

# CURRICULUM

OF

MBBS



**(REVISED 2011)**

Prepared by:  
**PAKISTAN MEDICAL & DENTAL COUNCIL**  
&  
**HIGHER EDUCATION COMMISSION**  
**ISLAMABAD**

# **CURRICULUM DIVISION, HEC**

Dr. Syed Sohail H. Naqvi	Executive Director
Prof. Dr. Altaf Ali G. Shaikh	Member (Acad)
Mr. Muhammad Javed Khan	Adviser (Academics)
Mr. Malik Arshad Mahmood	Director (Curri)
Dr. M. Tahir Ali Shah	Deputy Director (Curri)
Mr. Abdul Fatah Bhatti	Assistant Director (Curri)

Composed by: Mr. Zulfiqar Ali, HEC, Islamabad

# CONTENTS

1.	Introduction	6
2.	Competencies of a medical graduate required by PMDC	11
3.	Framework of the Curriculum	20
4.	Table of Allocation of contact hours to various subjects	24
5.	Table of Module Titles with list of disciplines in a module and allocated time in weeks.	27
6.	Curricular Contents	
6.1	Anatomy	32
6.2.	Physiology	41
6.3.	Biochemistry	50
6.4.	Forensic Medicine	56
6.5.	Pharmacology	62
6.6.	Pathology	66
6.7.	Community Medicine	88
6.8.	Surgery	94
6.9.	Orthopaedics	104
6.10	Anaesthesia	110
6.11.	Medicine	111
6.12.	Dermatology	121
6.13.	Psychiatry	122
6.14.	Behavioural Sciences	124
6.15	Medical Ethics	125
6.16	Radiology	126
6.17	Paediatric Medicine	128
6.18	Gynaecology and Obstetrics	135
6.19	Otolaryngology	146
6.20	Ophthalmology	151
7.	Rules of the House Job/Internship	156
8.	Annexures – A, B, C, & D.	159

## PREFACE

The Pakistan Medical & Dental Council is a statutory body constituted by the Federal Government under the Pakistan Medical & Dental Council Ordinance, 1962, presently controlled by the Council. One of the main functions of the Council is to lay down the minimum standard of basic and higher qualifications in Medicine & Dentistry. The Council has been empowered to:

- Prescribe a uniform minimum standard of courses of training for obtaining graduate and postgraduate dental qualification.
- Prescribe minimum requirements for the content and duration of courses of studies for the degree of MBBS.
- Prescribe condition for admission to courses of training for the degree of MBBS.
- Prescribe the standards of examinations method of conducting the examination.

Curriculum Development, Review and Revision at Graduate and Post-graduate level is one of the major on-going activities of Higher Education Commission as provided under Section (10) Sub-Section (V) of its Ordinance No. LIII of 2002 and Ministry of Education, Government of Pakistan Notification No. D.733/76-JEA (Curr) dated December 4, 1976 appointed Higher Education Commission as the Competent Authority to look after the Curriculum Revision Work beyond Class XII at Bachelor level and onwards to all Degrees, Certificates and Diplomas awarded by Degree Colleges, Universities and other Institutions of higher education.

For this purpose senior teachers of all specialities in MBBS were invited to review/revise the existing curriculum. A draft curriculum was finalized after due consideration of the comments and suggestions received from the Universities and Colleges where the subject under consideration is taught.

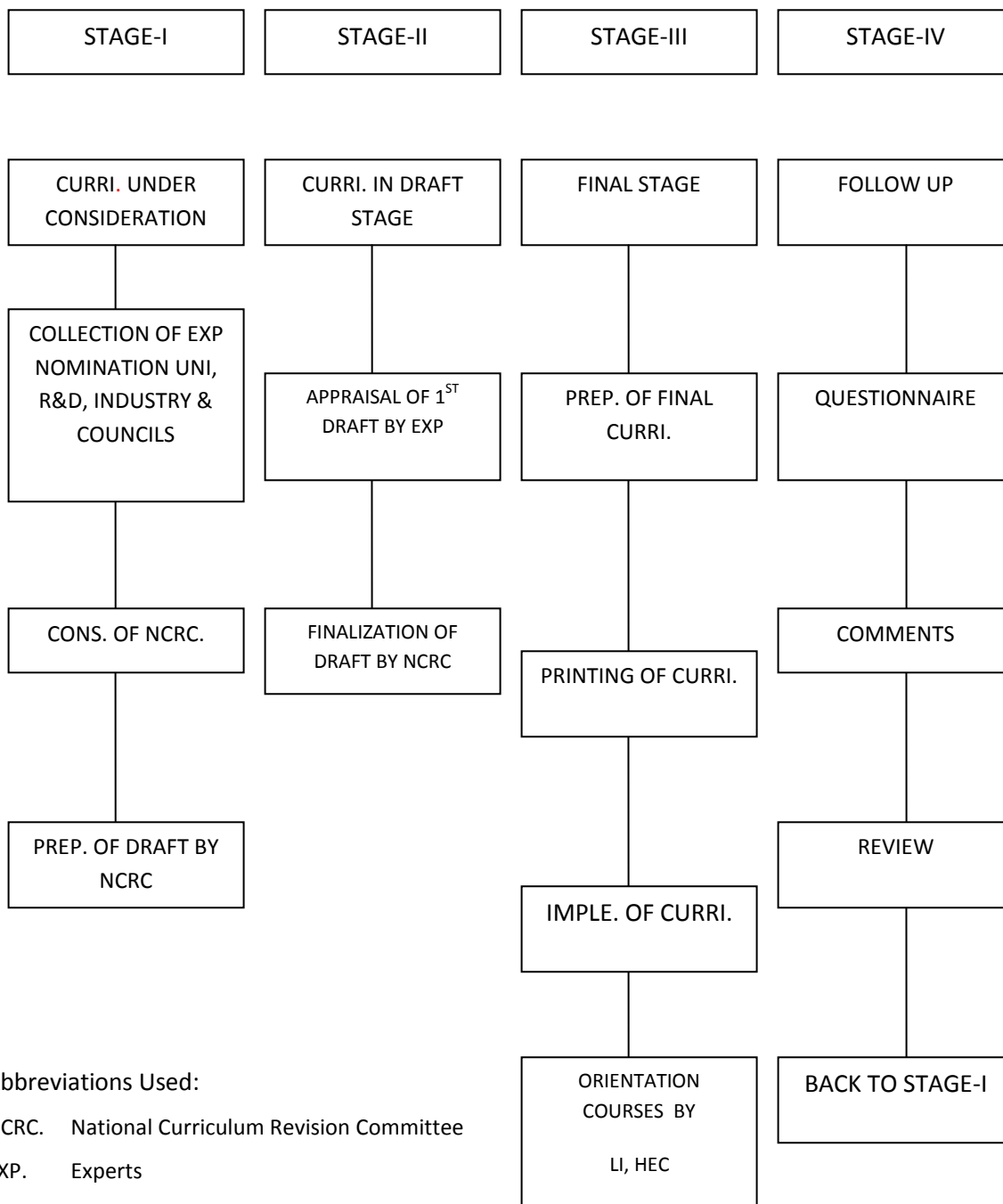
The curriculum prepared by the National Curriculum Revision committee (NCRC) of Higher Education commission and Pakistan Medical & Dental Council was approved by PM&DC which is being circulated for implementation by the concerned institutions.

This Curriculum is to be followed by all Medical Colleges and Universities in Pakistan to get registration of the Council for Medical practitioners.

**(Mr. Muhammad Javed Khan)**  
**Adviser (Acad.), HEC**

**(Maj. Dr. A. Nadeem Akbar)**  
**Registrar, PMDC**

# CURRICULUM DEVELOPMENT



**Abbreviations Used:**

- NCRC. National Curriculum Revision Committee
- EXP. Experts
- COL. Colleges
- UNI. Universities
- PREP. Preparation
- REC. Recommendations
- LI Learning Innovation
- R&D Research & Development Organization
- HEC Higher Education Commission

# INTRODUCTION

A meeting of National Curriculum Revision Committee for finalization of the Curriculum for MBBS at degree level was held at HEC Regional Centre, Lahore from June 08-10, 2011. List of participants of meeting is as under:

<b>Sr.</b>	<b>Name</b>
1.	<b>Prof. Dr. Muhammad Hafizullah,</b> Vice Chancellor, Khyber Medical University, Peshawar
2.	<b>Prof. Dr. Nasir Aziz Kamboh,</b> Principal, Department of Anatomy, Nawaz Sharif Medical College University of Gujrat, Gujrat
3.	<b>Prof. Dr. Rukhsana W. Zuberi,</b> Associate Dean Education, FHS Aga Khan University, Karachi
4.	<b>Prof. Dr. Salim Khattak,</b> Principal, Kohat University of Science & Technology, Kohat
5.	<b>Prof. Dr. Abdul Rasheed Mian,</b> Principal & Professor Department of Forensic Medicine & Technology, Amna Inayat Medical College, Sheikhupura
6.	<b>Prof. Syed Muhammad Awais (S.I),</b> Professor & Chairman Orthopaedics Surgery, King Edward Medical University, Lahore
7.	<b>Prof. Roshan Shaikh,</b> Department of Anatomy, Liaquat University of Medical & Health Sciences, Jamshoro

8.	<b>Prof. Dr. Farmanullah Wazir,</b> Department of Physiology, Kohat University of Science & Technology, Kohat
9.	<b>Prof. Dr. M. Zahoor-ul-Hassan,</b> Professor, Department of Biochemistry (Medicine), Sargodha Medical College, University of Sargodha, Sarghoda
10.	<b>Prof. Dr. Nirmal Das,</b> Department of Pharmacology & Therapeutics, Bolan Medical College, Quetta
11.	<b>Prof. Dr. Naveed Iqbal Ansari,</b> Services Institute of Medical Sciences Hospital, Ghaus-ul-Azam Jail Road, Lahore
12.	<b>Dr. Saira Afzal,</b> Assistant Professor Community Medicine, King Edward Medical University, Lahore
13.	<b>Dr. Abdur Rahman,</b> Professor, Department of Pathology, Sargodha Medical College, University of Sargodha, Sargodha
14.	<b>Prof. Dr. Anila Jalil,</b> Associate Professor, Biochemistry Dean, Basic Health Sciences, Ziauddin Medical College, Ziauddin University, 4-B, Shahrah-e-Ghalib, Block 6, Clifton – Karachi
15.	<b>Prof. Dr. Nasir Izhar,</b> Professor of Behavioral Sciences, University of Health Sciences, Lahore

16.	<b>Prof. Dr. Aisha Mehnaz,</b> Professor of Paediatrics, Dow University of Health Sciences, Karachi
17.	<b>Prof. Dr. Atif Kazmi,</b> Dean, Faculty of Medicine/Allied, Chairman Department of Dermatology, King Edward Medical University, Lahore
18.	<b>Prof. Dr. Abid Hussain,</b> Professor of Dermatology, Khyber Girls Medical College, PDA Building, Block 4, Phase-V, Hayatabad, Peshawar
19.	<b>Prof. Dr. Sardar Fakhar Imam,</b> Professor and Head of Department, Allama Iqbal Medical College, 185-A, Phase-II, Govt. Employee Housing Society, Link Road, Model Town, Lahore
20.	<b>Prof. Dr. Maaz Ahmad,</b> Head of Community Medicine, King Edward Medical University, Lahore
21.	<b>Dr. Rais Ahmed Siddiqui,</b> Professor (OPS), Department of ENT, Liaquat University of Medical & Health Sciences, Jamshoro
22.	<b>Prof. Dr. Hamid Mahmood,</b> Professor, Department of Ophthalmology, Fatima Jinnah Medical College/Sir Ganga Ram Hospital, Lahore
23.	<b>Prof. Dr. Nargis Soomro,</b> Professor of Obstetrics & Gynecology, Dow University of Health Sciences, Karachi



24.	<b>Prof. Muhammad Tayyab,</b> Allama Iqbal Medical College, Lahore
25.	<b>Prof. Dr. Abdul Rashid,</b> Professor of Surgery University Medical and Dental College, University of Faisalabad, Faisalabad
26.	<b>Prof. Dr. Khalid Ahmed Durrani,</b> Professor of Surgery, U.C.M.D, University of Lahore, Lahore
27.	<b>Prof. Dr. M. Saeed Quraishy,</b> Professor of Surgery, Dow University of Health Sciences, Karachi
28.	<b>Prof. Dr. Abdul Razzak Memon,</b> Professor (OPS), Department of Plastic Surgery, Liaquat University of Medical & Health Sciences, Jamshoro

**List of the Participants, Core Committee - MBBS  
27-28.06.2011**

- i) Prof. Dr. Rukhsana W. Zuberi,** **Convener**  
Department of Educational Development,  
Aga Khan University,  
Karachi
- ii) Prof. Dr. Muhammad Hafizullah,** **Member**  
Vice Chancellor,  
Khyber Medical University,  
Peshawar  
**(nominee of PMDC)**
- iii) Prof. Dr. Nasir Aziz Kamboh,** **Member**  
Principal & Professor,  
Department of Anatomy,  
Nawaz Sharif Medical College,  
University of Gujrat,  
Gujrat

- |  |                  |
|--|------------------|
| <b>iv) Prof. Dr. Salim Khattak,</b><br>Principal,<br>Kohat University of Science & Technology,<br>Kohat  | <b>Member</b>    |
| <b>v) Prof. Dr. Idress Anwar,</b><br>Head of Surgery<br>Department, Sheikh Zayed Medical College,<br>Rahim Yar Khan  | <b>Member</b>    |
| <b>vi) Prof. Dr. Sardar Fakhar Imam,</b><br>Professor and Head of Department,<br>Medical Unit -IV<br>Allama Iqbal Medical College,<br>37/9 Sarwer Road<br>Lahore Cantt | <b>Member</b>    |
| <b>vii) Prof. Dr. M. Saeed Quraishy,</b><br>Professor of Surgery,<br>Dow University of Health Sciences,<br>Karachi   | <b>Member</b>    |
| <b>viii) Prof. Dr. Syed Muhammad Awais (S.I.),</b><br>Prof. & Chairman,<br>Orthopaedics Surgery,<br>King Edward Medical University,<br>Lahore                          | <b>Secretary</b> |

## **2. Preamble**

The MBBS curriculum of the Pakistan Medical and Dental Council (PM&DC) is defined according to the PM&DC Vision and Mission which is aligned to the national health needs. This Curriculum highlights the kind of physician expected to graduate from its medical colleges and Universities, outcomes and competencies, and is based on best evidence in medical education. PM&DC ensures that the minimum standards are achieved and the medical graduates are competent to practice medicine. Subjects to be examined in different years are the responsibility of concerned universities

One of the major functions of Pakistan Medical and Dental Council is to ensure that medical and dental graduates should be able to meet the health needs of the society. These graduates should be competent to apply evidence based medicine to health promotion, disease prevention, curative and rehabilitative care, using the bio-psycho-social model.

## **3. Curriculum**

Medical education is a life-long process and MBBS curriculum is a part of the continuum of education from pre-medical education, MBBS, proceeding to house job, post-graduation, continuous medical education and continuous professional development (CME/CPD).

Curriculum development is a dynamic process and works best in an environment conducive to learning, and thrives on monitoring, quality assurance and continuous quality improvement. It consists of not only the formal curriculum but also the informal learning that takes place through day-to-day interactions of students with peers, teachers, colleagues, other health care providers, and the patients and their families.

With the information explosion of the last century and scientific discoveries expanding the boundaries and restructuring the concepts of current knowledge, it is essential to work towards curricular integration, identify a core curriculum which all students must master, with plenty of opportunities for students to follow their own interest as electives.

The curricular model should be grounded in educational theory and adult learning principles, which will promote learning of basic sciences in the clinical context. Medical schools should ensure building of analytical and critical thinking, clinical and lifelong learning skills, and desired professional behaviors in medical and dental graduates by appropriate multi-modal teaching, learning, and assessment and feedback strategies.

## **4. Competencies of Medical Graduate required by PM&DC**

PM&DC outlines the guiding principles for undergraduate medical curriculum and has defined the generic competencies and desired

outcomes are required for a medical graduate to provide optimal health care, leading to better health outcomes for patients and societies. These generic competencies set the standards of care for all physicians, and form a part of the identity of a doctor. Each competency describes a core ability of a competent physician.

These competencies provide a framework for the development of educational programs throughout the physician's learning continuum, from undergraduate MBBS level, to postgraduate and continuing professional development (CPD).

Graduates of medical and dental colleges of Pakistan should be able to demonstrate four main outcomes: those of a competent medical practitioner, a professional, a researcher, a role model leader; demonstrating competencies of a seven star doctor.

### **Clinical, Cognitive and Patient Care Skills (Skillful):**

Competent medical and dental graduates require sound clinical skills grounded in knowledge and skills in patient-centered care. They should be able to demonstrate they can.

- a. **Take a focused history** and identify the patient's risk factors with appreciation of the bio-psycho-social model taking into consideration the environment, ethnicity, race, religion, gender, age, sexual orientation, occupation and cultural practices;
- b. **Perform physical** and mental state examination(s) in order to identify specific problems and differentiate from others, and identify non-conformity to anatomical or physiological configurations;
- c. **Formulate a provisional diagnosis** with justification, and two to three likely differential diagnoses;
- d. **Order appropriate investigations** with the consent of the patient, and interpret their reports to either confirm the diagnosis or differentiate from others;
- e. **Perform procedures** with the consent of the patient, ensuring infection control in giving injections (I/M, I/V, S/C, I/D), managing infusion lines and blood transfusion; providing first aid, basic life support (including cardiopulmonary resuscitation), nebulisers, wound care and dressings; monitoring oxygen saturation and oxygen therapy; taking swabs and Pap smears; recording ECG; performing peak flow spirometry, glucometer blood sugar testing,

proctoscopy, urinary catheterization, dipstick urinalysis, and simple skin suturing;

- f. **Debate** the advantages, disadvantages, indications, contraindications, limitations and complications of the current treatment modalities, justifying the use of each by best available evidence;
- g. **Formulate management plans** in partnership with patients ensuring their safety by:
  - **Diagnosing and managing common health problems** independently;
  - **Using cost-effective best evidence patient-safe approaches**, reporting adverse drug reactions and drug interactions;
  - **Recognizing alternate medicine is an option** with its own effect on health;
  - **Incorporating patients' concerns, expectations & understanding**, determining the extent to which the patients wish to be involved in decision-making, and respecting the decisions and rights of the patients;
  - **Recognizing, stabilizing (first aid and basic life support), investigating and managing as necessary**
    - *transporting* patients in emergency situations,
    - *referring* others appropriately (triage);
    - recognizing and report *abuse and neglect*;
  - **Being readily accessible** when on duty;
  - **Alleviating pain and distress**, including end-of-life care;
  - **Recognizing and working within the limits of own competence**, making use of available resources, and taking advice from colleagues where appropriate, following the consultation process.
- h. **Advise and counsel** the patient and their family members for appropriate health promotion, rehabilitation and support; prevention of risk factors for family members including genetic counseling; immediate treatment and medications, complication and prognosis, using simple terms and layman's language;
- i. **Educate** the patient regarding the health problem, available choices, management plan, self-care, and use of prescribed drugs and equipment, such as inhalers;
- j. **Recognize and take into consideration issues of equality, equity and diversity**, and that opportunities are missed if not perceived to be useful by others;

- k. **Describe and debate the reasons for the success or failures of various approaches** to increase prevention and to decrease social inequities;
- l. **Manage time and prioritise tasks** and use of resources;
- m. **Ensure patient safety** always including strict infection control practices.

## II. Scientific Knowledge for Good Medical Practice (Knowledgeable):

This embodies knowledge of basic medical and clinical sciences required for the practice of medicine. A medical and dental graduate should be able to:

- a. **Differentiate between**
  - **normal and abnormal structure and functions** of the body; in order to recognize and identify abnormalities in body structure in context of different diseases;
  - **normal and abnormal molecular, cellular, biochemical, and physiological and pathophysiological mechanisms and processes** (physical and mental) that maintain and derange the body's homeostasis, in health and disease;
  - **normal and abnormal human behavior**, and relate the abnormality to its psycho-pathological and pathophysiological basis;
  - **effects of growth, development and aging** upon the individual, family and community in the human life cycle;
  - **biological and social determinants and risk factors of disease**,
  - **various etiological cause(s) and causative agents** for specific injuries, illnesses and diseases;
  - **available therapeutic options** to select the most appropriate treatment modality or drug(s) for common diseases based on pharmaco-dynamics and/or efficacy;
  - **other relevant biochemical, pharmacological, surgical, psychological, social interventions** in acute and chronic illness, rehabilitation and end-of-life care, recognizing the role of religious and cultural interventions in end-of-life care;
- b. **Relate**
  - the effects and interactions of physical, emotional and social environments to health and disease of humans;
  - the natural history of acute and chronic, communicable and non-communicable diseases with respective etiologic agents

and effect of appropriate interventions on the progress of disease;

c. **Apply**

- evidence-based medicine concepts to provide best possible cost-effective care;

d. **Ensure**

- compliance with the legal system as it impacts health care and the PM&DC regulations;
- patient safety guidelines.

**III. Knowledge of Population Health and Health Systems (Community Health Promoter):**

To deal with problems of population-based primary health care, including health promotion and disease prevention with special emphasis on vulnerable populations, medical and dental graduates require knowledge of population health and health systems.

Medical graduates should understand their role and be able to take appropriate action for protecting and promoting health of populations.

They should be able to

- a. **Understand their role and be able to take appropriate action** for protecting and promoting the health of population(s).
- b. Relate effects of life-styles and genetic, demographic, environmental, social, cultural economic, psychological and **determinants of health** and illness on populations;
- c. Take appropriate action for **infectious, non-communicable disease and injury prevention**, and in protecting, maintaining and promoting the health of individuals, families and community;
- d. **Evaluate national and global trends in morbidity and mortality** of diseases and injuries of social significance, the impact of migration, environmental factors on health and the role of national and international health organizations on health status;
- e. **Work as an effective member of the health care team** and demonstrate acceptance of the roles and responsibilities of other health and health related personnel in providing health care to individuals, populations and communities;

- f. **Adopt a multidisciplinary approach for health promoting** interventions which require shared responsibility and partnerships of the health care professions with the population served as well as inter-sectoral collaboration.
- g. **Apply the basics of health systems including policies,** organizations, financing, cost-containment measures of rising health care costs, and principles of effective management to the care of populations, families and individuals;
- h. Promote and implement mechanisms that **support equity** in access to health care, effectiveness, and quality of care;
- i. **Make decisions for health care using demography, biostatistics and epidemiology** as well as national, regional and local surveillance data.

#### **IV Critical Thinking, Problem Solving and Reflective Practice (Problem-solver):**

The ability to critically evaluate existing knowledge, technology and information, and to be able to reflect on it, is necessary for solving problems. Medical and dental graduates should be able to demonstrate:

- a. **Use of information** obtained and correlated from different sources;
- b. **Critical data evaluation** (interpret, analyse, synthesize, evaluate to form decisions);
- c. **Dealing effectively with complexity, uncertainty** and probability in medical decision-making, reflecting on the latest evidence and its application to the health problem;
- d. **Regular reflection on their own practice** and on standards of medical practice;
- e. **Initiating, participating in or adapting to change as required,** to ensure that the profession and the patients both benefit;
- f. **Flexibility and a problem-solving approach;**
- g. **Commitment to quality assurance** and monitoring by participating in chart audits and reporting critical incidents to improve medical practice and decrease risk to self, patients and the public;
- h. **Raising concerns about public risk and patient safety.**

#### **V Competencies related to Professional Attributes (Behavioral Sciences and Professionalism):**

Competent medical and dental graduates require professional values, attitudes and behaviors that embody good medical practice,



that is, life-long learning, altruism, empathy, cultural and religious sensitivity, honesty, accountability, probity, ethics, communication skills, and working in teams. The medical and dental graduates should be cognizant with the PM&DC Competencies and Fitness to Practice Guidelines and procedures.

Graduates should role model their code of conduct, professionalism and values, on and off duty, throughout their lives, and thus lead by example, in order to justify the trust reposed in them by the public. Their behavior must enhance public trust in the profession.

**i. Lifelong self-directed learner**

Medical and dental graduates must continually acquire new scientific knowledge and skills to maintain competence, and incorporate it into their day-to-day medical practice. For life-long learning, they should demonstrate a desire for continuing medical or dental education during professional life through personal development activities to continuously acquire and use new knowledge and technologies. Medical and dental graduates should be able to:

- a. Demonstrate continuous learning** based on regular self-assessment seeking peer feed-back. This also includes a continuous undertaking of self-directed study and credited continuous medical education activities up to re-licensure and re-certification;
- b. Manage information effectively** in order to use it for efficient and effective self-learning, medical problem solving and decision-making:
  - o **accurately document** and maintaining records of their own practice for better patient care and for analysis and improvement;
  - o **retrieve patient-specific information** from a clinical data system;
  - o using information and communication technology based on its value and limitations;
  - o **search, collect, organize and interpret** health and biomedical information from credible databases and sources;
  - o **match patient information to evidence available in literature** to form judgments for diagnostic, therapeutic, preventive or prognostic decisions and for surveillance and monitoring of health status.
- c. Provide evidence of continuing career advancement** by pursuing further training in specific fields or continuing professional development by attending CPD programmes in their primary discipline or as a professional. This evidence may be

collated by maintaining professional development portfolios;

- d. **Function effectively as a mentor and a teacher with training**, in order to appraise, assess, teach, and provide feedback to themselves, peers, colleagues and students;
- e. **Respond positively to appraisals and feedback.**

## ii. **Altruistic and Empathetic**

Medical and dental graduates should be able to demonstrate professional values of empathy, altruism and cultural sensitivity in arranging or coordinating the best possible care:

- a. Appropriate **demeanor and dress code**;
- b. **Responsibility, compassion, empathy, honesty, and integrity**;
- c. **Tolerance for diversity**;
- d. **Caring** attitude towards patients and health problems;
- e. **Put patients first** and the patients' needs before their own;
- f. **Have patient safety** paramount;
- g. **Culturally sensitive practice** which is also sensitive to patients' religious beliefs; and
- h. **Special sensitivity towards vulnerable populations.**

## iii. **Ethical**

Medical and dental graduates should be able to demonstrate professional values of self and professional accountability, honesty, probity, and ethics.

- a. **Without discrimination** on the basis of age, gender, religion or beliefs, colour, race, ethnic or national origin, culture, disability, disease, lifestyle, marital or parental status, sexual orientation and social or economic status;
- b. **Strive for constant improvement of self & health delivery systems**;
- c. **Respect the views & interests** of the patient and patient's family;
- d. **Uphold principles** of patient autonomy, beneficence, non-maleficence, and distributive justice; confidentiality, informed consent and ethics;
- e. **Use moral reasoning in decision-making** in dealing with conflicts within and between ethical, legal and professional issues including those raised by economic constraints, commercialization of health care, and scientific advances; and
- f. **Being accountable for regulation of self and the profession**, through audits and performance reviews, in setting up one's own practice and in dealing with pharmaceutical and other commercial enterprises.

#### iv. Collaborator

The medical graduate should be able to demonstrate skills of teamwork to best serve the interests of the patient, profession and institution by

- a. Working as an effective team member, understanding the importance of each role;
- b. Demonstrating collegiality and respect for juniors, peers, seniors and the health team;
- c. Continuously assessing themselves and others in their roles, and acting accordingly;
- d. Sharing information and handing over care appropriately;
- e. Focusing on a collegial but problem-solving approach.

#### v. Communicator

Medical and dental graduates should be able to demonstrate

- a. **Non-Verbal Communication Skills**, including active listening, empathy and a caring attitude; and demonstrating considerate and sensitive manners when dealing with patients and their families, nurses, other health professionals, community, the general public and the media.
- b. **Verbal Communication Skills**, clearly expressing themselves in layman's language; counseling patients sensitively and effectively, providing information in a manner which ensures that patients and families have understood the full information, so that they make educated decisions when consenting to any procedure or therapy;
  - o Clear, effective and sensitive communication for breaking bad news, dealing with an angry or violent patients, difficult circumstances, and vulnerable patients;
  - o Presentational skills;
- c. **Written and Electronic Communication Skills**, with well organized, legible, accurate, complete and concise documentation of prescriptions, medical records, procedural and progress notes, discharge summaries and referral letters including all important information and fulfilling medico legal requirements;
- d. **Confidentiality**, and balance confidentiality with public risk;
- e. **Dissemination of information & research** findings to improve health care.

#### VI Researcher:

Medical and dental graduates are expected to demonstrate constructive criticism, a spirit of enquiry, creativity and a research-oriented attitude. They graduates should be able to:

- a. Identify a researchable problem and critically review literature;
- b. Phrase succinct research questions and formulate hypotheses;

- c. Identify the appropriate research design(s) in Epidemiology and analytical tests in Biostatistics to answer the research question;
- d. Collect, analyze and evaluate data, and present results where possible;
- e. Demonstrate ethics in conducting research and in ownership of intellectual property.

## **VII Leader and Role Model:**

Medical and dental graduates are expected to demonstrate exemplary conduct and leadership potential in

- a. Advancing patient and health care;
- b. Enhancing medical education;
- c. Initiating, participating in and adapting to change, using scientific evidence and approaches;
- d. Enhancing the trust of public in the medical and dental profession by being exceptional role models at work and also when away from work;
- e. Accept leadership if required;
- f. Provide leadership in issues concerning society.

## **5. Framework of MBBS Programme (Rules and Regulations)**

### **5.1 Mission of MBBS Programme.**

To produce **Seven Star Doctor** who has following competencies;

1. Skillful
2. Knowledgeable
3. Community health promoter
4. Critical thinker
5. Professional and role model
6. Researcher
7. Leader

### **5.2 Admission Criteria**

As notified by PMDC

### **5.3 Duration and Scheme of the MBBS Programme**

Six (6) Years; five (5) years of the basic MBBS Programme and one (1) year of House Job/Internship

One Academic Week = 36 hours; One Academic Year =36 Weeks

Years 1 and 2: Divided into four (4) Semesters, with two semesters in each year

Years 3, 4 and 5: Annual Blocks with Modules/Courses/ Rotations/ Clerkships. Year 6: Apprenticeship Training during House Job/Internship

Year No	Study Block		Annual Examination
1	Semester-1	Semester-2	1
2	Semester- 3	Semester- 4	2
3	Annual		3
4	Annual		4
5	Annual		5
6	House Job / Internship		

#### 5.4. Integrated Curriculum Design of MBBS Programme

Two designs of the MBBS curriculum are acceptable.

- i. System Based (Preferred) with horizontal and vertical integration.
- ii. Subject Based (Allowed) must be synchronized with at least temporal integration.

The curriculum of each Clinical Discipline must emphasise “Health Promotion and Disease Prevention”, besides Curative Health Care.

#### 5.5. The Module

**Module** is the smallest unit of Curriculum both in the System-Based and Subject-Base (topic-based) Curricula. Modules can be taught as a continuous block or as a longitudinal theme and assessments should be carried out at the end of each module.

The System-Based Curriculum is usually made up of “Modules”, where each module is based upon organ-system(s) of the body or processes, etc. In each module, the Basic and Clinical Sciences are taught and learned in an integrated fashion. In the Subject-Based Curriculum, the curriculum may be divided into subjects according to “Topics” and must be integrated temporally (concurrent). The Module should make explicit:

- 1) Title of Module of a System, or Topic of a Subject,
- 2) Learning Objectives,
- 3) Allocated Time in weeks/Hours and Credit Hours,
- 4) the name of the Coordinator,
- 5) Teaching Faculty (regular/visiting),
- 6) Learning Sites,
- 8) Modes of Information Transfer,
- 9) List of the Recommended Books,
- 10) Assessment strategies, and
- 11) Strategies for Monitoring and Improvement.

## 5.6. Learning Objectives

Learning Objectives should be defined for each module or clinical rotation/clerkship. They should be Specific, Measurable, Achievable, Relevant to the desired competencies (Outcomes) of the PMDC Curriculum and Time bound (SMART), related to the level of the learner and the three main domains (as below).

### Level of the Learner

While developing the curriculum, the learning objectives must be written according to the desired level of the learner, and the assessment systems must assess the knowledge, skills and attitudes to be achieved for that level.

### Cognition Domain (Knowledge)

- C1 Recognition and Recall
- C2 Interpretation and application
- C3 Problem-solving (analysis, synthesis and judgment)

### Psychomotor Domain (Skills)

- P1 Observe
- P2 Assist in the procedure
- P3 Perform under supervision
- P4 Perform independently

### Affective Domain (Attitudes, Values, Behaviours)

## 5.7. Learning Sites and Strategies

The Medical Colleges/Universities must ensure student-centered active learning in the context of real problems, patients and the community. It may take many forms, for example, “Problem Based Learning”, “Case-based Learning” and “Community Oriented Medical Education.”

Appropriate learning sites and Modes of Information Transfer must be selected in primary, secondary and tertiary care settings.

1. Ambulatory care settings which may be outside the hospital
2. Accident and Emergency/Casualty departments
3. Clinical Skills Laboratory
4. Community Settings
5. Electives in own and other Institutions
6. Experimental Laboratories
7. Wards, Labour Wards, Maternity wards, Postnatal wards
8. Out Patient Departments

9. Procedure Rooms, Operation theaters
10. Others
  1. Conferences/Seminars/Workshops/Webinars
  2. Large Class Learning
  3. Logbook
  4. On-line courses
  5. Photographs, Slides and Software
  6. Practical exercises.
  7. Self-Learning: Medical Colleges/Universities must provide sufficient opportunities for self-learning in the curriculum
  8. Small Group Learning
  9. Student Assignments and Projects
  10. Student Presentations
  11. Videos
  12. Others.

