and research librarians of RMU are also be involved in students training in handling scientific literature. Again all teachings are ensured through objective formative assessment and are a compulsory part of final exams in 2nd and 3rd year.

Fourth year component of IUGRC is designed for students experiencing research in real world. As research competencies are best developed through active experience and participation in learner-centered areas of the curriculum. Development of these research competencies are integrated into curriculum, to enable students to better engage with evidence-based medicine, and the complexity, risk and uncertainty of medical practice. Learning mechanism is designed such that students at the level of subgroups (2-3 students) of all small groups are involved in every stage of research cycle. Each member of subgroup is involved with competing ideas along with his plan of research and after scientific evaluation one subgroup proposal is identified. Again all subgroup's proposals are debated to select one most appropriate for group research project. Similarly all students of small group participate in all phases of research including data collection, compilation and finally drafting & presenting research report. All groups have one year time to complete project. Each group is scheduled to work under a dedicated research supervisor / senior faculty. Participation in research is monitored credited in log-books side by side. A total 30 marks are reserved in 4th Prof Exam for assessment of each student's research competency.

In 5th year research teachings are focused to advance health research methods and issues including clinical trials, pharmaceutical research, research funding proposal writings and gray areas of health research etc.

Student's & faculty capacities and high level motivation, institutional support and high passion for research development held by the Vice Chancellor RMU are major strengths of this program. Incomplete strength, overwhelming academic & administrative workload, long leaves and transfers of the faculty are perceived threats.

Prof. Syed Arshad Sabir

MBBS, DCH, MCPS, FCPS, CRCP

Dean

Faculty of Community Medicine & Public Health

Professor in charge Research RMU

Lead: Team for Development Integrated Undergraduate Research Curriculum

Rawalpindi Medical University Rawalpindi (August 2019)

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Curriculum Development Scheme

- ***Vision of Vice Chancellor RMU***

The challenging & demanding task of Curriculum reform was accomplished by indefatigable and untiring efforts of Vice chancellor, RMU who in spite of being extremely busy schedule spared his valuable time and efforts for providing supervision and guidance to make this effort possible

- ***Need assessment***

Curriculum refers to road map or guide line consisting of combination of learning experience, instructional practices and students' performance assessment indicators formulated to appraise targeted learning outcomes. Discovery-care continuum introduced in academic health institutions has made curriculum a dynamic process. The 'Think much; publish little' dictum has been now replaced by a 'Publish or perish' culture *which demands changes in existing curriculum and incorporation of research as longitudinal them in order to keep pace with latest trends in medical education.*

- ***Formation of IUGRC Team***

IUGRC Team was established consisting of following Team members (Notified vide Order No.O-1-13326/RMU dated 31-12-2018)

- *Prof Dr Syed Arshad Sabir Chairperson faculty of community Medicine & Public Health RMU* ***(lead)***
- *Dr. Faiza Aslam Research Coordinator RMU*
- *An assistant professor of community medicine (Dr Khola Noreen AP Community Medicine)*
- *Dr Umaira Nawaz PGT (FCPS-II)*
- *Faculty of Community Medicine & Public Health RMU*

- ***Extensive mapping of existing curricula by expert panel***

The designated team has undergone extensive mapping and review of undergraduate research curricula of medical schools in the region and in developed countries in order to get guidelines for incorporation of the research component in the undergraduate medical curriculum. Curricular Models reviewed include;

a. *Dow Medical University Karachi*
b. *AK Medical University (AKU) Karachi*

c. *Govt. Khawaja Muhammad Saffdar Medical College, Sialkot*
d. *General Medical Council (UK)*
e. *PMDC curriculum for MBBS degree program*
f. *UHS curriculum for MBBS degree program*
g. *HEC Pakistan document*
h. *Current Literature on the subject*

This effort has helped us to formulate important research skill and attributes for medical graduates including critical appraisal of scientific work, ability to comprehend evidence based medicine, knowledge and application of principals of bioethics, communication skills and ability to understand group dynamics and effective teamwork.

- ***Extensive review of relevant literature and books on the subject***

Curriculum development team of RMU has undergone the extensive review of literature already available on recent curricular reforms as indicated in Bibliography. Following standard textbooks on subject were consulted for development of curricular outlines.

I. *Text Book of Public Health & Community Medicine by Muhammad Ilyas, Muhammad IrfanullahSiddique*
II. *Text Book of Preventive & social Medicine by K Park*
III. *Short Book of 'Research Methodology and Biostatistics" by Prof. Sira Afzal*
IV. *Biostatistics for All. By Prof. Dr Iqbal Ahmed Khan*
V. *Biostatistics by Muhammad Ibrahim*
VI. *WHO: Eastern Mediterranean Region. A Practical Guide for Health Researcher Srviers-30.*
VII. *USMLE- High Yield Biostatistics*
VIII. *Basic statistics for health sciences by Jan W. kuzma*
IX. *Essentials of medical statistics by Batty R. Kirkwood*
X. *Biostatistics: Basic concepts & methodology by Wayne W Daniel*
XI. *Methods in Biostatistics for Medical students & research workers by BK Mahajan*
XII. *Statistics in Clinical Practice: By David Coggon*
XIII. *Internet based sources (Google Scholar, Pub med , Pak medic net, WHO & CDC Sites)*
XIV. *WHO Medical Ethics*

Explicit and measurable research-related curricular outcomes have been formulated which were then drafted to multiple channels and experts for review to incorporate research as longitudinal theme over all years of undergraduate teachings. These curricular outcomes align closely to desired

competencies of PMDC Seven-star doctors. It has been tried hard to synchronize the undergraduate research curriculum close to international standards and under PMDC MBBS curricular framework.

IUGRC Team Effort & Consultative Summary:

1. *Guideline & consultative meetings with Vice Chancellor RMU (Multiple Meetings)*
2. *IUGRC Team work and Consultative meetings with institutional stakeholders of medical undergraduate teachings ;*
    a. *Faculty of community medicine & Public Health (six sessions)*
    b. *Deans forum & Academic Council of Rawalpindi Medical university (21 meetings)*
    c. *Modular curriculum team 1st year & 2nd year, 3rd & 4th year and 5th year MBBS (multiple sessions)*
    d. *RMU Medical Undergraduate Research Forum;* ***Rawallian students research society (RSRS)***
    e. *IUGRC- team meetings & reviews (30 meetings & reviews)*
    f. *It took approx seven months to complete the task.*

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Aim & Objectives

Aim

Aim of Integrated undergraduate research curriculum is to create center of excellence for future doctors by establishing intellectual foundation to promote critical thinking and practice evidence based medicine with the aspiration to improve clinical outcomes, population health and health care services delivery across the nation beyond traditional medical care

Objectives

To develop the research competent behavior in our future seven star doctors.

The aims & objectives of Integrated Undergraduate Research Curriculum (IUGRC) RMU can be further elaborated as under;

I. Enhance the students' capability in performing quality research

- *Develop the skill of data collection, analysis and interpret it scientifically.*
- *Inculcate lifelong self-directed independent learning.*
- *Develop the skills in critical evaluation and synthesis of new information.*
- *Inspire the habit of practicing evidence-based medicine.*
- *Explicit and measurable research related to curricular outcomes should be articulated.*

II. Promote innovation and research to improve overall health status of the community

- *Align collaborative learning and research outcome-based objectives according to the needs of society .*
- *Develop interdisciplinary research projects to foster overall learning.*
- *Develop innovative community health needs based research projects to attract research grants.*
- *Collaboration with HEC, PSCIT, Health department, UNICEF, WHO and other potential agencies for research funding for community need centered proposals.*

III. Develop institutional culture & infrastructure for long term sustainability and acceptability for research

- *Transform medical education with integrated research curricula, e-learning technologies, contemporary infrastructure and community based learning by Developing liaison with medical education, University Library, RSRS and IT Department for the arrangement of research methodology workshops, computer skills & on relevant software's hands on training.*

- *Collaboration with other departments to promote interdisciplinary research.*
- *Assess the impact pilot program by program evaluation and 360 degree feedback after five years.*
- *Regular seminars, conferences and talks on our population health issues & challenges by people from all walks of life and professions, to build communities of practice and interdisciplinary connections to enrich the students' experience.*
- *Active involvement of all stake holders of Health research ethics, the institutional Committee which should draw upon all disciplines, including the nursing staff, representation from the student body(RSRS), editors of scientific publications and city community representatives . Ethics circle should review proposed research work to develop recommendations from the Code of Ethics given by the PM&DC*

