

RAWALPINDI MEDICAL UNIVERSITY



**STUDY GUIDE MD HAEMATOLOGY
PROGRAMME**

PREFACE

The horizons of *Medical Education* are widening & there has been a steady rise of global interest in *Post Graduate Medical Education*, an increased awareness of the necessity for experience in education skills for all healthcare professionals and the need for some formal recognition of postgraduate training in HAEMATOLOGY.



We are seeing a rise in the uptake of places on postgraduate courses in medical education, more frequent issues of medical education journals and the further development of e-journals and other new online resources. There is therefore a need to provide active support in *Post Graduate Medical Education* for a larger, national group of colleagues in all specialties and at all stages of their personal professional development. If we were to formulate a statement of intent to explain the purpose of this curriculum we might simply say that our aim is to help clinical colleagues to teach and to help students to learn in a better and advanced way. This book is a state of the art book with representation of all activities of the **MD Haematology** program at RMU. Curriculum is incorporated in the book for convenience of supervisors and residents. MD curriculum is based on six Core Competencies of ACGME (*Accreditation Council for Graduate Medical Education*) including *Patient Care, Medical Knowledge, System Based Practice, Practice Based Learning, Professionalism, Interpersonal and Communication Skills*. The mission of Rawalpindi Medical University is to improve the health of the communities and we serve through education, biomedical research and health care. As an integral part of this mission, importance of research culture and establishment of a comprehensive research structure and research curriculum for the residents has been formulated and provided in this book.

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The document has been designed and compiled by Dr Shabih Haider (MBBS. MPHIL Haematology, CHPE) along with Dr Javeria Qaiser and Dr Sara Rafi under my supervision.

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INTRODUCTION TO UNIVERSITY

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

The founder principal of RMC worked hard to establish the institution. First Rawalian Principal, Prof. Mohammad Umar after taking over the office in 2013, started working on multi-dimensional approach to further develop the institution.

Since 1974 more than 7900 students have graduated and are serving nationally and internationally. RMC was privileged to claim top positions in university examination several times. Best of the best graduate in UHS is also a Rawalian.

Because of the untiring and dedicated efforts of Prof. Muhammad Umer Rawalpindi Medical College was upgraded to Rawalpindi Medical University recently by Government of Punjab, Health Department on 6th May 2017. Higher Education Commission has given NOC to RMU. The institute has strived to be upgraded to the level of an independent University after which the annual system of MBBS degree has been changed to the internationally preferred modular system.

Now after the successful launching of MD/MS program by VC RMU in various fields, we are struggling hard to get the MD Hematology Program approved.

RMU MISSION STATEMENT

- To impart evidence-based research oriented medical education
- To provide best possible patient care
- To inculcate the values of mutual respect and ethical practice of medicine

VISION AND VALUES

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

SECTION-1: INTRODUCTION

1.1 INTRODUCTION TO THE MD HAEMATOLOGY PROGRAMME

Hematology is essential branch of pathology that encompasses a broad spectrum of conditions ranging from anemia, leukemia, lymphoma, and bleeding disorders to various types of blood cancers. No diagnosis is complete without the test involving it.

Haematology department is well established and well equipped with the latest equipment and techniques including routine and specialized Haematology tests since 2006.

The Haematology department is headed by Prof Dr. Mobina Ahsan. She is looking after the teaching as well as diagnostic aspects. The following courses are being run in the specialty:

1. MBBS (3rd & 4th year).
2. MLT B.Sc. (HONS) 2nd year and 4th year.
3. Research of advance clinical Haematology subject of 4th year MLT B.Sc. (HONS).
4. FCPS Diagnostic Haematology
5. Rotational classes of FCPS, MCPS and M. Phil students.
6. M.Phil. Haematology

The MD program in Hematology typically spans over a duration of four years, during which medical graduates receive comprehensive training in both theoretical knowledge and practical skills necessary for the field. The curriculum covers various aspects of hematology, including hematopoiesis, blood coagulation, immunology, transfusion medicine, and molecular biology techniques relevant to hematology diagnostics.

Students pursuing MD in Hematology undergo rigorous clinical rotations in hematology departments, laboratories, and specialized clinics, where they gain hands-on experience in the diagnosis and management of hematological disorders under the guidance of experienced hematologists. They learn to interpret blood smears, bone marrow biopsies, and other diagnostic tests essential for evaluating hematological conditions.

1.2 MISSION STATEMENT

Our mission is to train Post Graduates of Haematology with excellent ability to teach, research and deal with daily laboratory work in the field of Haematology effectively and efficiently at National, International and Regional levels.

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

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

1.3 CAREER PROSPECTS IN HAEMATOLOGY

For successful postgraduates of the course, research opportunities in areas such as quality control, formulation research, clinical research, analytical development, and new drug development. They can also have jobs in research organizations and higher education institutions.

The course is designed to offer eligible candidates, adequate medical research training relevant to the present medical, educational, social and economic objectives of the country. To increase the number of haematologist who can play an important role in the quality assurance of labs standardization of routine and special chemistry tests and also standardization of blood banks. Enrolled students will be trained to write research reports through a curriculum aimed at augmenting their skills of data presentation in graphical form and carry out independent research and teaching of undergraduates of BS(Hons) and MBBS and post graduates. On the completion of master degree scholars should submit their thesis and then they deserve the respective degree. Professionally, such postgraduates have the option of pursuing relevant career opportunities in the hospitals, research and clinical laboratories, higher education institutions, pharmaceutical companies and biotechnology-based companies.