### **5.8 Subjects / Rotations / Disciplines in the MBBS Curriculum**

1. Anatomy
2. Physiology
3. Biochemistry
4. Pharmacology
5. Pathology
6. Forensic Medicine
7. Community Medicine
8. Medicine and Allied Specialities
  - General Medicine
  - Dermatology
  - Cardiology
  - Neurology
  - Chest and Pulmonology
  - Psychiatry
9. Paediatric Medicine
10. Surgery and Allied Specialities
  - General Surgery
  - Orthopaedics
  - Urology
  - Paediatric Surgery (as needed)
  - Anaesthesia
11. Obstetrics and Gynaecology
12. Ophthalmology
13. Otolaryngology
14. Behavioral Sciences
15. Medical Ethics
16. Professionalism..
17. Communication Skills

18. Radiology
19. Research Methods
20. Islamiyat and Pakistan Studies (as per HEC Guidelines)

## 5.9 Theoretical and Practical Learning

Approximate allocation of time for Theoretical and Practical Learning is based on the ratio of contact hours (theory:practice):

- |                       |           |
|-----------------------|-----------|
| 1. Basis Sciences     | 50:50     |
| 2. Clinical Sciences  | 30:70     |
| 3. House Job (year 6) | 15-20: 80 |

## 5.10 Credit Accumulation and Transfer System

Credit Hour is “Academic Currency”. Medical Colleges should use the notional learning hours concept for defining a credit. For example, in the European Credit Transfer System (ECTS)<sup>1</sup>, “one ECTS is equivalent to 25-30 student learning hours.”

### Allocation of Hours<sup>2</sup> and Credits in the MBBS Curriculum

One Academic Year = 9 months = 36 weeks  
 Academic Week = 42<sup>3</sup> hours/week (= 1512 hours/year = 7560 hours in 5 years.

According to ECTS, where 25 student learning hours equals one credit, one year of the MBBS programme (1512 hours) equals approximately 60 Credits (1512 / 25 = 60). When one year (36 weeks) is divided into two (2) Semesters of 18 weeks each, each semester will have 30 Credits. The MBBS programme will have a total of 300 credits (7560 hours / 25 student learning hours).

## 5.11 Teacher-Student Ratio

As per guidelines of the PMDC.

## 5.12 Minimum Attendance:

80% attendance is required from each student for examination subject and non-examination subjects, in order to be eligible to take the module or annual examinations.

---

<sup>1</sup> [http://ec.europa.eu/education/programmes/socrates/ects/index\\_en.html](http://ec.europa.eu/education/programmes/socrates/ects/index_en.html)

<sup>2</sup> Minimum

<sup>3</sup> 36 hours of week + at least one hour of student study per day = 42 hours/week. In the ECTS, student learning at home is also counted.



### **5.13 Assessments and Examinations:**

1. Minimum attendance and satisfactory completion of the log book is required for a student to be eligible for Module / Clerkship and Certifying Examination(s).
2. The assessment techniques / tools used must be appropriate for the objectives, the level of the learner and the domains tested.
3. Formative and Summative Assessment: The same tools may be used for formative or summative assessment. Formative Assessments will be used only for feedback to develop the learners, while Summative Assessments will be used to make pass/fail or progress decisions). Any assessment where the results contribute to a final score, which leads to a decision of the progress of the student, must be considered summative.
3. Feedback to the students should be provided after both formative and summative assessments.
4. Summative Assessment consists of the sum of the Continuous Assessment score (Internal assessment based on assessment of student performance during the module or clerkship) and end of year University Examination.
5. Students who pass all modules can sit in the University Examination.
6. Remediation and Re-sit Examinations. There should be opportunities for remediation and re-sit examinations for the summative component of continuous assessment and end-of-year assessments.
7. University Examinations will be held at the end of each academic year.

### **5.14 The Responsibilities of a Medical Student**

There should be explicit responsibilities for Medical Students regarding their own learning, achievement of the desired competencies/outcomes and conduct as health professionals

### 5.15 Disciplinary Issues

Separate committees should address disciplinary issues pertaining to the students and teachers of the MBBS Programme.

### 5.16 Programme Administration

1. Each Module / clerkship / rotation should have its own “Teaching Faculty” with one coordinator/head of the Module.
2. All such coordinators/heads shall constitute “the MBBS Program Coordination/Curriculum Committee” chaired by the Principal or designee.
3. Responsibilities of the MBBS Curriculum Coordination Committee:
  - i- Curriculum Administration and Implementation.
  - ii- Coordination of Internal Evaluations.
  - iii- Select/Recommend Examiners for the Annual University Examinations.
  - iv- Prepare Annual Monitoring Report for the quality enhancement of the MBBS Program, which should be submitted to the institution every year.

### 5.17 Continuous Quality Improvement of MBBS Programme:

The effectiveness of the curriculum in achieving the goals, learning outcomes and objectives should be measured by:

- i. Self-Monitoring by the Coordinator/head of each module/ clerkship/rotation/course and reported to the Coordinator/head of the MBBS Curriculum Coordination Committee **every year**, as required by HEC
- ii. Self-Assessment by the Institution by appointing a peer review committee to evaluate the MBBS Programme Examination Subject (13 subjects), **every 2-3** years, reported as “Self-Assessment Report (SAR)” of HEC
- iii. External review (Reaccreditation) **every 5 years** by PMDC.

### 5.18 Institutional Responsibilities for Learning Resources

Institutions are responsible for providing

1. An enabling educational environment conducive to learning
2. Library with books, Journals, e-library services, appropriate software and others
3. Skills learning and practice sites, equipment and opportunities
4. Opportunities for English language improvement
5. Extracurricular activities
6. Financial Assistance for deserving students.

## 5.19 Extra-Curricular Activities

Medical Colleges/Universities must provide sufficient opportunities for extracurricular activities

## 5.20 House Job

1. Learning objectives should be developed for each posting.
2. House Job in multiple specialties must be encouraged with 03 months each in Medical and Surgical specialties.
3. House-officers should be assessed at the end of each posting/rotation to ensure the objectives have been achieved.
4. All House Job Trainees must be provided training in Basic Life Support (BLS).

## 5.21 The Curriculum may be subject-based or system-based

### 5.21.1 SUBJECT-BASED CURRICULUM

Year	Medical Subjects Total Hours	General Subjects Total Hours
	<b>5500</b>	
<b>No</b>	<b>Subjects</b>	<b>Hours</b>
	Anatomy	600
	Physiology	600
	Biochemistry	300
		500
Year 1 & 2	Clinical Sciences	500
	Surgery 125	
	Medicine 125	
	Gynecology 50	
	Pediatrics 50	
	Pharmacology 50	
	Pathology 50	
		500
	Community Health	50
	Pharmacology	250
	Forensic Medicine	100
	Community Medicine	100
Year 3	Pathology & Microbiology	250
	Medicine	100
	Surgery	100
	Gynecology	100
		500
	Community Medicine	100

	Medicine	625		
Year	Pediatrics	100		
4 & 5	Surgery	625		
	Pathology	200	Community Health	100
	Gynecology & Obstetrics	150		
	ENT	100		
	Eye	100		
	Co Curriculum	200		
	<b>TOTAL</b>	<b>5500</b>	<b>TOTAL</b>	<b>980</b>

Minimal student self-learning of 1 hour/day over 36 weeks every year, over 5 years equals 1000 hours.

Therefore, 5500 and 980 and 1000 equals 7480 hours.

In an institution where a specialty is not present the subject will be taught by General Surgery/General Medicine (as appropriate), according to the learning objectives for that discipline/topic/subject/field of study.

Clinical Methods, nutrition, medical ethics, professionalism, communication skills, radiology, behavioural sciences and evidence-based practice should be re-enforced in all clinical rotations / clerkships.

\* Additional 2 weeks in Community Psychiatry where possible, where possible.

2 weeks per year can be utilized by the institutions for other curricular, co-curricular or remediation activities.

### 5.21.2 SYSTEM-BASED CURRICULUM

#### Suggested Module Titles, Disciplines and Duration in Weeks

1.	Introduction to the Study of Medicine		2
2.	Cell and Genetics	<a href="#">Anatomy, Physiology, Biochemistry, [1]relevant clinical disciplines</a>	4
3.	Information technology	<a href="#">Library Sciences</a>	2
4.	Growth and	<a href="#">Relevant Basic Sciences (Anatomy, Physiology, Biochemistry,</a>	2

---

	Development	<a href="#"><u>Pathology, Pharmacology[2]), Community Medicine relevant clinical disciplines</u></a>	
5.	Gastrointestinal Tract & Hepato-biliary System	Basic Sciences, Community, Medicine relevant clinical disciplines.	4
6.	Nutrition	Biochemistry, Community Medicine, relevant clinical disciplines	3
7.	Blood & Related Disorders	Basic Sciences, Community, Medicine relevant clinical disciplines.	3
8.	Homeostasis	Physiology, Biochemistry, Medicine	2
9.	Cardiovascular System	Basic Sciences, Community, Medicine relevant clinical disciplines.	4
10.	Respiratory System	Basic Sciences, Community, Medicine relevant clinical disciplines.	4
11.1	Genitourinary System	Basic Sciences, Community, Medicine relevant clinical disciplines.	3
12.	Reproductive System and Reproductive Health	Basic Sciences, Community, Medicine relevant clinical disciplines.	3
13.	Endocrine System	Basic Sciences, Community, Medicine relevant clinical disciplines.	4
14.	Special Senses and Head and Neck	Basic Sciences, Community, Medicine relevant clinical disciplines.	4
15.	Locomotion	Basic Sciences, Community, Medicine relevant clinical disciplines.	6
16.	Nervous System and Behavioural Sciences	Basic Sciences, Community, Medicine relevant clinical disciplines.	8

17.	Inflammation and Neoplasia	Pathology, Microbiology and relevant clinical disciplines	4
18.	Immunity, Infectious agents & Infections	Pathology, Microbiology and relevant clinical disciplines	6
19.	Community Medicine	Community Medicine, Health Systems (including District Health Departments).	<a href="#">12</a>
20.	Medical Ethics		2
21.	Forensic Medicine	Forensic Medicine, Basic Sciences, Community Medicine relevant clinical disciplines.	4
22.	Clinical Methods**	Interspersed in Medicine, Surgery, Obstetrics and Gynaecology, Paediatrics, ENT, Eye	4
23.	Medicine	General Medicine and specialty rotations, Community Medicine and Pathology and Therapeutics	12
24.	Medicine Subspecialty Rotations relevant to medical students	General Medicine and specialty rotations, Community Medicine and Pathology and Therapeutics	4
25.	Psychiatry* and Behavioural Sciences	Psychiatry, Community Medicine	4
26.	Dermatology	Dermatology, Medicine, Community Medicine	2
27.	Surgery	General Surgery	12
28.	Urology		2
29.	Orthopaedics & Traumatology	Orthopaedic surgery, Surgery and Emergency Medicine	2
30.	Radiology	Radiology	2
31.	Obstetrics, Gynaecology and Reproductive Health	Obstetrics and Gynaecology, Medicine, Paediatrics, Community Medicine.	10

32.	Paediatrics	Paediatrics, Obstetrics and Gynaecology, Community Medicine	8
33.	Community Paediatrics	Paediatrics, Preventive Paediatrics, Community Medicine, Family Medicine	2
34.	Ophthalmology	Ophthalmology, Medicine, Community Medicine	4
35.	Otorhinolaryngology	ENT and Community Medicine	4
36.	Accident and Emergency/Casualty		4
37.	Electives	In any field, including research electives.	8
<b>Total allocated weeks</b>			<b>170</b>

Clinical Methods may be interspersed with other modules and/or rotations and clerkships, as necessary.

Sessions on Islamiyat and Pakistan Studies will be included in Years 1 and 2.

Clinical skills, nutrition, medical ethics, professionalism, communication skills, radiology, behavioural sciences and evidence-based practice should be re-enforced in all clinical rotations/ clerkships.

\* Additional 2 weeks in Community Psychiatry are recommended where possible.

***2 weeks per year can be utilized by the institutions for other curricular, co-curricular or remediation activities.***

## **6.1 ANATOMY**

### **IA-: Introduction to**

- History and disciplines of Anatomy
  - Radiological, clinical and applied anatomy
- Terms and planes of Gross anatomy
- Developmental anatomy / embryology
- Anatomical positions

### **IB- Overview of the Skeletal system**

- Axial and appendicular skeleton
- Definition and Classification of bones
  - Functions of bones
  - Parts of a young and adult bone
  - Ossification of bones
  - Blood supply of bones
- Characteristics and classification of joints
  - Characteristics features of a synovial joint
  - Classification of synovial joints
  - Movements at different joints

### **IC- Introduction to the Muscular system**

- Classification of muscles
- Structure of skeletal muscles
- Parts of a typical skeletal muscle
- Aponeurosis, tendons, bursae, ligaments and sheaths
- Blood supply and nerve supply of muscles

### **ID- Introduction to the Nervous system**

- Classification of nervous system

## **II. GENERAL HISTOLOGY**

- Different types of microscopes
  - Parts of a light microscope
- Structure of an animal cell
  - Different organelles and surface projections of a cell
- Basic tissues
  - Epithelium, its classification with examples
  - Muscle tissue, its classification with examples
  - Connective tissue, and structure of various general connective tissues
  - Nervous tissue
- How to prepare a histology slide
- How to perform Gram staining

Applied anatomy

Commonest clinical conditions related to each histological practical



### **III. GENERAL EMBRYOLOGY AND ASPECTS OF GENETICS<sup>4</sup>**

- Cell division and structure of DNA
- Principles of cytogenetics
- Structure of genes and relation to DNA
- Terms used in embryology
- Gametogenesis
- Fertilization, cleavage and implantation of embryo
- Molecular mechanisms involved in embryology
- Development in 2nd and 3rd week of intrauterine life
- Changes in embryo between 4th to 8th week
- Derivatives of germinal layers
- Overview of organogenesis from 3-9th month
- Twinning and teratology

#### **Applied Embryology**

Genetic disorders, infertility, ectopic pregnancy, twinning, placental abnormalities, abortion, anomalies of organogenesis and foetal period, artificial insemination, IVF, Common genetic malformations

### **REGIONAL/SYSTEMIC ANATOMY**

#### **IV Neuroanatomy and Head and Neck**

##### **A. Neuroanatomy**

- Gross and surface anatomy of the skull and cervical vertebrae
- Parts of brain and spinal cord
  - Limbic system
  - Cranial nerve nuclei and peripheral distribution
  - Ascending and descending tracts
  - Spinal nerves
- Sensory, motor and autonomic nervous system
- Nerve lesions of cranial and somatic nerves
- Membranes or meninges of brain and spinal cord and dura venous sinuses
- Blood supply of nervous system and clinical manifestations related to blockage and rupture of blood vessels supplying the nervous system
- Cerebrospinal fluid (CSF) and ventricles
- Development of nervous system (normal and abnormal)
- Microscopic anatomy of CNS (nervous tissue, nerve, ganglion and different parts of brain spinal cord)
- Radiological anatomy (CT scan , MRI)
- Applied anatomy

---

<sup>4</sup> Genetics should be taught by a multi-disciplinary team with Biochemistry and Pathology

- Meningitis, paralysis, peripheral nerve lesions

### **Development of the Nervous system**

1. Development of brain and spinal cord
2. Development of peripheral and autonomic nerves
3. Development of meninges and ventricles.

### **Applied anatomy**

- Congenital anomalies of brain and spinal cord
- Genes, transcription factors, growth factors and signaling molecules involved in the development of all above mentioned organs and congenital anomalies related to mutations in genes and abnormal expression of the genetic factors

## **B. Head and Neck**

- Surface anatomy of head and neck
- Skull, cervical vertebrae and their joints
- Muscles and fasciae of scalp, face and neck with emphasis on organs of special senses (eye, ear, nose and tongue)
  - Microscopic structure of cornea, sclera and retina
  - Microscopic structure of internal ear (Cochlea)
  - Emphasis must be given to applied histology related to clinical medicine and surgery
- Blood supply of head and neck (superficial and deep)
- Lymphatic drainage
- Oral cavity, pharynx, larynx, trachea and oesophagus, thyroid gland, triangles of neck
- Nerve supply (sensory and motor)
- Radiological anatomy

**Development** of branchial apparatus including face, lips, nose, palate, tongue, skull and facial skeleton.

### **Applied Anatomy**

- Cleft lip and palate
- Fontanelle
- Tracheo-esophageal fistula
- Thyroglossal cyst
- Genes, transcription factors, growth factors and signaling molecules involved in the development of all above mentioned organs and congenital anomalies related to mutations in genes and abnormal expression of the genetic factors<sup>5</sup>.
- peripheral nerve lesions of head and neck

---

<sup>5</sup> With Biochemistry and Pathology

## **V Limbs: Upper limbs**

- Surface anatomy
- Bones and joints
- Joint movements and related muscles
- Muscle compartments
- Muscles, aponeuroses, sheaths, ligaments , retinacula
- Blood supply
- Lymphatic drainage
- Nerve supply (sensory and motor) and nerve plexuses
- Histological features of skeletal muscles
- Microscopic structure of tendon, ligament and loose areolar tissue, and osseous tissue
- Histological structure of various types of cartilages

### **Applied anatomy**

Fractures of clavicle and other long bones, Colle's fracture, frozen shoulder, rheumatoid arthritis and osteoarthritis, dislocation of shoulder joint, and brachial plexus injuries

### **Lower limbs**

- Surface anatomy
- Bones and joints
- Joint movements and related muscles
- Muscle compartments
- Muscles, aponeuroses, sheaths, ligaments , retinacula
- Blood supply
- Lymphatic drainage
- Nerve supply (sensory and motor) and nerve plexuses

### **Applied anatomy**

Inguinal and femoral hernias, varicose veins, fracture of lower limb bones and dislocations of joints, motor and sensory loss, paralysis of muscles. Sprain, atrophy, dystrophy and muscle spasms, Common fractures, osteomyelitis and osteoporosis, dislocation, subluxation, frozen joints, arthritis and injuries.

### **Development of the Musculoskeletal system**

1. Development of axial and appendicular skeleton
2. Development of skeletal, smooth and cardiac muscles

### **Applied anatomy**

- Common developmental anomalies of muscles and bones
- Genes, transcription factors, growth factors and signaling molecules involved in the development of all above mentioned organs and congenital anomalies related to mutations in genes and abnormal expression of the genetic factors

## **VI Thorax**

- Surface anatomy
- Ribs, thoracic vertebrae, sternum and their joints
- Muscles of thoracic cage and extrathoracic muscles attached to thorax
- Mechanism of respiration in context to chest wall muscles and diaphragm
- Blood supply
- Lymphatic drainage
- Mediastinum
- Thoraco-abdominal diaphragm
- Nerve supply (sensory and motor)

### **Applied anatomy**

Fractures of ribs and vertebrae, Paralysis of diaphragm and intercostal muscles, pleurisy, hydrothorax, pneumothorax, ischaemic heart disease, myocardial infarction, atrial and ventricular conduction defects.

### **VI-A Respiratory system (gross and microscopic anatomy)**

- Nasal and respiratory mucosa
- Larynx (vocal folds)
- Pharynx
- Trachea
- Bronchi
- Lungs and pleural cavities

Development of upper (nose, pharynx, larynx and trachea) and lower (lungs and bronchi) respiratory organs.

### **Applied anatomy**

- Developmental abnormalities of nasal passage, trachea and lungs
- Genes, transcription factors, growth factors and signaling molecules involved in the development of all above mentioned organs and congenital anomalies related to mutations in genes and abnormal expression of the genetic factors

### **VI-B Cardiovascular system (gross and microscopic anatomy)**

- Pulmonary and systemic blood circulatory systems
- Arterial, venous and Portal blood circulatory systems
- Histological features of cardiac muscles, arterial and venous blood vessels
- Heart and Pericardium

### **Applied anatomy**

Atherosclerosis, varicose veins, aneurysms, angiography, anastomoses

**Development** of heart and pericardium, major veins and arteries.  
Development of the Foetal circulation and its changes at birth.

### **Applied anatomy**

- Congenital anomalies of heart and vessels
- Genes, transcription factors, growth factors and signaling molecules involved in the development of all above mentioned organs and congenital anomalies related to mutations in genes and abnormal expression of the genetic factors

## **VII Abdomen**

### **VII-A Digestive Systems (gross and microscopic anatomy)**

- Surface anatomy of the abdomen
- Lumbar vertebrae
- Abdominal Wall: Anterolateral and posterior abdominal wall
- Abdominal and pelvic peritoneum
- Oral mucosa
- Gums
- Tongue
- Hard and soft palate
- Teeth
- Lips and oropharynx
- Salivary glands
- Abdominal viscera - oesophagus, stomach, duodenum, jejunum, ileum, colon, vermiform appendix, rectum, anal canal, liver and gall bladder, pancreas
- Blood supply of abdominal wall and viscera
- Lymphatic drainage of all abdominal
- Sensory, motor and autonomic nerve supply of abdomen
- Posterior abdominal wall and related structures
- Histological features of smooth muscles
- Radiological anatomy (with ultrasound U/S, computerized tomography CT scan, Barium studies)

### **Development of the Digestive System**

1. Development of diaphragm, body cavities and mesenteries
2. Development of oesophagus, stomach, small and large intestines and anal canal
3. Development of liver, pancreas and gall bladder
4. Development of spleen

### **Applied anatomy**

- Developmental defects of diaphragm
- Developmental defects of esophagus, intestines and other abdominal viscera
- Genes, transcription factors, growth factors and signaling molecules involved in the development of all above mentioned organs and

congenital anomalies related to mutations in genes and abnormal expression of the genetic factors.

## **VII-B Pelvis and Perineum**

- Surface anatomy
- Bony pelvis (male and female)
- Muscles and fascia of pelvis and perineum
- Pelvic viscera
- Perineal regions and fossae

### **Applied Anatomy**

Rectal Prolapse, Uterine prolapse and Abscesses

## **VII-C Urinary system (gross and microscopic anatomy)**

- Kidney
- Ureter
- Urinary bladder and urethra

**Development of the Urinary system:** kidneys, urinary bladder and urethra

### **Applied anatomy**

- Developmental abnormalities of kidneys, urinary bladder and urethra
- Genes, transcription factors, growth factors and signaling molecules involved in the development of all above mentioned organs and congenital anomalies related to mutations in genes and abnormal expression of the genetic factors

## **VIII - Reproductive System:**

### **VIII-A: Male (gross and microscopic anatomy)**

- Scrotum
- Testes
- Genital ducts
- Seminal vesicles, prostate and bulbourethral glands, penis

**Development of the Male reproductive system:** testes and genital ducts

### **Applied anatomy**

- Undescended testicles
- Anomalies of testes and genital ducts
- Anomalies of external genitalia
- Genes, transcription factors, growth factors and signaling molecules involved in the development of all above mentioned organs and congenital anomalies related to mutations in genes and abnormal expression of the genetic factors

## **VIII-B: Female (gross and microscopic anatomy)**

- Ovaries
- Uterus and fallopian tubes
- Vagina
- Mammary gland
- Foetal membranes
- Placenta, umbilical cord and their anomalies

### **Development of the Female Reproductive System**

1. Development of ovaries
2. Development of uterus and fallopian tubes
3. Development of vagina
4. Development of external genitalia

### **Applied anatomy**

- Congenital anomalies of uterus, vagina
- Anomalies of external genitalia
- Undescended ovaries
- Genes, transcription factors, growth factors and signaling molecules involved in the development of all above mentioned organs and congenital anomalies related to mutations in genes and abnormal expression of the genetic factors

## **IX Endocrine system (gross and microscopic anatomy)**

- Pituitary gland
- Thyroid and parathyroid glands
- Suprarenal glands
- Endocrine part of pancreas
- Enteroendocrine system
- Development of organs/ tissue of endocrine system

## **X Immune system (gross and microscopic anatomy)**

- Organization and components of lymphatic system
- Features of lymphatic vessels, Lymph node, Tonsils, Thymus, Spleen, GALT and MALT
- Development of lymphatic vessels, Lymph node, Tonsils, Thymus and Spleen

### **Applied anatomy**

Oedema, ascites, lymphangitis and lymphadenopathy

## **XI Integumentary system**

- Structure and types of skin, nails and hair.
- Histological structure of thin and thick skin
- Receptors, cutaneous blood and nerve supply

- Superficial and deep fasciae

### **Applied anatomy**

Acute and chronic skin diseases, congenital disorders of integument

Materials and aids for Learning:

- Charts
- Clinical skills sessions
- Cross sectional anatomy
- Digital atlas
- Dissection of available human cadavers
- Models
- Plastinated Bodies
- Prosected specimens
- Radiological images (Computerized tomography, Magnetic Resonance Images, Ultrasonography and others)
- Skeletons
- Video tapes, other software including ADAM

Emphasis must be given to applied anatomy related to clinical medicine and surgery.

### **RECOMMENDED BOOKS:**

1. Gray's Anatomy by Prof. Susan Standring, 39th edition (as reference book).
2. Clinical anatomy for medical students by Richard Snell.
3. Clinically oriented anatomy by Keith Moore.
4. Clinical anatomy by R. J. Last (latest edition).
5. Cunningham's Manual of Practical Anatomy by G J Romanes. Latest edition Vol. I, II and III.
6. The developing human, Clinically Oriented Embryology by Keith Moore. (Latest edition).
7. Embryology by Langmann (Latest edition).
8. Wheaters, Functional Histology by Young and Heath (Latest edition)
9. Histology. A Text and Atlas by Ross & Romrell (Latest edition).
10. Medical histology by Prof. Laiq Hussain.
11. Histology by Janquero (Latest edition)
12. Barr's the Human Nervous system: anatomical view point (Latest edition).
13. Neuroanatomy by Richard S. Snell (Latest edition).
14. Netter's Atlas of Gross anatomy (Latest edition).
15. Mariano De Flore atlas of Histology (Latest edition).
16. Digital atlas of microscopic anatomy by Khalid Khan



## 6.2 PHYSIOLOGY

### Cell and General Physiology

- Functional organization of human body
- Homeostasis
- Control systems in the body
- Cell membrane and its functions
- Intercellular Connections
- Cell organelles
- Transport through cell membrane
- Membrane transport including active transport, passive transport, simple and facilitated diffusion
- Types of particles in solution
- Importance of selectively permeable membranes, osmosis and osmotic pressure, surface tension, viscosity also in relation to body fluids
- Facilitated diffusion

### Clinical/Applied Concepts

- Failure of homeostasis (Illness)
- Abnormalities of the cell and its organelles (apoptosis, mutation, cancer and aging)

### Blood

- Composition and functions
- Plasma proteins: albumin, globulin fibrinogen, and their functions
- Red blood cells (Erythropoiesis)
- Haemoglobin and blood indices, iron metabolism, fate of haemoglobin.
- White blood cells, Leucopoiesis, functions
- Platelets
- Haemostasis, clotting factors, anticoagulants
- Blood groups, Blood transfusion and complications  
Reticuloendothelial system – Spleen

### Clinical/Applied Concepts

- Anaemia and its types
- Blood indices in various disorders Thalassemia
- Leucopaenia Leucocytosis, leukaemia, AIDS, allergy, vaccination
- Thrombocytopenia
- Clotting disorders (haemophilia etc.)
- Blood grouping/cross matching and significance

### Nerve and muscle

- The neuron-structure and functions
- Properties of nerve fibres

- Physiology of action potential including compound action potentials
- Conduction of nerve impulse, nerve degeneration and regeneration
- Synapses
- Types of muscle, functions
- Skeletal muscle contraction
- Isometric and isotonic contraction
- Smooth muscle contraction
- Neuromuscular junction
- Excitation-contraction coupling
- Motor unit
- Neuromuscular junction blockers

### **Clinical/Applied Concepts**

- Nerve conduction studies
- Electromyograms (EMG)
- Nerve injury
- Rigor mortis and contractures
- Myasthenia gravis
- Myopathies/Neuropathies

### **Cardiovascular system**

- Introduction to heart and circulation
- Properties of cardiac muscle
- Action potential in atrial and ventricular muscle and pace-maker potential
- Artificial pacemaker
- Cardiac impulse- origin and propagation
- Cardiac cycle Regulation of cardiac functions
- ECG-recording and interpretation
- Arrhythmias- mechanism of development
- Functional types of blood vessels
- Haemodynamics of blood flow
- Local control of blood flow
- Systemic circulation - basic principles/characteristics and control
- Cardiac output (regulation/measurement) peripheral resistance and its regulation
- Arterial pulse
- Arterial blood pressure (short/long term regulation)
- Heart sounds/murmurs
- Venous return and its regulation
- Coronary circulation
- Splanchnic circulation
- Cerebral circulation
- Cutaneous circulation- Triple response
- Foetal circulation and readjustments at birth
- Cardiovascular changes during exercise

## **Clinical/Applied Concepts**

- Correlation of cardiac cycle with Electrocardiogram (ECG) and heart sounds Echocardiogram
- Significance of apex beat / abnormalities
- ECG interpretation in cardiac muscle abnormalities and cardiac arrhythmias
- Flutter, fibrillation, ectopic beats
- Conduction defects
- Radial/other pulses
- Hypertension, types and effects
- Clinical evaluation of heart sounds and murmurs
- Jugular venous pulse
- Ischemic heart disease
- Cerebrovascular accidents
- Types of heart failure and circulatory shock

## **Respiratory system**

- Organization/functions of respiratory tract
- Functions of lungs (respiratory and non-respiratory)
- Mechanics of breathing, pulmonary pressure changes
- Surfactant and compliance
- Protective reflexes
- Lung volumes and capacities
- Dead spaces
- Diffusion of gases (gas laws, composition)
- Pulmonary Circulation Ventilation / perfusion
- Transport of O<sub>2</sub> in blood O<sub>2</sub>/CO<sub>2</sub> disassociation curves
- Transport of CO<sub>2</sub> in blood
- Regulation of respiration (nervous/chemical)
- Abnormal breathing
- Hypoxia-types and effects
- Physiology of cyanosis
- Physiology of high altitude, space, deep sea diving
- Oxygen debt
- Respiratory changes during exercise

## **Clinical/Applied Concepts**

- Examination of chest
- Types of respiration (intrapleural pressure, pneumothorax, effusion)
- Atelectasis
- Lung function tests (Spirometry)
- Sneezing, yawning, cough
- Obstructive / Restrictive lung disease (FEV1/FVC)
- Abnormal Ventilation / Perfusion
- Respiratory failure: Types I & II
- Asphyxia

- Hypoxia, cyanosis, dyspnoea, hypo- and hypercapnoea
- Artificial respiration
- Oxygen therapy and its toxicity
- Caisson's disease

### **Body fluids and kidneys**

- Compartments of body fluids and measurement
- Tissue and lymph fluids
- Fluid excess / depletion
- Structure of kidney / nephron
- General functions of kidney
- GFR-factors regulating
- Formation of urine, filtration, reabsorption, secretion
- Plasma clearance
- Concentration and dilution of urine
- Electrolyte balance
- Water balance
- Regulation of blood pressure by kidneys
- Hormones of kidneys
- Acidification of urine
- Acid-Base balance
- Micturition

### **Clinical/Applied Concepts**

- Renal function tests
- Renal failure/uraemia
- Nephrotic syndrome
- Artificial kidney/haemodialysis
- Metabolic acidosis/alkalosis
- Abnormalities of micturition including incontinence

### **Gastrointestinal tract (GIT)**

- Different parts of the GIT and their functions
- Enteric nervous system (gut, brain)
- Mastication, swallowing and their control
- Functions and movements of stomach Functions of pancreas
- Functions and movements of small intestine
- Functions and movements of large intestine
- Hormones of GIT
- Vomiting and its pathway
- Defecation and its pathway Regulation of feeding and energy expenditure
- Functions of liver/gall bladder

### **Clinical/Applied Concepts**

- Dysphagia, achalasia of oesophagus
- Examination of abdomen, peptic ulcer, pancreatitis

- Gastric function tests
- Vomiting and its effects
- Diarrhoea, constipation
- Jaundice, liver functions tests

### **Nervous system**

- Organization of nervous system
- Classification of nerve fibres
- Properties of synaptic transmission
- Neurotransmitters and neuropeptides
- Types and function of sensory receptors
- Functions of spinal cord and tracts
- Reflex action/reflexes
- Muscle spindle/muscle tone
- Tactile, temperature and pain sensations Structure of cerebral cortex
- Sensory Cortex
- Motor Cortex
- Motor pathways (pyramidal and extra pyramidal)
- Basal ganglia, connections and functions
- Cerebellum, connections and functions
- Vestibular apparatus/regulation of posture and equilibrium
- State of brain activity Reticular formation
- Physiology of sleep
- Electroencephalogram (EEG) Physiology of memory
- Physiology of speech
- Thalamus- nuclei and functions
- Hypothalamus and limbic system
- Cerebrospinal fluid
- Regulation of body temperature
- Function of skin
- Autonomic nervous system

### **Clinical/Applied Concepts**

- Significance of dermatomes
- Receptors and neurotransmitters (applied aspect)
- Interpretation of reflexes
- Injuries and diseases of spinal cord, analgesia system
- Disorders of cranial nerves
- Hemiplegia / paraplegia, Upper and lower motor neuron lesions: features and localisation
- Parkinsonism and other lesions of basal ganglia
- Cerebellar disorders
- Postural disorders
- Epilepsy
- Sleep disorders

- Higher mental function assessment
- Alzheimer's disease
- Abnormalities of speech
- Thalamic syndrome
- Lesion of hypothalamus
- Hydrocephalous
- Heat Stroke

### **Special senses**

- Structure and functions of eyeball
- Principles of optics
- Accommodation of eye
- Visual acuity
- Photochemistry of vision
- Colour vision
- Dark and light adaptation Neural function of retina
- Visual pathway, light reflex and pathway Visual cortex
- Eye movements and control
- Physiological anatomy of cochlea
- Functions of external and middle ear
- Functions of inner ear- organ of Corti
- Auditory pathway
- Physiology of smell - receptors and pathway
- Physiology of taste
- Olfaction/taste abnormalities

### **Clinical/Applied Concepts**

- Glaucoma
- Errors of refraction
- Colour blindness, fundoscopy
- Field of vision and lesions of visual pathway, visual evoked potentials and electroretinogram
- Rinne's and Weber's tests
- Hearing test audiometry, types of deafness, auditory evoked potentials

### **Endocrinology**

- General principles (classification, mechanism of action, feedback control)
- Biosynthesis, transport, metabolism, actions and control of secretion of hormones of:
- Hypothalamus
- Anterior pituitary
- Posterior pituitary
- Thyroid gland
- Parathyroid, calcitonin and calcitriol

- Adrenal medulla
- Adrenal cortex
- Pancreas
- GIT
- Pineal gland
- Thymus
- Kidney
- Physiology of growth

### **Clinical/Applied Concepts**

- Hormonal assays
- Panhypopituitarism, dwarfism acromegaly, gigantism, Sheehan's syndrome
- Diabetes insipidus, syndrome of inappropriate ADH secretion
- Myxoedema, cretinism, thyrotoxicosis
- Tetany
- Pheochromocytoma
- Cushing's syndrome, Conn's syndrome, Addison's disease, adrenogenital syndrome
- Diabetes mellitus and hypoglycemia, Zollinger Ellison's syndrome

### **Reproduction**

- Functional anatomy of male reproductive system
- Spermatogenesis
- Semen analysis
- Erection and ejaculation
- Testosterone
- Male puberty
- Functional anatomy and physiology of female Reproductive system, gonads and oogenesis
- Oestrogen and progesterone
- Menstrual cycle
- Puberty and menopause
- Pregnancy- physiological changes in mother's body during pregnancy
- Placenta
- Parturition
- Lactation
- Foetal and neonatal physiology

### **Clinical/Applied Concepts**

- Chromosomal abnormalities
- Male infertility
- Female infertility
- Contraception
- Pregnancy Tests

## **EXPERIMENTAL PHYSIOLOGY**

### **HAEMATOLOGY**

- Study of the microscope
- Determination of:
  - Haemoglobin (Hb%)
  - Erythrocyte Sedimentation Rate (ESR)
  - Packed Cell volume (PCV)/Haematocrit
  - Bleeding Time (BT)
  - Clotting Time (CT)
  - Blood groups
- Study of the Neubauer chamber
- RBC count
- Red cell indices
- Osmotic fragility of RBCs
- Platelet count
- WBC count
- Differential Leucocyte Count (DLC)
- Demonstration of prothrombin time and thrombin time

### **RESPIRATORY SYSTEM**

- Clinical examination of chest
- Measurement of pulmonary volumes and capacities (Spirometry)
- Auscultation

### **CARDIOVASCULAR SYSTEM**

- Study of the effects of temperature on cardiac contractility
  - Effect of drugs on cardiac contractility
  - Effect of inorganic ions on cardiac contractility
- Properties of cardiac muscle in frog's heart (demonstration)
- Cardiopulmonary resuscitation/ demonstration on subject
- Cold pressure test
- Triple response
- Examination of arterial pulse
- ECG recording/interpretation
- Measurement of arterial blood pressure
- Effect of exercise and posture on BP
- Examination of apex beat
- Heart sounds - auscultation of normal sounds/murmurs

### **Demonstration/Dissection: Frog nerve and muscle with exposure of gastrocnemius muscle and sciatic nerve**

#### **Study by Kymograph or Powerlab**

- Simple muscle twitch (SMT) in frog
- Effect of fatigue on muscle contraction



- Tatanization in frog's muscle
- Effect of two successive stimuli on SMT
- Effect of preload and after load on SMT
- Determination of velocity of conduction in sciatic nerve

### **Miscellaneous**

- Flame photometry
- Vitalograph
- Nerve conduction studies
- Muscle conduction studies
- Evoked Potential
- Use of Physiograph (polygraph)
- Elicit fatigue in human index finger

### **Nervous System**

- Examination of superficial reflexes
- Examination of deep reflexes
- Examination of sensory, motor system
- Clinical examination of cranial nerves
- Cerebellar function tests

### **Special Senses**

- Field of vision by confrontation method
- Field of vision by perimetry
- Light reflex
- Ophthalmoscopy
- Visual acuity
- Colour vision
- Hearing tests- audiometry/tuning fork tests
- Taste sensation
- Olfaction sensation

### **Miscellaneous**

- Recording of body temperature
- Pregnancy tests

## **6.3 BIOCHEMISTRY**

### **For MBBS Part-1**

#### **Cell Biochemistry**

- Introduction to biochemistry
- Biochemical composition and functions of the cell
- Biochemistry of eukaryotes, prokaryotes and archaea
- Cell membranes and their chemical composition
- Importance of lipids and proteins in cell membranes

- Signaling pathways and receptors
- Methods to study cell biochemistry (microscopy, centrifugation, spectrophotometry, chromatography, electrophoresis and thermal cycler)

### **Body fluids and pH regulation**

- Ionization of water, weak acids and bases
- pH and pH scale
- pK values, dissociation constant and titration curve of weak acids
- Body buffers and their mechanism of action
- Henderson – Hasselbach's equation
- Acid base regulation in human body
- Biochemical mechanisms for control of water and electrolyte balance..