VI. Setting the standard of excellence in research among under graduate medical students;

- *Retain, support and attract the diverse pool of highly motivated faculty for mentorship*
- *Develop field based research projects to gain practical experience of research in communities.*
- *Involving students in completion of research supportive infrastructure of the institution like demographic, clinical, diagnostics data capturing & achieving project.*
- *Encouragement & facilitation of participation of medical students in research competitions, seminars, symposia and research outcomes publishing.*
- *Establish the facility of virtual learning environment including e-learning modalities*
- *Establish the reward system and annual appraisals*
- *Alliance with external faculties & institutions for participation and dissemination of scholarly work at national and international level*

Schedule Outlines of IUGRC

Year of MBBS course	***Total Hrs allocated to Com-Med by PMDC***	***Hrs allocated to IUGRC [a] Visible within overall MBBS timetable***	***Actual Hrs invested in IUGRC teachings & class Pattern***	***Course title***	***Mode of Teaching***
I	*25*	*4hrs*	*4 x 4 = 16hrs (1/4th, 4 Parallel LGIS [b])*	*Health Research Foundation Module*	*Formal [d]*
II	*25*	*6hrs*	*6 x 4 = 24hrs (1/4th, 4 Parallel LGIS)*	*Basics of Health Research Module-I*	
III	*50*	*8hr*	*8 x 4 = 32hrs (1/4th, 4 Parallel LGIS)*	*Basics of Health Research Module-II*	
IV Formal Year of CM	*150*	*20hrs 10 contact sessions [c] Each comprising 2hrs*	*[c] 14 x2 x 10 =280hrs (small group based teachings)* ***14 (7 sessions each day for 2days) parallel contact sessions, each extending over 2hrs (one contact)***	*Experiential Health Research Module*	
V	*4 (added)*	*4 hrs*	*4 x 4 = 16hrs (1/4th, 4 Parallel LGIS)*	*Advance Health Research Module*	
	250hrs total (254)	***42hrs (15% of total hrs allocated to CM by PMDC are devoted to research)***	***368hrs visible time effort*** *(part of student's regular time-table)* ***in addition to informal contact sessions & Web based***		

a. *Teachings sessions according to IUGRC are incorporated& integrated in the respective modules of each year.*

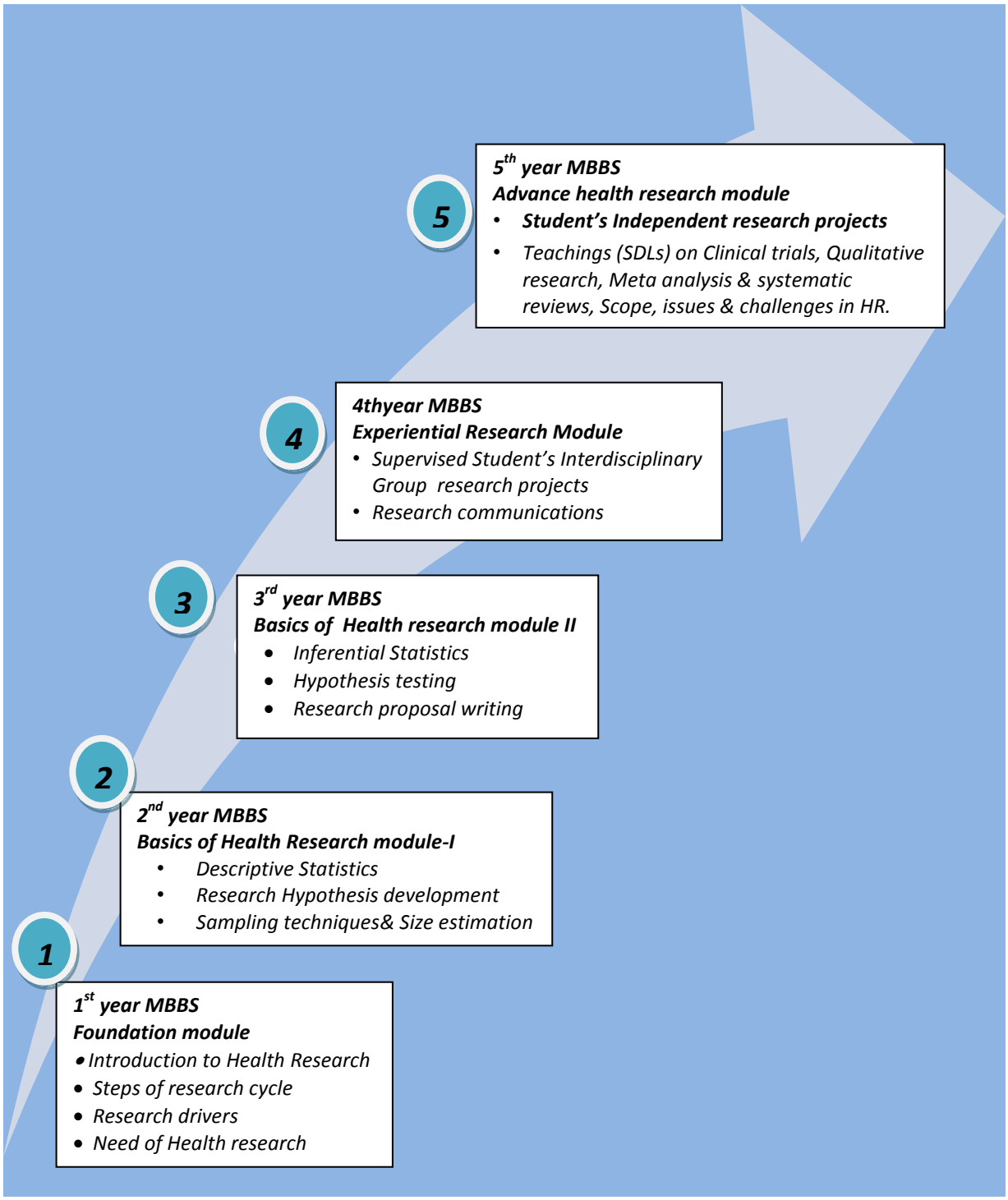
b. *Large Group Interactive Sessions*

c. *Whole class divided in 14Groups (each comprising approx 7% of class strength), 2hrs SGIS (small group interactive session) contact sessions/day. A total number of ten contact sessions are scheduled with gaps over whole year for student's Research Project work under a dedicated supervisor for each batch.*

d. *Formal requirement of PMDC &UHS: Research teachings are primarily part of Community Medicine under PMDC. All contents and teachings tools used in IUGRC of RMU are under PMDC & UHS MBBS curriculum for community medicine and are objectively evaluated in final university exams in the subject of CM.*

e. *Added research teachings to be included in 5th year MBBS curriculum*

Schema & contents of IUGRC at one glace



Component-I for 1st year MBBS

Premise:

a. *In the first year research relevant teachings are designed to be lighter in contents, softer in transfer but using modern medical teaching methods in the pursuit of active involvement of the students in learning process. Purpose of first year research teachings is to introduce the budding doctors with what & why of health research and able to perceive research needs in their profession context. It is desired to involve students in research process beyond the curriculum needs with a true spirit to best serve the health needs of human community. First year research learning also expose students to published research to enable them to properly understand scientific literature, induce high level thinking and provoke for their individual research ideas.*

b. ***Internet based learning:*** *In addition to formal class divisions for research learning, small groups (7% of total class) are created for the purpose of minute level coaching ("peer-share-learn" Eric Mazur Model) through an internet web based office (WBO) under mentorship of a dedicated faculty for each group. This mechanism operates throughout the MBBS course from 1st to 5th year. Students in initial groups' formation in first year undertake their "group research project" in 4th year in the same group and under same mentor. Role of mentor at this stage of learning is to transfer both the technical and ethical aspects of good standards and practices. Mentors will be responsible for professional development that includes both explicit conduct of scientific research and implicit development of standards of research including norms of confidentiality, respect, communications and judgment.*

   Using the ***Peer Instruction Method*** *students complete work* prior *to the lecture by reading* assigned course readings and review of literature available ***,*** *and then answer questions individually by logging onto the course webpage to record their answers. This method builds in student accountability. Next session begins with a student question which is obtained from the course website after reviewing student answers. Each student records his or her answer through web to assigned supervisor by using either their smart phone or laptop.*

c. *Course outlines for each formal contact session are notified one week before for prior readings & coming to class with prepared minds, under intimation that their level of prior preparedness on the session topics are judged by questioning at the start & during session and the results are reflected in log-books accordingly. Students in groups are guided on pre- & post contact sessions work through WBO and are provided with learning resources including books, journals and free web based lectures & exercises etc.*

a. ***Schedule of Assessment:***

   a. *1 MCQs covers each of the four session's teachings in relevant block examination and 04 MCQs in total under 04 max marks. Result / marks obtained contribute towards Internal assessment (IA) under total max 04 marks in 1st Prof. MBBS exam.*

   b. *At the end of module or 4th contact session each individual student is required to submit a one page individual research proposal based upon his learning experience under given specifications, guidelines and schedule of submission by the relevant faculty in charge* ***(Reflective writing)****. Work output of each student is assessed under total 06 marks. Result share in IA in 1st Prof. MBBS exam.*

c. ***Overall assessment:*** *Each student is subjected to assessment under max 10 marks (04 for MCQs and 06 for assignment-Reflective writing) and result is made part of IA in 1st Prof. MBBS exam. Student's credits are also entered in log book.*

Contact session-1; Duration 60-90 min

Session Theme: what & Why, Health research

Underlying idea is to introduce fresh medical students to health research in a soft way and to inculcate a pro research attitude in students as a need of their profession. First year MBBS Students are Introduced to meanings & concept of Research & steps of research cycle, fundamental types & drivers of research and research need in health profession.