1.3.1 Sites for Critical Appraisal

1. Standardization of routine, emergency and specialized Haematology tests.
2. Quality assurance in clinical laboratory practice.
3. Specialized Haematology.
 - a. Cytochemical staining.
 - b. Immunophenotyping / Flowcytometry
 - c. Molecular studies

SECTION-2: GENERAL

2.1 STATUTES OF THE PROGRAMME

2.1.1 Nomenclature

Name of the degree shall be MD Haematology, a well-recognized degree for the decades.

2.1.2 Course Title

Doctor of Medicine Haematology

2.1.3 Training Centre

Allied Hospitals of Rawalpindi Medical University.

Infrastructure

The department of Pathology, RMU occupies 2 laboratories (Experimental lab & Research Lab), 2 lecture halls with seating capacity of 300 students per hall and 06 rooms for offices with the following details:

Chairperson's Room	01
Female Staff Room	01
Male Staff Room	01
Conference Room	01
Support Staff Room	01

Departmental library present with 750 books approximately & 1000 microscopic slides app. We have well equipped diagnostic laboratories in all of our RMU Allied Hospitals where FCPS haematology students are getting their training for the last 18 years. There are two well-established diagnostic Haematology laboratories in Rawalpindi Medical University allied hospitals.

1. Holy Family Hospital.
2. Benazir Bhutto Hospital.

2.1.4 Duration of the programme

The duration of MD Haematology course will be 04 years programme with structured training in a recognized department under the guidance of an approved supervisor.

2.1.5 Course structure

Training pathway and Rotation

Year of Training	Rotations	Assessment
1 st year	<ul style="list-style-type: none">• Haematology (40 weeks)• Internal Medicine (12 weeks)	MCQs, Practical
2 nd year	<ul style="list-style-type: none">• Histopathology (8 weeks)• Microbiology (8 weeks)• Chemical pathology (8 weeks)• Paediatrics (12 weeks)• Haematology (16 weeks)	MCQs Practical
3 rd Year	<ul style="list-style-type: none">• Blood banking (12 weeks)• Oncology (12 weeks)• Haematology (28 weeks)	MCQs Practical
4 th Year	<ul style="list-style-type: none">• Haematology	MCQs SEQs Practical Thesis defense

2.2.6 Developmental Milestones for MD Haematology Program at Rawalpindi Medical University

This document presents milestones designed for programs to use in semi-annual review of resident performance and reporting to the ACGME. Milestones are knowledge, skills, attitudes, and other attributes for each of the ACGME competencies organized in a developmental framework from less to more advanced. They are descriptors and targets for resident performance as a resident moves from entry into Histopathology residency through graduation. In the initial years of implementation, the Review Committee will examine milestone performance data for each program's residents as one element in the Next Accreditation System (NAS) to determine whether residents overall are progressing. For each reporting period, review and reporting will involve selecting the level of milestones that best describes each resident's current performance level in relation to milestones. Milestones are arranged into numbered levels. Selection of a level implies that the resident substantially demonstrates the milestones in that level, as well as those in lower levels. A general interpretation of levels for Haematology is below:

Level 1: The resident demonstrates milestones expected of one who has had some education in Haematology.

Level 2: The resident is advancing and demonstrating additional milestones.

Level 3: The resident continues to advance and demonstrate additional milestones; the resident consistently demonstrates the majority of milestones targeted for residency.

Level 4: The resident has advanced so that he or she now substantially demonstrates the milestones targeted for residency. This level is designed as the graduation target.

Level 5: The resident has advanced beyond performance targets set for residency and is demonstrating "aspirational" goals which might describe the performance of someone who has been in practice for several years. It is expected that only a few exceptional residents will reach this level.

Milestone levels

Milestones for High level outcome	End of Year 1	End of Year 2	End of Year 3	End of Year 4
Patient care and technical skills	L2	L3	L4	L5
Medical knowledge	L 2	L 3	L 4	L 5
Professionalism	L 1	L 2	L 3	L 4
Interpersonal and communication skills	L 2	L 2	L 3	L 5
System based practice	L 2	L 2	L 3	L 4
Practice based learning and improvement	L 1	L 2	L 3	L 5

2.2 FACULTY OF PATHOLOGY DEPARTMENT

2.2.1 Faculty of Haematology

Sr. No	Faculty Member	Qualification	Designation	Department
1	Professor Dr Mobina Ahsan Dodhy	MBBS (1985) DCP (1992) FCPS (1998) MHPE (2021)	Professor	RMU, Rawalpindi
2	Dr Shabeeh Haider	MBBS (2015) M.Phil. (2019) CHPE (2024)	Senior Lecturer	RMU, Rawalpindi
3	Dr. Sarah Rafi	MBBS (2009) FCPS (2019)	Senior Lecturer	RMU, Rawalpindi
4	Dr. Javeria Qaisar	MBBS (2004) FCPS (2017)	APWMO	Holy Family Hospital

2.2.2 Faculty of Chemical Pathology

Sr. No	Faculty Member	Qualification	Designation	Department
1	Dr. Wafa Omer	MBBS, MPhil, PhD	Professor	RMU, Rawalpindi
2	Dr. Fatima tuz Zuhra	MBBS. MPhil	Assistant Professor	RMU, Rawalpindi
3	Dr Noreen Atzaz	MBBS, MCPS, MPhil	APWMO	BBH, Rawalpindi
4	Dr. Asma Nafeesa	PhD	Lecturer/ Biochemist	BBH, Rawalpindi