### **Carbohydrates**

- Definition, biochemical function and classification
- Structure and functions of monosaccharides and their derivatives
- Disaccharides and their important examples
- Oligosaccharides and their combination with other macromolecules
- Polysaccharides and their important examples and biochemical role
- Biochemical importance of carbohydrates

### **Proteins**

- Definitions, biochemical importance and classification of proteins based on physiochemical properties
- Amino acids and their structure, properties and functions
- Classification and nutritional significance of amino acids
- Dissociation, titration and importance of amino acids
- Structure of proteins and their significance in pH maintenance
- Separation of proteins e.g. salting out, electrophoresis, chromatography, centrifugation
- Immunoglobulins and their biomedical significance
- Plasma proteins and their clinical significance

### **Nucleotides and Nucleic Acids**

- Chemistry of purines and pyrimidines, their types, structure and function
- Chemistry and structure of nucleoside and nucleotide and their biochemical role
- Derivatives of purines and pyrimidines, their role in health and disease
- Nucleic acids, their types, structure and functions (gout)

### **Lipids and Fatty Acids**

- Classification of lipids and their biochemical functions

- Structure and biochemical function of phospholipids, glycolipids and sphingolipids
- Classification of fatty acids and their biochemical functions
- Functions of essential fatty acids
- Identification of fats and oils (saponification, acid number)
- Eicosanoids and their function in health and disease (overview)
- Steroids and their biochemical role
- Cholesterol, its structure, chemistry and functions
- Lipid peroxidation and its significance

### **Enzymes**

- Classification/nomenclature
- Properties of enzymes and catalysts
- Functions of enzymes and catalysts
- Co-enzymes and co-factors
- Isozymes and their clinical importance
- Factors affecting enzyme activity (Michaelis – Menten and Lineweaver burk equations) Classification of enzyme inhibitors and their biochemical importance
- Therapeutic use and application of enzymes in clinical diagnosis

### **Porphyryns and Haemoglobin**

- Chemistry and biosynthesis of porphyrins and related disorders
- Structures, functions and types of haemoglobin
- Oxygen binding capacity of haemoglobin, factors affecting and regulating the oxygen binding capacity of haemoglobin
- Degradation of haeme, formation of bile pigments, its types, transport and excretion
- Hyperbilirubinemia, biochemical causes and differentiation
- Haemoglobinopathies (Hb-S, Thalassaemia etc.) and their biochemical causes

### **Vitamins and minerals**

- Vitamins and their different types
- Classification of vitamins, their chemical structure and biochemical function
- Absorption of vitamins and minerals
- Daily requirements, sources of water and fat soluble vitamins
- Effects of vitamin deficiency
- Role of vitamins as co-enzymes
- Hypo- and hyper-vitaminosis
- Minerals in human nutrition, sources, biochemical actions and recommended daily allowance (RDA).
- Sodium, potassium, chloride, calcium, phosphorus, magnesium, sulfur, iodine, fluoride

- Trace elements (Fe, Zn, Se, I, Cu, Cr, Cd and Mn)

## **Nutrition**

- Caloric requirements of the body
- Balanced diet
- Nutritional requirements in:
  - pregnancy
  - lactation
  - newborn, youth and old age
- Nutritional disorders and protein energy malnutrition (Marasmus, Kwashiorkor and Marasmic-Kwashiorkor)

## **Bioenergetics and Biological Oxidation:**

- Endergonic and exergonic reactions, coupling through ATP
- Oxidation and reduction, methods of electron transfer, redox potential, enzymes and coenzymes of biologic oxidation and reduction
- Respiratory chain and oxidative phosphorylation, components of respiratory chain, electron carriers
- ATP synthesis coupled with electron flow
- ADP coupled to electron transfer
- ATP synthase- relation to proton pump, PMF, and active transport
- Uncouplers and inhibitors of oxidative phosphorylation

## **Introduction to metabolism**

### **Metabolism of carbohydrates**

- Glycolysis
  - Phases and reactions of glycolysis
  - Energetics of aerobic and anaerobic glycolysis and their importance
  - Regulation of glycolysis
  - Cori's cycle
  - The fate of pyruvate
- Citric Acid Cycle
  - Reactions, energetics and regulation and importance of citric acid cycle
  - Amphibolic nature of citric acid cycle (tricarboxylic acid cycle – TCA or the Krebs's cycle)
  - Anaplerotic reactions and regulations of TCA cycle
- Gluconeogenesis
  - Important three by-pass reactions of gluconeogenesis
  - Entrance of amino acids and intermediates of TCA cycle and other nutrients as gluconeogenic substrates
  - Significance of gluconeogenesis

- Glycogen metabolism
  - Reactions of glycogenesis and glycogenolysis
  - Importance of UDP-Glucose
  - Regulation of glycogen synthase and glycogen phosphorylase
  - Glycogen phosphorylase A and the blood glucose sensor
  - Disorders of glycogen metabolism (glycogen storage diseases)
- Secondary pathways of carbohydrate metabolism
  - Hexose Mono Phosphate (HMP) shunt, its reactions and importance
  - Glucuronic acid pathway, its reactions and importance
- Metabolism of fructose, galactose and lactose
- Regulation of Blood Glucose level
  - Hyperglycemia, hypoglycemia and their regulating factors
  - Biochemistry of Diabetes Mellitus, its laboratory findings and diagnosis

### 3. Metabolism of Lipids:

- Mobilization and transport of fatty acids, tricylglycerol and sterols
- Oxidation of fatty acids
  - Activation and transport of fatty acid in the mitochondria
  - $\beta$ -oxidation, fate of acetyl CoA, regulation of  $\beta$ -oxidation
  - Other types of oxidation, i.e.  $\alpha$ oxidation,  $\omega$ -oxidation, peroxisome oxidation, oxidation of odd number carbon-containing fatty acids and unsaturated fatty acids etc.
- Ketogenesis
  - Mechanism and utilization of ketone bodies and significance
  - Ketosis and its mechanism
 Biosynthesis of fatty acids
- Eicosanoids, synthesis from arachidonic acid, their mechanism and biochemical functions
- Triacylglycerol synthesis and regulation
- Synthesis and degradation of phospholipids and their metabolic disorders
- Cholesterol synthesis, regulation, functions, fate of intermediates of cholesterol synthesis, hypercholesterolemia, atherosclerosis
- Plasma lipoproteins, VLDL, LDL, HDL, and chylomicrons, their transport, functions and importance in health and disease
- Glycolipid metabolism and abnormalities

#### **4. Metabolism of Proteins and Amino acids:**

- Amino acid oxidation, metabolic fates of amino acid, transamination, deamination decarboxylation, deamidation and transamination
- Transport of amino group, role of pyridoxal phosphate, glutamate, glutamine, alanine
- Ammonia intoxication, nitrogen excretion and urea formation, urea cycle and its regulation, genetic defects of urea cycle
- Functions, pathways of amino acid degradation and genetic disorders of individual amino acids

#### **5. Integration and regulation of metabolic pathways in different tissues**

#### **6. Metabolism of nucleotides:**

- De novo purine synthesis
- Synthesis of pyrimidine
- Recycling of purine and pyrimidine bases (Salvage pathway)
- Degradation of purine, formation of uric acid
- Disorders of purine nucleotide metabolism

#### **7. Biochemical genetics (informational flow in the cell):**

- The structural basis of the cellular information
- DNA, chromosomes - discovery and organization of DNA in genomes
- Nucleosome structure and function
- Super-coiling of DNA
- DNA replication (DNA-dependent DNA synthesis)
  - DNA polymerase, its components and functions
  - Initiation, elongation and termination of replication
  - DNA repair, mutation and cancers
- Transcription (DNA-dependent RNA synthesis)
  - RNA polymerase, its components and functions
  - Initiation, elongation and termination of transcription
  - RNA processing
  - RNA-dependent synthesis of RNA and DNA
  - Reverse transcription DNA synthesis from viral RNA
  - Retroviruses in relation to cancer and AIDS
- Translation (Protein synthesis)
  - The genetic code
  - Initiation, elongation and termination of protein synthesis
  - Post-translational modification
  - Regulation of gene expression
- Molecular biology technology

- DNA isolation
- DNA-recombinant technology
- Hybridization, blotting techniques
- Epigenetics
- Genetic disorders

## 8. Biochemistry of Endocrine system

- Synthesis, secretion, mechanism of action and regulation of hormones
- Hormone effect on carbohydrate, lipid, protein, mineral metabolism
- Disorders of various endocrine glands

## 9. Biochemistry of Water and Electrolyte Imbalance and Acid-Base balance

### Laboratory practicals:

- Introduction to use of laboratory facilities/equipment
- Basic techniques and fundamental information
- Preparation of solutions - Normal solution and normal saline
- Gel electrophoresis
- Qualitative analysis of proteins by Lowery method, Biuret test
- Gel filtration chromatography (demonstration)
- Gene cloning (demonstration)
- DNA extraction (demonstration)
- Polymerase Chain Reaction (PCR; demonstration)
- Chemical analysis of normal and abnormal urine
- The techniques and instrumentation of clinical biochemistry
  - Spectrophotometry
  - UV spectrophotometry
  - pH metry
  - Collection and preservation of clinical specimens
- Estimation and clinical interpretation of Blood glucose and Glucose tolerance test (demonstration)
- Determination of amino acids in urine by paper chromatography (demonstration)
- Estimation of various biochemical parameters in blood (urea, uric acid, creatinine, bilirubin, protein, cholesterol and electrolytes)
- Measurements of plasma enzymes (ALT, AST, LDH, CK, ALP and amylase)

### RECOMMENDED BOOKS:

1. Harper's Biochemistry by Robert K. Murray, Daryl K. Granner, Peter A.
2. Mayes, Victor W. Rodwell, Latest Ed.
3. Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey, Latest Ed.
4. Practical Clinical Biochemistry by Varley.

5. Textbook of Biochemistry by Devlin, 5th Ed.
6. Textbook of Medical Biochemistry Vol-I and II by M.A. Hashmi.
7. Biochemistry by Stryer, Lubert, Latest Ed.

## **FORENSIC MEDICINE & TOXICOLOGY**

- A. This course is the first step in the curriculum designed to introduce both classical and contemporary topics in Forensic Medicine & Toxicology to the students.
- B. After taking this course students will be expected to have a basic understanding of the subject of Forensic Medicine & Toxicology and its role towards public, state and judiciary.
- C. They should be able to work independently in primary and secondary health care level organizations and to provide excellent medicolegal work/certification and manage problems to be treated in courts of law.

## **6.4 FORENSIC MEDICINE**

### **Introduction**

- I. Introduction to Forensic Medicine (definition and history, scope and Forensic Medical Examination).
- II. Medico legal systems:
  - Coroner's medico legal system
  - Medical Examiner medico legal system
  - Continental medico legal system
- III. Medico legal system in Pakistan.

### **1. LAW RELEVANT TO MEDICINE**

- **Law, Law Courts and Evidence in the Court**
  - Differentiate between Law, Common Law, Statute Law, Criminal Law, Civil Law.
  - Qasas and Diyat and evidence ordinance 1988, Courts of Law, their powers and jurisdictions, Legal Procedures (court etiquettes), Evidence, Types. of evidence, Admissibility of evidence, Deposition, Stages of evidence.
  - Law Medicine relationship, Criminal Justice, General Presumptions in Law, General Exceptions in Law, Unfit to plead, Diminished responsibility, Mc Naughten's Rule, Durham Rule.
  - General Definitions.
- **Legal aspects of medical practice**
  - Allopathic System, Medical and Dental Degree Ordinance 1980, Allopathic System (Prevention of misuse) Act 1962, PMDC Ordinance 1962, Medical Register,
  - Drug Act 1976, Dangerous drug act 1930.



- Medical treatment.
  - Mental Health Ordinance 2001 (replacement of Lunacy Act 1912).
  - Role and Types of Consent, and consent in vulnerable population (Minors, Prisoners, Insane, etc.)
  - Medical Negligence
  - Professional Misconduct
  - Professional secrecy
  - Medical Documentation
- **Medical aspects of law**
1. Existing criminal laws relating to:
    - Hurt (Criminal amendment Act 1997/ Qisas and Diyat Ordinance); its definition, classification and medico legal aspects.
    - Killings: QATL: Its definition, classification and interpretation in relation to medico legal aspects.
    - Sexual Assaults: Women protection Bill 2006/ Hudood Ordinance 1979
  2. Laws of Marriage
  3. Workman's compensation Act.

## 2. **PERSONAL IDENTITY**

- Parameters of personal identity.
- Various methods of identification.
- Identification in decomposed, mutilated bodies, fragmentary and skeletal remains.
- Role of teeth in identification and their medico legal importance.
- Role of radiology in identification and its medico legal importance.
- Role of osteology in identification and its medico legal importance.
- Special identification techniques and recent developments DNA Testing, Forensic Photography, Dentistry Radiology, Neutron Activation Analysis, Osteometry, Dactyloscopy, finger prints retinal imaging lip, and ear prints.

## 3. **THANATOLOGY**

- Definition, classification, diagnosis and medico legal aspects of death.
- Concept of brain death and its medico legal aspects.
- Medico legal aspects of sudden and unexpected death.
- Certification of cause of death as advised by World Health Organization (WHO).
- Physico-chemical changes in body after death and factors modifying these changes and relation of these changes with the time scale after death.
- Cause-mechanism-mode and manners of death.
- Calculation of POST MORTEM INTERVAL (PMI).

#### 4. **TRACE EVIDENCE**

- Definition and classification of trace evidence.
- Locard's Exchange Principle & its importance.
- Steps of collection, preservation and dispatch of specimens to analytical laboratories (Pre-Lab. Work).
- Analytical techniques and their medico legal importance (Lab. Work).
- Recent advances in analytical techniques.
- Interpretation of results of laboratories to assess medicolegal significance.

#### 5. **TRAUMATOLOGY**

- Definition of Injury, wound, hurt.
- Classification of injuries.
- Mechanics of wound production.
- Recognition of cause-appearance in mechanical injuries.
- Medico legal aspects of mechanical injuries (cause or weapon/time/manner of infliction)
- Patho-physiological effects of the injuries.
- Determination of age of Injury.
- Determination of nature of injuries whether antemortem / postmortem.
- Relationship of trauma to the disease.
- **Firearm / Blast Injuries**
  - A. Definition & types of ballistics.
    - Understand the basics of ballistics (interior, exterior and wound / terminal ballistics).
    - Study of interior, exterior and wound ballistics.
    - Effects of firearms on the body and its Medico legal aspects.
  - B. Mechanics of blast injuries.
    - Recognition of blast injuries.
    - Medico legal aspects of blast injuries
- **Transportation/Regional Injuries/Police Torture**
  - A. Motor vehicle ordinance 1965
  - B. Classification: Road traffic/Railway traffic/Air crash
  - C. Recognition of injuries to the driver or pilot/passengers/pedestrians
  - D. Traffic accident investigations
  - E. Special trauma such as police torture and death in custody
- **Thermal/Corrosive Burns And Injuries Due To Electrocutation/Lightening/Starvation**
  - A. Definitions & classification of thermal injuries.
  - B. Heat Injuries: various types of burns & their recognition in living and dead.

- C. Death due to Electrocution and Lightning.
- D. Medico legal aspects of thermal injuries.

## 6. **ASPHYXIA**

- **General aspects**

- A. Anatomy of neck, Physiology/Biochemistry and pathology of fatal asphyxia.
- B. Classification of Asphyxia.
  - Death due to Drowning: its mechanism, recognition, diagnosis and medico legal aspects. Drowning without inhalation of water.
  - Mechanical Asphyxia: Suffocation, Hanging, Strangulation, Throttling, Choking, Traumatic Asphyxia, Autoerotic Asphyxia. Recognition of each type of mechanical asphyxia by observing non - specific and specific findings and medico legal aspects.
  - Environmental Asphyxia: Recognition by autopsy findings and medico legal aspects.

## 7. **SEXUAL OFFENCES AND RELATED ISSUES**

- Puberty, Impotence, Sterility, Virginity, Pregnancy and Delivery (examination, certification and medico-legal issues).
- Abortion (Therapeutic & Criminal), Methods of inducing criminal abortion, Examination in living & dead and medico legal issues of new born (still born/dead born/live born, if live born then cause of death, age of new born etc.)
- Infanticide and criminal/non-accidental violence or abuse to newborn, infant or child.
- Examination of the victim and assailant of sexual assault (natural/un-natural).
- Sexual Perversions: recognition and its medico legal aspects
- Methods of collection, preservation and dispatch of specimens in cases of sexual assaults

## 8. **AUTOPSY AND EXHUMATION**

- Definition, Types, Principles, Objectives, rules, techniques and procedure of autopsy
- Autopsy protocol.
- Essentials of autopsy suite & medico legal clinic
- Risks and hazards of autopsy
- Autopsy artifacts and negative autopsy
- Autopsy on decomposed bodies, fragmentary & skeletal remains
- Exhumation procedure, scope & limitations
- Collection, Preservation and Dispatch of Routine Specimens at Autopsy.

## 9. **FORENSIC MEDICAL EXAMINATION**

- Principles, Objectives, Authorization, Consent, Protocol, Pre-Examination Formalities.
- History of allegation, Occupational history, Purpose of Examination.

- Establishment of personal identity.
- Physical examination of clothes/body.
- Local examination of part.
- Examination of body openings.
- Laboratory Investigations.
- Collection of specimens.
- Formulations of opinion
- Documentation of findings.
- Forensic medical certificate.

## **FORENSIC TOXICOLOGY**

### **1. GENERAL TOXICOLOGY**

- Definitions, classification, routes, absorption, metabolism, excretion of poisons.
- Diagnosis of poisoning in living & dead (integrated with Emergency)
- Management of a case of poisoning.
- Duties of medico legal officer to deal with a case of poisoning.
- Chronic industrial poisoning, assessment and compensation with community medicine.

### **2. SPECIAL TOXICOLOGY**

- Specific Poisons
- Corrosives, Irritants, Neurotoxic, Asphyxiants, Cardiac, Spinal and Miscellaneous group.
- Recognition, Diagnosis in living and dead.
- Management and medico legal aspects of poisoning.

## **LEARNING METHODOLOGY**

### **A. KNOWLEDGE** as per learning strategies in section 5.8

### **B. PRACTICAL SKILLS**

- Visits in autopsy rooms/medico-legal clinics /poison control centers.
- Experimental work in biological/analytical/radiological/anatomy/histopathological laboratories.

### **C. VISITS**

- Visits in autopsy rooms/medico-legal clinics /poison control centers
- Visit of autopsy lab
- History taking / General examination.
- Special examination (Injuries)
- Opening of Corpse
- Internal Scrutiny of Corpse
- Collection of Specimens
- Preliminary reporting/Certification
- Final Opinion

- Design of medico legal clinic Lab.
- Instrument Orientation
- Scrutiny of Police Papers
- History taking and General examination.
- Special examination (Injuries)
- Collection of Specimens
- Investigations
- Reference to Consultant
- Preliminary reporting/Certification
- Final Opinion

**For proper orientation and practical demonstration, visits are also suggested to:**

- Court.
- Forensic science laboratory.
- Psychiatric unit or asylum.
- Site during conduction of exhumation.

#### **D. DEMONSTRATION AND SPOTTING WORK IN BIOLOGICAL/ANALYTICAL/RADIOLOGICAL/ANATOMY LAB**

Medico-legal significance of:

- Examination of Blood
- Examination of Seminal Stain
- Examination of Hair
- Examination of Stomach Contents
- Examination of Metallic Poisons
- Examination of Volatile Poisons
- Examination of Organic Poisons
- Special Techniques
- Examination of X-Rays
- Examination of Bones

#### **RECOMMENDED BOOKS:**

1. Simpson's Forensic Medicine by Barnard Knight, 11<sup>th</sup> Ed. Edward Arnold, London.
2. Parikh's Text book of Medical Jurisprudence, Forensic Medicine and Toxicology by C.K. Parikh 6<sup>th</sup> Ed., CBS Publisher.
3. Buchanan's Text book of Forensic Medicine and Toxicology by Buchanan, 9<sup>th</sup> ed., Livingstone.
4. G. Principles and Practice of Forensic Medicine by Prof. Nasib R. Awan.
5. Medical Jurisprudence and Toxicology by Dr. Siddique Hussain.
6. Textbook of Forensic Medicine & Toxicology Krishan Vij (4<sup>th</sup> Edition)

## 8.5 PHARMACOLOGY AND THERAPEUTICS

### 1) General Pharmacology:

- Definition & Branches/divisions of pharmacology, objectives of learning pharmacology.
- Definition of drug, drug nomenclature & sources of drugs.
- Standard sources of drug information, Pharmacopoeas and Formularies (only relevant information)
- Dosage forms and doses of drugs.
- Pharmacokinetics: basic principles and their clinical application
  - Route of drug administration.
  - Transport of drugs across cell membranes
  - Absorption of drugs and bioavailability
  - Drug reservoirs, distribution and redistribution of drugs, plasma protein binding and volume of distribution.
  - Bio-transformation of drugs.
  - Excretion of drug, enterohepatic recirculation, plasma half-life, clearance
- Pharmacodynamics
  - Mechanism of drug action.
  - Receptors and post receptor molecular mechanism of drug action
  - Mechanism of drug action other than mediated through drug receptors.
  - Dose response curves, structure-activity relationship.
- Factors modifying action and doses of drugs.
- Pharmacogenetics.
- Adverse drug reactions & drug toxicity/poisoning
- Drug Interactions

### 2) Locally Acting Drugs (definitions with examples)

- Dermatological and topical drugs
- Demulcents, emollients, irritants, counter irritants, astringents.
- Antiseborrhoeics, locally acting enzymes.
- Antiseptics and disinfectants.

### 3) Autacoids

- Histamine & antihistamines
- Introduction to other Mediators:
  - Eicosanoids
  - Serotonin
  - Substance P
  - Bradykinin

### 4) Drugs Acting on Gastrointestinal Tract:

- Emetics and anti-emetics.
- Pharmacotherapy of Peptic ulcer disease,

- Pharmacotherapy of Constipation
- Pharmacotherapy of Diarrhea
- Pharmacotherapy of irritable bowel syndrome
- Prokinetics

#### **5) Drugs Acting on Autonomic Nervous System:**

- Neurohumoral Transmission
- Parasympathetic nervous system
  - Parasympathomimetics
  - Parasympatholytics
  - Autonomic ganglionic stimulants and blockers
  - Skeletal muscle relaxants
- Sympathetic nervous system
  - Sympathomimetics
  - Sympatholytics
  - Adrenergic neuron blockers

#### **6) Drugs acting on renal system**

- Diuretics
- Anti-Diuretics
- Drugs for acid base and electrolyte balance

#### **7) Drugs acting on Cardiovascular System**

- Antihypertensive drugs.
- Anti-anginal drugs
- Drug management of C Heart F and Inotropic drugs.
- Thrombolytics/anticoagulants/antiplatelets.
- Anti-arrhythmic drugs.
- Antihyperlipidemic drugs.
- Drugs used in anaemias

#### **8) Drugs Acting on Respiratory System**

- Pharmacotherapy of cough:  
Antitussives, Expectorants and Mucolytics.  
Bronchial asthma.

#### **9) Drugs Acting on Endocrine System**

- Pituitary-hypothalamic drugs.
- Thyroid antithyroid drugs.
- Pancreatic hormones and anti-diabetic drugs.
- Adrenocorticoids.
- Anabolic steroids.
- Reproductive hormones: Testosterone, Estrogen, Progesteron, Contraceptives

## **10) Drugs acting on Central Nervous System**

- Introduction to CNS Neuronal organisation and Neurotransmitters
- Sedative-hypnotics, Pharmacotherapy of sleep disorder
- Pharmacotherapy of Epilepsy, Parkinsonism, Migraine.
- Psychopharmacology: antipsychotics, antidepressants, anxiolytics, antimania drugs
- Anaesthetics: Local and general anaesthetics.
- CNS stimulant drugs
- Pharmacotherapy of Pain and inflammation:
  - Opioids and Non-Steroidal Anti-inflammatory Drugs (NSAIDs)
  - Pharmacotherapy of Gout, Rheumatoid arthritis
- Drugs for movement disorder/muscle relaxant.

## **11) Drugs Acting on Uterus**

- Drugs increasing and drugs decreasing uterine motility
- Drugs decreasing uterine motility

## **12) Chemotherapy**

- Introduction to chemotherapy
- Antimicrobials acting on cell wall
- Protein synthesis inhibitors
- Nucleic acid synthesis inhibitors
  - Antifolates
  - Gyrase inhibitors
- Anti-mycobacterial drugs.
- Anti-fungal drugs.
- Antiviral drugs.
- Anti-protozoal drugs: Antimalarials and Anti-amoebic drugs.
- Chemotherapy for Sexually Transmitted Diseases (STDs)
- Cancer chemotherapy: Principle and general consideration, treatment approach in some common malignancies

## **13) Immunopharmacology**

- Immunostimulants including Probiotics
- Immunosuppressants
- Vaccines and sera

## **14) Miscellaneous**

- Pharmacotherapy of Glaucoma and Cataract
- Pharmacotherapy of anaemias
- Drug therapy in children, elderly, during pregnancy and lactation.
- Drug therapy in disease states such as renal and hepatic disease.
- Overview of radiation therapy.

## **PRACTICALS:**



## **A EXPERIMENTAL PHARMACOLOGY**

Experiments designed to observe action of drugs on animals and isolated tissue. Experiments on the actions of selected drugs to be demonstrated to the students.

- Biostatistics
- Effects of drugs on frog's heart in situ.
- Effects of drugs on rabbit's eye.
- Effects of drugs on isolated rabbit's ileum.
- Schemes to find out unknown drug having stimulatory or inhibitory effect on isolated rabbit's ileum.
- Effects of neuromuscular blocking agents on frog rectus abdominis muscle.
- Methodology of clinical trials.

## **B. PHARMACY**

- Weights and measures
- Abbreviations
- Conversions
- Percentage solutions
- Preparation and dispensing of: Percentage solutions, Powders, Mixtures, Ointments, Liniments, Emulsion

## **C. PRESCRIBING**

### **P Drug selection**

Guideline for rational use of drugs

*First of all select the Personal drug and then write the Prescription*

### **Prescription writing**

General principles and abbreviations

Prescription writing for common ailments

- Respiratory system
  - Cough
  - Bronchial Asthma
- GIT
  - Peptic Ulcer
  - Diarrhoea
- CNS
  - Epilepsy
  - Migraine
  - Parkinsonism
  - Rheumatoid arthritis
- CVS
  - Hypertension
  - Angina

- Hyperlipidemias
- Shock
- Endocrinology
  - Hyper and hypothyroidism
  - Diabetes all types
- Anaemias
- Infectious diseases
  - Malaria
  - Typhoid fever
  - Bacillary dysentery
  - Amoebic dysentery
  - Ascariasis
  - Tape-worm infestation
  - Acute streptococcal pharyngitis
  - Scabies
  - Tuberculosis
  - Urinary Tract Infection (UTI)

#### **D. CLINICO PHARMACOLOGICAL SEMINARS**

- Rational Drug Therapy and Drug Interaction
- Essential Drug List concept

#### **E. GROUP DISCUSSION**

Assignment and discussion by the students on all topics

## **6.6 PATHOLOGY AND MICROBIOLOGY**

### **GENERAL PATHOLOGY**

Enabling objective for cell Injuries:

- The students will be able to differentiate between normal and altered state of homeostasis
- Recognize various types and causes of cell injuries and cell death.
- Understand the pathogenesis and morphology of necrosis and apoptosis
- Knowledge of cell adaptation (Physiological / Pathological)
- Describe the various cellular accumulation

#### **A. CELL INJURY:**

1. Definition of necrosis, apoptosis, ischemia, hypoxia, infarction and gangrene.
2. Sequence of the structural and biochemical changes which occur in the cell in response to the following:
  - Ischemia
  - Immunological injury e.g. Asthma /SLE/ Anaphylactic reaction
  - Physical agents: e.g. Radiation

- Genetic defects e.g. Thalassaemia / haemophilia
- Nutritional deficiency e.g. anemia
- Infectious agents
  - Viruses: e.g. Hepatitis
  - Bacteria: e.g. Staphylococcus aureus
  - Fungi: e.g. Candida
  - Parasites: e.g. Malaria
- 3. Irreversible and reversible injury.
- 4. Critical mechanisms in cell injury.
  - Especially with reference to ATP, mitochondria, calcium ions and cell membrane
  - Role of free radicals
- 5. Apoptosis and its significance.
- 6. Exogenous and endogenous pigment deposition.
- 7. Dystrophic and metastatic calcification along with clinical significance.
- 8. Metabolic disorders
  - lipid disorders, steatosis of liver, hyperlipidemia
  - protein disorders
  - carbohydrate disorders
- 9. Adaptation to cell injury, atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia.
- 10. The necrosis and its types.
- 11. Patterns of necrosis, the mechanism and characteristic gross and microscopic findings
- 12. The term gangrene and its pathological mechanism
- 13. Intracellular accumulations
- 14. Hyaline change

### **Practical: Gross morphology (Heart, Liver, Prostate)**

Microscopy Haematoxylin and Eosin (H and E)

Transparency (Atlas of Histopathology)

- Cloudy swelling of the kidney (reversible injures)
- Fatty change liver (reversible injures/Accumulation)
- Infarction (coagulative necrosis)
- Benign Prostatic Hypertrophy (BPH - Cell Adaptation)

## **B. INFLAMMATION AND NEOPLASIA**

### **Relate**

- Vascular and cellular events with chemical mediations in acute and chronic inflammation with
  - sequelae of acute inflammation
  - transudate and exudate
  - types of chronic inflammation (simple and granulomatous) and their effector cells with functions
  - morphologic patterns of chronic inflammation
  - sequence of events in formation, types and causes of granuloma

- the different types of necrosis with prototypic examples
- role of complement in inflammation and immunity with various cellular events
- structure and formation of antibodies with their functions
- characteristic of bacterial structure with its virulence and pathogenesis
- the structure (cell wall) of bacteria with their staining properties (Gram stain)
- histology of lymph node with their normal and abnormal functions
- proto-oncogenes, oncogenes, tumor suppressor genes and apoptosis regulating genes in carcinogenesis with their mode of activation and with common human tumours
- tumour markers with their use in clinical practice
- the virulence factors of Streptococci and Staphylococci with acute inflammation

**Differentiate between:**

- cells of the immune system on the basis of their structure and function
- cellular and humoral immunity and their respective functions/actions
- acute and chronic inflammation including chronic granulomatous inflammation on the basis of aetiology, pathogenesis and clinical features and diagnostic tools
- Streptococci and Staphylococci
- staging and grading of the tumours
- various cellular adaptations (physiology to pathology) that is, sequence of events(hyperplasia-metaplasia-dysplasia-carcinoma)
- grading and staging of the tumors

**Discuss:**

- nomenclature of tumours along with biology of tumor growth and spread (direct, lymphatic, blood borne)
- epidemiology of cancer with special emphasis of epidemiology in Pakistani context
- clonal theory of cancer
- carcinogenesis (chemical, viral, ionizing radiation, bacteria, fungus, parasites)
- laboratory diagnosis of cancer (routine histology, cytology, frozen section, Immunohistochemistry etc.)
- the synthesis and regulation of metabolism of arachidonic acid and functional importance of its metabolites
- role of cytokines in inflammation

**Laboratory Skills: Students should be able to:**

- estimate erythrocyte sedimentation rate

- differentiate normal histology of lymph node from granulomatous inflammation
- differentiate between important benign and malignant tumors
- identify and differentiate gram positive from negative bacteria under the microscope

### C. **WOUND HEALING:**

- Differences between repair and regeneration.
- Wound healing by first and second intention.
- Factors that influence the inflammatory reparative response.
- Wound contraction with cicatrization.
- Formation of granulation tissue.
- Complications of wound healing.