Session title	*Course outlines for the session*	*Learning outcomes*	*Teaching strategy*	*Assessment tools*
Introduction to Health Research (HR) & Research Cycle (Health Research Methods)	*Discussion will cover to understand;* • *Background and value of research in health & human development* • *Definitions of Research & steps of Health research study (research cycle/HRM).* • *Fundamental types and fields of health research incl.;* - *Basic & Applied Research* - *Quantitative & Qualitative Research* - *Collaborative & Multidisciplinary research* - *Health Research triangle* a. *Drivers of research Including;* - *Curiosity* - *Health needs* - *Opportunity* - *Profit*	*At the end of the session students should be able to;* - *Appreciate role of HR in healthcare practices and human development* - *Define HR and illustrate its meanings* - *State steps of Research cycle* - *Identify various types and fields of health research* - *Explain how various drivers of research play role in selecting a field of research.*	b. *One week before students are communicated on prior readings through WBO.* c. *Long Group Interactive Session (LGIS)* d. *Duration- 60-90m* e. *2 parallel classes are conducted by Senior Faculty (AP or Subject Specialist)* - *Attendance are monitored objectively*	*1 MCQ (C1-C3)*

Contact session-2 Duration: 60-90 min

Session theme: Students will introduced to basic characteristics of Research Process and attributes of the researcher to understand scientific needs of research activity and the capacities required to undertake a health research project

Session title	*Session course outlines & theme*	*Learning outcomes*	*Teaching strategy*	*Assessment tools*
Characteristics of research process and attributes of the researcher.	*Discussion will cover to understand what are;* ***Characteristics of Re-Process in terms of;*** *Systematic, Rigorous, Controlled, valid, verifiable , reproducible, empirical, critical, logical reasoning and use of probability theory,* ***Attributes of Researcher in terms of;*** *Honesty & Rigor, Curiosity, Positivity of purpose, Objectivity,* ***Session Theme:*** *Taking advantage of above terms students are introduced to basic capacities including medical statistics & probability*	*At the end of the session students should be able to* - *Explain meanings of various characteristics of health research process so as to be able to differentiate research activity from non-research activity.* - *Interpret certain ingredients of the researcher* - *Explain the importance of comprehending certain pre-requisite competencies (knowledge & skills) before undertaking a research study.*	- *1week prior to teaching session students are provided copy of purposely selected research articles for prior readings* - *LGIS* *2 parallel classes spanning over a period of 60-*	*1 MCQs of level C1 to C3*

	theory, study designs, sampling techniques & sample size calculation, & hypothesis testing, required to undertake research.		*90min Each session conducted by Senior faculty*	

Contact session-III. Session Theme: Students are introduced towards general principles of ethics in research so they could perceive basic ethical needs of the health research

Session title	*Session course outlines*	*Learning outcomes*	*Teaching strategy*	*Assessment tools*
Health Research Ethics Basic	*Discussion on Health Research ethics including;* - *Background, Nuremburg code and importance of ethics in health research* - *General ethical principles of HR including explanation of 06 basic principles: autonomy, beneficence, non-maleficence, respect &justice and truthfulness.* - *Value of Informed consent and confidentiality in health research involving human subjects.* - *Ethics in research methods** - *Responsibility for ethics in HR* - *Intro to working of Institutional review board*	*At the end of the session students should be able to;* - *Recognize value of ethics in conduct of Health Research.* - *Relate principles of research ethics with a research in real world.* - *Interpret method & explains value informed consent and confidentiality in HR.* - *Justify ethics of health research methods** - *Tell responsibility for ethics in HR.* - *Explain Process of IRB.*	- *1 week earlier students will guided for specific readings through WBO.* - *LGIS* *2 parallel classes spanning over a period of 60-90min.* *Each session conducted by Senior faculty*	*1 MCQs of level C1 to C3*

Contact session-IV. Time: 60-90 min

Session Theme:

Students are introduced to basic elements of health research proposal writing so they would be able <u>to conceive</u> their research ideas and <u>perceive</u> their learning requirements to materialize their research thinking or for undertaking a small research project in future years. Class room teachings are based on discussion on an "abstract or full text purposely selected article of an original public health research (cross-sectional study) article published in some standard medical journal.

Session title	*Session course outlines*	*Learning outcomes*	*Teaching strategy*	*Assessment tools*
Translating a research idea into a workable research proposal.	*Considering elements of article under discussion, teachings will cover basic elements of Health research Proposal (HRP) writing focusing;* - *Sources of research ideas* - *Criteria for research topic selection* - *Literature review & making citations-* *(Purpose, method, Sources & ethics)* - *04 Parts of Introduction (background, update literature, rationale and expected utility)* - *Constructing Statement of objectives* - *Elements of Methodology section: (emphasizing data collection*	*At the end of the session students should be able to ;* - *Clarify means and criterion used for selecting a topic for research* - *Explain purpose and sources of update information on topic* - *Narrate elements of introduction* - *Explain purpose of statement of objectives* - *Narrate necessary components of methodology section and appreciate value of each.* - *Explain parts of questionnaire and types of questions used.*	*1week prior to session-IV, students are communicated through WBO to read at least one original full text research article preferably a cross-sectional study under precise guidelines tailored to the need of contact session IV.* *SGID: 4 Parallel*	*1 MCQs (level C1-C3)*

	techniques & tools / Questionnaire & check list, study objectives & variables etc)	*sessions are held under uniform teaching guidelines.*
Suggest reading sources	*I. Text Book of Public Health & Community Medicine by Muhammad Ilyas, Muhammad IrfanullahSiddique* *II. Short Book of 'Research Methodology and Biostatistics" by Prof.Sira Afzal* *III. WHO : Eastern Mediterranean Region. A Practical Guide for Health Researcher Srviers-30.* *IV. USMLE- High Yield Biostatistics.* *V. https://www.who.int/ethics/research/en/*	

Component-II for 2nd year MBBS

Premise:

*Second year research teachings are based on principal of incorporating **ACTIVE LEARNING**. Research teaching begins with revising the **instructional plan** for the selected course. It includes;*

a. *Reviewing the expected learning outcomes: This module of IUGRC aims to equip the 2nd year students with necessary knowledge and skills for applying quantitative research methods for generating new knowledge and evidence. After the students are educated in meanings & need of Biostatistics are expected to develop a clear understanding of data & variable, types, methods of summarization & presentation of data, principles of descriptive analysis including cross-tabulations, use of relevant computer programs, descriptive study designs and its applications to address a specific research question.*

b. *Identifying potential pedagogical methods to achieve the learning outcomes. Course outlines for each contact session are notified one week before for prior readings & coming to class with prepared minds, under intimation that their level of prior preparedness on the session topics are judged by questioning at the start & during session and the results are reflected in log-books accordingly.*

c. *Selecting the method (learning activity) which is feasible and appropriate for the students at this level, keeping in consideration their learning environment (context). Students in groups are guided on pre- & post contact sessions work through WBO and are provided with learning resources including books, journals and free web based lectures etc. Post session assignments / exercises are assigned for comprehending biostatistics.*

d. *White-board & markers, Multimedia projections and other internet based teaching tools & computer based soft-wares are used as teaching aids.*

e. ***Schedule of Assessment :***

   a. *1 MCQs covering each session teachings is part of relevant block examinations and 06 MCQs in total. Results will contribute towards IA under total 06 marks in 1st Prof. MBBS evaluation.*

   b. *Subject will share 04 MCQs in 2nd Prof. MBBS Exam. Overall assessment is under 10 Mark in total.*