2.2.3 Faculty of Histopathology

Sr.no.	Faculty	Qualification	Designation	Department
1	Dr Mudassira Zahid	MBBS, FCPS	Associate professor	RMU, Rawalpindi
4	Dr Mehreen Fatima	MBBS, M.Phil	Lecturer	RMU, Rawalpindi

2.2.4 Faculty of Microbiology

Sr. No.	Faculty	Qualification	Designation	Department
1	Professor Naeem Akhtar	MBBS, PhD	Professor	RMU, Rawalpindi
2	Dr. Kiran Ahmad	MBBS, M.Phil.	APWMO	RMU, Rawalpindi
3	Dr. Rabia Anjum	MBBS, M.Phil.	Consultant Pathologist	BBH, Rawalpindi
4	Dr. Amber Habib	MBBS, M.Phil.	Consultant Pathologist	HFH, Rawalpindi

2.3 MD ELIGIBILITY CRITERIA

1. MBBS with one year house job will be required for admission in the MD.
2. If applicant is a government servant, he/she needs to produce N.O.C., from the concerned department along with the study leave, where required.

2.4 MD ADMISSION TEST

Applications for admission to MD Training Programs will be invited through advertisement in print and electronic media mentioning closing date of applications and date of Entry Examination.

1. The candidates must get 70% in subject based university test for admission in MD.
2. An interview will be held of the short-listed students.
3. Persons having 3 years experience in relevant fields shall be preferred.

2.5 REGISTRATION AND ENROLMENT

1. As per policy of Pakistan Medical Council the number of PG Trainees/ Students per supervisor shall be maximum 05 per annum for all PG programs including minor programs (if any).
2. The University will approve supervisors for MD courses.
3. Candidates selected for the courses: after their enrollment at the relevant institutions shall be registered with RMU as per prescribed Registration Regulations.

SECTION-3: COURSE CONTENTS, LEARNING OBJECTIVES AND REQUIRED COMPETENCIES.

3.1 AIMS AND OBJECTIVES OF THE PROGRAM:

The aim of four years MD programme in Haematology is to train residents to acquire the competency of a specialist in the field of Haematology so that they can become good teachers, researchers and clinicians in their specialty after completion of their training.

3.1.1 General Objectives

1. To provide a broad experience in Haematology, including its inter relationship with other disciplines.
2. To enhance medical knowledge, clinical skills, and competence in diagnostic procedures and interpretation.
3. To cultivate the correct professional attitude and enhance communication skill towards patients, their families
4. and other healthcare professionals.
5. To enhance sensitivity and responsiveness to community needs and the economics of health care delivery.
6. To enhance critical thinking, self-learning, and interest in research and development of patient service.
7. To cultivate the practice of evidence-based medicine and critical appraisal skills.
8. To inculcate a commitment to continuous medical education and professional development.
9. To provide a broad training and in-depth experience at a level for trainees to acquire competence and professionalism of a specialist in Haematology especially in the diagnosis, investigation and towards the delivery of holistic patient care.
10. To acquire competence in advising the correct and judicious investigations in acute emergencies referred by other doctors.
11. To encourage the development of skills in communication and collaboration with the community towards healthcare delivery.
12. To foster the development of skills in the critical appraisal of new methods of investigation and/or treatment.
13. To reinforce self-learning and commitment to continued updating in all aspects of Haematology.

14. To encourage contributions aiming at advancement of knowledge and innovation in Haematology through basic and/or clinical research and teaching of junior trainees and other health related professionals.
15. To acquire professional competence in training future trainees in Haematology at Rawalpindi Medical University.

3.1.2 Specific Objectives:

Core Competencies of Curriculum

Curriculum of MD Histopathology at Rawalpindi Medical University is an important document that defines the educational goals of Residency Training Program and is intended to clarify the learning objectives for all inpatient and outpatient rotations. Program requirements are based on the **ACGME (Accreditation Council for Graduate Medical Education)** standards for categorical training in Haematology. Curriculum is based on 6 core competencies. Detail of these competencies is as follows:

Competency No 1

PATIENT CARE:

Provide patient care that is compassionate, appropriate and effective.

Skills

- Gather essential and accurate information about patients.
- Develop a diagnostic plan based upon the clinical question/s and relevant clinical and pathological/ investigation-based information.
- Oversee diagnostic testing to ensure adequacy of studies performed.
- Counsel patients concerning preparation for diagnostic testing.
- Demonstrate a basic understanding of electronic patient information systems.
- Demonstrate the ability to use the Internet as an educational instrument to expand medical knowledge.
- Demonstrate knowledge of the levels of ionizing biohazard related procedures and employ measures to minimize biohazard exposure to the patient.
- Perform pathological investigations appropriately and safely, assuring that the correct examination is ordered and performed.

Education (with graduated faculty supervision and feedback)

- Practical experience in developing a differential diagnosis and investigations plan based upon clinical data, testing findings and other medical test results.
- Active participation in journal reviews to determine the effectiveness of
- Investigative tests for specific diagnostic questions
- Graduated responsibility in performing pathology related procedures.
- Didactic instruction in biohazard safety
- Preparation and presentation of rare cases to other members of the healthcare team

Assessment

- Global ratings by faculty
- 360-degree examination
- Procedure log
- Objective structured clinical examination

Competency No 2

MEDICAL KNOWLEDGE:

Residents must demonstrate knowledge about established and evolving biomedical and clinical sciences and the application of this knowledge to patient care.