### D. **DISORDERS OF CIRCULATION**

- **Thrombo-embolic disorders and their modalities:**
  - Hemorrhage and congestion
  - Pathogenesis of thrombosis.
  - Possible consequences of thrombosis
  - Define and classify emboli according to their composition.
  - Infarction: red (hemorrhagic) and white (anemic)
- **Disorders of the circulation and shock:**
  - Definition of edema, ascites, hydrothorax and anasarca.
  - Pathophysiology of edema with special emphasis on Congestive Heart Failure (CHF).
  - Pathogenesis of four major types of shock (hypovolemic, cardiogenic, vasovagal & septic) and their causes.
  - Compensatory mechanisms involved in shock.

### E. **MICROBIOLOGY**

- Defense mechanisms of the body.
- Microbial mechanisms of invasion and virulence.
- Differentiation between sterilization and disinfection.
- Appropriate methods of disinfection and sterilization for the following:
  - Spillage: blood and body fluids such as sputum, vomitus, stool, urine,
  - Equipment and items:
- **Critical items:** surgical instruments, sutures, bandages, surgical drapes
  - **Semi critical items:** endoscopes, laryngoscopes, vaginal speculum, proctoscope, thermometer, nasal and ear specula and spatula
  - **Non critical items:** bed linen, floor, blood pressure apparatus, bedrail

- Principles of aseptic techniques for venepuncture, urinary catheterisation, wound dressing, suturing and lumbar puncture.
- Healthcare associated infections and basic concepts of infection control including standard precautions
- General principles of the following serological tests:
  - Precipitation (VDRL) and agglutination (Latex particle) and Haemagglutination TPHA test
  - Immunofluorescent FTA
  - ELISA Hepatitis (A, B, C,D,E,) Rubella, Cytomegalovirus (CMV) and Human Immunodeficiency Virus (HIV)
  - Western blot for HIV
  - ICT Hepatitis Band C.
- Interpretation:
  - Culture reports,
  - Serological reports and
  - Microscopic reports of Gram and AFB stain.
- Laboratory diagnosis of infectious diseases: Principles of proper sample collection and submission of specimens for laboratory investigations with due precautions.
- Classification of microorganisms: General characteristics and taxonomy of Bacteria, Rickettsia, Chlamydia, Viruses and Fungi.
- Definition of communicable endemic, epidemic and pandemic diseases, carriers, pathogens, opportunists, commensals and colonizers.
- Micro-organisms responsible for infection of the following organ systems:
  - Central nervous system
  - Respiratory system
  - Gastrointestinal system
  - Genital infections
  - Urinary system
  - Infections of bone and joints
  - Systemic infections
  - Infection of the skin
  - Hepatobiliary and pancreatic infections
  - Zoonosis
- Pathogenesis, treatment, epidemiology, prevention and control of following organisms.

**Bacteria:** Staphylococcus aureus, Streptococcus pneumoniae, Beta hemolytic streptococcus group A & B, Diphtheria sp, Bordetella sp, Bacillus anthracis, Clostridia (perfringens, botulinum, difficile, tetani), Actinomyces israeli, Nocardia asteroides, Neisseria (meningitides and

gonorrhoeae), *Gardenerella vaginalis*, *Haemophilus influenzae*, *Mycobacterium tuberculosis* and *leprae*, *Escherichia coli*, *Klebsiella*, *Proteus*, *Salmonella*, *Shigella*, *Yersinia pestis*, *Pseudomonas*, *Vibrio cholera*, *Vibrio parahemolyticus*, *Campylobacter jejuni*, *Helicobacter pylori*, *Legionella*, *Lycoplasma pneumoniae*, *Chlamydia*, *Treponema pallidum*, *Leptospira*, *Rickettsia* sp.

**Viruses:** Enterovirus, Mumps, Herpes, Adenovirus, Measles, Influenza, Parainfluenza, Rhinovirus, Respiratory Syncytial Virus (RSV), Hepatitis A, B, C, D, E, Rotavirus, Astrovirus, Cytomegalo Virus (CMV), Epstein Barr Virus (EBV), Rubella, Chicken pox, Arbovirus, HIV, Rabies.

**Fungus:** *Cryptococcus neoformis*, *Candida albicans*, *Tinea* species,

## F. PARASITOLOGY

### **Protozoa:**

*Plasmodium* species, *Giardia lamblia*, *Entamoeba histolytica*, *Leishmania* species, *Trichomonas vaginalis*, *Toxoplasma gondii*, *Pneumocystis carinii*, *Trypanosoma*, *Balantidium coli*.

### **Helminths:**

- **Cestodes**

*Taenia* (*Solium*, *Saginata*), *Echinococcus* species, *Hymenolepis nana*, *Diphyllobothrium latum*.

- **Nematodes**

*Filaria* species, *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Enterobius vermicularis*, *Trichuris trichiuria*, *Trichinella spiralis*, *Strongyloides stercoralis*, *Loa Loa*.

- **Trematodes**

*Schistosoma* (*Haematobium*, *Mansoni*, *Japanicum*), *Fasciola Hepatica*, *Clonorchis sinensis*

**Immunity:** Types of Immune Cells, Structure & Function of Immunity, Hypersensitivity Reactions, Autoimmune diseases.

## G. PRINCIPLES OF ANTI-MICROBIAL ACTION

- Definitions: antibiotics, selective toxicity, bacteriostatic and bactericidal.
- Host determinants in relation to selection of an antimicrobial drug for therapy.
- Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC)
- Bacterial resistance and the mechanisms involved in acquiring

bacterial resistance.

- Mechanisms involved in transfer of drug resistance to bacterial resistance.
- Mode of action of various antimicrobial drug groups.
- Cross resistance
- Super infection

## **H. COMMON ORGANISMS CAUSING ORGAN / SYSTEM EFFECTS**

### **Common organisms causing CNS Infections**

- **Bacteria:** Streptococcus pneumoniae, Neisseria meningitidis, Haemophilus influenzae, Beta hemolytic streptococcus group B, Escherichia coli, Listeria monocytogenes and Mycobacterium tuberculosis, Clostridium tetani.
- **Viruses:** Enterovirus (polio), Mumps, Herpes, Adenovirus.
- **Fungus:** Cryptococcus neoformis
- **Protozoa:** Plasmodium

### **Common organisms causing Respiratory Tract Infection**

- **Bacteria:** Streptococcus pneumoniae, Haemophilus influenzae, Beta hemolytic Streptococcus group B, Klebsiella, Legionella, Mycoplasma pneumoniae, Mycobacterium tuberculosis, Chlamydia, Staphylococcus aureus, Diphtheria sp., Bordetella sp.
- **Viruses:** Measles, Herpes, Adenovirus, Influenza, Parainfluenza, Rhinovirus, RSV.
- **Fungus:** Aspergillus sp.
- **Protozoa:** Pneumocystis carinii.

### **Common organisms causing gastrointestinal infection/infestation**

- **Bacteria:** Salmonella, Shigella, Vibrio cholera, Mycobacterium tuberculosis, Campylobacter jejuni, Helicobacter pylori, Clostridium perfringens, Staphylococcus aureus, Bacillus cereus, Vibrio parahaemolyticus, Clostridium botulinum and difficile.
- **Viruses:** Hepatitis A, Rotavirus, Astrovirus.
- **Fungus:** Cryptococcus neoformis.
- **Protozoa:** Giardia lamblia, Entamoeba histolytica, Cryptosporidium.

### **Common organisms causing hepatic infections**

- **Bacteria:** Streptococcus species, Coliforms and Anaerobes.
- **Viruses:** Hepatitis A, B, C, D, E, G, CMV, EBV, Herpes simplex.
- **Protozoa:** E. histolytica.

### **Common organisms causing skin infection**

- **Bacteria:** Staphylococcus aureus, Streptococcus pyogenes,



*Pseudomonas aeruginosa*, *Clostridium perfringens*, *Actinomyces israelii*, *Nocardia asteroides*, *Corynebacterium diphtheriae*, *Mycobacterium tuberculosis* and *leprae*, *Bacteroides fragilis*.

- **Viruses:** Small pox, *Molluscum contagiosum*, Herpes, Measles, Rubella, Chicken pox.
- **Fungus:** *Candida albicans*, *Tinea* species.
- **Arthropods:** *Sarcoptes scabiei*, *Pediculus* species, *Cinex lectularius*.
- **Helminths:** *Filaria* species, *Strongyloides stercoralis*, *Schistosoma* sp.
- **Protozoa:** *Leishmania* species.

#### **Common organisms causing bone and joint infection**

- **Bacteria:** *Staphylococcus aureus*, *Streptococcus pyogenes*, *Haemophilus influenzae*, *Neisseria gonorrhoeae*, and *Mycobacterium tuberculosis*.
- **Fungi:** *Madurella mycetoma*.

#### **Common organisms causing urinary tract infection**

- **Bacteria:** *Entamoeba coli*, *Klebsiella* sp, *Enterococcus* sp, *Proteus* sp, *Staphylococcus saprophyticus*, *Mycobacterium tuberculosis*.

#### **Common organisms causing genital infection**

- **Bacteria:** *Neisseria gonorrhoeae*, *Treponema pallidum*, *Chlamydia trachomatis*, *Mycoplasma urealyticum*
- **Viruses:** Pox virus, Herpes simplex type 2, Hepatitis B, HIV.
- **Fungus:** *Candida albicans*.
- **Arthropods:** *Sarcoptes scabiei*.
- **Protozoa:** *Trichomonas vaginalis*.

#### **Common organisms causing Zoonosis**

- **Bacteria:** Anthrax, *Brucella*
- **Viruses:** Rabies, Congo, Crimean, Hemorrhagic Fever
- **Protozoa:** *Toxoplasma gondii*, *Leishmania* sp.
- **Helminths:** *Echinococcus* sp.

### **I. GENETICS**

- Common genetically determined autosomal recessive and autosomal dominant disorders.
- Common genetic mutations.
- Diseases associated with co-sanguinous marriages.
- Diagnosis of genetic disorders

### **J. IMMUNOLOGY**

- Differentiate between antigen, antibody, epitope, hapten and

adhesion molecules. Differentiate between innate and acquired immunity.

- The structure and function of Major Histocompatibility Complex (MHC). Cytokines.
- The mechanism of humoral and cell mediated immunity.
- Type I, type II, type III and type IV hypersensitivity reactions giving relevant examples.
- Differentiate between auto graft, homograft, allograft and xeno graft. Immuno tolerance and immune paralysis.
  - Discuss the mechanism involved in allograft rejection and steps that can be taken to combat rejection.
- Classification of immunodeficiency disorders.
- The basis of autoimmunity.
- Amyloidosis-Pathogenesis, classification.

## **K. IMMUNITY**

- Central and peripheral mechanisms of immunological tolerance and significance
- Break down of tolerance (mechanisms)
- Non-organ specific autoimmune diseases (Rheumatoid arthritis, Systemic Lupus Erythematosus, Progressive Systemic Sclerosis, Dermatomyositis/Polymyositis, Mixed connective tissue disease)
- Anti-nuclear antibodies (ANA), various patterns and associations
- Lab diagnosis of autoimmune disorders (Total Ig's, Anti ds DNA antibodies, Anti SM antibodies, Other anti ENA antibodies, Antibodies to blood cells, Antiphospholipid antibodies, Complement and Immune complexes)

## **L. ENVIRONMENTAL**

Occupational, zoonotic diseases (air and water pollution, radiation, chemicals, nutritional diseases like vitamin deficiencies, pneumoconiosis, asbestosis, psittacosis etc.),

## **M. CHILDHOOD DISEASES**

Neonatal and perinatal infections, ABO incompatibility, metabolic diseases (enzyme related), acute respiratory distress syndrome, childhood tumours, syndromes and congenital disorders

## **Microbiology PRACTICALS / TUTORIALS:**

- Grams staining
- AFB staining
- Stool DR
- Mantoux / PPD test
- Differentiation between Staphylococcus and Streptococcus
- Identification of common Gram negative bacteria
- Serological tests and their interpretation

- Antimicrobial sensitivity testing methods and interpretation
- Identification of common gastrointestinal and heme/tissue parasites

## **SYSTEMIC PATHOLOGY**

### **1. BLOOD VESSELS AND HEART**

- Differentiate among atherosclerosis, Monckeberg's medial calcific sclerosis and arteriolosclerosis.
- Describe atherosclerosis with respect to the following factors
  - Etiology and pathogenesis
  - Early lesion
  - Late and complicated lesion
  - Vessels affected
  - Complications
- Classify hypertension and list the causes of secondary hypertension
- Describe the vascular changes in hypertension.
- Discuss the common pathogenic mechanisms of vasculitis.
- Classify aneurysm according to etiology.
- Describe atherosclerotic aneurysm with respect to
  - Pathogenesis.
  - Type of vessel involved.
  - Morphological and clinical features.
- Describe varicose veins with respect to
  - Common sites
  - Predisposing factors
  - Clinical features.
- List the benign and malignant tumours of blood vessels.
- Describe the pathogenesis of ischemic heart disease.
- Describe myocardial infarction with respect to the following
  - Sequence of changes in myocardial infarction (MI)
  - Pattern of elevation of biochemical markers used in the evaluation of MI
  - Complications
- List the causes of sudden cardiac death
- Describe cor pulmonale and list the predisposing disorders
- Describe rheumatic fever with respect to aetiology, pathogenesis, morphological and clinical features, and its sequelae
- List the causes of myocarditis and describe its morphological and clinical features
- Describe the three major clinico-pathological groups of cardiomyopathy (dilated, hypertrophic and restrictive)
- List the causes of pericarditis and describe its clinical and morphological features
- List the primary and secondary cardiac tumours
- Describe the main features of Fallot's tetralogy and coarctation of

aorta

- Valvular heart disease and mitral valve prolapse
- Infective endocarditis
- Complications of artificial valve
- The concept of cardiac transplantation

## **2. HAEMATOPOIETIC AND LYMPHOID SYSTEMS**

- Discuss the morphology of a normal bone marrow.
- Outline the stages in the formation of red blood cells (RBCs), white blood cells (WBCs), platelets and correlate haematopoiesis with various haematopoietic growth factors.
- List the normal values of red cell count, haemoglobin level, packed cell volume, MCH, MCV, MCHC, WBC count and platelet count.
- Classify anaemia on the basis of morphology and underline pathogenesis of RBC production.
- Hypochromic microcytic anaemia: Describe the causes and clinical features of Iron deficiency anaemia
- Megaloblastic anaemia: Differentiate between the causes of based on risk factors and laboratory diagnosis with special emphasis on Vitamin B12 and folate deficiency.
  - List the conditions which predispose to folate deficiency.
  - Describe vitamin B12 deficiency with respect to the conditions which produce it, its blood picture and clinical features
- Define anemia of chronic disease and explain its pathophysiology
  - Differentiate between anaemia of chronic disease and nutritional deficiency anaemia.
- Classify hemolytic anaemias and describe their cardinal features and laboratory diagnoses.
  - Describe the pathophysiology, clinical features and lab diagnosis of hereditary spherocytosis.
- Discuss the Pakistani perspective of beta thalassemia major with emphasis on incidence, common mutations, associated psychosocial problems and prevention.
  - Discuss the pathogenesis of thalassaemia.
  - Classify thalassaemia on the basis of clinical and genetic features.
  - Differentiate between the blood picture and clinical feature of Beta- thalassaemia minor and major.
- Discuss the mechanism of haemolytic anaemia due to glucose-6-phosphate dehydrogenase deficiency.
- Classify immune hemolytic anaemia.
  - Differentiate between warm and cold antibodies in immunohaemolytic anaemia.
- Discuss the inheritance, clinical features, lab diagnosis of von Willebrand's disease and Hemophilia A and B.
- Describe aplastic anaemia with respect to the etiology,

pathogenesis, clinical features and laboratory diagnosis.

- Describe polycythemia with respect to etiology, pathogenesis, clinical significance and laboratory diagnosis
- Describe the mechanisms which can cause neutropenia/ agranulocytosis.
- Differentiate between the benign and malignant causes of leukocytosis.
- Describe the epidemiological, morphological and clinical features of infectious mononucleosis.
- Differentiate between acute and chronic non-specific lymphadenitis.
- Describe the different classifications (REAL and working formulations) of non-Hodgkin's lymphoma.
- Describe Hodgkin's disease with respect to classification, etiology, pathogenesis and clinical stages
- Classify leukemias
  - Discuss the etiology, clinical features, laboratory diagnosis and prognostic factors of acute lymphoblastic and acute myeloblastic leukemias.
  - Discuss the prognostic factors of acute lymphoblastic and acute myeloblastic leukemias.
  - Describe the pathophysiology of chronic myeloid and chronic lymphocytic leukemias
- Describe multiple myeloma with respect to etiology, pathogenesis, morphology, clinical features
- Describe disseminated intravascular coagulation with respect to, etiology, pathogenesis, clinical features and laboratory diagnosis
- List the causes of decreased production and decreased survival of platelets.
  - Describe the pathogenesis of idiopathic & thrombotic thrombocytopenic purpura
- Indicate the value of following tests in the assessment of bleeding disorders
  - Bleeding time
  - Clotting time
  - Platelets count
  - Platelet function test
  - Partial thromboplastin time
  - Prothrombin time
  - Mixing test studies
- ABO and Rhesus blood groups:
  - Describe ABO and Rhesus blood groups and outline the way in which a sample of blood is typed.
  - Explain the inheritance of ABO and Rhesus blood groups.
- List the common indications of blood products (red cells, platelets and plasma
- List the hazards of blood transfusion and discuss their prevention.

### 3. RESPIRATORY SYSTEM

- List micro-organisms causing upper respiratory tract infection.
- Describe the etiology and clinical features of rhinitis and nasal polyps.
- List and differentiate between malignant and benign tumours of nasopharynx and larynx.
- Discuss and differentiate between pleural effusion, haemothorax, hydrothorax, pleuritis, pneumothorax and chylothorax.
- Discuss and differentiate between acute pharyngitis, acute bacterial epiglottitis and acute laryngitis.
- Classify atelectasis on the basis of underlying mechanisms.
- Describe the etiology, pathogenesis, morphology and clinical features of asthma.
- Discuss the disorders associated with airflow obstruction disease.
- Differentiate between restrictive and obstructive lung disease on the basis of clinical features and pulmonary function tests.
  - Describe various types of emphysema, its pathogenesis, morphology and clinical features.
  - Describe pathogenesis and clinical features of chronic bronchitis.
- Describe the predisposing factors, pathogenesis, morphology and clinical features of bronchiectasis.
- Describe the pathogenesis, morphology and clinical features of adult respiratory distress syndrome.
- Describe the pathogenesis, morphology and clinical features of sarcoidosis and hypersensitivity pneumonitis.
- Describe different categories of Pulmonary Eosinophilia.
- Describe the pathogenesis, morphology and clinical features of idiopathic pulmonary fibrosis.
- Describe clinical features of Goodpasture's syndrome based on the pathology.
- List the pathogenesis, morphology and clinical features of thromboemboli.
- Describe the morphology & clinical features of pulmonary infarction.
- List the causes of pulmonary hypertension and vascular sclerosis.
- Describe the etiology, pathogenesis, morphology and clinical features of acute bacterial pneumonias.
  - List the micro-organisms causing atypical pneumonias.
- Discuss the etiology, pathogenesis and clinical features of tuberculosis of the lung.
- List the fungal infections of lung.
- Describe classification, aetiology, pathogenesis and clinical features of bronchogenic carcinoma.
- Describe etiology & pathogenesis of mesothelioma.
- Describe pneumoconiosis with respect to etiology, pathogenesis and clinical features.

- List the common diseases caused by air pollutants and asbestos and describe Asbestos related diseases.

#### **4. THE ORAL CAVITY AND GASTROINTESTINALTRACT**

##### **4.1 Oral cavity**

- Define the term leukoplakia.
- List the possible predisposing factors of leukoplakia (pipe smoking, ill-fitting denture, alcohol abuse, irritant foods).
- Discuss the risk factors, clinical and morphological features of oral cancer.
- Differentiate between the benign and malignant tumours of salivary glands.
- Describe the clinical and morphological features of pleomorphic adenoma.

##### **4.2 Oesophagus**

- Differentiate between oesophagitis, Barrett's oesophagus and carcinoma of the oesophagus.

##### **4.3 Stomach**

- List the predisposing factors for and describe the pathogenesis and clinical features of acute gastritis.
- Describe the pathogenesis, morphological and clinical features of chronic gastritis and peptic ulcer
- Describe gastric carcinoma with respect to risk factors, pathogenesis, clinical and morphological features and prognosis; and differentiate from Gastric lymphoma and Gastrointestinal stromal tumor (GIST).

##### **4.4 Intestine**

- Describe the clinical and morphological features of Hirschsprung's disease.
- Describe the pathogenesis, morphological and clinical features of
  - Celiac sprue
  - Tropical sprue
- Describe the predisposing conditions for and clinical and morphological features of ischemic bowel disease.
- Differentiate between Crohn's disease and ulcerative colitis.
- List the major causes of intestinal obstruction.
- Describe the clinico-pathological features of following diseases of the intestine and differentiate from each other: Amoebiasis, Tuberculosis and Typhoid
- List the non-neoplastic polyps of intestine.
- Classify adenomas on the basis of epithelial architecture and describe the clinical and morphological features of adenomas.
- Discuss the pathogenesis of colorectal carcinoma and describe the

morphological and clinical features of colorectal carcinoma.

- Describe carcinoid tumour with respect to the peak incidence, most prevalent sites in the gut and morphological features.
- Describe the clinical features of carcinoid syndrome.
- Describe the morphological features of ulcerative colitis
- Appendix:
  - Describe the etiology, pathogenesis, morphological and clinical features of acute appendicitis.
  - List the tumours of appendix.

## **5. LIVER AND BILIARYTRACT**

### **5.1 Liver**

- Describe the pathway of bilirubin metabolism and its elimination from the body.
- Describe the types of jaundice with respect to the causes, clinical features and laboratory diagnosis
- Differentiate between intrahepatic and extrahepatic biliary obstruction.
- List the causes and describe the morphological, clinical features and important complications of hepatic failure (hepatic encephalopathy, hepato-renal syndrome).
- List the common causes of cirrhosis (viral hepatitis, cryptogenic, alcohol, biliary disease, genetic hemochromatosis, Wilson's disease, alpha-1 anti-trypsin deficiency).
- Discuss the pathogenesis of cirrhosis and describe its complications (progressive liver failure, portal hypertension, hepatocellular carcinoma).
- Differentiate among viral hepatitis A,B, C, D and E with respect to
  - Route of transmission
  - Incubation period
  - Clinical features.
  - Potential outcome of acute infection.
- Define carrier state and differentiate between acute and chronic hepatitis.
- List the common causes of liver abscess and differentiate between them (amebic, echinococcal, bacterial, fungal) on the basis of clinical and morphological features, and laboratory diagnoses.
- List the drugs and toxins which cause hepatic injury along-with their specific effects.
- Discuss the pathogenesis of alcohol liver disease.
- Differentiate between the morphological and clinical features of alcoholic hepatitis and cirrhosis.
- List the causes of secondary hemochromatosis and describe its pathogenesis, morphological and clinical features.
- Discuss the clinico-morphological features of Wilson's disease.
- Describe the clinico-morphological features of alpha-1 anti-trypsin



deficiency.

- List the causes of neonatal hepatitis.
- Differentiate between primary and secondary biliary cirrhosis.
- Discuss the epidemiology, pathogenesis, morphological and clinical features of hepatocellular carcinoma.

## **5.2 Biliary tract**

- Describe the pathogenesis and risk factors of cholelithiasis.
- Describe the morphological and clinical features of acute and chronic cholecystitis.
- Describe clinical and morphological features of gall bladder cancer.

## **5.3 Pancreas**

- Describe acute pancreatitis with respect to aetiology, pathogenesis, clinical and morphological features.
- Differentiate between acute and chronic pancreatitis on the basis of their clinical and morphological features.
- Describe the clinical and morphological features of carcinoma of pancreas.

## **6. THE URINARY SYSTEM**

- Define the terms: Azotemia, Uremia, Acute renal failure, Chronic renal failure
- Discuss the types, genesis, basis, clinical features and complications of polycystic kidney disease.
- Differentiate between the different types of glomerulonephritides based on their pathogenesis, etiology, morphology clinical features and complications (membranous, minimal change, membranoproliferative and acute post-streptococcal glomerulonephritis).
- Differentiate between nephritic and nephrotic syndromes.
- Discuss the aetiology, clinical course, pathogenesis and complications of acute pyelonephritis and differentiate from chronic pyelonephritis.
- Discuss pathogenesis, morphology, clinical features and complications of chronic pyelonephritis.
- Define acute tubular necrosis, its pathogenesis and clinical course.
- Differentiate between benign and malignant nephrosclerosis (on the basis of clinical data). Discuss the pathogenic mechanism, morphology, gross and microscope picture and clinical course.
- Differentiate between the different types of renal stones based on their pathogenesis, clinical features and lab diagnosis.
- Define hydronephrosis, its causes, clinical features and complications.
- Discuss the epidemiology, morphology and clinical features (paraneoplastic syndrome) of renal cell carcinoma.

- Describe the clinical features, morphology and prognosis of Wilm's tumour.
- Describe the etiology, morphology and clinical features of cystitis.
- Describe the clinical features, etiology and morphology of transitional cell carcinoma of the urinary bladder.

## **7. MALE GENITAL SYSTEM**

- Discuss the following congenital conditions: Hypospadias and Undescended testis
- Describe the etiology, route of infection, pathogenesis and methods of diagnosing urethritis: Gonococcal and non-gonococcal
- Discuss the etiology, pathogenesis and natural history of prostatitis, prostatic hyperplasia and prostatic carcinoma
- Discuss the causes, pathogenesis and clinical features of scrotal swelling due to
  - Testicular adnexae
  - Varicocele
  - Hydrocele
  - Spermatocele
  - Inflammation and tumor of testis and epididymis
- Discuss the causes, pathogenesis and relevant investigations of male infertility.
- Classify the tumours of the male genital tract including prostate and testis

## **8. FEMALE GENITALSYSTEM**

- List the causes, routes of infection and methods of diagnosis of sexually transmitted diseases. List the micro-organisms involved, route of infection, pathogenesis and methods of diagnosing::
  - Gonorrhoea, syphilis, chlamydia, HPV, herpes simplex and trichomonas vaginalis.
- Classify the neoplasms of cervix with special reference to cervical intraepithelial neoplasia.
- Describe the causes, pathogenesis and clinical features of dysfunctional uterine bleeding with special reference to endometrial hyperplasia, endometrial polyp and carcinoma.
- Describe the clinical features and pathogenesis of adenomyosis and endometriosis.
- Classify tumours of the uterus on the basis of endometrium, endometrial stroma and myometrium.
- Classify tumours of the ovary. Histiogenesis of epithelial, germ cell and sex cord stromal tumors.
- Describe the etiology, clinical features and pathogenesis of ectopic pregnancy and toxemia of pregnancy.
- Classify gestational trophoblastic tumours with special reference to their clinical features.

- Vulvar and vaginal squamous intraepithelial lesions

## 9. BREAST

- List the causes of lump in the breast and differentiate on the basis of etiology, pathogenesis, morphology, clinical features and natural history
  - Inflammation (Mastitis)
  - Fibrocystic disease of the breast
  - Benign tumours (Fibroadenoma and Phyllode's tumour)
  - Carcinomas of the breast (Ductal and Lobular)
    - Epidemiology, etiology and pathogenesis
    - In-situ (Ductal and Lobular )
    - Invasive carcinomas of the breast, NOS, other types
    - Prognostic and predicative markers of breast carcinoma
- List the causes of nipple discharge with special reference to intraductal papilloma.
- Describe gynaecomastia and list its causes.

## 10. MUSCULOSKELETAL SYSTEM

- Describe the pathogenesis and clinical features of achondroplasia and osteogenesis imperfecta.
- List the causes of osteoporosis and describe its pathogenesis, morphological and clinical features.
- Describe osteomyelitis with respect to
  - Common causative micro-organisms (Staphylococcus aureus, Pseudomonas, Escherichia coli, Group-B Streptococci, Salmonella and Mycobacterium tuberculosis).
  - Common routes of spread (haematogenous, direct extension, traumatic implantation).
  - Complications.
  - List the common sites involved in tuberculous osteomyelitis (vertebral bodies, long bones).
  - Differentiate between acute and chronic osteomyelitis.
- Describe the pathogenesis, morphological and clinical features of
- Paget's disease (osteitis deformans).
- List the benign and malignant bone forming tumours (osteoid osteoma, osteoblastoma, and osteosarcoma).
- List the common sites of osteogenic sarcoma (lower end of femur, upper end of tibia, upper end of humerus). Describe the morphological and clinical features of osteogenic sarcoma.
- List the most frequent sites of giant cell tumours of the bone (distal femur, proximal tibia, proximal humerus and distal radius).
- Describe the clinical and morphological features of giant cell tumours of bone.
- Differentiate between the peak incidence, common sites of origin, morphological and clinical features of

- Osteosarcoma
- Osteoclastoma
- Ewing's sarcoma
- List the benign and malignant cartilaginous tumours and describe chondrosarcoma with respect to peak incidence (sixth decade), common sites of origin (shoulder, pelvis, proximal femur, and ribs) and morphological and clinical features.
- Describe the pathogenesis, morphological and clinical features of osteoarthritis
- Describe rheumatoid arthritis with respect to pathogenesis, morphological and clinical features
- Classify gout and describe its pathogenesis, morphological and clinical features.
- Describe the pathogenesis, morphological and clinical features of
  - Duchenne's muscular dystrophy
  - Myotonic dystrophy
- List congenital (central core disease, nemaline myopathy and centronuclear myopathy) and inflammatory myopathies (dermatomyositis, polymyositis and inclusion body myositis).
- Describe the clino-pathological features of myasthenia gravis.
- Differentiate between lipoma and liposarcoma.
- Describe rhabdomyosarcoma with respect to
  - Peak incidence (1st decade of life).
  - Histological variants (embryonal, alveolar, sarcoma botryoides, pleomorphic).
  - Frequent sites (head & neck region, genitourinary, retroperitoneum).

## **11. ENDOCRINE SYSTEM**

### **Pituitary**

- List the causes of hyperpituitarism.
- Describe the morphology and clinical features of pituitary adenomas.
- Describe the clinical features of acromegaly and gigantism.
- List the causes of hypopituitarism and describe the etiology pathogenesis and clinical features of
  - Sheehan's syndrome
  - Dwarfism
- Describe the etiology factors, clinical features, pathogenesis and laboratory findings in inappropriate secretion of anti-diuretic hormone (ADH).
- Diabetes insipidus and syndrome of inappropriate ADH secretion.

### **Adrenal Cortex and Medulla**

- List the causes of adrenal cortical hyperfunction.
- Describe the etiology, pathogenesis clinical features and laboratory

diagnosis of

- Primary hyperaldosteronism (Conn's syndrome)
- Hypercortisolism
- Adrenogenital syndrome.
- List the causes of adrenal insufficiency and describe the etiology, pathogenesis, and clinical features of Addison's disease.
- List the tumours of adrenal medulla and cortex and describe the clinical features and diagnosis of pheochromocytoma.

## **Thyroid**

- Thyroglossal cyst (congenital)
- List the etiology and clinical features of hyperthyroidism.
- List the etiology and clinical features of hypothyroidism, differentiating between Cretinism and Myxoedema.
- Describe the types, with pathogenesis, morphology and clinical features of thyroiditis with special reference to auto-immune thyroiditis (Hashimoto's thyroiditis and Grave's disease).
- Define goiter, list its types and describe the etiology, pathogenesis and clinical features of diffuse and multinodular goiter.
- List the causes of solitary thyroid nodule and discuss the diagnostic approach.
- Classify the etiology, pathogenesis, morphology and clinical features:
  - Follicular adenoma
  - Papillary carcinoma
  - Follicular carcinoma
  - Medullary carcinoma
  - Anaplastic carcinoma.
- List the types of MEN syndromes.
- Discuss the investigation/lab tests for diagnosis of thyroid dysfunction.