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Year second	2nd Year MBBS	Contact Session duration 60-90min		
Course title: Descriptive Statistic				
Session # & Title	*Session Course outlines*	*Learning outcomes*	*Teaching strategy*	*Assesmen t tool*
(I) Information & precision in scientific work (Data & variable)	- *Definition, uses and need of statistics in research & healthcare profession.* - *Concept of data & variable and sources of data* - *Concept of information & precision Types of data with explanation with examples. (nominal, ordinal, interval & ratio scale data)* - *Classification of variables (qualitative & quantitative, Discrete & Continuous)* - *Raw and Processed Data* - *Sources of health data* - *Descriptive & inferential statistics* - *Simple data entry and construction of a variable in computer software (SPSS etc)*	*By the end of the session students should be able to:* - *Define & enlist uses of statistics in research* - *Appreciate value of information & precision in scientific decision making* - *Differentiate b/w data & variable* - *Enlist data types with examples in medical background* - *Classify variable with examples* - *Differentiate descriptive statistics form inferential statistics* - *Enlist sources of data* - *Identify raw & processed data with example* - *Demonstrate constructing variable and data entry in computer (SPSS, ..)*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignment based model.* - *Session are conducted by Senior faculty* - *Attendance is monitored objectively*	*1 MCQs of level C1 to C3*
	Include - *Frequencies (qualitative data)* - *Frequency distribution (quantitative data)* - *Tabulations* - *Data presentation methods inc: Bar & pie diagram, histograms & line diagrams, frequency polygons* - *Frequency distribution tables & curves* - *Shapes of frequency distributions (modality &skewness)* - *Use of computer soft ware (SPSS etc) for data entry, tabulation & graphing*	*By the end of the session students should be able to;* - *Construct simple & complex tables for quali- variable* - *Construct frequency distribution table for quanti- var showing class limits, class freq-, relative freq- & cumulative frequencies.* - *Interpret freq- tables* - *Indicate diff graphs & diagrams used for diff types of data* - *Construct bar & pie diagram, histogram and line graphs* - *Interpret graphs and forms of skewness* - *Demonstrate on computer above data presentations skills*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignment based model.* - *Session are conducted by Senior faculty* - *Attendance are monitored objectively*	*1 MCQs of level C1 to C3*
(III) Data summarization : Measures of Central Tendency	*Interactive discussion covering following areas of descriptive statistics;* - *Measures of Central Tendency MCT (Mean, Median & mode), uses and advantages & disadvantages of each with illustrations* - *Measures of variations (range, mean deviation, standard deviation & Inter-quartile range) with illustrations form medical background* *Degree of freedom (DF)* - *Coefficient of variations*	*By the end of session students should be able to:* - *Compute and explain uses of different measures of central tendency (mean, mode, median) form a given data file* - *Compute and explain with examples uses of measures of variations (range, IQ-range, variance & Standard deviation) form a given data file* - *Explain concept with example DF* - *Compute Coefficient of variation for*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignment based model.* - *Session are conducted by Senior*	*1 MCQs of level C1 to C3*

	- *Data summary measures for a population & sample* - *Application of data summary measures for on health data. (descriptive analysis of data* - *Uses of computer software (SPSS) on data summarization techniques*	*give data file* - *Compare two data sets by computing & comparing their coefficient of variations* - *Explain diff b/w population &sample mean, SD.* - *Summarizes a given health related data set in term of measures of central tendency and variation (descriptive analysis)* - *Demonstrate above on computer*	*faculty* - *Attendance is monitored objectively*	
(IV) Probability , Probability distribution and Normal Distribution	*Interactive discussion covering following areas of descriptive statistics;* - *concept of probability in medical statistics calculation of probability (addition & multiplication rules)* - *Normal distribution and standard normal distributions* - *Importance of Normal Distribution curve and standard Normal Curve in medical statistics* - *Relative deviate*	*By the end of session , students should be able to:* - *State meanings of probability and its application in health data management & research* - *State & apply basic principles of probability in health situations* - *Explain importance of Normal distribution in health research decision making* - *Identify properties of normal dist. curves.* - *Explain & compute normal deviate*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignment- WBO* - *Session are conducted by Senior faculty* - *Attendance is monitored objectively*	*1 MCQs of level C1 to C3*
(V) Descriptive analysis of data: Frequencies, 2x2 table & Cross-tabulations	*Interactive discussion covering following areas of descriptive statistics;* - *Descriptive analysis of data.* - *Frequencies & distributions Constructions of 2x2 (contingent)table* - *Descriptive Cross-tabulation* - *Analytical cross tabulation* - *Role of cross tabulation / 2x2 table in hypothesis generation & testing*	*By the end of session , students should be able to:* - *Perform descriptive data analysis techniques on given data set (descriptive study data) in term of frequencies, percentages, proportions, ratios, rates, variability measures* - *Perform descriptive and analytical cross tabulation for two binomial variables in the give distribution.* - *Interpret the results of cross-tabulations* - *Generate hypothesis based on analytical cross tabulations*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignments (WBO).* - *Session are conducted by Senior faculty* - *Attendance is monitored objectively*	*1 MCQs of level C1 to C3*
(VI) Sampling in Health research - I	*include;* - *Concept of sampling in health research* - *Need of sampling in health research Sampling methods and limitations and indications for each method.* - *Effectiveness of a random sample in health research* - *Fundamentals of sample size calculation*	*By the end of session , students should be able to:* - *Explain concept of sampling in HR* - *Distinguish with example each sampling method* - *State merits and demerits of each method* - *Explain factors which determine sampling technique and size according to a research study need.*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignment based model.* - *Session are conducted*	*1 MCQs of level C1 to C3*

		- *Explain importance of random sample in research.*	*by Senior faculty* - *Attendance is monitored objectively*	
Session-VII				
(VII) Sampling in Health Research - II	*Interactive discussion on;* - *Central limit theorem* - *Errors in sampling* - *Non sampling error / systematic errors* - *Sampling error and standard error* - *Generalize ability of results of research & sampling method* - *Confidence interval* - *Sample size calculation formulae* - *Web based sample size calculators*	*By the end of session , students should be able to:* - *Explain sampling and non-sampling errors* - *Explain central limit theorem* - *Explain ways to address non-sampling errors* - *Apply standard error in calculation of 95% confidence interval for point estimate in a given data set.* - *Interpret research results generalize ability in term of confidence interval* - *Calculate the sample size a given research study by manual fsormula* - *Calculate sample size from internet based WHO calculator*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignment based model.* - *Session are conducted by Senior faculty* - *Attendance is monitored objectively*	*1 MCQs of level C1 to C3*

Component-III for 3rd year MBBS

Premise:

This module aims to develop knowledge and skills for processing and performing statistical analysis of health research data including, analyzing hypothesized associations, interpretations and getting valid inference. The students are expected to develop an understanding of selecting and applying appropriate statistical techniques & particular tests according to nature of research question and study designs and able to critically appraise the research generated evidence and understand it's worth and mechanism of being translated into healthcare practices & decision making. Moreover students are introduced to basic elements of health research proposal writing at the level of beginners in research emphasizing WHO guidelines for the purpose and the subject available in recommended standard text books. Students are educated in principles of developing data collection tool and skills of health data capturing. Eventually students are expected to be prepared for writing research proposal for small scale cross-sectional descriptive or a doable longitudinal analytical study suitable enough to be considered for students group research project during 4thyear.

Course outlines for each contact session are notified one week before for prior readings & coming to class with prepared minds, under intimation that their level of prior preparedness on the session topics will be judged by questioning at the start & during session and the results will be reflected in log-books accordingly. Students in groups are guided on pre- & post contact sessions work through WBO and are provided with learning resources including books, journals and free web based lectures & exercises etc.

Post session assignments / exercises are assigned for comprehending relevant biostatistics teachings .

White-board & markers, Multimedia projections and other internet based teaching tools & computer based soft-wares are used as teaching aids.