Skills

- Demonstrate sufficient knowledge of medicine and apply this knowledge to pathological/investigation-based studies in a clinical context to generate meaningful differential diagnoses.
- Demonstrate progressive acquisition of pathological/investigation-based knowledge.

Education

- Demonstrate knowledge of the principles of research design and implementation
- Generate a clinically appropriate diagnostic plan.
- Demonstrate the ability to use all relevant information resources to acquire evidence-based data.
- Understand how pathology investigation equipment can be used to generate appropriate and diagnostic images.

- Didactic lectures and self-directed learning on the science and practice of Haematology
- Participation in departmental and inter-departmental case conferences
- Participation in the clinical activities of the Haematology department
- Departmental or institutional training programs on research design and implementation

Assessment

- Global ratings by faculty
- Program-developed written examinations.
- CAP in-training examination.
- Written examination
- Oral examination

Competency No 3

INTERPERSONAL AND COMMUNICATION SKILLS:

Residents must demonstrate interpersonal and communication skills that result in effective information exchange with patients, patient family members, medical students, other residents, supervising faculty, referring physicians, technologists, nurses and other members of the health care team.

Skills

- Provide a clear and informative written pathology report including a precise diagnosis whenever possible, a differential diagnosis when appropriate, and recommended follow-up or additional studies when appropriate.
- Provide direct communication to the referring physician or appropriate clinical personnel when interpretation reveals an urgent or unexpected finding and document this communication in the pathology report.
- Demonstrate effective skills of face-to-face listening and speaking with physicians, patients, patient's families and support personnel
- Demonstrate appropriate telephone communication skills.
- Demonstrate skills in obtaining informed consent, including effectiveness.
- communication to patients of the procedure, alternatives and possible complications

Education (with graduated faculty supervision and feedback)

- Participation as an active member of the Haematology team by communicating face to face with clinicians, answering the telephone, providing consultations, problem solving and decision-making.
- Act as the contact person for technologists and nurses in managing patient and testing issues.
- Active participation in preparing and moderating multi-disciplinary conferences
- Practical experience in dictating pathological/investigation-based reports.
- Record review (systematic evaluation of resident dictations)

Assessment

- Global ratings by faculty
- 360-degree evaluations
- Oral ABR examination

Competency No 4

PROFESSIONALISM:

Demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.

Skills

- Demonstrate altruism (putting the interests of patients and others above own self interest)
- Demonstrate compassion: be understanding and respectful of the patients, patient families, and staff and physicians caring for patients
- Demonstrate excellence: perform

responsibilities at the highest level

and continue active learning throughout one's career

- Be honest with patients and all members of the health care team
- Demonstrate honor and integrity: avoid conflicts of interest when accepting gifts from patients or vendors

- Interact with others without discriminating on the basis of religious, ethnic, sexual or educational differences and without employing sexual or other types of harassment
- Demonstrate knowledge of issues of impairment (i.e. physical, mental and alcohol and substance abuse), obligations for impaired physician reporting, and resources and options for care of self-impairment or impaired colleagues
- Demonstrate positive work habits, including punctuality and professional Appearance
- Demonstrate an understanding of broad principles of biomedical ethics
- Demonstrate principles of confidentiality with all information transmitted during a patient encounter
- Demonstrate knowledge of regulatory issues pertaining to the use of human subjects in research

Education

- Discussion of conflicts of interest and the ethics of conducting research during departmental or institutional conferences and daily clinical work
- Training programs (i.e. videotapes) on the issues of harassment and discrimination.
- Didactic presentations on the recognition and management of the “impaired physician”
- Participation in hospital-sponsored core curriculum educational activities (i.e.lectures, web-based programs)
- Didactic lecture/training program on the broad principles of medical ethics
- Institutional web-based self-directed learning and assessment programs on human subjects research guidelines

Assessment

- Global ratings by faculty
- 360 degree evaluations
- Conference attendance logs
- Resident self-assessment
- Written ABR examination

Competency No 5

PRACTICE BASED LEARNING AND IMPROVEMENT:

Residents must be able to investigate and evaluate their patient care practices and appraise and

assimilate scientific evidence in order to improve their pathology investigation practices.

Skills

- Analyze practice experience and perform practice-based improvement in cognitive knowledge, observational skills, formulating a synthesis and impression, and procedural skills.
- Demonstrate critical assessment of scientific literature.
- Demonstrate knowledge of and apply the principles of evidence-based medicine in practice.
- Use multiple sources, including information technology to optimize life-long learning and support patient care decisions.
- Facilitate the learning of students, peers and other health care professionals.

Education

- Participate in critical assessment of scientific literature through journal clubs, clinical conferences and independent learning.
- Didactic lectures on the assessment of scientific literature, study designs and statistical methods
- Teaching students, peers and other health care professionals, with graduated supervision and feedback from supervising faculty
- Active participation in departmental or institutional quality assurance
- (QA)/quality improvement (QI) activities with faculty supervision

Assessment

- Global ratings by faculty
- CAP in-service examination.
- Written ABR examination
- QA/QI conference attendance logs
- Global ratings by students
- Procedure log

Competency No 6

SYSTEMS BASED PRACTICE:

Demonstrate an awareness and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide optimal care.

Skills

- Demonstrate the ability to design cost-effective care plans based on knowledge of best practices
- Demonstrate knowledge of the sources of financing for National health care including

- Demonstrate knowledge of basic health care reimbursement methods
- Demonstrate knowledge of the regulatory environment including state licensing authority, state and local public health rules and regulations, and regulatory agencies.