## **Parathyroid**

- Differentiate between primary, secondary, tertiary and pseudo hyper-parathyroidism on the basis of causes, pathophysiology, diagnosis and clinical features.
- List the etiologic factors and clinical features of hypoparathyroidism
- Discuss calcium haemostasis and causes of hyper and hypocalcemia

## **Endocrine Pancreas**

- Classify Diabetes Mellitus and differentiate between Type 1 and 2 on the basis of pathogenesis, morphology, clinical features, laboratory diagnosis and complications.
- List pancreatic endocrine neoplasm's

## 12. SKIN

- Define the following macroscopic and microscopic terms: Macule, papule, nodule, plaque, vesicle, bulla, blister, pustule, scale, lichenification, excoriation, hyperkeratosis, parakeratosis, acanthosis, dyskeratosis, acantholysis, papillomatosis, lentiginous spongiosis.
- Describe the morphological and clinical features of urticaria.
- Classify eczematous dermatitis.
- Describe the etiology and pathogenesis of
  - Contact dermatitis
  - Atopic dermatitis
  - Drug related eczematous dermatitis
  - Photoeczematous eruptions
  - Primary irritant dermatitis
- Describe the morphological and clinical features of acute eczematous dermatitis
- List the conditions which are associated with erythema multiforme and describe its clinical features.
- Describe the pathogenesis, morphological and clinical features of psoriasis
- Differentiate between the variants of pemphigus with respect to frequent site of involvement and clinical features and discuss its pathogenesis.
- Describe the clinical and morphological features of bullous pemphigoid.
- List the types of warts and their most frequent locations.
- List the pre-malignant epithelial lesions.
- List the predisposing factors for squamous cell carcinoma of skin. Differentiate squamous cell carcinoma from basal cell carcinoma on the basis of morphology and clinical features.
- List the types of Nevo cellular Nevi (congenital nevus, blue nevus, Spitz's nevus, halo nevus, dysplastic nevus) along with their clinical significance.
- Describe the clinical and morphological features of dysplastic nevi.
- Describe malignant melanoma with respect to frequent site of origin, clinical and morphological features.

## 13. NERVOUS SYSTEM

- Describe clinico-pathological features of hydrocephalus.
- Describe the categories of cerebral edema (vasogenic and cytotoxic).
- List the types of herniation of brain along with clinical significance.
- Describe the clinical and morphological features of intra-cranial haemorrhage.
- Differentiate between acute purulent meningitis and acute lymphocytic meningitis.

- List the aetiologic agents of chronic meningitis (mycobacterium tuberculosis, Cryptococcus neoformans, Treponema pallidum) and describe its clinical and morphological features.
- List the route of infecting agents causing brain abscesses and describe the clinical and morphological features (tuberculosis meningitis).
- List the causative organisms of viral encephalitis (herpes simplex virus, cytomegalovirus, HIV, JC virus, arbovirus).
- Describe clinico-pathological features of Guillain Barre syndrome.
- List the infectious agents associated with polyneuropathies (leprosy, diphtheria, Varicella-zoster virus).
- List the organic and inorganic compounds which can produce toxic neuropathy (organophosphorous esters, vincristine, acrylamide, hexame, ethanol, arsenic and lead).
- List the important types of intracranial tumours (astrocytoma, oligodendroglioma, ependymoma, medulloblastoma and meningioma) along with clinical significance of glial tumours.
- List the frequent metastatic tumours to the brain (carcinoma of the lung, breast, malignant melanoma, leukemia and lymphoma).
- List common primary peripheral nerve sheath neoplasms along with their clinical significance.

#### **14. CHEMICAL PATHOLOGY (PRACTICALS / TUTORIALS)**

- Introduction to chemical pathology, reference/ranges conventional and SI units.
- Biochemical markers of ischemic heart disease
- Renal function tests.
  - Causes of proteinuria and its laboratory diagnosis.
- Lab diagnosis of acid base disorders.
- Lab diagnosis of Diabetes mellitus.
- Liver function tests.
- Laboratory diagnosis of hyperlipidaemia and its clinical interpretation.
- Role of enzymes in diagnosis of pancreatitis.
- Lab diagnosis of inborn errors of metabolism.
- Laboratory diagnosis/investigations of endocrine disorders:-
  - Thyroid function tests
  - Adrenal function test.
  - Lab diagnosis of hyper and hypoparathyroidism.
  - Role of hormone estimation in diagnosis of infertility.
  - Role of hormone estimation in diagnosis of growth disorder.

#### **15. HISTOPATHOLOGY AND HAEMATOLOGY SLIDES OF COMMON PROBLEMS**

## 6.7 COMMUNITY MEDICINE

The course is designed to familiarize medical students with some basic health promotion concepts and practices. The general learning objectives of the course to be achieved at the end of 4<sup>th</sup> year medical training will be:

- Define and explain health in a holistic manner
- Develop an understanding of local health care delivery system
- Identify important determinants of health, risk factors of disease and epidemiological characteristics of indigenous population.
- Seek, facilitate and promote community participation in provision of healthcare (i.e. encourage patients and public to take interest in their health)
- Create awareness and disseminate through available and appropriate means information to individuals and community regarding development/adaptation of healthy life style behaviours/healthy social environment
- Identify, develop and support local partnership with workforce from allied sectors and with relevant stakeholders to broaden the local response to health inequalities.
- Create awareness and demand for services like immunization, prenatal and postnatal care, family planning, good hygienic practices and health education regarding communicable and non-communicable diseases.
- Create awareness and sensitivity to provide health care to underserved populations.
- Know the steps of basic Research Methodology and importance of dissemination of evidence based knowledge.

### COURSE CONTENT

#### 1. **Concept of Health and Disease**

Concept of health, Definition of health. Dimensions, physical, mental, social and spiritual. Spectrum of health, Determinants of health. Responsibility for health. Indicators of health. Health promotion.

Concept of disease, concept of causation (all theories including ecological triad, agent, host and environmental factors), spectrum of disease. Natural history of disease. Levels of prevention. Disease elimination and eradication. Disease surveillance and disease prevention.

#### 2. **Introduction to Public Health**

Historical background. Evolution of Public health. Definition of Public health. Branches of Public health. Preventive medicine, social



medicine, population medicine, community medicine. International Health. Health for all.

### **3. Health Systems in Pakistan**

Development of Public Health in Pakistan. Economics and Health. Health Policy and planning in Pakistan. "Health for all", background, concepts and progress. "Primary Health Care": Concepts and progress. The National Disease Control programmes; policies, strategies and operations.

Health System in Pakistan: The role of Federal and Provincial Governments in Health Care. The District Health System, in the context of devolution. The Physician as a manager: Functions of manager, management of material, human and financial resources. Leadership and motivation.

Partners in Health: The public and private sector. Non-governmental Organizations and International Agencies. Resources for health. Community Mobilization.

### **4. General Epidemiology and Research Methodology**

Background and concepts, uses, basic measurements in epidemiology (morbidity, mortality, disability and fatality). Epidemiological methods (descriptive, analytic and experimental). Epidemiological transition. Association and causation. Investigation of an outbreak or an epidemic. Screening for disease. Community diagnosis. Research and survey methodology. Introduction to qualitative research methodology.

### **5. Biostatistics**

- Concepts and uses
- Data and its types
- Rates, ratios and proportions
- Crude, specific and standardized rates.
- Collection and registration of vital events in Pakistan
- Sources of health related statistics
- Measures of central tendency, (Mean, Median, Mode),
- Measures of dispersion (Range, Standard deviation, Standard error)
- Normal curve.
- Methods of data presentation (tables, graphs & diagrams)
- Interpretation of data (t-test and Chi-square test)
- Sampling and its various techniques.
- Health Management Information System

### **6. Demography and Population dynamics**

- Concept, demographic principles and demographic processes
- Census, definition, methodology, types

- Determinants of fertility, mortality
- Population Pyramid, and its interpretation
- Demographic Transition, Demographic Trap and its public health importance
- Demographic and social implication of high population growth
- Social Mobilization
- Urbanization

#### **7. Nutrition and Health (Integrated)**

- Concepts (Nutrition, Nutrient, Food, Diet). Food groups and their functions. Role of fibre in diet. Balanced Diet
- Malnutrition at all stages of life, its types causes and prevention. Common nutritional problems of public health importance and their prevention and control
- Dietary requirements of normal human being at different stages of life
- Food hygiene, pasteurization, fortification, additives and adulteration and preservation
- Nutritional diseases and Programmes.
- Assessment of nutritional status of a Community

#### **8. Reproductive and Child Health (Integrated)**

- Safe motherhood and its components. (Ante-natal, Post-natal, Family Planning and Emergency Obstetric Care)
- Maternal mortality and its causes and prevention
- Infant care: Growth and development. Breast feeding, common causes of morbidity and mortality, their prevention and control
- Child Care: Child health surveillance. Health promotion strategies. Common ailments, home accidents, child mortality prevention. Strategic approaches of Integrated Management of Childhood Illness (IMCI)
- Adolescent health
- Reproductive tract infections: guidelines for management of sexually transmitted diseases

#### **9. Health of school age children (Integration).**

- Role of teachers and role of doctor in maintenance of health
- Procedures for determining health status of school age children
- Common health problems of school children

#### **10. Environmental Health Sciences**

- Air: Composition of air. Causes of Air pollution. Purification of Air. Diseases caused by impurities in air and their prevention (Acute Respiratory Illnesses)
- Water: Sources of Water. Daily water requirement. Water pollution its causes and prevention. Purification of Water. Water quality

standards. Diseases due to polluted water

- Waste disposal: Contents, hazards and safety measures for solid and liquid; Domestic, Industrial and Hospital waste (Global and Marine problems)
- Climate: Climate and weather. Global environmental concerns (Greenhouse effect, depletion of Ozone layer, Acid rains). Effect of extremes of temperature, humidity, atmospheric pressure on human health and their prevention
- Radiation: Sources, types, causes, hazards and prevention
- Healthful housing. Urban and rural slums. Refugee camps and hostels
- Noise: Definition, causes, acceptance level, hazards and control

## **11. Occupational Health**

- Concepts, of occupational health, occupational medicine and occupational hygiene. Ergonomics and its importance
- Occupational hazards. Principles of control
- General principles of occupational disease prevention
- Organization of occupational health services
- Health Insurance and Social Security Schemes, Labour Laws

## **12. Prevention and control of Infectious diseases: (Integration).**

### **Definitions to differentiate between**

- Infection, contamination, pollution, infestation
- Infectious disease, communicable disease, contagious disease
- Host, Immune and susceptible persons
- Sporadic, Endemic, Epidemic, Pandemic
- Epizootic, Exotic, Zoonotic
- Contact, fomites, Carriers, Insect Vectors, Reservoir of infection
- Incubation period, Infective period, Generation time
- Cross infection, Nosocomial infection, Opportunistic infections, iatrogenic (Physician induced) disorders
- Surveillance control, Eradication, Elimination

### **Dynamics of infections, disease transmission:**

- Reservoir and source of infection, Escape of organism, Mode of transmission, Entry into the body, Susceptible host, Immunity (different types of immunity and immunization).

### **Control of infection:**

- Controlling the reservoir-notification, early diagnosis treatment, isolation, quarantine, disinfections.
- Interruption of transmission.
- The susceptible host (active and passive immunization, Combined. Chemoprophylaxis, Non-specific measures).

- Health advice to travellers.
- National case management guidelines.

**Epidemiology, control and prevention of infectious diseases of Public Health importance.**

- Diseases transmitted through inhalation.
- Diseases transmitted through faeco-oral route.
- Diseases of animals conveyed to man.
- Diseases due to direct contact.

**13. Control and prevention of non-infectious diseases of Public Health importance (Integration)**

- Hypertension.
- Coronary heart disease.
- Cancers.
- Injuries.
- Diabetes mellitus.
- Obesity.
- Acute Rheumatic fever and heart diseases.

**14. Arthropods and their public health importance**

- Common arthropod borne diseases
- Control of arthropods of medical importance
- Insecticides and their public health importance

**15. Prevention and control of Parasitic diseases of public health importance**

- Common parasitic infections of Public Health importance.

**16. Snake Bites: Identification, personal protection and management**

**17. Mental Health and Behavioural Sciences (integrated with other departments like behavioural sciences/psychiatry)**

- Concept. Common mental health problems, their causes, prevention and control
- Juvenile delinquency
- Drug abuse, addiction, alcoholism and smoking
- Child abuse and child labour
- Self medication

**18. Information, Education and Communication (IEC)**

- Concept. Aims and objectives
- Approaches used in public health
- Contents, principles and stages of health education
- Communication methods, barriers and skills in health education
- Planning, organizing and evaluating a health education programme
- Social Marketing

## **19. Disaster and accidents**

- Definition, Classification (Natural disasters like earthquake, floods. Epidemic of communicable diseases, Man Made Disasters. Thermo nuclear warfare.
- Magnitude and effects of disaster and Public Health consequences.
- Disaster: preparedness and management.
- Accidents: Definition, classification, prevention.

## **20. Health Planning and Management (to be included)**

- Health Planning. Planning cycle,
- Management and administration.
- Management methods and techniques.
- Planning-programming-budgeting system

## **PRACTICAL AND COMMUNITY BASED TRAINING**

I. Student should have practical experience in questionnaire development, data collection, compilation, presentation, analysis and report writing.

### **II. Field visits**

- Visit to Basic Health Unit (BHU) and Rural Health Center (RHC)
- Visit to a Non-Government Organization (NGO)
- Visit to a primary school to assess the nutritional status of school children (school health, comparison in different socio economical strata)
- Visit to Maternal and Child Health/Reproductive Health Centre to observe the organization and function of the centre, and to demonstrate counseling skills in the following
  - Nutritional counseling for children, pregnant and lactating women
  - Antenatal Care
  - Family planning services
  - Immunization, others
- Visit to a hospital to see the hospital waste disposal
- Visit to an industry
- Visit to a physical/mental/social rehabilitation centres
- Visit to Management/Administration/Medical Superintendent offices
- Visit to meteorological centre/ weather centre.

### **III. Skills Development Laboratory**

- Water purification at domestic level
- Contraceptives
- Vaccination including the cold chain
- Oral Rehydration Solution
- Growth monitoring

- Diet Chart
- Communication Skills
- Reference writing style (End note)
- Insecticides and disinfection
- Practicals on SPSS (Statistical Package for Social Scientists)

### **BOOKS RECOMMENDED:**

- 1: Park's text book of preventive and social medicine
- 2: A synopsis of epidemiology and basic statistics (Ali Muhammad Mir)
- 3: Statistics at square one (TDVS winscow)
- 4: Essentials of research design and methodology. (Geoferry Marczyk)
5. Text book by Illyas Ansari.
6. The essentials of clinical epidemiology (Robert H)

## **6.8 GENERAL SURGERY.**

### **Principles of Surgery**

- Metabolic response to Surgical Trauma and homeostasis. (C2)
- Pathophysiology and Management of Shock (C3)
- Fluid, electrolyte and acid base balance. (C3)
- Haemorrhage, coagulopathy and Blood/products Transfusion and its complications. (C3)
- Nutrition of surgical patients. (C2)
- Wounds, wound repair and its complications (C3).

#### ***To understand:***

- Investigation and treatment of common Infections and Parasitic Infestations of Surgical Importance including clinical therapeutics (C3)
- Gas Gangrene and Tetanus (C2).
- Special Infections related to surgery (C3)
- Tuberculosis
- Principles in the Management of common Skin and Soft Tissue Problems: Ulcers, abscesses, inflammations, cysts, sinuses & fistulae, swellings, embedded foreign Bodies, minor Injuries and benign and malignant conditions (C3)
- Principles of oncologic therapy and palliation (C2)
- Principles of organ transplantation and its ethics and implications (C2).
- Surgical Audit (small group discussions)
- Surgical ethics

### **TRAUMA**

- Pre-hospital care (P2)
- Triage (P2)

- Primary survey, ABC and DE (P3). Primary Survey of Polytrauma patients with airway difficulty and circulatory instability (P2)
- External Haemorrhage (P2)
- Airway management. (P3)
- Tension Pneumothorax. (P2)
- Cardiac Tamponade. (P2)
- Head injuries
  - Resuscitation P2
  - Management of the Patient with Head Injury P1
  - Management of an Unconscious patient due to Head Injury (C3, p1) and Glasgow Coma Scale (C3)
  - Skull fractures C3
  - Intracranial pressure C2
  - Intracranial hemorrhage C3
- Cervical spine injury C3P1
- Spinal cord trauma P1
- Blunt and Penetrating Injuries of chest and their Complications C3, including haemothorax, pneumothorax, resuscitation, chest drains C3P1
- Principles of management of (blunt and penetrating), liver/spleen, pelvic and urogenital trauma C3
- Principles of management of fractures / dislocation C3/P1
- Focused Abdominal Sonographic Assessment for trauma (FAST) C3
- Peripheral nerve Injuries C3P1
- Amputations C3

### **Operative procedures and basic surgical skills**

- Provide First Aid: Resuscitation (ABC) of Polytrauma, CPR.
- Collect samples of blood, urine, stool, sputum, pus swab etc.
- Insert Naso-gastric tube, have observed chest intubation and paracentesis.
- Do IV cannulation, should have Observed CV-line insertion and cut-down of veins.
- Able to Catheterize male and female patients.
- Prepare the patient for and know the procedure of doing X-Ray Chest, Abdomen, KUB, Bones, IVU, barium studies, ultrasound and other imaging investigations.
- Understands the principles of pre-operative preparations, Sterilization/Disinfection techniques.
- Understand principles of wound care, Skin Suturing and Suture Removal, Incision and Drainage of Superficial Abscesses, Excision of Small Soft Tissue Lumps, Needle Biopsies, Aspiration of localized fluids, etc.

- Have observed common surgical procedures Lymph node biopsy, appendectomy hernia repair cholecystectomy, breast/thyroid surgery laparotomy, anastomoses Incision drainage hemorrhoids and perianal surgeries, treatment of Fracture/Dislocation and Methods of General/Local Anaesthesia.
- Apply Bandage and Splint/POP cast to the patient's limbs.
- understand use of Surgical instruments and sutures
- Gastric surgery for morbid obesity
- Splenectomy indications and complications C3

### **Attitude/Affect/Values to be inculcated**

- Demonstrate polite and gentle patient handling.
- Observes Aseptic Techniques.
- Keeps confidentiality of the patient.
- Uphold medical ethics.

Anesthesia, pain relief, critical and ambulatory care

### **Basic life support (BLS)**

#### **LUMP/SWELLING (general)**

- Congenital
- Traumatic
- Inflammatory
- Neoplastic

#### **STOMATITIS**

- General causes
  - Debility
  - Anemia
  - Vitamins deficiency
  - Blood disease
  - Drugs
  - Autoimmune mechanism
  - Secondary syphilis
- Local
  - Poorly fitting denture
  - Infections
  - Trauma
  - Foot and mouth disease

#### **NECK SWELLING**

- Lymphadenopathy (Inflammatory), acute and chronic
- Chronic granulomatous
  - Neoplastic benign/malignant
  - Lymphatic leukemia



- Autoimmune disorders
- Lipoma
- Neurofibroma
- Sebaceous cyst
- Sublingual dermoid
- Thyroglossal cyst
- Salivary Glands: calculi, enlargement (benign/malignant)
- Thyroid gland enlargement
- Branchial cysts, sinus or fistula
- Cystic hygroma
- Carotid artery tumor

### **BREAST LUMP**

- Cystic:
- Solid: benign, atypical and malignant
  - Breast Imaging
  - Breast Biopsies
  - Breast Conserving Surgery / wide/ local excision
  - Sentinel Lymph Node Biopsy or Axillary Clearance
  - Adjuvant /systemic therapies

### **GYNAECOMASTIA**

### **BREAST PAIN**

### **NIPPLE DISCHARGE**

- From surface: Paget's disease, eczema psoriasis
- Bright red: duct papilloma/carcinoma
- Dark/altered: papilloma
- Blood stained with cyst: intracystic carcinoma
- Clear yellow/serous with lump: benign breast diseases (fibrocystic)
- Thick green: ductectasia
- Purulent: Infection
- Milky: insufficient suppression of lactation or prolactinoma

### **DYSPHAGIA**

#### **i) Extrinsic pressure**

- Enlarged thyroid
- Pharyngeal pouch
- Aortic aneurysm
- Abnormal aortic arch
- Mediastinal tumors
- Parapharyngeal hiatus hernia

#### **ii) Abnormalities of the wall**

- Stricture

- Post traumatic
- Benign and malignant lesions
- Corrosives
- Crohn's disease
- Post radiotherapy
- Diverticulum
- Scleroderma
- Achalasia
- Diffuse esophageal spasm
- Post-surgical complications

### **iii) Abnormalities within the lumen**

- Foreign bodies
- Webs
- Schatzki's ring

## **GASTRO-OESOPHAGEAL REFLUX DISEASE**

### **UPPER GI BLEEDING C3, P1 (Oesophageal, Gastric and Duodenal)**

- Ulcers
- Erosions
- Mallory-Weiss tear
- Oesophageal varices
- Tumour
- Vascular lesions
- Others

## **PAIN ABDOMEN**

### **Adults**

- Appendicitis (C3P1)
- Gastric carcinoma, primary gastric lymphoma, gastro-intestinal stromal tumors
- Acute colonic diverticulitis
- Perforated peptic ulcer
- Acute cholecystitis
- Cholelithiasis and its Complications C3P2
- Liver abscess
- Intestinal obstruction (small and large bowel) C3
- Ureteric colic
- Dyspepsia
- Acute, and Chronic pancreatitis C3
- Inflammatory bowel disease
- Regional ileitis
- Meckel's diverticulum
- Rectus sheath haematoma

- Peritonitis, abscesses C3P1

### **Elderly**

- Colorectal cancer
- Vascular disease (mesenteric infarct/ ruptured aortic aneurysm)
- Medical causes (diabetic ketoacidosis / Porphyrria)

### **Children**

- Appendicitis
- Non-specific abdominal pain
- Mesenteric adenitis
- Intussusception
- Urinary tract infection
- Hernia
- Upper respiratory tract infection

### **Women**

- Pelvic inflammatory disease
- Ovarian cyst
- Ectopic pregnancy

### **Extra abdominal causes**

- Parietal conditions like cellulitis etc.
- Thoracic conditions like pleurisy, pneumonia, pneumothorax, pericarditis, angina etc.
- Retroperitoneal
- Diseases of spine
- General diseases

### **Anal Pain**

- Haemorrhoids C3P2
- Pilonidal Sinus C3P2
- Perianal Abscess P2
- Perianal Fistulae P2
- Anal Fissure P2

### **ABDOMINAL MASS**

- Incisional Hernia. C3P2
- Right Hypochondrial
  - Parietal swellings
  - Intra-abdominal swellings arising from liver C3: liver abscess, hydatid cyst, malignancy (hepatoma and secondaries), gall bladder, subphrenic space, pylorus of stomach and duodenum, hepatic flexure of colon, right kidney and right adrenal gland

- Epigastrium
  - Parietal swellings: hernia
  - Intra-abdominal swellings: liver and subphrenic space, pylorus of stomach and duodenum, transverse colon, pancreas, omentum, abdominal aorta, lymph nodes and retroperitoneal sarcoma etc.
- Left Hypochondrial
  - Parietal swellings
  - Intra-abdominal swellings from spleen, stomach, left lobe of liver, sub-phrenic space, splenic flexure, left kidney and adrenals.
- Lumbar region
  - Ascending and descending colon, right and left kidneys
- Umbilical
  - Umbilical Polyp
  - Hernia (Umbilical and para-umbilical) C3P2
  - Rectus sheath haematoma, abscess and desmoids tumor
  - Small bowel and mesentery; cysts, L nodes, matted coils of gut
  - Retroperitoneal growths
- Right Iliac
  - Appendicular Mass
  - Ileo-caecal tuberculosis
  - Amoebic typhlitis
  - Crohn's Disease
  - Carcinoma caecum
  - Impaction of round worms
  - Lymph nodes
  - Iliac or iliopsoas abscess
- Hypogastric
  - Urachal cyst
  - Urinary bladder
  - Uterus
  - Fallopian tubes and ovaries, cysts and tumors
  - Ruptured ectopic pregnancy
  - Cyst broad ligament
  - Pelvic abscess
- Left Iliac Region
  - Diverticulitis
  - Carcinoma

### **LOWER GI BLEEDING C3**

- Colorectal carcinoma (C3 P1)
- Ulcerative colitis (C3) and Crohn's Disease (C3)
- Diverticulitis (C2)
- Mesenteric vascular occlusion (C3)
- Polyps

- Rectal prolapse
- Gross upper GI Bleeding
- Meckel's diverticulitis (C3)
- Colitis amoebic/bacterial (C2)
- Idiopathic ulcers
- Haemorrhoids /anal fissure (C3P2)
- Idiopathic proctitis
- Behavioural trauma
- Kaposi's sarcoma
- Cytomegalovirus (CMV)
- Herpes Simplex Virus (HSV)
- Others

### **FAECAL INCONTINENCE C3**

#### **OBSTRUCTIVE (Surgical) JAUNDICE C3**

- Lumen
  - Gall stones
- In the wall
  - Strictures benign/ malignant (Cholangiocarcinoma) C3
  - Sclerosing cholangitis
- Outside the wall
  - Pancreatic (benign, malignant Tumors C2), ampullary hepatic

#### **INGUINOSCROTAL SWELLING C3P2**

- Inguinal hernia
- Femoral swellings
- Encysted hydrocele of cord
- Varicocele
- Lymphangiectasis
- Funiculitis
- Diffuse lipoma of cord
- Inflammatory thickening of cord
- Malignant extension of testis (including testicular malignancy C3P2)
- Undescended and/or Ectopic testis C3P1
- Retractable testis
- Torsion of testis
- Enlarged lymph nodes
- Abscess

#### **HAEMATURIA C3**

##### **Renal**

- Carcinoma of kidney
- Carcinoma of renal pelvis
- Stones

- Trauma
- Intrinsic renal disease, e.g, Glomerulonephritis
- Polycystic kidney
- Tuberculosis
- Arterio-venous malformations

### **Ureteric**

- Carcinoma of urothelium
- Stone

### **Bladder**

- Carcinoma of bladder
- Stone
- Trauma
- Cystitis
- Schistosomiasis

### **Prostate**

- Carcinoma of prostate C3
- Benign prostatic hyperplasia C3
- Prostatitis

### **Urethra**

- Carcinoma of urothelium
- Stone
- Trauma C3
- Urethritis
- Stricture

### **Others**

- Blood dyscrasias and Coagulopathies

## **URINARY RETENTION**

- Mechanical
  - Urinary bladder stone C3, tumor, clot and bladder neck contracture and sequelae (reflux and hydronephrosis C3)
  - Prostate: abscess, stone and prostatic enlargement benign/malignant C3P1.
  - Urethra: stricture, stone, rupture, congenital valves, foreign body, acute urethritis, growth and pin hole meatus
  - Prepuce; phimosis
- From outside: pregnancy, fibroids, ovarian cysts, carcinoma of cervix, uterus, rectum and pelvic growth.
- Neurogenic:
  - Spinal cord diseases
  - Injuries and diseases of spine

- Miscellaneous

## **PRIAPISM/ ERECTILE DYSFUNCTION C1**

## **URINARY INCONTINENCE C3**

## **MALE INFERTILITY C2**

## **RECONSTRUCTIVE SURGERY**

- Principles of skin coverage C3
- Common benign and malignant skin lesions. C3
- Burns, principles of management C3P1
- cleft lip and palate C2
- epi/hypospadias C2

## **NEUROSURGERY C3**

- Raised intracranial pressure/ hydrocephalus
- Introduction to intracranial infections
- Introduction to intracranial tumors
- Peripheral nerve Injuries C3P1

## **PAEDIATRIC SURGERY**

- Paediatric Tumours C3
- Neonatal surgical problems C3
- Tracheoesophageal malformations C3
- Pyloric stenosis C3
- Hirschprung's disease C3
- Imperforate anus C3P1
- Intestinal obstruction C3 (Intussusception C3P1)
- Foreign body (Aspirated or Ingested) C3P1

## **PAINFUL/COLD /ULCERATED LIMB**

- Large artery occlusion: acute (embolic), chronic (atherosclerotic)
- Small arteries occlusion: Buerger's Disease, Raynaud's Disease, embolism, Diabetes, Scleroderma and physical agents.
- Diabetic foot C3P2
- Vascular afflictions and limb Ischemia C3P1
- Varicosities C3P2
- Deep venous thrombosis and complications C3P1
- Peripheral neuropathies

## **Skills**

- Perform,:
  - Provide First Aid: Resuscitation (ABC) of Polytrauma, CPR.
  - Insert Intra-venous cannula,
  - Collect samples of blood, urine, stool, sputum, pus swab etc.

- Insert Naso-gastric tube,
- Catheterize male and female patients.
- Prepare the patient for and know the procedure of doing X-Ray Chest, Abdomen, KUB, Bones, IVU, barium studies, ultrasound and other imaging investigations.
- Apply Bandage and Splint/POP cast to the patient's limbs
- Should have observed
  - Chest intubation and
  - Paracentesis.
  - CV-line insertion
  - Cut-down of veins.
  - Common surgical procedures: lymph node biopsy, appendectomy, hernia repair, cholecystectomy, breast/ thyroid surgery, laparotomy, anastomoses, Incision, drainage, haemorrhoid surgical techniques and perianal surgeries,
  - Treatment of Fracture / Dislocation
  - Methods of General / Local Anaesthesia.
- Understands the principles of:
  - Pre-operative preparations, Sterilization/Disinfection techniques.
  - Wound care, Skin Suturing and Suture Removal, Incision and Drainage of Superficial Abscesses, Aspiration of localized fluids,
  - Excision of Small Soft Tissue Lumps, Needle Biopsies, etc.
- Order and interpret renal tract investigative tests P2

**Attitude / Affect / Values to be inculcated**

- Demonstrate polite and gentle patient handling.
- Observes Aseptic Techniques.
- Maintain patient confidentiality.
- Uphold medical ethics.

## 6.9 ORTHOPAEDIC SURGERY & TRAUMATOLOGY

### Curriculum Contents.

#### 1. General Orthopedics

##### **General Objectives**

After successful completion of the course the students are expected to demonstrate knowledge and exhibit skills regarding preservation, investigations and treatment of common affections of the upper and lower limbs and the spine. The students should be able to give emergency care to patients with all kinds of injuries to the limbs and spine and demonstrate holistic approach in managing patients inclusive of safe transportation of patients to tertiary care centers.



### **i. Cognitive domain**

- History, Definition and Scope of Orthopedics.
- Principles of recognition of injuries to the bones, joints and soft tissue of explains limbs and spine;
- Detect and manage related musculoskeletal infections;
- Identify congenital malformations and deformities for referral with management;
- Recognize metabolic bone diseases;
- Explain pathology with diagnosis of neoplasm for appropriate referral and treatment;
- Explain associated pathology of common painful disorders;

### **ii. Psychomotor domain**

- Deliver first aid measures for common sprains fractures and dislocations.
- Identify problems of patients severely injured in any kind of accidents inclusive of road traffic, explosions, falls, fights, etc.
- Apply dressings, splints, plasters and other immobilization techniques.
- Assist in drainage, debridement, sequestration, orthopaedics surgeries related to the problems listed below and amputations.

## **2. General Orthopaedic Problems / Diseases**

- Identify, diagnose and treat common orthopaedic emergencies (C3 P3).
- Define common orthopaedic problems in a scientific manner and with logical reasoning with clear understanding of their effect on body systems inclusive of congenital and acquired problems (C1).
- Request relevant investigations (C2).
- Exhibit holistic approach to an injured patient and identify haemodynamically unstable patient.
- Identify the conditions/diseases effecting musculoskeletal system through their signs and symptoms (C1).
- Identify the drugs needed for a person with orthopaedic and related problems (C3);
- Explain the differential diagnosis with logical reasoning (C3);
- Interpret, explain and advise needs of rehabilitation for PPP, CP, Amputations.
- Prescribe treatment for common painful conditions.
- Understand medical ethics and its application to surgical procedures related to orthopaedics like amputations, hip replacements, etc.
- Identify the surgical procedures needed for a person with orthopaedic and related problems (C3).
- Communicate effectively with the patients.

- Counsel and help patients and his/her family independently for making informed choices regarding relevant surgical procedures (P3).
- 3. Bone dysplasia (defect intrinsic to bone)**
- Dwarf- Achondroplasia
- 4. Drugs Frequently used in Orthopaedics**
- Antibiotics: Cephalosporins, Aminoglycosides, Fusidic Acid, Vancomycin.
  - NSAID (non-steroidal anti-inflammatory agents), Diclofenac sodium / Diclofenac Potassium, Naproxen, Piroxicam.
  - Analgesics; Mefenamic Acid, Paracetamol, Tramadol, Sosegon.
  - Calcium, Calcitonin, Vitamin D3, HRT (Premarin), Bi-phosphonates
  - Anticoagulant: Heparin, low molecular weight heparin, Warfarin
  - Anti-tubercular drugs
  - Multivitamins (B6, B12), Morphine derivatives, Muscle relaxants, Norflex, Ternelin
  - Uricosuric Agents (Zyloric)
  - Anti-depressants, Local Anaesthetic, Xylocaine, Abocaine
  - Steroids
  - Drugs for Acid Peptic Diseases
  - Cartilage Tonics like, glucosamine, Chondroitin Sulphate and Hyaluronic Acid
- 5. Applied Basic Sciences to Orthopedics (C1 C2)**
- pathophysiology of trauma and shock
  - mechanical properties of bone & Soft & tissue
  - biomechanics of Fracture
  - healing & Repair (Bone & soft tissues)
  - healing principles of fracture
  - principles of physiotherapy, (orthosis and prosthesis)
  - (Orthotics Orthopaedic appliances to support and correct deformities)
  - (Prosthesis artificial substitute for missing body parts)
  - Biomaterials Alloys, Hydroxy-Apatite and Implants.
- 6. Congenital & Developmental Disorders (C2)**
- Congenital Talipes equino varus (CTEV)
  - Congenital dislocation of hip (CDH)
  - Flat foot
  - Perthes' Disease
  - Slipped Capital Femoral Epiphysis
  - Prevention of Contractures and Deformities.