Schedule of Assessment:

MCQs covering contents of each session of level C1 to C3 are covered in relevant block examinations and 07 MCQs in total. Results will contribute towards IA for total 07 marks in 1st Prof. MBBS exam. Subject will share eight (8) MCQs in Final (3rd Prof) exam. Total evaluation marks: 15

Year Three	*3rd year MBBS*	*Duration of contact session: 60-90min*		
	Course title : Inferential Statistics			
Session # & Title	*Session course outlines*	*Learning outcomes*	*Teaching strategy*	*Assessment tools*
(I) How to extrapolate on and reach conclusions that extend beyond the raw data itself	*Interactive discussion covering;* - *Definition & relevance of inferential statistics in health research* - *Recall: Estimation of pop parameters from sample data. Central limit theorem CLT* - *Recall : Estimation of probability, Common Probability distributions, Standard error (SE) confidence interval (CI).* - *Relevance of SE with Sample size in estimating population parameters based on sample statistics.* - *Hypothesis testing ;* *Research hypo- & statistical hypothesis* - *Null-Hyp& Alternate Hypothesis* - *Level of significance & P value.* - *Type-I & Type-II errors* - *Intro to tests of significance & power of the test* - *One sided & two sided test and paired and unpaired tests* - *Parametric and Non-parametric tests*	*By the end of the session students should be able to:* - *Define inferential statistics* - *Explain role of inf. statistics in health research decision making* - *Explain zone of rejections & acceptance on probability distribution curve.* - *Explain probability distribution chart for P – values & DF (chi- & t – distributions)* - *Explains role of sample size in magnitude of SE & population estimates* - *Explains hypo- testing, LOS and P-value* - *Describe sources of Type-I & Type-II errors* - *Interpret P-values and CIs in published research results.* - *Tell the concept of generalization of study results to population* - *Explain role tests of significance in hypo testing* - *Distinguishes between parametric and non-parametric, paired-unpaired tests*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignment based model.* - *Session are conducted by Senior faculty* - *Attendance are monitored objectively*	*1 MCQs of level C1 to C3*
(II) Comparing two proportions (chi-square test)	*Interactive discussion covering following areas of inferential statistics;* - *Sampling distributions of Proportions and standard error of proportion (SEP)* - *Standard error of the difference b/w two proportions* - *Pearson's Chi-Square test & hypothesis testing* *Chi- distributions* - *Interpretation of P-value based upon chi-value* - *Forms of chi-square test*	*By the end of session students should be able to:* - *Explain principle of sampling distributions of Proportions and standard error of proportion (SEP)* - *Calculate SEP for a given sample proportion* - *Calculate standard error of the diff b/w two proportions in a given data set.* - *Compute value of chi-square for appraising differences b/w two proportions based upon statistical hypo-* - *Interpret results of chi-test* - *Explains Fisher's exact test*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignment based model.* - *Session are conducted by Senior faculty* - *Attendance are monitored objectively*	*1 MCQs of level C1 to C3*
Inferential statistics –III :				

(III) Computing 95% CI and comparing two means (student's t-test)	*Interactive discussion covering following areas of inferential statistics;* - *Recall: sampling distributions of means (CLT) and SE for sample mean and confidence interval for mean.* - *Calculation of Standard error of the difference b/w two means* - *Calculation of 95% CI for a sample mean* - *Student's-t test and its application in Health research* - *Paired and un-paired t-test* - *One-sided and two sided tests* -	*By the end of session , students should be able to:* - - *Explains application of principles of sampling distributions of means in calculating SE and 95% CI for a sample mean.* - *Compute SE of the difference b/w two sample means for a given data set* - *Apply student's-t test for comparing difference b/w two means and interpret the result* - *Use student's t-test for hypo-testing involving a quantitative variable.* - *Distinguishes b/w paired and unpaired and one-sided and two sided tests and one sample test.*	- *SGID (small group interactive discussions)* - *Prior & post teachings assignment based model.* - *Session are conducted by Senior faculty* - *Attendance are monitored objectively*	*1 MCQs of level C1 to C3*
(IV) Comparing more than two means (Analysis of variance)	*Interactive discussion covering following areas of descriptive statistics;* - *Comparison of several means (analysis of variance)* - *Analysis of variance (ANOVA) One-way ANOVA* - *Two-way ANOVA* -	*By the end of session , students should be able to:* - *to use ANOVA for comparing more than two mean the observed data* - *apply and compute ANOVA for the given distribution* - *Compute one way and two way ANOVA for the given data set.* - *interpret the results of ANOVA*		*1 MCQs of level C1 to C3*
(V) Analyzing associations which involve interval / ratio scale data (correlation-regression analysis)	*Discussion covering following topics ;* - *association and correlation* - *statistical associations and clinical associations* - *statistical significance and clinical significance correlation-analysis* - *co-efficient of correlation (r)* - *types & diagrammatic representation of correlations* - *determination of correlation* - *regression analysis & drawing regression line*	*By the end of session , students should be able to:* - *Explain with example concept of correlation and association in research data* - *Distinguishes clinical significance from statistical significance* - *Explains principles of correlation analysis for comparing two Qunti-Continuous variables in same subjects in given data set.* - *Compute co-efficient of correlation r and interpret results* - *Compute and interpret determination of correlation for a given data set.* - *Draw & interpret scatter diagrams-types of correlation*		*1 MCQs of level C1 to C3*
(VI) Research proposal writing- I (selection o	*Review of Guidelines for identifying a topic for research covering;* *WHO criteria for selecting a research topic (FINER)* *Prioritizing scheme for finalizing one topic out many competing*	*By the end of session , students should be able to:* - *Explains all FINER criteria for selection of research study* - *Prioritize a health problem for under taking a research under the scheme.*		*1 MCQs of level C1 to C3*

	topics - *Eight- steps of undertaking a research project (research cycle)* - *Four components of writing introduction* - *literature review and making citations* - *Constructing statement of objectives,* - *Writing operational definitions*	- *Explain 8 steps for undertaking a research project* - *Explains rightly 04 basic principles of intro writing* - *Develop a statement of study objectives for a research question* - *Explain methods of doing relevant to topic literature review and making citations appropriately*		
(VII) Research Proposal writing II: Research Methods: Data collection tool development & data capturing skills and developing informed	*Interactive discussion focusing on;* - *Review of steps of research cycle* - *Principles of developing a data collection tool (questionnaire and check list) for a quantitative re-study* - *Basic 04 parts of questionnaire or Performa* *Structure of a statement of informed consent form.* - *Response coding & data entry in computers* - *04 Methods of data collection* - *Face to face interviewing skills*	*By the end of session , students should be able to:* - *Rightly recall steps of undertaking a small research project.* - *Explain 04 basic part of questionnaire.* - *Construct a statement of informed consent form.* - *Explains close & open ended questions* - *Explains Coding of responses* - *Narrate observation check list* - *Distinguishes among 04 methods of data collection* - *Explain & Exhibit interviewing skills*		*1 MCQs of level C1 to C3*
(VIII) Research Proposal writing III: Research study designs and choosing a study design & statistical measures appropriate to research question	*Interactive discussion focusing on;* - *Elements of research methodology part of re-proposal.* - *classifications and brief overview of a of research study designs* - *Steps of undertaking a cross-sectional study and longitudinal studies.* - *Choosing a particular study appropriate to the research question* - *Developing plan of study data analysis including choice of tests of significance*	*By the end of session , students should be able to:* - *Explain Elements of methodology section* - *Classify research study designs with salient features of each* - *Explain steps of cross-sectional study* - *Give outlines of longitudinal studies* - *Narrates Principles of choosing a study design fitting to investigation of re-question* - *Explains scheme of choosing relevant statistical measures & tests* - *Prepare Plan of analysis of study data*	*LGIS* *1hr contact session in 2-4 parallel classes conducted by Senior faculty Prior assignment based model.*	*1 MCQs of level C1 to C3*

Component-IV for 4th year MBBS

Premise

In fourth year Research curriculum is devoted to student's experiential learning in research by practicing research in real world. The ultimate goal for the experiential learning was twofold: to provide a real world scenario for students to apply their knowledge of research methods and students will be benefited by independent learning opportunity by actual participation in research projects (metacognition). Main purpose is to prepare Students for future independent research and to inculcate self directed lifelong learning aptitude. Other components of experiential learning include authentic or real world tasks, and opportunities for students to discuss, reflect, and apply learning to their own experiences

- ***Group Research projects:*** *Each student of 4thyear MBBS is expected to undertake a small scale research study as a co-researcher of the research group comprising about 7% students of the class in each group. It is a group activity labeled as student's "Group Research Project" (GRP). Fourteen to fifteen students' GRPs are supposed to be undertaken each year. A cross-sectional or a doable longitudinal study (not clinical trial) on a public health topic is preferred choice for the purpose. Students of each group in the form of smaller sub-groups comprising 2-3 students are induced to formulate their research questions, perform relevant literature review, appraise appropriate study design, address ethical relevancies, identify & decide study variables, develop data collection tool and analysis plan, all at their own. One study proposal out of subgroup's proposals is finalized on scientific merit basis for the group research project for each group.*
- *The department of community medicine invests its full human resource to cater technical, logistic & administrative needs of all groups in parallel at one time over the year throughout their research projects. Each group research project has almost one year time range. Ten to twelve contact sessions (each extending over 2hrs) are scheduled for each group within time table of 4thyear MBBS class in the subject of community medicine. During each contact session a prefixed curriculum is covered accordingly. The contact sessions are scheduled with sufficient gaps considering the nature & course of research projects, pre-completion of prior work and also needs of integration & teachings in other subjects formally taught during 4thyearMBBS. Faculty is determined to facilitate their group students round the clock in their research work beyond scheduled timings and formal duty hours. What's up groups for each group & WBO function for real time, convenient and fast communications and effective supervision of students research projects (e-portal). In between contact sessions supervisor remain accessible to their group students to resolve their queries. Schedules & deadlines for tasks completions are pre-notified under realistic goals & targets under an objective mechanism.*
- *In each group every student is actively involved in research work. Students learn academic interactions, effective communications and more vitally learn spirit of team work. At the termination of projects each group is bound to document its report on the format of manuscript required for publishing in a standard medical journal (Jrmc). SRPs reports are considered for publications under preformed publication SOPs and ethics. Students end up*

with understanding of research process with its product, the "research-report" as indicator of their research skills. This research experience is expected to give the students a level of confidence in health research methods and qualify them to undertake independent researches in times ahead.