Education

- Systematic review of appropriate literature, including current American College of Pathology (CAP) Appropriateness Criteria, to develop knowledge of evidence-based indications for testing procedures.
- Attendance and active participation in departmental and multi-disciplinary conferences where there is discussion of the testing evaluation of specific diseases and most appropriate and cost-effective methods for establishing a diagnosis.

Assessment

- Global ratings by faculty
- Written ABR examination
- CAP in-training examination
- Multi-disciplinary conference attendance logs
- Documented membership and participation in pathology

- Demonstrate knowledge of basic practice management principles such as budgeting, record keeping, medical records, and the recruitment, hiring, supervision and management of staff

- Interaction with department administrators and knowledgeable faculty to gain an understanding of the costs of diagnostic examinations and the influence of the type of payer system on reimbursement.
- Membership and active participation in local and national pathological/investigation-based societies.
- Departmental or institutional presentations on health care funding and regulation

investigation societies and other health care organization.

3.1.3 Trainee's Role and Responsibilities

- Given the provision of adequate resources by the institution, trainees should accept responsibility for his own learning and ensure that it is in accord with the relevant requirements.
- Should seek reasonable infrastructure support from their institution and Supervisor, and use this support effectively.
- Should ensure that they undertake training diligently.
- Should work with their supervisors in writing the synopsis/research proposal and submit the synopsis/research proposal within six months of registration with the RMU.
- Should accept responsibility for the research and plan and execute the research within the time limits defined.
- Should be responsible for arranging regular meetings with the supervisor to discuss any hindrances to progress and document progress etc.
- Should provide the supervisor with word-processed dated synopsis and dissertation drafts that have been checked for spelling, grammar and typographical errors, prior to submission.
- Prior to submission of dissertation, the student should ensure that the supervisor has all the raw data relevant to the thesis.
- Should submit the completed thesis before the last year of training.
- Should follow the Colleges complaint procedures if serious problems arise.
- Should complete all requirements for sitting an examination.
- Provide feedback regarding the training post to the College on the prescribed Confidential form.
- Submit yearly summary sheets of the logbooks, duly filled and signed by the Supervisor.

3.1.4 Course Content

1. Basic

- Anatomy and Physiology of Blood and Bone Marrow
- Hematopoiesis: Normal and Abnormal
- Biochemistry of Blood Components
- Immunology and Blood Disorders
- Genetics and Molecular Biology in Hematology

2. Clinical Hematology:

- Diagnosis and Management of Anemia

- Diagnosis and Management of Bleeding Disorders
 - Diagnosis and Management of Thrombotic Disorders
 - Diagnosis and Management of Hematological Malignancies (Leukemia, Lymphoma, Myeloma)
 - Diagnosis and Management of Myeloproliferative Disorders
 - Diagnosis and Management of Myelodysplastic Syndromes
 - Diagnosis and Management of Hemoglobinopathies
 - Diagnosis and Management of Platelet Disorders
 - Diagnosis and Management of Coagulation Disorders
3. Laboratory Medicine:
- Hematological Laboratory Techniques (Blood Cell Counting, Coagulation Studies, Bone Marrow Aspiration and Biopsy)
 - Interpretation of Hematological Tests
 - Blood Transfusion Medicine
 - Molecular Diagnostics in Hematology
4. Hematological Procedures:
- Bone Marrow Aspiration and Biopsy
 - fine needle aspiration Biopsy
5. Transplantation
- Hematopoietic Stem Cell Transplantation
 - Blood and Marrow Transplantation
6. Research Methodology:
- Principles of Clinical Research
 - Biostatistics
 - Research Ethics
7. Rotations to Histopathology, Chemical Pathology, Microbiology, Medicine, Paediatrics and Oncology.

Competencies in Haematology

During the period of training, a Resident acquires various skills and knowledge. The minimum level of competencies required for years are listed accordingly. It goes without saying that these competencies are "added, on". Therefore, the second year Resident will have all competencies of the 1st year and those that he/she acquires in the 2nd year. The level of competencies will also advance as the training proceeds. In the beginning the Resident will perform a skill under

supervision, subsequently that skill should be performed independently and later, the Resident should be competent enough to impart training of that skill to a junior colleague.

Course content, learning objectives and competencies to be achieved by the end of first year

- Explain of the origin, development, morphology and functions of the normal hemopoietic cells and mechanism of hemostasis.
- Outline the essential features of modern clinical and laboratory hematology and explain manifestations of blood diseases with this new knowledge of the disease process
- Red cell disorders and differential diagnosis of anemia.

Origin and development of blood cells:

Haemopoietic organs, Haemopoietic stem cell, Haemopoietic growth factors and Functions of action Receptors

Erythrocyte:

- Erythropoiesis (stages, genetic control and mechanism)
- Biosynthesis of haemoglobin (Globin synthesis and Heam synthesis)
- Normal red cell metabolism, red cell membrane
- Functions of red cells and haemoglobin and oxygen dissociation curve.