## **7. Specific Required Skills**

- clinical Examination for CTEV (severity of deformity) (P2)
- clinical Examination for CDH (Ortoloni and Barlow test) (P2)
- X-ray interpretation of Perth's disease and slipped capital femoral epiphysis (C2P2)
- manipulation/application of POP cast for CTEV (P1)
- management Pelvic Harness, Von Rosen Splint, Hip Spica (P1)
- Deformities (C3)
  - Scoliosis
  - Kyphosis

## **8. Musculoskeletal Painful Disorders**

- Neck Pain, Shoulder Pain, Elbow Pain, Low Back Pain, Sciatica, Tendinitis, Fasciitis
- Role of Psychological wellbeing in treatment of painful disorders.

### **Specific Required Skills**

- Examination of Pts. and treatment with above disorders.

## **8. Metabolic Bone diseases;**

- Rickets, Osteomalacia, Osteoporosis, Hyperparathyroidism
- Diabetes, Crystal Arthritis (gout)
- Prevention of Metabolic Bone Diseases and Skeletal Deformities
- Specific required skills
- Interpretation of X-rays( C2 P1)
- Rickets/Osteomalacia, Osteoporosis/osteopetrosis, Hyperparathyroidism
- Interpretation of laboratory reports (C2 P1)
- Serum Calcium, Phosphates, Alkaline Phosphatase, Parathormone
- Management of diabetes with relation to injury/surgical procedure and infections (P2)

## **9. Neuromuscular disorders**

- Muscular Dystrophies e.g. Duchene type and Becker's type, Spina Bifida, Cerebral Palsy (CP), Post Poliomyelitis Paralysis (PPP), Neurofibromatosis, Prevention of Polio, CP, Joint Contractures and Deformities.

## **10. Bone Tumours**

- Benign (C2)
- Exostosis/Multiple Hereditary Exostosis/Enchondroma, Fibroma, lipoma, neuroma, Osteoid Osteoma, Giant Cell Tumour
- Malignant (C2)
- Osteogenic Sarcoma, Ewing's, Chondrosarcoma, Multiple Myeloma, Metastatic Bone disease
- C Metastatic bone disease

- Organs commonly responsible for secondaries to bone are thyroid, lungs, kidney, breast and prostate.

### **Specific required skills**

- Biopsy – Needle and open (P1)
- Amputation/Limb salvage surgery principles, indications, techniques (P1)
- Orthotics

## **11. Bone and joint infections**

- Acute osteomyelitis and septic arthritis
- Chronic osteomyelitis
- Tuberculosis, arthritis/Carries spines
- Prevention of infections (environmental hazards and use of prophylactic antibiotics in surgery)

### **Specific required skills**

- Clinical examination of
  - red hot swollen joint (P2)
  - discharging sinus
  - abscess
  - Taking and sending pus/tissue/swabs for C/S
- X-ray interpretations (C2 P1)
  - Osteolysis / bone cyst
  - Sequestratum
  - Periosteal reaction
- Interpretation of laboratory reports (C2)
  - urine blood and bacteriology
- Management
  - joint aspiration (P1)
  - curettage and sequestrectomy (P1)
  - drainage of abscess joints (P1)

## **12. Rheumatic Diseases**

- Rheumatoid Arthritis/Ankylosing Spondylitis/Psoriatic Arthritis/Fibromyalgia

## **ORTHOPAEDIC TRAUMATOLOGY**

### **Soft Tissue Injuries**

- Sprains / ruptures of Muscles, Ligaments, tendons (C3)
- Nerve Injuries (C3)
- Arterial Injuries (C3)
- Clean / contaminated wounds (C3)

## ***Specific required skills***

### **Management**

- application of cold and compression dressings on sprains of ligaments and tendons (P3)
- repair procedures for Nerve and Vessel Injuries (P1)
- dressing of Surgical Wounds postoperatively (P3)
- debridement (P2)
- wound cleaning / washing (P2)
- application and removal of wound stitches (P2)
- aseptic dressing (P2)

### **Spinal Injury (C3)**

- Soft tissue injuries (sprains, strains etc.)
- Fractures (stable, unstable)
- Neurological Damage (partial, complete)
- Paraplegia (C3)

### ***Specific required Skills***

- application of cervical collar (P2)
- cervical traction (P1)
- application of lumbosacral corset (P2)
- internal fixation of spinal fracture (P1)
- log rolling
- prevention of bed sores
- bladder care / catheter care
- rehabilitation

### **Fractures**

- Basic and advanced trauma life support (C3)
- Triage of injured patients in emergency room (C3)
- Principles of fracture classification (C3)
- Principles of fracture treatment in children (C3)
- Principles of fracture fixation (C3)
- Management of common orthopaedic emergencies (C3)
- Mal-united fractures (C3)
- Non-unions (C3)

### ***Specific required skills***

- Examination
  - Clinical Examination of injured patient (P2)
  - Record blood pressure, pulse rate, respiratory rate peripheral pulses and capillary filling
  - Recognition of associated injuries / complications e.g. vascular, neurological, vascular compartment syndrome etc.
- Investigations

- Request and interpret urine and blood examination in trauma patient (CBC, ESR, Blood Urea and Sugar etc. - P2)
- interpret X-ray of limbs with clear fractures and dislocations (C2);
- Request and interpret reports of ultrasound, CT, MRI scans (P2)
- Management
  - provide first aid to a person with bone injury like common sprains, fractures and dislocations (immobilization of body part)
  - resuscitation of injured patient.
  - apply dressings, splints, plasters and other immobilization techniques in fracture patients in emergency (P4);
  - maintain clear airway of patient (P3)
  - reductions and observation of surgical fixations (P1)
  - internal and external fixation of fractures (plates, nails, others) (P1)
  - manipulation and application of plaster of Paris cast/back slab (P2)
  - use of external fixators in treatment of open fractures (P2)
  - application of traction skin/skeletal (P2)

### **RECOMMENDED BOOKS:**

1. Bailey and Love. Short Practice of Surgery
2. Current Surgical Diagnosis and Treatment
3. Surgery; Principals in General by Shuja Tahir & Abid Bashir
4. Hamilton Baily. Demonstration of physical signs in clinical surgery.
5. Browse. Introduction to signs and symptoms of surgical diseases
6. Clinical Skills for Undergraduates by Abdul Majeed Ch. and Aamer Zaman Khan
7. Vascular and lymphatic Disorders and neck swellings
8. Apley's System of Orthopaedics and Fractures, 8th Edition, Lous Solomon; Ed David J. Warwick, Selvadurai Nayagam.
9. Current Diagnosis and Treatment of Orthopaedics, 4th Edition; Harry B. Skinner.
10. Clinical Orthopaedic Examination, 5th Edition, Ronald McRae
11. Orthopaedic Updates, American Review by AAOS
12. Pocket Orthopaedica. 3rd Edition. Domian M. Raspoli.
13. Atlas in Orthopaedics by F. Netter
14. Section on Orthopaedics; in, Short Practice of Surgery, by Baily and Love

### **6.10 ANESTHESIA.**

- Pre-operative assessment of patients and pre-medication
- Local Anaesthesia
  - Local Anaesthetic agents (Pharmacology)
  - Regional Anaesthesia (Spinal and Epidural)
- Intravenous Anaesthetic agents
- Muscle Relaxants

- Inhalational Anaesthetic agents
- Complications of Anaesthesia.
- Perioperative Management.
- Recovery from Anaesthesia.
- Pain Management and postoperative care.
- ICU Monitoring

### **LOG BOOK:**

- Pre-Operative assessment of the patient.
- I/V Cannulation and Intra-operative fluid Management.
- Induction of General Anaesthesia and Tracheal Intubation.
- Demonstration of Spinal Block.
- Demonstration of Epidural Block.
- Demonstration of Local Blocks in Eye, ENT and General Surgery.
- Demonstration of CPR.
- Post-Operative Care/Pain Management.
- Introduction to the ICU.
- Demonstration of Anaesthesia Machine and other instruments
- Demonstration of Sterilization procedures in O.T and ICU.
- Demonstration of Vital Sign Monitors and their application.

## **6.11 MEDICINE**

### **GENERAL MEDICINE**

**By the end of five years, medical students should be able to identify and discuss the common causes of common clinical presentations. Causes in detail can be discussed under various other headings.**

- Fever
- Edema
- Headache
- Drowsiness and unconsciousness
- Clubbing
- Cough
- Sputum and haemoptysis
- Chest pain.
- Dyspnea
- Shock
- Painful and difficult swallowing
- Anorexia, nausea and vomiting
- Abdominal pain
- Diarrhea and constipation
- Urination abnormalities
- High colored urine

- Cachexia
  - Involuntary movements
  - Seizures
  - Paresis and paralysis
  - Numbness and paresthesias
- Weakness and lassitude
  - Dizziness and vertigo
  - Joint pains
- Nutrition (re-enforcement)
- Geriatrics
- End-of-Life Care
- Preventive aspects
- Ethical problems
- Communication Skills

## **GASTROENTEROLOGY**

- Oral Cavity Presentations:
  - Aphthous Ulcers<sup>6</sup>, Pigmentation (Addison's), Gingivitis, Glossitis\* (Candida, Plummer-Winson Syndrome, Vitamin B2 and folate deficiency).
- Nausea/Vomiting
  - Hepatitis\*\*, Gastro-enteritis\*\*, Bacterial food poisoning, Acid peptic disease\*\*
- Indigestion/Flatulence
  - Diet, Irritable Bowel Syndrome and Gastroparesis
- Dysphagia\*\*
  - Of Solids: Carcinoma Esophagus (with cachexia)\* and Achalasia\*.
  - Of Liquids: Psychogenic and Neuro-Muscular Disorders (Dementia, Bulbar Palsy and Scleroderma)
- Heartburn and/or Epigastric pain
  - Gastro Esophageal Reflux Disease\*\*, Peptic ulcer and Gastritis\*\*.
- Diarrhea
  - Acute Diarrhea due to Acute Gastro-enteritis: Viral\*\*, Shigellosis\*\*, Salmonellosis\*\*, Traveler's diarrhea\*\*
  - Chronic Diarrhea: Amebiasis\*\*, Giardiasis\*, Malabsorption syndromes like Celiac Disease\* and Tropical Sprue

---

<sup>6</sup> Some areas are more important for medical students to know as compared to others and have been identified by the number of asterisks (No asterisk= nice to know, \* = Important, \*\* and \*\*\* = Essential).



- With Haematochezia Inflammatory bowel diseases: Ulcerative colitis\* and Crohn's Disease\*
- Irritable bowel syndrome\*.
- Constipation\*.
  - Irritable Bowel Syndrome, Diet and sedentary life style, Hypothyroidism, Carcinoma descending colon
- Ascites\*\*.
  - Chronic Liver Disease\*\*, Malignancy\*, Abdominal tuberculosis\*\*.
- Jaundice\*\*.
  - Congenital hyperbilirubinemia (Gilbert Syndrome and Dubin Johnson Syndrome)
  - Wilson's Disease
  - Haemolytic: Malaria, Auto-immune, Hypersplenism
  - Differentiate from Obstructive (Re-enforcement) \*: Gall Stones, Carcinoma Pancreas, Cholangitis, Obstructive phase of Hepatitis
  - Hepatic\*\*: Viral\*\* (acute and chronic), Toxic and Drugs).
- Haematemesis and / or Melena\*\*.
  - Esophageal varices\*, Mallory Weiss Syndrome, Carcinoma Stomach, Cirrhosis of Liver\*\* and Bleeding peptic ulcer\*\*.
- Bleeding per rectum\*.
  - Bacillary dysentery, Inflammatory Bowel Disease, Hemorrhoids\*, and Amoebic dysentery\*\*.
- Abdominal Pain
  - Acid peptic Disease\*\*, Irritable Bowel Syndrome\*, Carcinoma stomach, Pancreatitis\* and Porphyria
- Abdominal Mass: Visceromegaly
  - Liver: Hepatitis\*\*, Liver abscess\*, Hydatid Cyst, Congested Liver\*, and Carcinoma (Primary and Secondary)
  - Spleen: Portal Hypertension, Chronic Malaria, Chronic Myeloid Leukemia, and Myelofibrosis
  - Splenomegaly with fever\*\*: Malaria\*\*, Typhoid\*\*, Infective\* endocarditis and Miliary tuberculosis\*, Visceral Leishmaniasis,
  - Kidney (see below)
  - Abdominal Aneurysm
- Altered Mentation: Hepatic Encephalopathy\*\* and other causes of altered mentation.
  - Drugs Contraindicated in Liver Diseases\*.

## **KIDNEY AND GENITOURINARY SYSTEM**

- Lumbar pain\*\*.
  - Acute pyelonephritis\*\*, Acute papillary necrosis, Renal Infarction, Perinephric abscess (Surgery) \* and Urolithiasis (Surgery).
- Oliguria/Anuria: Acute Kidney Injury\*\*:

- Nephritides\*\*, Acute Tubular Necrosis\*\*, Drug-induced\* (analgesic), Hypersensitivity nephropathy\*, Contrast Induced\* and (brief) Haemolytic-uremic syndrome
- Polyuria / nocturia
  - Diabetes mellitus\*\*, Diabetes insipidus, Hypercalcaemia\*\*,
  - Chronic Kidney Disease: Glomerulopathies\*\*, Nephrotic Syndrome\*\*, Hyperuricemia, Drug-induced and Hemolytic uremic syndrome (brief)
  - Psychogenic\*.
- Dysuria\*: With and without frequency of Micturition (Urinary Tract infection) \*\*
- Hematuria with Dysuria\*.
  - Cystic infection of the bladder\*\*, Urethritis and Urolithiasis
  - Painless Hematuria\*: Renal Tuberculosis\*, Renal Cell Carcinoma\* and Bladder carcinoma
- Urinary incontinence
  - Urge Incontinence (Urinary infection\* and Bladder neck problems) and Stress
- Urinary retention
  - Prostatic Enlargement\* and Neurogenic bladder
- Impotence
  - Diabetes mellitus and Psychogenic
- Renal glycosuria\*.

Should know the commonly prescribed (analgesics and antibiotics) drugs contra-indicated and drugs to be used with caution in renal insufficiency\*\*.

## **RESPIRATORY SYSTEM**

- Shortness of Breath
  - Episodic: Bronchial Asthma\*\*
  - Acute: Pneumothorax\*\*, Pulmonary Thrombo-embolism\*\* / Acute Cor Pulmone, Adult respiratory distress syndrome, Acute respiratory failure\* (Type I and II) and Mechanical ventilation
  - Chronic: Chronic obstructive airway diseases\*\*, Pleural Effusion\*\*, Environmental and Occupational lung diseases (in brief: Asbestosis, Silicosis, Bagassosis, Byssinosis and Pneumoconiosis), Hypersensitivity pneumonitis and Interstitial lung disease.
- Fever with Cough
  - Upper respiratory tract infection\*\*
  - Lower respiratory tract infection: Acute and chronic Bronchitis\*\*
  - Pneumonias\*\*: Community acquired, Nosocomial, Lobar and Bronchopneumonia.
- Cough with Sputum: Bronchiectasis\* Hemoptysis: Carcinoma lung\* and Tuberculosis\*\*

- Respiratory Distress
  - Type-I Respiratory Failure: Pneumonia\*\*, Pulmonary Edema\*\* and Pulmonary Embolism \*\*
  - Type-II Respiratory Failure: Chronic Obstructive Pulmonary Disease (COPD) \*\*

Should be able to debate and select appropriate drugs and treatment for Tuberculosis, Asthma, COPD, and Pneumonia, based on their indications, drug interactions, contra-indications and complications.

Should know the drugs contra-indicated and those to be used with caution in pulmonary disease.

## **CARDIOVASCULAR SYSTEM**

Fever with Murmur\*

Rheumatic fever\*\* and Infective endocarditis\*\*

Shortness of breath with Murmur

Mitral, Aortic and Pulmonary valve diseases

Palpitations

Sinus tachycardia\*, Paroxysmal Supraventricular Tachycardia\*\*, Acute atrial Fibrillation and atrial flutter\*\*, and Premature atrial and ventricular contractions\*\*

Chest Pain \*\*

Angina\*\*, Myocardial infarction\*\*, Constrictive pericarditis, and Pericardial effusion

Shortness of breath\*

Orthopnea and/or Paroxysmal Nocturnal Dyspnea\*\*, Left Ventricular Failure\*\*, Congestive Cardiac Failure\*\*, Cor pulmonale and Cardiomyopathies (brief).

Congenital heart diseases (brief): atrial septal defect, patent ductus arteriosus and ventricular septal defect

Hypertension\*\*

Atherosclerosis/Arteriosclerosis\*\* and Lipid Disorders\*\*

Secondary Hypertension\*: Renal Causes\* (Polycystic Kidney, Renal Artery Stenosis, Renal Parenchymal Diseases) and Endocrine Disorders\*\* (Gigantism, Acromegaly, Cushing's\*, Hyperthyroidism and Pheochromocytoma)

Postural Hypotension\*.

Autonomic neuropathy (Diabetes mellitus) and Drug-induced (Anti-hypertensives, Loop diuretics\* and Nitrates)

Claudication: Peripheral vascular disease and Ischemia

Shock\*\*: Arrhythmias (ventricular tachycardia, fibrillation) and asystole.

Syncope\*: Arrhythmias, Vasovagal attack and Heat syncope

## CENTRAL NERVOUS SYSTEM

- Headache\*\*.
  - Acute Severe: Sinusitis\*\* and Subarachnoid and Intra-cerebral Hemorrhage\*\*.
  - Periodic: Refractive errors, Migraine\* and Tension Headaches\*
  - Progressive: Space-occupying lesion
  - With Fever\*\*: Meningitis\*\* (Bacterial, Tuberculosis and Viral), Encephalitis\*\* and Brain abscess.
  - Nuchal headaches/Neck pain: Muscle spasm (Tension, Postural) and Cervical spondylosis\*.
- Facial Pain: Trigeminal neuralgia
- Squint: Cranial nerves III, IV and VI (Cavernous sinus thrombosis)
- Intellectual Impairment
- Impaired Memory and Dementia\*
- Confusional states/Delirium/Encephalopathy\*\*: Substance abuse, Toxins and Poisons
- Paralysis\*.
  - Hemiplegia/hemiparesis/monoplegia/quadruplegia\*\*: Thrombotic, Hemorrhagic and Embolic
  - Paraplegia/paraparesis/quadruplegia\*: Spinal cord compression, Secondaries in the spine, Transverse Myelitis\*, Tuberculous spine\*, Syringomyelia and Syringobulbia
  - Focal Neurological Deficit: Multiple sclerosis, Space occupying lesion and Mononeuritis multiplex
- Facial Weakness: Bell's Palsy\*\*
  - Ptosis: Myasthenia Gravis, Horner's Syndrome and III nerve palsy
  - Transient Ischemic Attack\*\*
- Speech disturbances
- Hypertonia: Myotonia Dystrophica and Parkinsonism \*
- Hypotonia and muscle wasting: Lower motor neuron disease,\*
- Muscle cramps: Metabolic, Overexertion and Idiopathic
- Movement Disorders:
  - Hyperkinesia: Tremors\* (Hyperthyroidism\*\*, Anxiety\*, Drug-induced, Parkinsonism, Cerebellar\*)
  - Fasciculations: Motor neuron disease and Myokymia,
  - Others: Athetosis, Chorea, Hemiballismus, Ballismus, Myoclonus and Carpopedal Spasm (tetany)\*
  - Hypokinesia: Parkinson's Disease and Drug induced
  - Gait abnormalities:
    - Ataxic: Cerebellar disorder\*
    - Shuffling gait: Parkinsonism\*
    - Scissor Gait: Cerebral palsy
    - Lurching gait: Post Cerebro-vascular accidents

- Waddling gait: Proximal myopathy (Thyroid disease, Cushing's disease, Vitamin deficiency, steroids)
- Convulsions/Fits\*\*: Tetanus, Epilepsy\*, Space-occupying lesion, Head injury and Cerebro-vascular accidents
- Coma/ Stupor / drowsiness\*\*: Metabolic\*\*, Trauma, Infection\*\* (Meningitis and Encephalitis), Poisoning, Substance abuse (alcohol), Toxins and Cerebrovascular accidents
- Dizziness: Malignant Hypertension and Anxiety
- Vertigo: Benign Positional Vertigo\*, Meniere's disease, Labyrinthitis, Upper Respiratory Tract Infections and Vertebro-basilar insufficiency
- Congenital Deafness (ENT)
- Blindness / Blurring of Vision: Occipital Infarction /Hemorrhage, Head injury / Traumatic, Visual Field Defects (pituitary lesions), Malignant hypertension, Transient mono-ocular blindness (Amaurosis fugax), Multiple sclerosis (associated with more deficits), Snake-bite (neurotoxins) and Drug-induced
- Paraesthesias: Polyneuropathy / Peripheral neuropathies
  - Hypoesthesia: Diabetes mellitus\*\*, Vitamin deficiencies (B6 and B12) \*, Mono neuritis multiplex\*, and Drug induced (INH) \*
  - Hyperesthesia: Diabetic Burning feet syndrome and Restless leg syndrome
- Muscular Weakness:
  - Acute: Periodic Paralysis and Guillain Barre Syndrome\*
  - Chronic: Toxic/ Drug Induced, Hypothyroidism and Hyperthyroidism, Vitamin D deficiency\*, Motor-neuron disease
  - Myasthenia Gravis.

## MUSCULOSKELETAL SYSTEM

- Joint pain and/or Joint swelling:
  - Monoarthritis\* or Polyarthritis\*
  - Large Joint involvement: Osteoarthritis, Septic arthritis\*, Haemarthrosis and polyarthritis migrans\* (Rheumatic fever)
  - Small joint involvement (Inflammatory): Rheumatoid Arthritis\*, Systemic Lupus Erythematosus\* and Gout\*
- Easy Fractures: Osteoporosis\*
- Bone Pain: Osteomalacia\*, Osteomyelitis, Hyperparathyroidism, Malignancy (Multiple Myeloma, Osteosarcoma, Secondaries in the bone and Leukemias)
- Neck Pain: Cervical spondylosis\* and Tension
- Dorsal Pain: Tuberculosis\*
- Low back pain: Sciatica (Herniated disc) \*, Inflammatory (Ankylosing spondylitis and Sacro-iliitis), Secondaries, Lumbar spondylosis,

- Mechanical/postural, Vertebral Collapse (Tuberculosis and Osteoporosis)
- Claudication: Spinal stenosis\*\*
- Increased skin elasticity and hypermobility of joints: Ehler's Danlos syndrome and Marfan's Syndrome
- Muscle stiffness and pain: Depression, Anti-psychotic drugs and Fibromyalgia

## **BLOOD**

Pallor: Anaemias.

- Microcytic Hypochromic (Iron deficiency)\*\*: Increased Loss and Decreased uptake (Malabsorption, Tuberculous and Hookworms)
- Macrocytic Megaloblastic\*\* (B-12 deficiency and Folic acid deficiency),
- Normocytic normochromic\*: Anemia of chronic inflammation, Malignancies and Renal failure
- Hemolytic anemia\*: Hereditary (Thalassemia\*, Sickle cell anemia, Hereditary spherocytosis), Acquired (Blood Transfusion incompatibility, Autoimmune and Valve replacement)
- Intra-corporcular: G6P Deficiency, Malaria, Sickle cell syndromes (brief) and Thalassaemias
- Extra-corporcular Intravascular
  - Aplastic anemia: Myelofibrosis and Drug-induced

Hepatosplenomegaly (Myeloproliferative diseases).

- With pallor: Chronic myeloid leukemia and Kala Azar
- Without pallor: Polycythemia rubra vera, Essential thrombocytosis

Pallor with Lymphadenopathy and/or lassitude

- Leukemias\*\*: Acute and Chronic and
- Lymphomas\*\*: Non-Hodgkin's and Hodgkin's.

Blood groups and blood transfusion\*\*.

Fever with lymphadenopathy: Infectious mononucleosis

Bleeding and / purpura

- Clotting Disorders: Decreased production and increased destruction
  - Von Willebrand's disease,
  - Disseminated intravascular coagulation (DIC) \*\*,
  - Hemophilia
  - Vitamin K deficiency
  - Anticoagulant Therapy\*: Injectable and oral including anti-platelet agents
- Bleeding Disorders: Epistaxis (Hypertension), Thrombocytopenia (Immune/ Idiopathic\* and Acquired Thrombocytopenic purpura), Vessel wall disorders, Thrombotic Dysfunction and Drug-induced bleeding (Polypharmacy).

## **METABOLIC AND ENDOCRINAL DISORDERS**

### Generalized Pigmentation

- Endocrinal: Addison's Disease, with Diabetes Mellitus (Haemochromatosis in brief)
- Drug-induced: Chloroquine, Heavy Metals and Chemotherapy

Polyuria and Polydipsia: Diabetes mellitus\*\*\* and hyperglycemic states\*\*.

### Growth Abnormalities:

- Tall stature: Gigantism and Acromegaly
- Short Stature: Hypothyroidism\*\*, Obesity: Cushing's syndrome and Hypothyroidism\*\*
- Infertility: Hypogonadism, Primary Ovarian failure and Sheehan's Syndrome

## **INFECTIOUS DISEASES**

- Common infections in the organ-systems listed above,
- With emphasis on those common in Pakistan: Tuberculosis, Malaria, Typhoid, Dengue, Pneumonias, Meningitides and encephalitides, Infectious mononucleosis and
- Those of global importance

**By the end of 5 years, medical graduates should be able to perform and/or provide:**

1. Basic Life Support (MANDATORY).
2. Inject I/V, I/M, S/C, intradermal injections
3. Insert and maintain I/V lines.
4. Administer Blood transfusion (Know the indications, contra-indications and complications of blood transfusions).
5. Treatment for Acute Pulmonary Edema and anti-platelet therapy
6. Oxygen therapy
  - Should know the indications, complications, different modes of Oxygen delivery
7. Peak expiratory flowmetry.
8. Nebulisation
9. Educate the patient regarding correct inhaler technique
10. Should be able to take an Electrocardiogram
  - Should be able differentiate normal electrocardiograms from common abnormalities of ischemia, left ventricular hypertrophy and arrhythmias (acute myocardial infarction/ischemia, complete heart block, atrial premature contractions, ventricular premature contractions, supraventricular tachycardia, ventricular tachycardia, left bundle branch block and hyperkalemia)

11. Prepare a slide for examination of Malarial Parasite and its examination.
12. Urinary catheterization and collect urine samples
13. Urinalysis by dipstick or other method.
14. Large bowel enema.

**Interpret and/or identify:**

The common radiological findings of bone and joint diseases (Rheumatoid arthritis, Osteoarthritis, Vertebral collapse, Caries spine, Cervical rib, etc.)

**Should know the indications, contra-indications to order tests appropriately and should be able to interpret reports of**

- Order and interpret results: urinalysis, culture and sensitivity, serum creatinine, blood urea, protein estimation, creatinine clearance, ultrasound etc.
- Echocardiography, Stress testing, Angiography, and the conclusions of Thallium Scan
- Pulmonary function tests.
- Arterial blood gas estimations
- Thyroid function tests
- Understand the conclusion of HR CT of the lungs.

**Should know the indications, contra-indications and complications for**

- Holter monitoring, Nitrate Infusion, and Digitalization.

**PROCEDURES TO BE OBSERVED/ASSISTED: Preferably on patients but Videos can be an alternative** (including the indications, contra indications, steps of the procedure and complications)

- Passing the N/G Tube, and feeding, suction and stomach wash.
- Preparing a patient for endoscopy, upper and lower GIT and to observe the procedures.
- Placing airway and its maintenance.
- Endotracheal tube placement
- Endotracheal suction/maintenance of airway/nursing on side etc.
- Bronchoscopy.
- Should observe, learn and even may assist electroversion therapy, (AED) with indications, complications etc.
- Aspiration of fluids (Pleural, Peritoneal, Pericardial and Knee)
- Under water seal aspiration
- Lumbar puncture
- Fine needle aspiration
- Bone marrow aspiration/Trephine.
- Peritoneal and Hemodialysis



## 6.12 DERMATOLOGY

Anatomy and physiology of skin (layers of skin, functions of skin, appendages of skin)\*\*

- Maculopapular Lesions
  - With Pruritus: Lichen planus\*, Scabies\*\*, Fungal Infections, Psoriasis, Eczema, Drug Reaction
  - Without Pruritus: Secondary stage of Syphilis and Eczema (pityriasis alba)
- Vesicular
  - Chicken Pox\*\*, Varicella Zoster\*\*, Herpes Simplex\*\*, Molluscum contagiosum\*, Pemphigus vulgaris
- Pustular:
  - Acne\*\*, Furunculosis/Folliculitis\*\*, Miliaria pustulosa and Sycosis vulgaris
- Tender Erythema
  - Infections Staph/Strep\*
  - Erythema Nodosum
- Nodular
  - Malignancy: Squamous Cell Carcinoma, Basal Cell carcinoma and Malignant melanoma
  - Non-malignant: Lupus vulgaris, Verrucous vulgaris and Erythema nodosum
- Bullae
  - Bullous pemphigoid
  - Impetigo Contagiosa bullousa\*
  - Epidermolysis Bullosa.
- Plaque
  - Psoriasis\*
  - Lichen planus\*\*
  - Lichen simplex chronicus\*
  - Leprosy
- Urticaria
  - Drug induced\*
  - Heat (solar) and Cold urticaria
- Pigmentary Disorders
  - Hypopigmentation: Vitiligo\*\*, Pityriasis alba\*, Pityriasis versicolor, Leprosy
  - Hyperpigmentation: Melasma\*\*, Freckles\*, Malignant melanoma, Post-inflammatory, Café-au-lait and Addison's Disease
- Papulo-squamous
  - Psoriasis\*\*
  - Lichen Planus\*
  - Pityriasis Rubra Pilaris

- Bullous Disorders (Pemphigus Vulgaris)
- Pityriasis Rosea
- Erythema Multiforme
  - Drugs\* (sulphonamides, Non-steroidal anti-inflammatory Drugs)
  - Infectious: Viral, Rickettsial, Bacterial and Fungal
- Ulcers
  - Genital ulcer: Syphilis, Herpes genitalis, Lymphogranuloma venereum and Chancroid
  - Non-Genital Ulcers: Aphthous ulcers, Vasculitis and Venous ulcer
- Discoid Lesions
  - SLE \* (Systemic Lupus Erythematosus)
  - PMLE (Polymorphic light eruption)
- Hair disorders
  - Hair loss:
    - i. Alopecia areata\*\*
    - ii. Scarring alopecia (Tinea capitis\*, Folliculitis and Discoid lupus erythematosus)
    - iii. Non-scarring alopecia (Tinea capitis, Stress alopecia\* and Androgenic alopecia)
  - Hirsutism
    - iv. Polycystic ovaries
    - v. Drug-induced: Minoxidil, Oral Contraceptives and Steroids\*
- Pruritus with excoriation: Pediculosis and Scabies
- Nails:
  - Discolored: Onychomycosis\*, Psoriasis , Drug Eruptions and Lichen Planus\*
  - Pitting: Eczema, Psoriasis\*\* and Alopecia Areata
  - Brittle nails: Protein Energy Malnutrition, Occupational and Contact dermatitis
- Lasers / Dermatosurgery procedures

## **PROCEDURES/INVESTIGATIONS**

- Use of Magnifying Glass\*\*
- Use of WOOD'S Lamp\*\*
- Scraping for Fungus
- Observe Skin Biopsy
- Tzanck Smear
- Slit Skin Smear
- Diascopy
- Smear for Giant Cell
- Smear for Candida
- Observe Cryotherapy
- Observe Electrocautery

## 6.13 PSYCHIATRY

The students will be able to diagnose and manage anxiety and depression, and will refer patients with suicidal ideation, and recognise and refer all others including psychiatric emergencies.

- Low Mood: Depressive Disorders<sup>\*\*\*7</sup>
- Anxiety (Restlessness, apprehension)<sup>\*\*\*</sup>
  - Generalised Anxiety Disorder
  - Panic Disorders
  - Phobic Disorders
  - Acute Stress Disorder
  - Post-Traumatic Stress Disorder\*
- Obsessions and Compulsions, Obsessive Compulsive Disorder\*
- Aggressiveness
  - Schizophrenia\*, Bipolar Disorder\* and Drug Induced Psychosis
- Deliberate Self Harm\*
- Medically Unexplained Physical Symptoms \*
  - Conversion disorders, Hypochondriasis and Other somatoform Disorders
- Impairment of Memory: Dementia and Delirium\*\*
- Intellectual Impairment\*\*
  - Congenital or Developmental (Psych/Paeds) and Acquired
- Substance Abuse\*
  - Drug, Alcohol, Tobacco Dependence and others
- Sexual dysfunction\*\*
- Sexual deviation
  - Psycho sexual Disorders

### Paediatric psychiatry

- Enuresis\*\*
- Encoparesis
- Conduct Disorder
- School refusal
- Learning disabilities\*: Autism and Dyslexia
- Attention Deficit Hyper Activity Disorder\*
- Law related to Psychiatry (also in forensic medicine)

**Community Mental Health:** Integrated with Psychiatry, Community Medicine and Paediatrics and others as needed.

The student should know the indications, contraindications and complications of pharmacological and non-pharmacological treatments.

---

<sup>7</sup> Some areas are more important for medical students to know as compared to others and have been identified by the number of asterisks (No asterisk= nice to know, \* = Important, \*\* and \*\*\* = Essential).