- *A purposely designed log-book is in practice for record, work track and performance crediting for formative assessment of each student.*
- ***Interdisciplinary Integration:*** *Experiential learning is also built upon a foundation of interdisciplinary and constructivist learning. Students groups are encouraged to choose a topic from some biomedical, psychosocial or other clinical disciplines provided they have formal intentions and written consent of a worthy supervisor from the concerned discipline they took. In such cases department of CM provides administrative & technical support to the group for whole project. Its purpose is to provide opportunity to the student of multifaceted learning in research methods and to promote interdisciplinary & collaborative research culture.*
- ***Learning Strategies:*** *The learning strategies adopted in SGRPs are students centered and tailored to research competencies development needs at their level. Compulsory Prior readings & group works,(peer-share-Learn model) and modified PBL are among the learning norms of groups. Combining experiential learning with overt efforts to enhance the learning environment by adapting these strategies may increase the potential of creating pedagogical content knowledge. Web based office (WBO) maximizes its role during 4th year where 14-15 groups of students are undertaking their group research projects under a separate supervisor over the whole year. learning strategies include;*
    - *Small Group interactive sessions*
    - *Problem based learning Sessions*
    - ***Hands on workshops*** *on computer soft skills. SPSS, epiinfo, Use of sample Size Calculator, Reference writing & management (Endnote & Mendeley) are essential part of batch work.*
    - *e-learning (WBO office)*
    - *flipped classroom*
- ***Research (GRPs) Facilitations:*** *Manger ORIC for research operations & development, departmental -Statistician, Rawalian Students Research Society (RSRS), Research Librarian, Department of Medical Education and the "Vice Chancellor Research fund" fully support to students in their GRPs.*

  Research lab of the department of CM & PH and Research Labs of other departments of RMU & Allied Hospitals serve the needs of student's GRPs if relevant. Institutional data bases and archives including clinical data, labs & other diagnostics and hospital statistical data is available for use for students experiential research learning projects.

Schedule of assessment in GRPs:

It has two components;

a. ***Internal Assessment (10 marks)*** *based on level of prior preparedness for each contact session, quality of work out put, active participation in group work, timeliness in assigned work completion are markers and credit*

will be entered in log-book by the relevant batch supervisor for each contact session and other research group activities. Overall score of each student based on credits obtained in aforementioned areas out of 10 will share internal assessment under 10 max marks in 4th Prof. MBBS exam in the subject of community medicine.

b. ***Research Project based assessment (20 marks)****:*
under maxi marks 20 is part of viva voce / practical exam in 4th Prof. MBBS exam in the subject of community Medicine. Each individual student has to defend its relevant Group research project report before external examiner. This component of viva voce exam is objectively fixed on the subject of "Health research methodology under particular curriculum needs in relevance to group research project.
(Total maxi assessment marks = 30)

Outlines of schedule of contact sessions & research project work:

Before commencement of 1st Contact-Session (CS) students group's formation takes place. Over all Schedule of all contact sessions including dates, times, venues, supervisors & principal supervisor's names, contact numbers, what's up and WBO details along with communications SOPs are notified. Prior & Post sessions work assigning mechanisms are detailed. Time of contact session is utilized according to nature & stage of group research project of each batch accordingly. Supervisors has liberty to use any of the aforementioned specific learning strategy according to need of group project. Seven batches or half class is entertained on one day for one contact session at seven different places under seven supervisors in parallel at one time and remaining half class (next 7 batches) is served on very next day.

Contact session (CS 1): Flip Class Room

First contact session is based on concept of ***flipped classroom*** *to actively involve the students and develop their interest in research activity. Active learning such as teamwork, self-reflection and group discussions engage and motivate students to attain more knowledge and improve their skills. This activity will comprise of three sessions*

Pre flip classroom activity (FCA): *Pre FCA activity occurs before commencement of 1st Contact-Session (CS). All these activities occur through e-portal (WBO). The pre-FCA stage aims to prepare students for topic selection & proposal development.*
Students brainstorm different topics individually and list problems /topics that they think are interesting and solvable. During this session students are provided with written guidelines (WHO FINER CRITERIA) for topic selection and research proposal writing to refresh the knowledge of what they have already covered in previous class.
Flip classroom activity (FCA) *: Groups formed have face to face contact session with their groups members as well as with their respective supervisors. This is followed by a formation of sub groups of 3- 4 students .During FCA students will initially discuss the topic with each of subgroup comprising of 3 students. During this activity each student will discuss his/her topic with fellow students in subgroup and receive critique and feed back of facilitator and fellow students in subgroup (think peer share) . Prioritizing scheme for finalizing one topic out many competing topics will be carried out. After this activity topics will be discussed with larger group of 20-22 students and final selection of topic is done keeping in consideration PICO (population, intervention, control, and outcomes) and FINER (feasible, interesting, novel, ethical, and relevant) criteria in framing a research question.*

After Flip classroom activity FCA:

During this session students will be assigned the task of writing one pager synopsis on basis of discussion carried out during FCA session. This assignment will be directly submitted to assigned supervisor through web.
Feedback will be given to students through web and proposals are returned to students for a revision and improvement within a week. As this session will be followed by learning activity or workshop on research proposal writing

Contact Session II Time duration; 2hrs Venue : pre notified room in the NTB RMU.				
Indictors of accomplishment Prior readings / assigned work	*Learning objectives/ competencies*	*Learning outcomes*	*Teaching strategy*	- *Next assigned prior readings / work*
• ***Able to reflect on Elements of proposal writings*** • ***Reflect on relevant lit search and on some article close to topic of interest*** • ***Reflect on point to research topic selection***	*Interactive discussion on how to;* *How to and what literature / sources reviewed for topic selection* *To perform advanced search option to modify ,refine the topic & search for new ideas/perspectives* *organize research idea or general thought into a topic that can be configured into a research problem / formulating research question* *brief outline of study proposal in chronological order* *developdata collection tool* *do reflective learning*	*Each student be able to;* - *Develop the list of useful keywords for relevant literature search* - *perform review of relevant Literature* ***to refine how to approach selected topic and finding a way to analyze it.*** - *review community health profile data bases, EMBASE,MEDLINE, PubMed, GooglescholarOvid,ProQuestPsyclINFO,CochraneDatabase,Scopus) etc* - *identify knowledge gaps* - *formulate an appropriate research questionin the form of a study proposal* - *Attempt "reflective writing.*	- *Flip class room /Prior readings based model* - *SGIDs* - *Modified PBL* - *Reflection in and reflection on learning*	- *Study principles and practice of health research Project governance* - *Students subgroups (3-4) will mutually formulate their research question and present in the form of scientific proposal on next contact session scheduled after 2weeeks. (reflective writing)*
Contact Session-III: Time duration; 2hrs: Venue : pre notified room in the NTB RMU.				
Indicator of accomplishment prior readings / assigned work	*Learning objectives/ competencies*	*Learning outcomes*	*Teaching strategy*	*Next assigned prior readings / work*
The students will have - ***Ready to present 3-4 subgroup research proposal (reflective writing)*** - ***Actively talk on research project practices & management***	- *How to debate & finalization of one topic out of 3-4 proposals for group research project with reasoning on each step of topic finalization under FINER (WHO) guidelines* - *Refining study objectives according to focused research question* - *Appraising workability study design chosen* - *Appraisal of strengths, weaknesses, risks & threats to the selected GRP.(SWOC Analysis)* - *How to govern a small research project*	*By the end of session students of the group should be able to:* - *Finalize one topic for GRP* - *Appreciate each step of FINER criteria applied in the case* - *Refine & Finalize intro section of study* - *Finalize study objectives, operational definitions etc* - *Explain each step of study design of the GRP selected to undertake* - *Identify study variables and data collection tool* - *Appreciate principles of governing a research project*	- *Prior readings based model* - *SGIDs* - *Modified PBL* - *Reflection in and reflection on learning*	*Literature review & discourse on;* - *identifying study variables relevant to GRP* - *Plan for analysis of study data* - *Guidelines for Data collection tool relevant to GRP topic* - *Sampling techniques &sample size determination* - *Gantt chart for GRP* - *Relevant Medical ethics*
Contact Session-IV: Time duration; 2hrs: Venue : pre notified room in the NTB RMU.				
Indicator of accomplishment prior readings /	*Session course outlines*	*Learning outcomes*	*Teaching strategy*	*Next assigned prior readings / work*