Leucocytes:

- Development , morphology and Functions of leucocytes

Platelets and Megakaryocytes:

- Development, Structure and Functions

Coagulation

- Blood Coagulation (Haemostasis, Control of coagulation)
- Endothelium and its role in Hemostasis

Anemias:

- General features
- Diagnostic approach to Anemias

Iron Deficiency Anemias:

- Iron Metabolism
- Etiology and Pathogenesis
- Clinical Features
- Lab. Diagnosis

Megaloblastic Anemias:

- Vit. B12 and folic acid metabolism
- Etiology and pathogenesis
- Clinical features
- Lab Diagnosis
- Treatment

Anemias of Chronic Disorders :

- Chronic Infections
- Renal Disease
- Liver Disease
- Malignant Disease
- Endocrine Disease

Sideroblastic Anemias:

- Classification
- Pathogenesis
- Lab. Diagnosis

Hemolytic Anemias:

- Classification
- General features
- Red Cell Membrane Defects (HS, HE)
- Enzymopathies (esp. G-6 PD, PK deficiency)
- Immune Hemolytic Anemias
- Paroxysmal Nocturnal haemoglobinuria
- Acquired Haemolytic Aneamias due to drugs, chemicals, physical agents

Haemoglobins Disorders:

- Classification
- Prevalence
- Genetic Mechanism
- Pathophysiology
- Diagnosis
- Genetic counselling
- Treatment

Aplastic Anemia / Bonemarrow Failure Syndromes:

- Inherited
- Acquired

Haemochromatosis and Porphyrrias:

- Etiology
- Clinical Features
- Diagnosis

Anemia of Pregnancy

Anemia of Infants and Children

Lab Work:

- Specimen collection and anticoagulants used.
- Reference ranges and normal values
- Laboratory organization and management
- Quality assurance
- Basic haematological investigations techniques
- Full blood count
- Preparation of peripheral smears and staining methods
- Reticulocyte count
- Principles of Automation in haematology
- Normal Blood cell morphology
- Red Blood cell morphology in
 - Iron deficiency anemia
 - Megaloblastic anemia
 - Anemia of chronic disorders
 - Sideroblastic anemias
- Red cell cytochemistry
 - Perls' stain
- Identification of malarial parasite and other hemoparasites
- Laboratory methods for investigation for Hemolytic anemias
- Investigations for Hereditary Hemolytic anemias
- Hb Electrophoresis
- Osmotic Fragility test
- Detection of enzyme deficiencies in Hereditary Hemolytic anemias

- Investigations of abnormal hemoglobins and thalassaemias.
- Haemoglobin electrophoresis
- Sickling test
- HbF estimation
- Coomb's Test direct and indirect
- Serological investigation of the auto-immune and drug-induced immune haemolytic anaemias
- Bone marrow morphology in aplastic anemia

Teaching Strategies

- Seminars
- Interactive sessions
- Assignments
- Directed Self Learning
- Review of literature
- Group discussion
- Journal club
- Workshops
- Presentations
- Quiz

Books Recommended:

1. Wintrobe's Clinical Hematology G.R. Lee, T. C. Bithell, J Foerster, J. W. Athens, J. N. Lukens.
2. Post Graduate Haematology. A.V. Hoffbrand, D. Catovsky, E.G.D. Tuddenham.
3. Practical Hematology. Sir J. V. Dacie & S. M. Lewis

Course content, learning objectives and competencies to be achieved by the end of second year

Microbiology Rotation:

- Learning different staining procedures. a. Gram staining b. AFB staining
- How to prepare different medias
- Sterilization procedures and working of Autoclaves
- Quality control of microbiological tests

- Handling specimen, learning of proper specimen collection techniques, How to proceed with different specimen systemically
- Inoculating culture plates, putting up different biochemical tests , sensitivity and interpreting the results along with microbiologist.
- Performing different serological tests based on the principles of Ag-Ab reaction.
- Develop an understanding of the principle and working of ELISA technique.
- Urine analysis, stool examination, fluid Analysis.
- Submission of a written assignment on the topic designated at the end of rotation.

Teaching Strategies

- Interactive Lectures
- Small group discussions
- Presentations
- Demonstrations
- Laboratory techniques practice
- Assignments
- Seminars

Books Recommended:

- 1. Jawetz Melnick & Adelbergs Medical Microbiology, 27th Edition
Authors: Geo. Brooks, Karen C. Carroll, Janet Butel and Stephen Morse
- 2. Bailey & Scott's Diagnostic Microbiology, 14th Edition

Chemical Pathology Rotation:

- Putting up different manual tests routinely
- Practice accurate pipetting using rubber teats.
- Learning proper specimen collection and plasma separation technique.
- Develop an understanding regarding working and principles of Auto analyzers.
- Learning the maintenance of quality control in the lab.
- Chemical correlation of abnormal results.

Teaching Strategies

- Interactive Lectures
- Small group discussions

- Presentations
- Demonstrations
- Laboratory techniques practice
- Assignments
- Seminars

Books Recommended:

1. Clinical Chemistry Michael I. Bishop
2. Clinical Chemistry and Molecular Diagnostics Norbert W. Teitz
3. Clinical Chemistry William J Marshal

Histopathology Rotation:

- Handling of specimen.
- Gross examination of specimens.
- Section cutting under the guidance of histopathologist.
- Learning the different steps of tissue processing.
- Learn process of frozen section.
- Routine H & E Staining.
- Special Staining Procedures.
- Fine needle aspiration biopsy

Teaching Strategies

- Interactive Lectures
- Small group discussions
- Presentations
- Demonstrations
- Laboratory techniques practice
- Assignments
- Seminars

Haematology

Disorders of platelets

- Classification
- Pathophysiology, Lab diagnosis, differential diagnosis and treatment of quantitative defects of Platelets.