## 6.14 BEHAVIOURAL SCIENCES

Based on Psychology, Sociology, Anthropology

- Bio-Psycho-Social Model of Health Care
- Link of Health with Behavioural Sciences
- Importance of Behavioural Sciences in Health
- Correlation of brain, mind and Behavioural Sciences
- Desirable Attitudes in Health Professionals
- Define perception, what factors affect perception
- Define attention and concentration. What factors affect them?
- Define memory and describe its stages, types and methods to improving it
- Define thinking; describe its types and theories.
- What is cognition and levels of cognition?
- Discuss problem solving and decision making strategies
- Define communication
- Characteristics of a good communicator
- Describe ways to recognize non-verbal cues.
- Define personality
- What are cognitive and psychodynamic theories of personality?
- What factors affect personality development?
- How personality can be assessed?
- Influence of personality in determining reactions during health, disease, hospitalization, stress
- Define intelligence and the various types of intelligence.
- Relevance of IQ and EQ in the life of a doctor.
- Define emotions. What are the various types of emotions?
- Emotional Quotient (EQ) concept & utility,
- Define motivation and what are the types of motivation?
- Define learning, Principles of learning, modern methods and styles of learning, types of learners, cognitive theory of learning and its use in enhancing learning
- Define and classify stress and stressors
- Relationship of stress and stressors with illness
- Concept of life events and their relationship with stress and illness
- What are coping skills?
- What is psychological defense mechanism?
- What is concept of adjustment and maladjustment?
- Collecting data on psychosocial factors in Medicine/Surgery/ Reproductive Health/Paediatrics and other general health conditions
- Define types of interview and listening
- Skills of interviewing and listening
- Discuss the doctor-patient relationship.

- What is the concept of boundaries and psychological reactions in doctor patient relationship (such as transference and counter transference)
- What is the concept of medical/dental ethics? Common ethical dilemmas in doctor-patient relations, interaction with families, teachers, colleagues, pharmaceutical industry
- Attitude, value, belief, myths, social class, stigma, sick role and illness, health belief models
- Grief and bereavement, Family and illness, Dealing with difficult patients
- Symptoms presentation and culture.
- Illness and Behaviour (sick-roles, stigma, Somatisation)
- Treatment Adherence (Compliance)
- What are the psychosocial aspects of illness, hospitalization, rape, torture, terminal illness, death
- Breaking bad news: Introduction, Models, Methods, Death of the patient, abnormal baby, intractable illness
- Psychosocial correlates of hospitalization, illness behaviour, sick-roles
- Psychosocial issues in Emergency Departments, Intensive Care and Coronary Care Units, Operating Theatres, Cancer wards, Transplant Units, Anaesthesia
- Psychological influences on sleep and consciousness, Non-pharmacological methods of inducing sleep, changes in consciousness
- Principles of effective communication, active listening, the art of questioning, the art of listening.
- Good and bad listener. Counselling: Scope, Indications and Contraindications, Steps, Do's and Don'ts, How to deal with real life crisis and conflict situations in health settings
- Informational Care: A practical method of communication between the doctor and patient.

## **6.15 MEDICAL ETHICS**

- Principles of Autonomy, Beneficence Non-maleficence and Justice
- Informed consent
- Confidentiality
- Privacy
- Develop and defend a personal moral view on ethical dilemmas according to religious, cultural and legal perspectives. For example, euthanasia, end of life issues.

## 6.16 RADIOLOGY

- Should have enough knowledge and exposure to various radiological techniques and be able to interpret radiological findings with accuracy and confidence.
- Different pathologies have characteristics radiological features which are strong basis for diagnosis of different diseases.
- Modern imaging i.e.; Intravenous urography, Ultrasonography, CT and MRI have made diagnosis easy and accurate.
- Interventional Radiology has emerged as rapidly developing subspecialty and contributes a lot in diagnosis and therapeutic aspect.

### OBJECTIVES

#### The student will be:

- Able to select/order the required radiological examination correctly
- Identify gross abnormalities in the films
- List indications and advantages of modern techniques
- Recognize major abdominal viscera and their imaging characters

### Required Radiological Examinations and Abnormalities

#### Plain Radiography

##### Chest

- Normal anatomy and projections
- Pneumothorax
- Pneumonia
- Effusion
- Cardiomegaly
- Pulmonary oedema
- Fractures
- Surgical emphysema
- Neoplastic Diseases
- Chronic inflammatory disease (TB)

##### Skull

- Normal Anatomy and Projections
- Fracture
- Lytic and sclerotic lesion
- Calcifications
- Pituitary fossa
- Paranasal sinuses

## **Abdomen**

- Normal Anatomy and projections
- Renal and Urinary tract stones, gall stones and other calcifications
- Fluid levels (intestinal obstruction)
- Free gas under Diaphragm, (perforation)
- Enlarged liver and spleen

## **Spine/bones:**

- Normal anatomy and various projections.
- Disc space reduction
- Vertebral Collapse
- To recognize changes due to rickets
- Appreciate fractures in children and adults
- To understand the importance of plain x-rays in bone tumors

## **Barium studies single and double contrast (where applicable)**

- Normal anatomy and various projections
- Gastric outlet obstruction
- Stomach mass/filling defect
- Oesophageal outline/ /strictures
- Intussusception
- Stricture
- Any filling defect
- Ulcerative colitis

## **Intravenous Urograms**

### **Hydronephrosis and renal masses**

### **Micturating Cystourethrogram**

### **Vesico-ureteric reflux**

**Echocardiogram:** Be able to interpret the report

## **Computerized Tomography (CT) / Magnetic Resonance Imaging (MRI)**

- To know the cross sectional anatomy
- Understand the principals of radiation safety in CT scan
- To know and understand the clinical indications and contraindications
- Be able to interpret the report

## **ULTRASOUND**

- Understand the indications and applications of ultrasound
- Is able to interpret the report of ultrasounds.

## **NUCLEAR MEDICINE:**

- Understand the indications of nuclear studies
- Is able to understand the hazards of radionuclides and internalize the rules of radiation protection
- Is able to interpret the reports.

## **6.17 PAEDIATRICS**

The students should be equipped with the knowledge and confidence for the role of a physician, educator, supervisor and organizer, social motivator in a primary health care setting.

**OUTCOMES: By the end of 5 years, students should be able to**

### **A. KNOWLEDGE AND UNDERSTANDING: Cognition.**

Acquire the knowledge of health promotion, disease prevention and management of common diseases/problems in children (including diseases and problems of the newborn).

#### **Students should be able to**

- describe common paediatric problems and diseases, in children at different ages;
- demonstrate understanding of national programs working for health promotion and disease prevention in children, e.g., IMNCI (Integrated Management of Neonatal and Childhood Illnesses), EPI (Extended Program of Immunization), ARI (Acute Respiratory Infections) etc.;
- apply the processes of growth and development in childhood to differentiate between normal and delayed growth parameters and developmental milestones at different ages;
- demonstrate understanding of the importance of nutrition in children by being able to prescribe diets suitable for different ages and in different diseases;
- show an understanding of the interaction between heredity and environment in the genesis of disease in children;
- describe care of new-born baby, in health and when suffering from common problems, along with importance of perinatal factors impacting on the wellbeing of the new-born;
- show understanding and knowledge about common accidents and poisoning in children and their management; and
- identify social issues related to paediatrics.

### **B. SKILLS:**

Students should become proficient in basic clinical skills of history taking in paediatrics, physical examination of a child (including



newborn) and interpretation of clinical findings. Student should be proficient in performing basic technical procedures as applied to children of different ages. They must also be able to demonstrate the ability to select appropriate investigations and interpret data.

**Students should be able to**

- demonstrate the ability to obtain a relevant clinical history from a parent or an older child;
- demonstrate ability to perform adequate clinical examination of a child of any age (including new-born);
- interpret clinical and laboratory data and arrive at diagnosis(es);
- advise appropriate nutritional measures for healthy and sick children (breast feeding, avoidance of bottle-feeding, proper weaning);
- counsel the parents on health promotive and disease preventive strategies for the child e.g. immunization procedures, hand washing);
- recognize and manage common health problems of children;
- recognize the danger signs of disease in children and be able to appropriately refer children with severe disease to appropriate specialists/hospital;
- demonstrate ability to perform essential clinical procedures relevant to children, for example:
  - Resuscitation of new-born
  - Basic cardio-pulmonary resuscitation
  - Anthropometric measurements
  - Use the growth chart effectively
  - Measuring blood pressure
  - Starting Intravenous lines/draw blood sample
  - Giving Nebulizer therapy and Bronchodilator as needed.

**ALL STUDENTS MUST OBSERVE THE FOLLOWING SKILLS:**

- Lumbar Puncture
- Bone marrow aspiration
- Thoracocentesis
- Liver Biopsy
- Observe passing of urinary catheter
- Observe pericardial tap

**C. DESIRED ATTITUDES**

The student will demonstrate empathy, caring, patient safety and cost-effective-care in providing advice for health promotion and disease prevention, general care of sick children and in carrying out simple diagnostic tests in the side laboratory. Students should be able to

- demonstrate an attitude of sympathetic care for the child patient and his parents/ care takers;
- develop a desire for self-learning; and

- visualize the impact of the disease on the community as a whole and be able to study the genesis of epidemics and be able to plan prevention of those.

The curriculum of Pediatrics has been designed based on clinical presentations of common paediatric problems of Pakistani children.

- **Common Paediatric problems** in Pakistan and statistics of Pakistani children with epidemiology/disease burden of common problems.
- **Clinical Methods in Paediatrics**
- **Nutrition:**
  - Optimal breast feeding, infant feeding and complementary feeding practices.
  - Nutritional disorders: Protein Energy Malnutrition, Vitamin A deficiency, Vitamin D deficiency, Zinc deficiency, Iodine deficiency, Iron deficiency.
- **Growth and development:**
  - Developmental assessment.
  - Learning disabilities (Autism, Attention Deficit Hyperactivity Disorder and Dyslexia).
- **National Paediatrics Programmes:**
  - IMNCI: integrated management of neonatal and childhood illness
  - EPI\*: Expanded programme of immunization and newer non-EPI vaccine
  - IYCF: Infant and young child feeding
  - ENCC: Essential newborn care course
  - CMAM: Community management of acute malnutrition
  - National malaria control programme.
  - DOT: Directly observed treatment programme for Tuberculosis.
- **Genetics:**
  - Pattern of inheritance & Genetic counseling\*\*\*
  - Down's syndrome\*\*
  - Turner's syndrome\*
- **Social Paediatrics:**
  - Rights of children & child abuse\*\*\*: (physical, sexual and emotional abuse).
  - Enuresis & encopresis\*\*
  - Attention Deficit Hyperactivity disorder\*.
  - Behavioral disorders
- **Detection of Paediatric Surgical problems:**
  - Hernia,
  - Intussusceptions,
  - Intestinal obstruction,
  - Talipes,
  - Congenital dislocation of Hip,
  - Vesico-ureteral reflux.

- **Prescribing in paediatrics:**
  - Drugs used in common pediatric problems
  - Drugs to be avoided in pediatrics
- Prevention of Accidents and Rehabilitation
  - Poisoning, toxicology,
  - Prevention of home accidents.
  - Physical Medicine & rehabilitation

There should be problem based learning for undergraduates.

## **NEONATOLOGY:**

- Normal full term baby
  - Essential newborn care
- Not cried at birth
  - Birth asphyxia /neonatal resuscitation
- Baby with congenital malformation
  - Head to toe examination for identification of congenital anomalies (Congenital diaphragmatic hernia, talipes equinovarus, neural tube defects (meningocele and meningomyelocele) oro-pharyngeal anomalies, cleft lip and palate and trachea-oesophageal fistula.
- Respiratory distress
  - Infant respiratory distress syndrome, pneumonia, sepsis, (Meconium Aspiration Syndrome), Hypoxic Ischemic Encephalopathy, prematurity, Transient Tachypnea of Newborn,
- Jaundice.
  - Physiological jaundice, pathological jaundice, blood group incompatibility, hemolytic anemia, Glucose 6-Phosphate Dehydrogenase deficiency
- Cyanosis
  - Hypothermia, Hypoxic Ischemic Encephalopathy, congenital heart diseases, respiratory diseases (pneumonias)
- Small baby
  - Low birth weight (LBW), prematurity and related problems hypothermia, hypoglycemia and feeding problems
- Convulsion
  - Hypoglycemia and hypocalcaemia, birth trauma and asphyxia, infections
- Refusal to feed
  - Sepsis, asphyxia, prematurity
- Cold to touch
  - Hypothermia, hypoglycemia, sepsis

- Vomiting
  - Bilious (duodenal and ileal atresia), non-bilious (pyloric stenosis and oesophageal atresia).
- Bleeding manifestations
  - Hemorrhagic disease of newborn, sepsis
- Skin lesions
  - Pustules, milia, erythema toxicum, erythema multiformis, oral thrush, candidiasis, nappy rash (staphylococcal and fungal), erythema, seborrheic dermatitis, contact dermatitis.

### **INFECTIOUS DISEASES:**

- Fever with rash
  - Measles, Rubella
- Fever without rash
  - Typhoid, Malaria, Tuberculosis, urinary tract infection, Dengue fever, AIDS and hepatitis
- Fever with convulsion
  - Meningitis. Encephalitis, cerebral malaria.
- Fever without focus
  - Clinical approach to diagnosis.
- Cough and/ difficulty in breathing (<30 days)
  - Pneumonia, Foreign Body (FB) aspiration, bronchiolitis,
- Chronic cough (30 days)
  - Persistent pneumonia, pertussis, asthma, Pneumocystis Carinii
  - Foreign body, asthma, Tuberculosis
- Croup
  - Epiglottitis, viral croup, laryngotracheal bronchitis
- Acute diarrhea
  - Rota virus diarrhea
- Dysentery
  - Bacillary and ameobic dysenteries
- Floppy baby / Acute Flaccid Paralysis
  - Poliomyelitis, Guillain-Barre syndrome.
- Jaundice
  - Viral hepatitis, drugs

### **HEPATOBIILIARY /GIT**

- Jaundice
  - Viral hepatitis
- Pruritis

- Cholestatic jaundice
- Chronic diarrhea
  - Malabsorption syndrome, giardiasis, amoebiasis
- Rash with or without itching
  - Rubella, chicken pox, scabies, drug eruption
- Vomiting
  - Gastroenteritis, hepatitis, Gastro-esophageal reflux disease
- Abdominal distension
  - Cirrhosis, Chronic Liver Disease, Hirschsprung's, malabsorption syndrome
  - Worm infestation
- Haematemesis / melaena / bleeding per rectum
  - peptic ulcer, portal hypertension, drugs
  - rectal polyp

### **CNS/METABOLIC DISORDERS**

- Convulsions with or without fever
  - Febrile, meningitis/encephalitis, cerebral malaria, metabolic (hypocalcemia and hypoglycemia), epilepsy, cerebral palsy
- Developmental delay
  - Focal and global delay and their causes, cerebral palsy, Down's syndrome and hypothyroidism.
- Headache
  - Hypertensive encephalopathies, migraine, raised Intracranial pressure, Space Occupying Lesion (SOL)
- Paresis/paralysis/ Acute Flaccid Paralysis
  - Cerebrovascular Accident, (acute infantile hemiplegia and arterio-venous malformation, infection, polio and Guillain-Barre Syndrome)
- Coma
  - Central Nervous System infections (meningitis and encephalitis), Diabetic ketoacidosis, hypoglycemia.

### **CVS AND PULMONOLOGY**

- Recurrent/persistent breathlessness with or without murmur.
  - Congenital( Ventricular Septal Defect, Patent Ductus Arteriosus, Tetralogy of Fallot)
  - Acquired heart diseases (Rheumatic fever)
  - Cystic fibrosis, bronchiectasis, bronchial asthma.
- Generalized Oedema with or without respiratory distress.

- Congestive Cardiac failure, Nephrotic Syndrome, Acute Glomerulonephritis, Protein Energy Malnutrition, Chronic Liver Disease (CLD), pericarditis
- Central cyanosis
  - Congenital Heart disease, Congestive Cardiac failure
- Failure to thrive

## **HAEMATOLOGY/ONCOLOGY/CT DISORDER**

- Pallor
  - Nutritional anaemia (iron deficiency, folic acid and B12 deficiency,
  - Hemolytic anaemia (thalassemia, Sickle cell disease)
  - Worm infestation
  - Aplastic Anemia
- Bleeding/purpuric rash
  - Idiopathic Thrombocytopenic Purpura (ITP), Haemophilia, Malignancies (Leukemia), HSP.
- Lymphadenopathy
  - Leukemia, Lymphoma (Hodgkin's and non-Hodgkin's)
- Joint pain
  - Juvenile Rheumatoid Arthritis, Rheumatic fever

## **GENITOURINARY/ENDOCRINOLOGY**

- Oedema/oliguria
  - Nephrotic Syndrome, Acute Glomerulonephritis, Chronic Kidney Disease (CKD), Acute Kidney Injury (AKI)
- Anuria/Retention
  - Posterior Urethral valves, urolithiasis.
- Polyuria
  - Diabetes Mellitus, Diabetes insipidus, CKD, Hypokalemia
- Ambiguous genitalia
  - Congenital Adrenal Hyperplasia
- Short Stature
  - Growth Hormone deficiency, Hypothyroidism, CKD, Turner's syndrome, constitutional Short Stature
- Constipation
  - Hypothyroidism, Lower GI Problems
- Obesity
  - Cushing's disease, drugs, dietary mismanagement

## **GENETICS/SOCIAL/BEHAVIOURAL PAEDIATRICS**

- Dymorphic features
  - Down's syndrome, Turner's Syndrome,
- Genetic counseling
  - patterns of inheritance
- Battered baby /child, child with unexplained injury, irritable infant.
  - child abuse (physical / sexual / emotional), child rights
- Enuresis and Encoparesis
  - organic/non-organic causes
- Hyperactive/inactive child/ learning disability.
  - ADHD, Autism, Dyslexia

## **MISCELLANEOUS: PAEDIATRIC SURGERY, POISONING, OTHERS**

- Inguino-scrotal swelling
  - Hernia, hydrocoele, testicular swelling, undescended testes.
- Abdominal mass
  - Neoplasm, intussusception,
- Neck swelling
  - Midline and lateral swellings
- Poisoning/ bites
  - kerosene/ organo-phosphorus, drugs, dog bite, snake bite.
- Burns, Road Traffic Accident, trauma
  - BLS, first aid management

## **6.18 GYNAECOLOGY AND OBSTETRICS**

### **BASIC SCIENCES AND CLINICAL SKILLS**

#### **Learning outcomes**

Understand and demonstrate adequate knowledge (including basic sciences concepts), skills, and attitudes in relation to history taking, physical examination, and requesting and interpreting relevant investigations.

- History taking:
  - Takes detailed history to reach a provisional diagnosis
- General Physical Examination (GPE) of a Gynaecological patient:
  - Demonstrates proficient GPE
- Abdominal examination of a Gynaecological patient:
  - Demonstrates adequate P/A with informed consent
- Pelvic examination on mannequins:

- Demonstrates adequate P/V skills on a model or mannequin with diagnosis of clinical signs
- Communication skills and counseling of a Gynaecological patient:
  - Demonstrates good communication and counseling skills with Role players
- Ethics and medico-legal issues:
  - Provides adequate knowledge of ethical and medico-legal issues in relation to Gynaecology
- Lab tests in Gynaecology:
  - Orders, interprets reports and justifies various lab tests for Gynaecological patients
- Imaging in Gynaecology:
  - Provides adequate knowledge and interpretation of Ultrasound, X Ray and HSG reports.
- Surgical anatomy of female reproductive tract:
  - Describes relevant surgical anatomy for a Gynaecological patient
- Embryology of female reproductive tract and congenital abnormalities:
  - Describes embryological development of female reproductive tract
  - Discusses various congenital anomalies of genital tract
- Normal menstrual cycle:
  - Describes normal menstrual cycle and its physiological basis

## **GENERAL GYNAECOLOGY**

### **Learning outcomes**

Understand and demonstrate adequate knowledge, skills, and attitudes in relation to benign conditions and general presenting complaints to clinics.

- Miscarriage and abortion:
  - Discusses causes and types of miscarriage
  - Diagnoses miscarriage and describe management principles of miscarriage.
  - Describes indications of Termination of Pregnancy (TOP)
  - Enumerates methods of safe TOP
- Ectopic pregnancy:
  - Enumerates causes
  - Describes principles of management
- Dysmenorrhea:
  - Can discuss causes and management of primary and secondary dysmenorrhea
- Chronic pelvic pain:



- Enumerates causes
- Describes principles of management
- Menorrhagia/heavy menstrual bleeding (HMB), and DUB:
  - Enumerates causes
  - Describes tools of diagnosis
  - Discusses medical management
  - Discusses Mirena and other surgical options
- Uterine fibroids:
  - Describes types and presentations of fibroids
  - Discusses options of managements
  - Enumerates indications for surgery
- Pruritus Vulvae:
  - Enumerates causes, including types of NNED (non neoplastic epithelial disorders)
- Benign Ovarian cysts:
  - Describe various types
  - Can diagnose benign cysts
  - Discusses principles of surgery, and when surgery required
- Cervical ectopy and polypi:
  - Can diagnose benign cysts
  - Describe types

## **REPRODUCTIVE ENDOCRINOLOGY**

### **Learning outcomes**

Understand and demonstrate adequate knowledge, skills, and attitudes in relation to Reproductive Endocrinology

- Puberty:
  - Describes basic physiology
  - Describe management of disorders of puberty, other than menstrual disorders
- Amenorrhea:
  - Enumerates causes of amenorrhea
  - Can diagnose cause by relevant investigation
  - Describe management plan of individual cause
- Endometriosis and Adenomyosis:
  - Describes presentation of such a case
  - Describes medical management options if pain is main complaint
  - Describes various surgical options if Infertility is main presentation
- Hirsutism and virilism:
  - Enumerates causes
  - Describes principles of management

- Infertility:
  - Describes common causes
  - Understands concept of “unexplained infertility”
  - Discusses relevant lab tests, Semen analysis
  - Discusses management principles
- Polycystic Ovaries (PCO):
  - Defines PCO and PCOD
  - Discusses investigations and plan of management
- Recurrent pregnancy loss:
  - Enumerates causes
  - Discusses investigations and plan of management
  - Counsels such a patient
- Pre Menstrual Syndrome (PMS):
  - Can diagnose PMS
  - Describes management principles
  - Counsels such a patient
- Menopause and HRT:
  - Describes symptomatology of menopause
  - Can diagnose cause by relevant investigation
  - Describe management plan of individual case

## **UROGYNAECOLOGY AND PELVIC FLOOR**

### **Learning Outcomes**

Understand and demonstrate adequate knowledge, skills, and attitudes in relation to Urogynaecology and pelvic floor disorders

- Genital fistula:
  - Describes causes and types
  - Diagnoses and describes outline of management
- Urinary stress incontinence:
  - Enumerates types
  - Can describe outline of management of urethral sphincter incontinence, and Detrusor instability
- Uterovaginal prolapse:
  - Enumerates types of prolapse
  - Describes management
- Urinary tract infections:
  - Enumerates causes
  - Discusses drug treatment

## **GYNAECOLOGIC ONCOLOGY**

### **Learning Outcomes**

Understand and demonstrate adequate knowledge, skills, and attitudes in relation to Gynaecologic cancers and precancerous conditions

- Preinvasive disease CIN, VIN, VAIN:

- Describe types of pre invasive disease
  - Describe principles of management
- Screening for Gynaecological cancer:
  - Enumerate principles of screening and tumour markers
- Ovarian Cancer:
  - Diagnose cancer of Ovary
  - Describe principles of management
- Endometrial cancer:
  - Diagnose cancer of endometrium
  - Describe principles of management
- Cervical cancer:
  - Discuss prevention by cervical cancer vaccination
  - Diagnose cancer of Cervix
  - Describe principles of management
- Vulval cancer:
  - Diagnose cancer of Vulva
  - Describe principles of management
- Gestational Trophoblastic Neoplasia (GTN):
  - Diagnose Hydatidiform Mole and Choriocarcinoma
  - Describe principles of management
- Basic principles of Chemotherapy and Radiotherapy:
  - Select chemotherapeutic drugs and common side effects
  - Describe principles of radiotherapy and its complications
- Care of terminal Gynaecological cancer patient
  - Describe outline of care of a terminal cancer patient

## **OPERATIVE GYNAECOLOGY**

### **Learning Outcome**

Understand and demonstrate adequate knowledge in relation to common Gynaecological operations and instruments

- Pre-operative evaluation:
  - Describes principles of pre-op preparation
- Post-operative care:
  - Discusses complications and their management
- Basic principles of D and C, D and E, Myomectomy, Hysterectomy, Diagnostic Laparoscopy and Hysteroscopy

## **REPRODUCTIVE HEALTH**

### **Learning outcomes**

Understand and demonstrate adequate knowledge, skills, and attitudes in relation to concepts in Reproductive Health

- Vaginal discharge:
  - Enumerates causes and types of vaginal discharge

- Discusses management options
- HIV/AIDS:
  - Describes management plan
  - Discusses precautions of staff members
  - Discusses prevention
- Sexually Transmitted Infections (STI):
  - Enumerates causes and types of STI
  - Discusses management options
- Contraception and Sterilization:
  - Discusses CPR (contraceptive prevalence rate) and its causes in Pakistan
  - Discusses types and side effects of various contraceptives
  - Discuss efficacy and compliance of various methods
- Psychosexual disorders:
  - Describe types of such disorders
  - Describe management plans
- Women's Rights to Reproductive Health:
  - Describe types of Women's rights, and role of doctors in their protection, promotion, and advancement

## **ANTENATAL CARE, NORMAL AND HIGH RISK PREGNANCY**

### **Course Objectives:**

The student should be able to demonstrate adequate knowledge, skills and attitudes in relation to antenatal care in low risk pregnancy and to recognise high risk pregnancy and manage/refer appropriately.

### **Course Outline:**

- Book patient for confinement
- Provide antenatal care specific to the expectant mother and plan frequency of visits.
- Screen appropriately for:
  - Anaemia, Diabetes mellitus, pre-eclampsia
  - Foetal growth and placement etc. by ultrasound and its significance:
    - Anomaly scan at 16 18 weeks,
    - Second ultrasound at 28 weeks (Optional)
    - Ultrasound at 32 34 weeks (fetal growth etc.)
- Manage minor disorders of pregnancy, including vaginal discharge during pregnancy.
  - Provide essential drugs with proper dosage
  - Prescribe safely in pregnancy for common ailments
- Must be familiar with immunizations protocol during antenatal care
- Screen patients for common conditions, prevalent in the population e.g. Hepatitis B, C, HIV, Rubella and syphilis, TORCH profile (where indicated)
- Identify high risk pregnancy and its significance

- Mange/ Refer appropriately and follow up as required
- Understand multi-disciplinary approach for high risk pregnancy
- Should be able to provide effective communication and Counseling skills
  - Educate the mother of care during pregnancy
  - Counsel regarding labour, newborn and lactation

## **ABNORMAL PREGNANCY**

### **Course Objective:**

Demonstrate an understand of the etiology, risk factors for complication and management of the major antenatal complications of pregnancy.

### **Course Outline:**

- Bleeding in early pregnancy
  - Abortion
  - Ectopic pregnancy
  - Gestational trophoblastic disease
- Bleeding in 2<sup>nd</sup> half of pregnancy (Ante partum haemorrhage)
  - Placenta previa
  - Abruption placentae
  - Vasa previa and incidental causes
- Polyhydramnios/oligohydramnios
- Intra uterine fetal death
- Mal-presentation and position
  - Breech presentation
  - Transverse lie and shoulder presentation
  - Face presentation
  - Brow presentation
- Cord prolapse
- Preterm labour/PROM
- Prolonged Pregnancy
- Intra Uterine growth restriction
- Multiple pregnancy
- Congenital anomalies

## **MEDICAL DISORDER(S) IN PREGNANCY**

### **Course Objectives:**

- Should be able to identify the medical disorder diagnose and manage.
  - Anemia in pregnancy
  - Pyrexia in pregnancy
  - Misc. conditions e.g. UTI., Respiratory infections, allergic conditions
- Identify and diagnose the condition, evaluate the severity of the medical disorders, provide initial treatment and refer to proper health care facility.
  - Pregnancy with hypertensive disorders
  - Pregnancy with cardiac disease
  - Pregnancy with diabetes mellitus

- Pregnancy with jaundice / hepatitis
- Pregnancy with renal problems
- Deep vein thrombosis
- Endocrine disorder / autoimmune disorders

### **Course Outline:**

- Anaemia in Pregnancy
  - History taking and clinical examination to identify cause and severity
  - Order appropriate investigation to reach the diagnoses
  - Treat anemia according to type, severity and gestational age
  - Must know the modes of treatment available, dosages, routes and side effects
  - Know the principles of blood transfusions & risks
- Pyrexia in Pregnancy
  - Differential diagnose of the causes of pyrexia in pregnancy
  - Appropriate investigation to reach a diagnosis
  - Provide treatment general and specific according to cause
  - Take opinion of specialist when required
  - Safety of antibiotics/drugs with regard to fetus should be known.
- Pregnancy with hypertensive disorders
  - Should be able to carry out differential diagnosis, assessment of severity and complications maternal & fetal
  - Order relevant investigation
  - Carry out initial management according to severity. Current drugs and doses should be known
  - Referral for specialized care as required
- Pregnancy with cardiac disease
  - Recognition of complications of this condition in pregnancy
  - Management with help of specialized case
- Pregnancy with diabetes
  - Should know screening/diagnostic tests for diabetes
  - Should be aware of maternal/fetal complication
  - Basic management should be known
  - Principles of delivery time/mode and neonatal care
- Pregnancy with jaundice/hepatitis
  - Should be aware of screening tests for hepatitis and basic management
- Renal problems in pregnancy
  - Awareness of changes in urinary tract physiology and its effect on renal function tests
  - Refer for specialized care
- Deep vein thrombosis
  - Should be able to diagnose, order relevant investigation and refer for specialized care
- Endocrine / autoimmune disorders
  - Recognition of these, diagnoses and referral for specialized care.

## **BASIC CLINICAL SKILLS IN OBSTETRICS**

### **Course Objectives:**

Understand and demonstrate adequate knowledge, skills and attitudes in relation to history taking, clinical examination, investigation and communication in obstetrics

### **Course Outline:**

- Eliciting history from obstetric patient
- Performing thorough clinical general examination
- Performing abdominal examination of pregnant lady
- Order appropriate investigations and knows interpretations
- Learning effective verbal and non-verbal communication skills
- Provide treatment / counseling as appropriate to the condition

## **ANATOMY OF FOETAL SKULL AND MATERNAL BONY PELVIS**

### **Course Objective/ specific learning objective**

Should know and is able to demonstrate;

- The anatomy of fetal skull and maternal bony pelvis
- Identify abnormalities of maternal pelvis and the significances in relation to labor complication
- Learning on the dummy and bony pelvis

## **PHYSIOLOGY OF PREGNANCY**

### **Course Objectives:**

Understand and demonstrate adequate knowledge, skills and attitudes in relation to physiology of pregnancy

### **Course Outline:**

- Diagnosis of pregnancy
- Conception, implantation, development of placenta, fetal circulation and abnormalities of placenta
- Physiological changes associated with pregnancy

## **NORMAL LABOUR**

### **Course Objectives:**

To understand and demonstrate appropriate knowledge, skills and attitudes in relation to labor

### **Course Outline:**

- Normal labour
  - Physiology
  - Mechanism
  - Diagnosis

- Management of labour
- Understanding and use of partogram
- Intra partum fetal monitoring
  - Fetal heart rate monitoring and CTG interpretation
- Methods of induction and augmentation of labour
  - Indications
  - Contraindications
  - Complications
- Analgesia and anaesthesia in labour
- Management of 3<sup>rd</sup> stage of labor prevention of PPH

## **ABNORMAL LABOR**

### **Course Objectives:**

To understand and demonstrate appropriate knowledge, skills and attitudes in relation to abnormal labour

### **Course Outline:**

- Prolonged labor/obstructed labour/ruptured uterus
  - Diagnosis, causes and management
- Complication of III stage of labour. Diagnoses, causes and management
  - Primary PPH and inversion of uterus
  - Obstetrical shock
- Operative delivery. Prerequisites, indications and complications
  - Episiotomy
  - Instrumental vaginal delivery (forceps and ventouse)
  - Cesarean section

## **PUERPERIUM AND LACTATION**

### **Course Objectives:**

Should be able to understand normal and abnormal puerperium and lactation management

### **Course Outline:**

- Physiological changes in normal puerperium
- Puerperal pyrexia
- Puerperal psychosis
- Breasts disorder and lactation management
- Contraception different methods, appropriate in the postpartum period

## **NEW BORN CARE (INTEGRATED WITH PAEDIATRICS)**

### **Course Objectives:**

Demonstrate an understanding of essential newborn care and is able to diagnose and manage common neonatal problems



**Course Outline:**

- Newborn examination & Essential newborn care.
- Basic resuscitation & Apgar score.
- Common neonatal problems.
- Breast feeding and its importance.

**SAFE MOTHERHOOD****Course Objectives:**

Should be able to understand the concept of safe motherhood and implement it at the community level

- Act as a leader at primary health care facility utilizing local resources and personnel
- Be able to provide emergency obstetric services
- Organize health care teams, incorporating LHV, LHW and midwives of the area.
- Act as a liaison officer in referral of patients to secondary and tertiary health care facility
- Should understand the definition and causes of MMR & PNMR
- Should organize seminars and workshops for health care workers as preventive strategies to reduce MMR and PNMR in the local population

**SITES OF LEARNING:** Antenatal clinics, outpatient departments, labour wards, maternity wards, postnatal wards and others.

**INSTRUCTIONAL STRATEGY:** as per section 5.11

**ASSESSMENT:** As per Section 5.12 Individual universities and institutions have the flexibility to exercise their modes of assessment within guidelines from PMDC / HEC.

- Regular end ward rotation assessment with Formative feedback
- Professional university examinations

**Reference Books:**

- A. Obstetrics by Ten Teachers (latest edition)
- B. Fundamental of Obstetrics and gynecology by Llewlyn and Derek (latest edition)
- C. Essential of obstetrics by Hacker & Moore.

## 6.19 OTOLARYNGOLOGY (ENT)

### Learning Aims and Objectives

#### Aims

- To acquire sufficient knowledge of ENT conditions to be able to recognize common problems and when and what to refer.
- To learn the skills required to examine patients with ear, nose, and throat diseases and to make a presumptive diagnosis.
- To learn how to prioritize and manage different ENT conditions.
- To become stimulated and interested in the specialty of ENT.