assigned work				
Active participation and wise contribution during interactive discussion & development & finalizing; Study variables, data analysis plan, use of relevant statistical measures, data collection tool development, addressing ethical aspects of GRP and preparing Gantt chart	*How to;* - *Identify relevant and statistically appropriate study variables.* - *Develop appropriate data analysis plan,* - *Decide use of relevant statistical tests* - *Decide sampling method & calculate sample size relevant to GRP* - *Develop data collection tool & decide data collection technique for GRP* - *Apply principles of research ethics in GRP specifically informed consent, confidentiality of information e*	*By the end of session , students should be able to; Finalize study variables, data analysis plan, use of statistical tests of relevant GRP* *Appreciate relevant sampling and data collection technique* *Finalize data collection tool / questionnaire appropriate for GRP objectives ((on basis of information required able to target respondents and decide methods of reaching target respondents)* *Develop Gantt chart for GRP* *Develop informed consent form for the GRP study* *Conduct small scale pilot study* *Address other ethical relevancies in GRP*	- *Prior reading s based model* - *SGIDs* - *Modifie d PBL* - *Reflecti on in and reflectio n on learning* - *WS data collectio n tool develop ment*	*Literature review and comprehend ;* - *Needed behavior for data collection by human subjects* - *research& logistic issues in research on human subjects* - *data feeding on computers* - *data organization & cleaning* - *needed computer skills & soft ware*
Contact Session-V Piloting the research projects. ***Theme: time duration 2hr plus evening times as additionally 2-4hrs on each work day for a short period (1-2 weeks) as appropriate to Pilot study need under close supervision of group supervisor (piloting the GRP)***				
Indicator of accomplishment prior readings / assigned work	*Session course outlines*	*Learning outcomes*	*Teaching / learning strategy*	*Next assigned prior readings or work after 4th contact session*
Group will Demonstrate - ***Needed skills &behavior for data collections,*** - ***How addresses logistic & field issues*** - ***How perform data cleaning, feeding, and organizing skills*** - ***Proper Use Computer skills & soft ware***	*Discussions on How to ;* - *Practice right skills & behavior while collecting data from human subjects or form healthcare practicing sites or form population settings* - *Organizing and analyzing data from pilot study* - *Interpreting and inferring on pre determined pilot study objectives like frequency of disease, variables suitability, , questionnaire validity, subject coordination or response rate, margin for attrition / sample size etc* - *Make appropriate changes in GRP plan accordingly* - *Take measures to address logistic and other issue faced if any*	*By the end of session , students should be able;* - *to compile & interpret pilot study data* - *make observable improvements or changes based on pilot study results in;* - *Data collection skills & behaviors if any* - *Notable changes in questionnaire or checklist if any* - *Objectively modify GRP draft based where indicated including reducing measurements errors as indicated* - *On record take measures to address logistic issues reported like lack of*	- *Prior reading s based model* - *SGIDs* - *Modifie d PBL* - *Reflecti on in and reflectio n on learning*	*Review of principles & practices of research project. Interpret the pilot study results for necessary implications Learn & clearly perceive his job by group lead & supervisor in collection & compilation of study data and how to handle interim issues if any. Familiarize with key statistical & computer terminology , use of appropriate*

		equipment ,facilities ,need assessment for prior data collection training , poor quality assurance, language barriers , systematic errors - *Take up ethical aspects of study if any*		*statistical Measures expected to be used in data handling of the GRP/study*

Contact Session -VI , Duration 2hrs : Venue : pre notified room in the NTB RMU. (1st 30min) and study site (90min)
Session theme:

- ***Execution of data collection for formal study: based on pilot study after final version of study proposal is ready, sample size decided the field work/ data collection work are executed for a estimated period of time.***
- ***Each student is delegated to perform his / her assigned role in data collection, compilation, feeding to computers, data cleaning and side by side analysis for the individual data set of his / her part (at the completion of sample size all cleaned data are pooled for analysis in group work setting).***
- ***In CS– V, field work takes place under close supervision and physical presence of the group supervisor.***
- ***Students are specifically educated medical ethics, research ethics, social norms and official codes for the purpose***
- ***Thereafter the scheme for further data collection according to nature of study are followed and students may also invest their personal time (evening hours, week holidays etc) for this purpose. A written information & consent of the parents for students field work may also be obtained where justified, However safety & security of the co researchers is never compromised.***
- ***The maximum period limit for field / data collection work is six months.***
- ***Batch lead & supervisor monitor and ensure attendance at site of the co researchers and grade their performance in log book.***

Next two (02) contact sessions (7th & 8th) are scheduled for field work of research projects with research projects needs based gaps.

CS-IX
Duration 2hrs: Venue : pre notified room in the NTB RMU.
Prior readings & work conveyed accordingly for : review of making citations and reference writing & management. Have online tutorial or video lecture on making citations, reference writing and Endnote soft ware use.
A hand on work shop on " Medley: Endnote" reference management software are offered through ORIC or RSRS as per need and feasibility,

Indicator of accomplishment prior readings / assigned work	*Session course outlines*	*Learning outcomes*	*Teaching / learning strategy*	*Next assigned prior readings / assigned work after 6th contact session*
At the start answer to questioning on the assigned work (making citations and references writing etc) And Level of demonstrate some skills learned.	*Interactive discussions on how to;* - *Search relevant sites by using write key words,* - *Phrase a citation* - *indicate reference in body of study manuscript* - *Formulate a reference on Vancouver style .* - *Manage reference through EndNote* - *Avoid plagiarism* -	*By the end of session , students should be able to:* - *Construct key word for relevant to topic lit search* - *Demonstrate relevant lit search* - *Make a citation from ref searched on topic* - *Formulate the same references in Vancouver style* - *Elaborate types of plagiarisms and making citations properly* - *Demonstrate EndNote software on computer*	- *Prior reading s based model* - *Experie ntial learning* - *Reflecti ng in* - *Using online sources for learning*	- *Review on descriptive statistics relevant to data summarization, tabulated & graphic presentations relevant to study data* - *have a online / you tube tutorial on how to run " SPSS or Epi Info*

CS-X: Duration 2hrs: Venue : pre notified room in the NTB RMU.

Indicator of accomplishment prior readings / assigned work	*Session course outlines*	*Learning outcomes*	*Teaching / learning strategy*	*Next assigned prior readings / assigned work after 7th contact session*
At the start level of answering to the questioning on the assigned work. And level of demonstrating some initial steps of computer software skills / SPSS	*Interactive discussions on how to;* - *Summarize data under principles of descriptive statistics* - *Perform cross-tabulations for pre-selected study variables* - *Present data by tabulation & graphically* - *Feed and descriptively analyze data on computer (SPSS)*	*By the end of session , students should be able to:* - *Make variables on computer* - *Feed data under variables on computers* - *Summarize data on computer including text, tabulations & graphics* - *Perform Descriptive analysis of data on computer* - *Run SPSS*	- *Prior reading s based model* - *Experie ntial learning* - *Reflecti ng in* - *Using online sources for learning*	- *Review on inferential statistics techniques relevant to study analysis plan.* - *Analytical cross-tabulations* - *Use of simple tests of significance relevant to study plan of analysis* - *have a online / you tube tutorial on how to run " SPSS or EpiInfo for data analysis*

CS-XI
Duration 2hrs: Venue : pre notified room in the NTB RMU.