- Qualitative Abnormalities of Platelets
- Bleeding Disorders due to Vascular Defects

Coagulation Disorders

- Inherited coagulation disorder, esp. Haemophilia A, Haemophilia B, von Willibrand Disease
- Acquired Coagulation disorders, DIC and Fibrinolysis.
- Deficiency of Vit K-dependent factors, PIVKA
- Coagulation defect in systemic diseases.
- Pathologic inhibitors of coagulation
- Other factors affecting coagulation

Thrombosis

- Inherited Thrombophilia
- Acquired Thrombophilia

Lab Work:

- Platelet count
- Bleeding Time
- Clotting Time
- Prothrombin time
- Activated Partial Thromboplastin Time
- INR
- Thrombin Time
- FDPs
- Fibrinogen level
- Mixing studies
- Clotting factor levels
- Thrombophilia profile
- Lupus anticoagulant
- Quality control and management of Hemostatic investigations.
- Bone marrow aspiration and trephine biopsy.

Teaching Strategies

- Seminars
- Interactive sessions
- Assignments

- Directed Self Learning
- Review of literature
- Group discussion
- Journal club
- Workshops
- Presentations
- Quiz

Course content, learning objectives and competencies to be achieved at the end of third year

- Student deal with the non-neoplastic disorders of leukocytes as well as general and some specific aspects of Hemoncology.
- After the completion of this course the students will acquire knowledge of the non-neoplastic white cells disorders including HIV disease.

Non-malignant Disorders of Leucocytes:

- Variation of leucocytes in disease
- Neutropenia
- Qualitative disorder of leucocytes
- Lysosomal storage disease
- Langerhan's cell histiocytosis
- Haematological aspect of AIDS

Disorders of the Spleen:

- Anatomy
- Functions
- Splenomegaly -Etiology
- Splenectomy
 - Indications
 - Complications

Immunology:

- General features of immune system
- Cells and tissues of the immune system
- Innate and adaptive immunity

- Disorders of the immune system
- Autoimmune diseases
- Immunological deficiency syndromes

Stem cell Transplantation

- Indication
- Types
- Complication

Lab Work:

- Differential Leukocyte Count in various diseases
- Bone marrow morphology in Gaucher's disease
- Hematological features of hypersplenism
- Hematological findings in splenectomy

Seminars:

- Neutrophil disorders and their management
- Cell morphology – peripheral blood & bone marrow
- The hematological features of HIV infection

Teaching Strategies

- Seminars
- Interactive sessions
- Assignments
- Directed Self Learning
- Review of literature
- Group discussion
- Journal club
- Workshops
- Presentations
- Quiz

Books Recommended:

Students will consult the relevant sections of the following books

1. Wintrobe's Clinical Hematology G.R. Lee, T. C. Bithell, J Foerster, J. W. Athens, J. N. Lukens.
2. Post Graduate Haematology. A.V. Hoffbrand, D. Catovsky, E.G.D. Tuddenham.

3. Practical Hematology. Sir J. V. Dacie & S. M. Lewis
4. Bone Marrow Pathology Barbra J. Bain.

Blood Banking

Course Description and Learning Objectives:

This course is designed to encompass the diagnostic and clinical aspects of blood transfusion.

After the completion of this course students will be able to

- Describe of red cell antigens and anti-bodies.
- Outline all aspects of clinical blood transfusion including blood component therapy, blood transfusion reactions and prevention of blood transfusion transmissible diseases

Course Contents:

- Red Cell Immunohematology
- Clinical Blood Transfusion
- Blood Donor selection
- Storage of blood components
- Blood Components
- Appropriate use of blood and components
- Blood transfusion reaction
- Antibody identification
- Quality control in blood banking

Lab Work:

- ABO grouping
- Rh grouping
- Cross match test
- Anti body screening
- Special compatibility tests
- Tests for transfusion reactions
- Titration of antibodies
- Tests for ABO Hemolytic disease of new born

Seminars:

- New technologies for red cell serology
- Structural and functional diversity of blood group antigens
- Guidelines on hospital blood bank documentation and procedures

- Guidelines for the clinical use of blood cell separators
- Guidelines of the administration of blood and blood components and the management of transfused patients

Teaching strategies

- Seminars
- Interactive sessions
- Assignments
- Directed Self Learning
- Review of literature
- Group discussion
- Journal club
- Workshops
- Presentations
- Quizzes

Books Recommended:

1. Blood Transfusion in Clinical Medicine. P.L. Mollison, C.P. Engelfiret, M. Contrás.
2. Post Graduate Haematology. A.V. Hoffbrand, D. Catovsky, E.G.D. Tuddenham.
3. Practical Hematology. Sir J. V. Dacie & S. M. Lewi

Couse content, learning objectives and competencies to be achieved at the end of fourth year.