#### Objectives

- To learn the signs and symptoms of common ENT problems.
- To learn the techniques of ear, nose, throat and neck examination.
- To demonstrate an understanding of the basic anatomy and physiology of the ear and upper aero-digestive tract, and relate this knowledge to the signs and symptoms of ENT disease.
- To understand the medical and surgical treatment of common ENT conditions.
- To be familiar with the commonly used medications for treating ENT problems, and their side effects.
- To understand the risks and complications of ENT surgery.
- To recognize the different ways in which head and neck malignancy can present, and to understand that early diagnosis of head and neck cancer leads to improved survival.
- To learn the ways in which ENT related communication difficulties can arise and be overcome.
- To appreciate and be sensitive to the impact of ENT conditions on patients and their families.
- To communicate effectively with the patient, the family and the community regarding ENT diseases and its related issues.
- To understand medical ethics and its application pertaining to Otorhinolaryngology and maintain the confidentiality of the patient.
- To understand the prevalence and prevention of the common Public Health Problem related to Otorhinolaryngology in the community.
- To understand the principles of medical research including fundamentals of Information Technology.

#### Practical skills

- Use of the otoscope to examine the external auditory meatus and tympanic membrane.
- Basic examination of the nose.
- Examination of the oropharynx, nasopharynx and laryngopharynx.
- Examination of the neck.
- Management of nosebleed and oral bleeding.

- Instill nose and ear drops/medication.
- Take swab from ear, nose and throat.
- Tuning fork tests
- Dry mopping of eyes

## **EAR**

- Basic anatomy and physiology of the ear.
- Common ear symptoms and their relationship with ear diseases e.g. otalgia, otorrhea, hearing loss, tinnitus, vertigo/dizziness.

### **External Ear:**

- Congenital abnormalities, Pre-auricular sinus, Trauma to pinna/hematoma, Perichondritis of the auricle, Atresia : Congenital and Acquired Wax ear, Keratosis obturans, Foreign bodies in the ear,
- Otitis externa, : Furunculosis, Otitomycosis, Malignant Otitis Externa
- Benign tumours of the external ear Osteoma/ exostosis, Malignant Tumours of the external ear: Squamous cell carcinoma, Basal cell carcinoma

### **MIDDLE EAR:**

- Perforation of tympanic membrane
- Eustachian tube dysfunction
- Acute Suppurative otitis media
- Serous otitis media
- Chronic Suppurative otitis media  
CSOM without cholesteatoma  
CSOM with Cholesteatoma  
Complications of otitis media  
Extra-cranial complications
- Intra-cranial complications
- Conductive deafness; differential diagnosis
- Otosclerosis

### **INNER EAR:**

- Sensorineural hearing loss be able to differentiate between different causes
- Meniere's disease, Ototoxicity, Assessment of a deaf child
- Vertigo: differential diagnosis
- Tinnitus

**Facial nerve paralysis:** Differential diagnosis of and its treatment.

**Temporal bone fractures**

## **The principles of Myringotomy/grommet insertion, tympanoplasty and mastoidectomy**

- **Clinical Skills:**

- Examination of the ear including the pinna, ear canal and otoscopy. Demonstrate examination under microscopy (EUM).
- Facial nerve examination
- Testing hearing with tuning fork (Rinne's test, Weber test, ABC test) and audiometry.
- Assessment of Vestibular System: Nystagmus, Fistula test, Romberg's test and Caloric test
- Presentation and management of common ear disease e.g. otitis externa, otitis media, glue ear, chronic suppurative otitis media with or without cholesteatoma, vertigo, otosclerosis and Meniere's disease, and facial palsy.
- Identifying postoperative problems following ear surgery i.e. sensorineural hearing loss, facial nerve palsy, and vestibular dysfunction.

- **Investigations:**

- Radiology Plain, CT scan, MRI
- Audiological: Pure tone audiometry / impedance audiometry,

## **NOSE**

- Anatomy and physiology of the nose.
- **History** of the Symptoms: Nasal obstruction, Rhinorrhea, Sneezing, Epistaxis, Postnasal drip, Headache and facial pain. Rhinolalia, Disturbances of smell, Snoring, Nasal Deformity.
- **Clinical examination**
  - Examination of the nose including an assessment of the appearance, the septum, the turbinates, and the mucosa.
  - External nose, internal nose, postnasal space examination, rigid/flexible endoscopy of nose and postnasal space.
- Know the principles of management of a fractured nose and the timing of intervention.
- To understand the principles of common nasal operations including septal surgery, functional endoscopic sinus surgery, and rhinoplasty.

**Investigations:** Plain radiology, CT Scan,

**Congenital Malformations of nose and paranasal sinuses.**

**Choanal atresia.**

**Nasal and Facial Trauma:** Fracture Nasal Bones, Le Fort fractures (introduction only), Blow-out fracture of Orbit

## **Rhinorrhea / Rhinitis**

- Allergic (Seasonal, Perennial, Occupational)
- Infective; Acute, Chronic
- Others; Idiopathic, NARES (non-allergic rhinitis with eosinophilia - Drug-induced, Vasomotor, Atrophic), Nasal granulomas
- CSF Rhinorrhea: diagnosis and basic management

## **Epistaxis**

## **Sinusitis**

Acute Sinusitis, Chronic Sinusitis, Complications of Sinusitis  
Fungal rhinosinusitis

## **Septal Conditions**

Deviated nasal septum (DNS), Septal Haematoma, Septal Abscess,  
Septal Perforation

## **Foreign bodies of nose**

Rhinolith, Maggots

## **Polyps**

Ethmoidal Polypi, Antrochoanal polypus, Bleeding polypus

## **Tumours Nose and Paranasal Sinuses**

### **External nose:**

Nasal Dermoid  
Basal Cell carcinoma and  
Squamous cell carcinoma

### **Sinu-nasal tumours:**

**Benign:** Inverted papilloma, Osteoma, Hemangioma,  
**Malignant:** Squamous cell carcinoma, Adenocarcinoma,  
Staging of sinu-nasal tumours

### **Nasopharynx**

Nasopharyngeal angiofibroma,  
Nasopharyngeal carcinoma and lymphoma

## **Headache and facial pain**

## **Proptosis related to ENT Disorders**

## **Introduction to Endoscopic Sinus Surgery**

## **HEAD AND NECK – benign and malignant conditions**

- The basic anatomy and physiology of the oral cavity, salivary glands, pharynx, larynx, oesophagus, and their lymph node drainage.
- The presentations of head and neck cancer.

History for common symptoms and diseases in otolaryngology

Hoarseness, Stridor, hemoptysis and breathlessness

Oesophageal disease

- Examination of the oral cavity, larynx and pharynx including the use of the nasendoscopy
- Examining the neck with reference to lumps, masses and lymph nodes.
- The role of fine needle aspiration cytology (FNAC).
- The principles and limitations of radiological investigations of the head and neck region.
- The management of the airway in patients with a tracheostomy or end tracheostomy after laryngectomy.
- The postoperative management of a patient who has undergone major head and neck surgery.
- The role of the multidisciplinary team in head and neck cancer and voice disorders.
- Assessment of post tonsillectomy bleeding.

## **ORAL CAVITY AND PHARYNX**

### **Stomatitis and mouth ulcers**

#### **Pharyngitis - acute and chronic pharyngitis**

**Specific:** Tuberculous, Leprosy, Syphilis,

**Non-specific:** Pharyngeal diphtheria, Tonsillitis and its related disorders, Infectious Mononucleosis

### **Adenoids**

### **Neck Space infections**

Retropharyngeal abscess (Acute and Chronic), Parapharyngeal abscess, Ludwig's angina

### **Benign Diseases of Oral cavity and oropharynx**

Ranula, Leukoplakia, Erythroplakia, Submucous fibrosis, Pharyngeal Pouch

### **Tumours of Oral cavity, Oropharynx and Hypopharynx**

## **LARYNX**

Congenital malformations of the Larynx (laryngomalacia, vocal cord paralysis, subglottic stenosis)

Laryngeal infections:

Acute laryngitis, Acute laryngotracheobronchitis (croup), Acute epiglottitis

Laryngeal diphtheria

Chronic inflammations: Tuberculosis, Syphilis

Non-neoplastic Laryngeal Lesions  
Vocal cord nodules and polyps, Laryngocele,  
Neoplastic Laryngeal Lesions  
Benign: Papilloma Larynx,  
Malignant: Cancer of the Larynx,  
Evaluation of metastatic neck lymph node  
Vocal cord paralysis  
Laryngotracheal trauma  
Foreign Bodies: Laryngotracheal and bronchial  
Management of Obstructed Airway  
Management of Tracheobroncheal foreign bodies  
Tracheostomy: Indications, Contra indications, Complications,  
Operative steps and Post-Operative care...

## **OESOPHAGUS**

- Acute Dysphagia (corrosive's and foreign bodies) and its management
- Chronic Dysphagia: Oesophageal strictures, Plummer Vinson Syndrome, Carcinoma oesophagus
  - Diagnosis of Carcinoma oesophagus and differentiate from benign conditions
- Oesophagoscopy- Indications, contraindications and complications

## **6.20 OPHTHALMOLOGY**

### **NEED ASSESSMENT**

The prevalent ophthalmic disease patterns in our national and local contexts form the basis of the curriculum, with cataract, glaucoma, diabetic retinopathy, trachoma and vitamin A deficiency as leading causes of blindness. International best practices in medical education should be followed with emphasis on active learning, and constructivist, contextual and collaborative learning and teaching strategies.

### **GOALS**

To equip medical students with essential knowledge, skills and attitudes to enable them to:

- Identify ophthalmic diseases including ocular emergencies, provide primary eye care and refer when needed.
- Communicate effectively with the patients, their families and the community regarding eye diseases and its related issues.
- Understand medical ethics and its application pertaining to ophthalmology and maintain patient confidentiality.
- Understand the prevalence and prevention of common public health problems related to ophthalmology.

- Understand the relationship between eye and systemic diseases....

## LEARNING OUTCOMES

- Directed Ophthalmic History (PI)
  - Defects in visual acuity, colour vision and field of vision
  - Pain in and around the eye
  - Discharge from the eye
  - Abnormal appearance of the eye and orbit
  - Diplopia
- Ophthalmic examination for
  - Visual acuity for distance and near vision (PI)
  - Use pinhole during vision acuity checkup (PI)
  - Check colour vision (PI)
  - Confrontation test for field of vision (PI)
  - Inspection and palpation of adnexa and anterior segment (PI)
  - Evert the upper eye lid and assess the lacrimal system (PI)
  - Regurgitation test (PI)
  - Detect the deviated eye (PI)
  - Ocular movements and the cover / uncover test (PI)
  - Pupillary reflexes for afferent pupillary defects (PI)
  - Measure the intra-ocular pressure by palpation (PI)
  - Differentiate between Goldmann applanation, Schiøtz and tonopen tonometer (O)
  - Red glow test by distant direct ophthalmoscopy, to detect the defects in the ocular media (PS)
  - Direct ophthalmoscopy to recognize disc and its abnormalities like normal disc, swollen disc, large cup disc ratio, pale disc and retinal lesion (PS)
  - Retinoscopy (plain mirror or streak) (PS) to familiarize with indirect ophthalmoscopy and use of lasers and ultra sound in ophthalmology (O)
  - Diagnosing common eye conditions e.g. blepharitis, chalazion, sty, dacryocystitis, conjunctivitis, trachoma, ocular allergies (PI)
  - Initiate first aid treatment for ocular trauma (corneal foreign body/abrasion), corneal ulcer, red eye, painful eye, acute congestive glaucoma (PI)
  - Diagnose other eye conditions and refer them to secondary or tertiary eye care centres for further management for e.g., open or closed globe injuries, cataract, squint, amblyopia, refractive errors, tumours, leucocoria (white pupil), acute and chronic painful or painless loss of vision (PI)
- Prevention and early diagnosis of glaucoma, diabetic retinopathy and deficiency diseases (vitamin A) (PS)



- Perform essential procedures
  - Irrigation of eye (PI)
  - Instillation of eye drops (PI)
  - Staining for corneal ulcer (PI)
  - Removal of superficial foreign bodies (PI)
- Experience community-based eye camps for eye problems (PS)
- **Ocular Instrumentation**
  - Ophthalmoscope (Direct and Indirect)
  - Retinoscope
  - Slit Lamp
  - Tonometer
    - Applanation (contact and non contact)
    - Indentation (Schiotz)
  - Gonioscope
  - Refractometer
  - Lensometer
  - Keratometer
  - Perimeter
  - A B Scan
  - Laser (Yag and Argon)
  - Fundus and anterior segment camera (Angiography)

**Level of Learning:** Observer status (O), Assistant status (A), Perform under supervision (PS), Perform Independently (PI)

## CONTENTS

- Basic anatomy, physiology, biochemistry, pharmacology and pathology of eyeball, adnexa and orbit.
- **Orbit:** Orbital cellulitis, proptosis, thyroid ophthalmopathy, enophthalmos, tumours, trauma.
- **Lids:** Blepharitis, sty, chalazion, trichiasis, entropion, ectropion, ptosis, and common tumours.
- **Conjunctiva:** Infective and allergic conjunctivitis, pterygium, pingecula.
- **Cornea:** Corneal transparency, corneal edema, corneal vascularization, Keratitis, corneal ulcers, corneal opacity, dry eye, corneal dystrophy and keratoplasty.
- **Sclera:** Episcleritis, scleritis, scleral discoloration.
- **Lacrimal Apparatus:** Epiphora, lacrimation, dry eye, dacryocystitis (acute & chronic), lacrimal gland tumours.
- **Uveal Tract:** Uveitis, and its differential diagnosis from other causes of the red eye.
- **Lens:** Cataract classification, aetiology, management including visual rehabilitation and biometry.
- **Glaucoma:** Aetiology, classification, diagnosis and general principles of medical and surgical management.

- **Vitreo-Retina:** Primary retinal detachment, vitreous detachment and haemorrhage, diabetic retinopathy, hypertensive retinopathy, retinal artery and vein occlusion, retinitis pigmentosa, retinoblastoma, age related macular degeneration.
- **Neurophthalmology**
- **Optic Nerve:** Papilloedema, optic neuritis and optic atrophy.
- **Visual Pathway:** Visual field defects in the lesions of optic nerve, optic chiasma, visual pathway and visual cortex.
- **Cranial Nerve:** Oculomotor, Trochlear, Abducent, Trigeminal and Facial cranial nerve paresis and palsies.
- **Pupil:** Pupillary pathways and reflexes with their common abnormalities.
- **Injuries:** Blunt and perforating, Intra and extra ocular foreign bodies, chemical injuries and burns and sympathetic ophthalmitis.
- **Squint:** Amblyopia, phoria and tropia, paralytic and non paralytic.
- **Systemic Diseases:** Diabetes, thyroid ophthalmopathy, hypertension, collagen vascular disorders, ocular manifestations of vitamin A deficiency.
- Common causes, definition, standards of blindness and low vision aids.
- **Errors of refraction:** Introduction to optical system of normal eye, emmetropia, myopia, hypermetropia, anisometropia, astigmatism, presbyopia, aphakia, pseudophakia, and refractive surgery.
- **Ophthalmic therapeutics:** Antibiotics, anti viral, anti fungal, steroids, local anesthetics, anti glaucoma, fluorescein dye, mydriatic-cycloplegic.

## Ocular emergencies

- Chemical burns, corneal ulcer, corneal foreign body, corneal exposure, inadvertent use of medicines like Atropine and Steroids, acute congestive glaucoma, perforated globe, leucocoria in children, retinal artery and vein occlusion, acute vitreous haemorrhage, rhegmatogenous retinal detachment and papillitis

## Ocular pharmacology

### Antibiotics

Aminoglycosides e.g. Tobramycin eye drops  
 Quinolones e.g. Ciprofloxacin eye drops

### Glaucoma medications

Pilocarpine eye drops  
 Beta blockers eye drops  
 Prostaglandin analogue eye drops  
 Acetazolamide tablets  
 Mannitol 20% intravenous

Steroids: Dexamethasone eye drops

Antivirals: Acyclovir 3% eye ointment

Antifungal: Miconazole eye drops

Mydriatic-cycloplegics

Atropine 1% eye drops

Cyclopentolate 1% eye drops

Tropicamide 1% eye drops

### **Suggested Reading List:**

1. Parson diseases of Eye. Butterworth-Heinemann; 2002.
2. Vaughan, Asbury. General Ophthalmology. McGraw-Hill Medical; 2007.
3. Akhtar M. Saleem. Clinical Ophthalmology. National Book Foundation 2007.
4. Shah, Syed Imtiaz Ali. Clinical Ophthalmology. Azam Sons, Karachi.
5. Jatoi, M. S. Clinical Ophthalmology. Farooq Kitab Ghar, Urdu Bazar, Karachi.

**Rules for House Job/Internship****1. Purpose of the House Job.**

- i. "A house job is compulsory for Registration with Pakistan Medical and Dental Council. It shall be of one year in duration, with 6 months in medicine and allied disciplines (Paediatrics included), and 6 months in surgery and allied disciplines (Gynaecology included). It must be carried out in a hospital recognized by the Pakistan Medical & Dental Council for the House Job. A house job should have a structured, and supervised training programme with opportunities for self-learning. House jobs should be evaluated and certified.
- ii. The PMDC guidelines are to appoint one house officer for 5 beds in clinical departments. The number of house officers will depend upon the work load, number of beds and number of trainers. Anesthesia will be included in Surgery and Allied, Radiology in Medicine and Allied and Pathology can be included in Both (Surgery/Medicine).
- iii. All vacancies of House Officers will be regular, and they will be provided full stipend.
- iv. The graduates of the same institution will have the first choice for selection, followed by the graduates from other institutions.
- v. No vacancy with its stipend can be shifted from one department to other departments or from one unit to another unit.
- vi. The selection will be purely according to merit and availability of positions.
- vii. Major selection will be made once a year after 1<sup>st</sup> annual, to accommodate successful candidates of 2<sup>nd</sup> annual, selection will be made only for vacant seats.
- viii. The graduates of foreign countries must be selected only if registered by PMDC.
- ix. House Job in non-teaching hospitals may be allowed only if the non-teaching hospital is affiliated to the teaching hospital to ensure curriculum and faculty supervision.
- x. The selection, posting, training, evaluation, payment of stipend must be managed by the head of the Teaching Institution through MBBS Program Committee.
- xi. The working hours of House Officer must be, day time 36 hours/ week and additional one evening and one night / week), not exceeding 80 hours / week.
- xii. All House Officers must be evaluated at the end of the year to satisfy that the House Officers have achieved the learning objectives as laid down.

## 2. The professional training standards of House Officers.

The following topics should be covered through in-service training and, where appropriate, formal educational sessions.

- a. Medical Knowledge and skills (General objectives which can be achieved in all specialities)
  - i. Generic medical knowledge and skills:
    - History taking skills
    - Physical examination and mental state assessment
    - Clinical problem-solving skills
    - The science of health and disease
    - Resuscitation techniques
    - Acute and chronic pain relief
    - Assessing the quality of care
    - Managing common acute emergencies
    - Managing terminal illness and bereavement
    - Prescribing practices according to Rational Drug Use
    - Evidence-based practice
  - ii. Specialty-specific knowledge and skills as defined by the relevant specialty.
  - iii. Professional standards and legal matters:
    - The PMDC's guidelines for Good Medical Practice
    - The ethical and legal aspects of medical practice
- b. Attitudes and Values
  - i. Personal attitudes:
    - Maintaining attitudes and conduct appropriate to a high level of medical practice
    - Recognizing personal limitations and the need for a second opinion from, or the help of, a colleague
    - Recognizing the obligation to teach others, particularly doctors in training and patients
    - A commitment to continuing professional development and lifelong learning
  - ii. Social attitudes:
    - Sensitivity to the social, psychological and personal needs of patients and colleagues
    - The practice of medicine in a multi-cultural society
    - The promotion of health and prevention of illness
- c. General skills
  - i. Communication skills:
    - Developing the ability to communicate sensitively with patients and colleagues, verbally and in writing

- Understanding medical informatics and the use that can be made of IT systems to collect and store data, inform practice and communicate information.
- ii. Managerial and organizational skills:
  - Effective triage and coordination of care
  - Using resources efficiently and cost-effectively
  - Managing problems according to cultural preferences of the patient
  - Understanding the principles of clinical audit and self-assessment
  - Developing appraisal techniques and performance review skills
- iii. Personal development:
  - Developing the skills for successful team-working
  - Developing leadership skills
  - Learning teaching skills...

**COMPULSORY COURSES IN ENGLISH FOR BS  
(4-YEAR) IN BASIC & SOCIAL SCIENCES**

**English I (Functional English)**

**Objectives:** Enhance language skills and develop critical thinking.

**Course Contents**

Basics of Grammar  
Parts of speech and use of articles  
Sentence structure, active and passive voice  
Practice in unified sentence  
Analysis of phrase, clause and sentence structure  
Transitive and intransitive verbs  
Punctuation and spelling

**Comprehension**

Answers to questions on a given text

**Discussion**

General topics and every-day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students)

**Listening**

To be improved by showing documentaries/films carefully selected by subject teachers

**Translation skills**

**Urdu to English**

**Paragraph writing**

Topics to be chosen at the discretion of the teacher

**Presentation skills**

Introduction

*Note: Extensive reading is required for vocabulary building*

**Recommended books:**

1. **Functional English**
  - a) Grammar
    1. Practical English Grammar by A. J. Thomson and A. V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492
    2. Practical English Grammar by A. J. Thomson and A. V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506

- b) Writing
  - 1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Françoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.
- c) Reading/Comprehension
  - 1. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.
- d) Speaking

## **English II (Communication Skills)**

**Objectives:** Enable the students to meet their real life communication needs.

### **Course Contents**

#### **Paragraph writing**

Practice in writing a good, unified and coherent paragraph

#### **Essay writing**

Introduction

#### **CV and job application**

Translation skills

Urdu to English

#### **Study skills**

Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

#### **Academic skills**

Letter/memo writing, minutes of meetings, use of library and internet

#### **Presentation skills**

Personality development (emphasis on content, style and pronunciation)

*Note: documentaries to be shown for discussion and review*

### **Recommended Books:**

#### **Communication Skills**

- a) Grammar



1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.
- b) Writing
1. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Françoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 45-53 (note taking).
  2. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).
- c) Reading
1. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.
  2. Reading and Study Skills by John Langan
  3. Study Skills by Richard York.

### **English III (Technical Writing and Presentation Skills)**

**Objectives:** Enhance language skills and develop critical thinking

#### **Course Contents**

##### **Presentation skills**

##### **Essay writing**

Descriptive, narrative, discursive, argumentative

##### **Academic writing**

How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

##### **Technical Report writing**

##### **Progress report writing**

*Note: Extensive reading is required for vocabulary building*

#### **Recommended Books:**

Technical Writing and Presentation Skills

- a) Essay Writing and Academic Writing

1. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).
2. College Writing Skills by John Langan. Mc-Graw-Hill Higher Education. 2004.
3. Patterns of College Writing (4<sup>th</sup> edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.

b) Presentation Skills

c) Reading

The Mercury Reader. A Custom Publication. Compiled by northern Illinois University. General Editors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharon. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).

## Pakistan Studies (Compulsory)

### Introduction/Objectives:

- Develop vision of historical perspective, government, politics, contemporary Pakistan, ideological background of Pakistan.
- Study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan.

### Course Outline:

#### 1. Historical Perspective

- a. Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah.
- b. Factors leading to Muslim separatism
- c. People and Land
  - i. Indus Civilization
  - ii. Muslim advent
  - iii. Location and geo-physical features.

#### 2. Government and Politics in Pakistan

Political and constitutional phases:

- a. 1947-58
- b. 1958-71
- c. 1971-77
- d. 1977-88
- e. 1988-99
- f. 1999 onward

#### 3. Contemporary Pakistan

- a. Economic institutions and issues
- b. Society and social structure
- c. Ethnicity
- d. Foreign policy of Pakistan and challenges
- e. Futuristic outlook of Pakistan

### Books Recommended:

1. Burki, Shahid Javed. *State & Society in Pakistan*, The Macmillan Press Ltd, 1980.
2. Akbar, S. Zaidi. *Issue in Pakistan's Economy*. Karachi: Oxford University Press, 2000.
3. S. M. Burke and Lawrence Ziring. *Pakistan's Foreign policy: An Historical analysis*. Karachi: Oxford University Press, 1993.
4. Mehmood, Safdar. *Pakistan Political Roots & Development*. Lahore, 1994.
5. Wilcox, Wayne. *The Emergence of Bangladesh.*, Washington: American Enterprise, Institute of Public Policy Research, 1972.
6. Mehmood, Safdar. *Pakistan Kayyun Toota*, Lahore: Idara-e-Saqafat-e-Islamia, Club Road, nd.

7. Amin, Tahir. *Ethno - National Movement in Pakistan*, Islamabad: Institute of Policy Studies, Islamabad.
8. Ziring, Lawrence. *Enigma of Political Development*. Kent England: WmDawson & sons Ltd, 1980.
9. Zahid, Ansar. *History & Culture of Sindh*. Karachi: Royal Book Company, 1980.
10. Afzal, M. Rafique. *Political Parties in Pakistan*, Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.
11. Sayeed, Khalid Bin. *The Political System of Pakistan*. Boston: Houghton Mifflin, 1967.
12. Aziz, K. K. *Party, Politics in Pakistan*, Islamabad: National Commission on Historical and Cultural Research, 1976.
13. Muhammad Waseem, *Pakistan Under Martial Law*, Lahore: Vanguard, 1987.
14. Haq, Noor ul. *Making of Pakistan: The Military Perspective*. Islamabad: National Commission on Historical and Cultural Research, 1993.

## ISLAMIC STUDIES (Compulsory)

### Objectives:

This course is aimed at:

- 1 To provide Basic information about Islamic Studies
- 2 To enhance understanding of the students regarding Islamic Civilization
- 3 To improve Students skill to perform prayers and other worships
- 4 To enhance the skill of the students for understanding of issues related to faith and religious life.

### Detail of Courses:

#### Introduction to Quranic Studies

- 1) Basic Concepts of Quran
- 2) History of Quran
- 3) Uloom-ul-Quran

#### Study of Selected Text of Holly Quran

- 1) Verses of Surah Al-Baqra Related to Faith (Verse No-284-286)
- 2) Verses of Surah Al-Hujrat Related to Adab Al-Nabi (Verse No-1-18)
- 3) Verses of Surah Al-Mumanoon Related to Characteristics of faithful (Verse No-1-11)
- 4) Verses of Surah al-Furqan Related to Social Ethics (Verse No.63-77)
- 5) Verses of Surah Al-Inam Related to Ihkam (Verse No-152-154)

#### Study of Selected Text of Holly Quran

- 1) Verses of Surah Al-Ihzab Related to Adab al-Nabi (Verse No.6,21,40,56,57,58.)
- 2) Verses of Surah Al-Hashar (18,19,20) Related to thinking, Day of Judgment
- 3) Verses of Surah Al-Saf Related to Tafakar, Tadabar (Verse No-1,14)

#### Seerat of Holy Prophet (S.A.W) I

- 1) Life of Muhammad Bin Abdullah ( Before Prophet Hood)
- 2) Life of Holy Prophet (S.A.W) in Makkah
- 3) Important Lessons Derived from the life of Holy Prophet in Makkah

#### Seerat of Holy Prophet (S.A.W) II

- 1) Life of Holy Prophet (S.A.W) in Madina
- 2) Important Events of Life Holy Prophet in Madina
- 3) Important Lessons Derived from the life of Holy Prophet in Madina

#### Introduction To Sunnah

- 1) Basic Concepts of Hadith

- 2) History of Hadith
- 3) Kinds of Hadith
- 4) Uloom –ul-Hadith
- 5) Sunnah & Hadith
- 6) Legal Position of Sunnah

## **Selected Study from Text of Hadith**

### **Introduction To Islamic Law & Jurisprudence**

- 1) Basic Concepts of Islamic Law & Jurisprudence
- 2) History & Importance of Islamic Law & Jurisprudence
- 3) Sources of Islamic Law & Jurisprudence
- 4) Nature of Differences in Islamic Law
- 5) Islam and Sectarianism

### **Islamic Culture & Civilization**

- 1) Basic Concepts of Islamic Culture & Civilization
- 2) Historical Development of Islamic Culture & Civilization
- 3) Characteristics of Islamic Culture & Civilization
- 4) Islamic Culture & Civilization and Contemporary Issues

### **Islam & Science**

- 1) Basic Concepts of Islam & Science
- 2) Contributions of Muslims in the Development of Science
- 3) Quran & Science

### **Islamic Economic System**

- 1) Basic Concepts of Islamic Economic System
- 2) Means of Distribution of wealth in Islamic Economics
- 3) Islamic Concept of Riba
- 4) Islamic Ways of Trade & Commerce

### **Political System of Islam**

- 1) Basic Concepts of Islamic Political System
- 2) Islamic Concept of Sovereignty
- 3) Basic Institutions of Govt. in Islam

### **Islamic History**

- 1) Period of Khlaft-E-Rashida
- 2) Period of Ummayyads
- 3) Period of Abbasids

### **Social System of Islam**

- 1) Basic Concepts Of Social System Of Islam
- 2) Elements Of Family
- 3) Ethical Values Of Islam

### **Reference Books:**

- 1) Hameed ullah Muhammad, "Emergence of Islam" , IRI,

Islamabad

- 2) Hameed ullah Muhammad, "Muslim Conduct of State"
- 3) Hameed ullah Muhammad, 'Introduction to Islam
- 4) Mulana Muhammad Yousaf Islahi,"
- 5) Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law" leaf Publication Islamabad, Pakistan.
- 6) Ahmad Hasan, "Principles of Islamic Jurisprudence" Islamic Research Institute, International Islamic University, Islamabad (1993)
- 7) Mir Waliullah, "Muslim Jrisprudence and the Quranic Law of Crimes" Islamic Book Service (1982)
- 8) H. S. Bhatia, "Studies in Islamic Law, Religion and Society" Deep & Deep, Publications New Delhi (1989)
- 9) Dr. Muhammad Zia-ul-Haq, "Introduction to Al Sharia Al Islamia" Allama Iqbal Open University, Islamabad (2001)

*Note: One course will be selected from the following six courses of Mathematics.*

**COMPULSORY MATHEMATICS  
COURSES FOR BS (4-YEAR)**

**(FOR STUDENTS NOT MAJORING IN  
MATHEMATICS)**

**1. MATHEMATICS I (ALGEBRA)**

**Prerequisites:** Mathematics at secondary level

**Credit Hours:** 3 + 0

**Specific Objectives of the Course:** To prepare the students, not majoring in mathematics, with the essential tools of algebra to apply the concepts and the techniques in their respective disciplines.

**Course Outline:**

*Preliminaries:* Real-number system, complex numbers, introduction to sets, set operations, functions, types of functions.

*Matrices:* Introduction to matrices, types, matrix inverse, determinants, system of linear equations, Cramer’s rule.

*Quadratic Equations:* Solution of quadratic equations, qualitative analysis of roots of a quadratic equations, equations reducible to quadratic equations, cube roots of unity, relation between roots and coefficients of quadratic equations.

*Sequences and Series:* Arithmetic progression, geometric progression, harmonic progression.

*Binomial Theorem:* Introduction to mathematical induction, binomial theorem with rational and irrational indices.

*Trigonometry:* Fundamentals of trigonometry, trigonometric identities.

**Recommended Books:**

Dolciani MP, Wooton W, Beckenback EF, Sharron S, *Algebra 2 and Trigonometry*, 1978, Houghton & Mifflin,

Boston (suggested text)

Kaufmann JE, *College Algebra and Trigonometry*, 1987, PWS-Kent Company, Boston



Swokowski EW, *Fundamentals of Algebra and Trigonometry* (6<sup>th</sup> edition), 1986, PWS-Kent Company, Boston

## 2. MATHEMATICS II (CALCULUS)

**Prerequisites:** Mathematics I (Algebra)

**Credit Hours:** 3 + 0

**Specific Objectives of the Course:** To prepare the students, not majoring in mathematics, with the essential tools of calculus to apply the concepts and the techniques in their respective disciplines.

### Course Outline:

*Preliminaries:* Real-number line, functions and their graphs, solution of equations involving absolute values, inequalities.  
*Limits and Continuity:* Limit of a function, left-hand and right-hand limits, continuity, continuous functions.

*Derivatives and their Applications:* Differentiable functions, differentiation of polynomial, rational and transcendental functions, derivatives.

*Integration and Definite Integrals:* Techniques of evaluating indefinite integrals, integration by substitution, integration by parts, change of variables in indefinite integrals.

### Recommended Books:

Anton H, Bevens I, Davis S, *Calculus: A New Horizon* (8<sup>th</sup> edition), 2005, John Wiley, New York

Stewart J, *Calculus* (3<sup>rd</sup> edition), 1995, Brooks/Cole (suggested text)

Swokowski EW, *Calculus and Analytic Geometry*, 1983, PWS-Kent Company, Boston

Thomas GB, Finney AR, *Calculus* (11<sup>th</sup> edition), 2005, Addison-Wesley, Reading, Ma, USA

## 3. MATHEMATICS III (GEOMETRY)

**Prerequisites:** Mathematics II (Calculus)

**Credit Hours:** 3 + 0

**Specific Objectives of the Course:** To prepare the students, not majoring in mathematics, with the essential tools of geometry to apply the concepts and the techniques in their respective disciplines.

### Course Outline:

*Geometry in Two Dimensions:* Cartesian-coördinate mesh, slope of a line, equation of a line, parallel and perpendicular lines, various forms of equation

of a line, intersection of two lines, angle between two lines, distance between two points, distance between a point and a line.

*Circle*: Equation of a circle, circles determined by various conditions, intersection of lines and circles, locus of a point in various conditions.

*Conic Sections*: Parabola, ellipse, hyperbola, the general-second-degree equation

**Recommended Books:**

Abraham S, *Analytic Geometry*, Scott, Freshman and Company, 1969

Kaufmann JE, *College Algebra and Trigonometry*, 1987, PWS-Kent Company, Boston

Swokowski EW, *Fundamentals of Algebra and Trigonometry* (6<sup>th</sup> edition), 1986, PWS-Kent Company, Boston