Indicator of accomplishment prior readings / assigned work	*Session course outlines*	*Learning outcomes*	*Teaching / learning strategy*	*Next assigned prior readings / assigned work after 8th contact session*
Level of answering; on Analytical cross-tabulations , Use of simple tests of significance relevant to research study plan of analysis and demonstrate some analysis " SPSS or Epi Info for	*Interactive discussions on how to;* - *apply principles of inferential statistics during data analysis* - *perform analytical cross-tabulation of data* - *apply relevant tests of statistics and conclude including OR, CI,RR, Chi-square test, Student's t-test and correlation's tests* - *Run SPSS on relevant tests*	*By the end of session , students should be able to:* - *Analyze data according plan of analysis of study including;* - *Construct 2x2 table if relevant to plan* - *Calculate measures of Risks* - *Apply tests of significance* - *Interpret the results of tests applied* - *Run SPSS on relevant analysis* - *Make effective use of computers and other information systems, including storing and retrieving information.*	- *Prior reading s based model* - *Experie ntial learning* - *Reflecti ng in* - *Using online sources for learning*	*Review principles of report or manuscript writing for publications in a standard medical journal (jrmu)* *Have a online lecture or tutorial on research report drafting for publications and presentations and presenting report on poster* *Principles & guidelines on discussion section of manuscript*

CS.XII Duration 2hrs: Venue : pre notified room in the NTB RMU.

Indicator of accomplishment prior readings /	*Learning objectives/ competencies*	*Learning outcomes*	*Teaching / learning strategy*	*Next assigned prior readings / assigned work after*

assigned work				*9th contact session*
Level of answering on questions Principles of report writing for publications, poster and oral presentation. And elements of discussion of research report.	*Interactive discussions on how to;* - *Interpret & apply basic principles of manuscript writing of research report* - *Perceive authorships requirements or rules of drafting manuscript of a research report for publication in PMDC indexed journal* - *Write discussion section of draft* - *Report research as oral presentation and poster presentation* - *practice basic communication skills*	*At the end of session students should be able to;* - *explain principles of research manuscript writing for publication* - *write report for oral presentation* - *reporting on poster* - *explain rules of discussion on results of study* - *clarify types of citations included in discussion section* - *explain conclusion, recommendation and acknowledge part of research report.*	- *Prior reading s based model* - *Experie ntial learning* - *Reflecti ng in* - *Using online sources for learning*	*Through review & rectification of whole work done Draft research report for publications under Jrmc requirements Prepare research report on power point before whole faculty & Guest faculty in 10th session.(half class session) for first seven batches and then for next seven on next day. Involve multiple presenter under predefined SOPs Prepare original data & all soft files to submit to department*
CS-Final	*Duration 2hrs: Venue : pre notified room in the RMU (CPC Hall, auditorium or Departmental lecture hall) CS-XIII: theme: Group research Projects Presentation Session A & B each will cater seven presentations on a given day.* • *A combined session for presentation of seven group project's oral reports presentation on PPT format* • *8-10 slide and total time per presentation are 12-13 min.* • *Each presentation is followed by 2-3 min question- answer session. Group supervisor will address quires raised* • *In addition to full faculty of CM , external faculty / senior faculty and Vice chancellor are guest of the session* • *Each presentation isl assessed by panel of expert or judges for deciding first three researches* •			

Component-V for 5th year MBBS

Premise;

In final year of MBBS where student's learning occurs in a clinical environment IUGRC focuses two aspects of their research related capacity building;

I. *After the students have learnt basics of health research and have experience it in real world the purpose of 5th year teachings is to develop some more health research relevant competencies in outgoing medical students which would be expected to help them to pursue their research aptitude in their future career. This include intro to qualitative research methods, Meta analysis & systematic reviews, plagiarism and medical writings & authorship ethics, and research grant funding proposals writings etc.* ***Teaching & Assessment strategy;*** *Self directed learning- large group interactive sessions & small group discussions facilitated by senior faculty of community medicine, DME & clinical medicine. Whole teaching contents are assessed under 05 marks as part of IA meant for 5th Professional MBBS exam. Five MCQs relevant to five teaching sessions will be part of relevant block examination. The result will serve base for aforementioned internal assessment under max marks 05.*

II. *Students are motivated & facilitated for* ***independent research projects****. ORIC and other research pertinent forums including RSRS, Alumni of RMU, Vice Chancellor RMU research fund, extend their full services & coordination at all levels for it.*

Session # & title	Session course outlines	Learning outcomes
(I) advance health techniques. issues & challenges in health research in regional and global scenario	*Interactive teachings focusing upon;* - *Intro to Qualitative research methods* - *FGDS are conducted* - *How qualitative research data is analyzed*	*After the end of the session students are able ;* - *To differentiate qualitative research techniques from quantitative research* - *Appreciate basic steps of conducting a FGD* - *Explain methods of analyzing Quli- research data*
(II) Basics of Meta analysis & systematic review	*Interactive teachings focusing upon; ;* - *Into to principles of Systemic review and role in generation of scientific evidence* - *Intro to steps of performing Meta analysis and role in accentuation of scientific evidence*	*After the end of the session students are able ;* - *Explain concept of systemic reviews & meta-analysis in generation of evidence* - *Elaborate basic steps of performing meta analysis*
(III) Medical writing skills & authorship criteria & ethics	*Interactive teachings focusing upon;* - *Medical writing skills* - *Review of research article before publishing* - *Ethical issues in publishing health research* - *Criterion used for authorships in medial publishing*	*After the end of the session students are able to ;* - *Apply basic medical writing skills.* - *Appreciate simple criterions used to review a original research article before publication* - *Appreciate ethical issues in publishing research* - *Explain Authorship criterions*
(IV) research ethics : plagiarism	*Interactive teachings focusing upon what is ;* - *Plagiarism* - *What are forms of plagiarism* - *How to avoid plagiarism in medical research & writings*	*After the end of the session students are able to ;* - *Explain plagiarism* - *Differentiate various forms of Plagiarism* - *Explain medical writing ethics*

(V) Basics of research funding grant proposal writing	*Interactive discussion focusing;* - *Intro to Interdisciplinary & collaborative research* - *Research funding grant proposal writing* - *Ethical requirements of clinical trial*	*After the end of the session students are able to ;* - *Explain Interdisciplinary & collaborative research* - *Identify basic components of Research funding grant proposal writing* - *Tell basic ethical requirements of clinical trials* -

Scheme for Execution of Integrated Undergraduate Research Curriculum (IUGRC)

- ***Formal execution of Undergraduate Research Curriculum (IUGRC)RMU***
  - *IUGRC will be fully & formally executed from First Year MBBS Entry Session 2019-20*
- ***Merger of IUGRC into existing MBBS Course;***
  - *IGURC Component –I (first year) has been incorporated into current first year MBBS class (session 2018-19)*
  - *IGURC Component –II (Second year) has been incorporated into current 2nd year MBBS class (session 2017-18)*
  - *IGURC Component –III (Third year) has been planned to incorporate into forthcoming 3rd year MBBS class (session 2016-17). This class has taught under "Integrated under Modular curricula" system of medical education. For this particular class Research Teachings are tailored to the needs of IGURC such that the students could go through formal experiential research / execute student's research projects during 4th year MBBS under Integrated undergraduate research curriculum (IUGRC).*
  - *Forthcoming 4thyear MBBS academic year 2019-20 will learn health research including undertaking group research projects under conventional system. This class is being taught under UHS conventional MBBS curriculum.*
  - *Special lectures under IUGRC component-V will be arranged for final year classes (year 2019-20 & 21) being taught under conventional UHS MBBS curriculum.*

Suggested Reading Sources

XV. *Text Book of Public Health & Community Medicine by Muhammad Ilyas, Muhammad Irfanullah Siddique*

XVI. *Text Book of Preventive & social Medicine by K Park*

XVII. *Short Book of 'Research Methodology and Biostatistics" by Prof. Sira Afzal*

XVIII. *Biostatistics for All. By Prof. Dr Iqbal Ahmed Khan*

XIX. *Biostatistics by Muhammad Ibrahim*

XX. *WHO: Eastern Mediterranean Region. A Practical Guide for Health Researcher Srviers-30.*

XXI. *USMLE- High Yield Biostatistics*

XXII. *Basic statistics for health sciences by Jan W. kuzma*

XXIII. *Essentials of medical statistics by Batty R. Kirkwood*

XXIV. *Biostatistics: Basic concepts & methodology by Wayne W Daniel*

XXV. *Methods in Biostatistics for Medical students & research workers by BK Mahajan*

XXVI. *Statistics in Clinical Practice: By David Coggon*

XXVII. *Internet based sources (Google Scholar, Pub med , Pak medic net, WHO & CDC Sites)*

XXVIII. *WHO Medical Ethic site*

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