- They will also be well versed in the molecular basis, cytogenetics and immuno diagnosis of leukemia and lymphoma.
- The students will be expected to have in depth knowledge of Acute leukemia and Myelodysplastic Syndromes and skills for their diagnosis

Aetiology, Genetics and Management of Haematological Malignancies:

- Molecular Basis of Leukemia and Lymphoma
- Cytogenetics of Leukemia andLymphoma
- Immuno Diagnosis of Leukemia and Lylmphoma
- Management of Haematological malignancies

Acute Leukemias:

- Classification and Diagnosis

- Acute Myeloid Leukemia
- Childhood Acute Lymphoblastic Leukemia
- Adult Acute Lymphoblastic Leukemia

Myelodysplastic Syndromes

Myeloproliferative Disorders :

- Chronic myeloid leukaemias
- Polycythaemia vera
- Myelofibrosis
- Essential thrombocythemia

Lymphoproliferative Disorders :

- Chronic lymphocytic leukaemia
- Non-Hodgkin's lymphoma
- Hodgkin's disease
- Hairy cell leukaemia

Plasma Cell Dyscrasias:

- General considerations
- Etiology
- Protein abnormalities
 - Multiple Myeloma
 - Waldenstrom's Macroglobuliaemia
 - Heavy Chain Disease
 - Amyloidosis
 - Cryoglobulinemia
- Properties of M-component
- Diagnosis

Lab Work:

- Bone marrow and peripheral blood morphology in:
 - Chronic Myeloid Leukemia
 - Chronic Lymphocytic Leukemia
 - Non Hodgkin's Lymphoma
 - Hodgkin's Lymphoma

- Multiple Myeloma
- MPN/ Myelodysplastic syndromes
- Acute lymphoblastic leukemia
- Acute Myeloblastic leukemia
- Cytochemistry for above neoplasias
 - Myeloperoxidase
 - Sudan Black
 - Estrases
 - PAS
- Flow cytometry in above mentioned hematological malignancies

Seminars:

- Juvenile myelomonocytic leukemia
- Monitoring minimal residual disease in BCR-ABL-positive chronic myeloid leukaemia
- Development of an International Prognostic Index (IPI) for myeloma
- Issues relating to individual entities in the WHO classification of lymphoma

Teaching strategies

- Seminars
- Interactive sessions
- Assignments
- Directed Self Learning
- Review of literature
- Group discussion
- Journal club
- Workshops
- Presentations
- Quizzes

Books Recommended:

Students will consult the relevant sections of the following books

1. Wintrobe's Clinical Hematology G.R. Lee, T. C. Bithell, J Foerster, J. W. Athens, J. N. Lukens.
2. Post Graduate Haematology. A.V. Hoffbrand, D. Catovsky, E.G.D. Tuddenham.
3. Practical Hematology. Sir J. V. Dacie & S. M. Lewis

4. Bone Marrow Pathology Barbra J. Bain.

Haematological changes in Systemic Diseases

Course Contents :

- Non-specific monitoring of systemic diseases
- Haematology of Pregnancy
- Neonatal Haematology Hemolytic Disease of New Born

Teaching strategies

- Seminars
- Interactive sessions
- Assignments
- Directed Self Learning
- Review of literature
- Group discussion
- Journal club
- Workshops
- Presentations
- Quizzes

Books Recommended: .

1. Post Graduate Haematology. A.V. Hoffbrand, D. Catovsky, E.G.D. Tuddenham.
2. Practical Hematology. Sir J. V. Dacie & S. M. Lewis

3.1.5 Learning Opportunities and Teaching Strategies

1. **Journal Club Meeting (JC):** A resident will be assigned to present, in depth, a research article or topic of his/her choice of actual or potential broad interest and/or application. Two hours per month should be allocated to discussion of any current articles or topics introduced by any participant. Faculty or outside researchers will be invited to present outlines or results of current research activities. The article should be critically evaluated, and its applicable results should be highlighted, which can be incorporated in clinical practice. Record of all such articles should be maintained in the relevant department.
2. **Small Group Discussions/ Problem based learning/ Case based learning:** Traditionally small groups consist of 8-12 participants. Small groups can take on a variety of different tasks, including problem solving, role play, discussion, brainstorming, debate, workshops and presentations. Generally, students prefer small group learning to other instructional

methods. From the study of a problem students develop principles and rules and generalize their applicability to a variety of situations PBL is said to develop problem solving skills and an integrated body of knowledge. It is a student-centered approach to learning, in which students determine what and how they learn. Case studies help learners identify problems and solutions, compare options and decide how to handle a real situation.

3. **Discussion/Debate:** There are several types of discussion tasks which would be used as learning method for residents including: guided discussion, in which the facilitator poses a discussion question to the group and learners offer responses or questions to each other's contributions as a means of broadening the discussion's scope; inquiry-based discussion, in which learners are guided through a series of questions to discover some relationship or principle; exploratory discussion, in which learners examine their personal opinions, suppositions or assumptions and then visualize alternatives to these assumptions; and debate in which students argue opposing sides of a controversial topic. With thoughtful and well-designed discussion tasks, learners can practice critical inquiry and reflection, developing their individual thinking, considering alternatives and negotiating meaning with other discussants to arrive at a shared understanding of the issues at hand.
4. **Task-based-learning:** A list of tasks is given to the students: participate in consultation with the attending staff
5. **Case Conference (CC)/ Morning Meetings:** These sessions are held once each week; the focus of the discussion is selected by the presenting resident. For example, some cases may be presented to discuss a differential diagnosis, while others are presented to share interesting cases.
6. **Clinico-pathological Conferences:** The clinico pathological conference, popularly known as CPC primarily relies on case method of teaching medicine. It is a teaching tool that illustrates the logical, measured consideration of a differential diagnosis used to evaluate patients. The process involves case presentation, diagnostic data, discussion of differential diagnosis, logically narrowing the list to few selected probable diagnoses and eventually reaching a final diagnosis and its brief discussion.
7. **Directly Supervised Procedures - (DSP):** Residents learn procedures under the direct supervision of an attending or fellow during some rotations.
8. **SEQ as assignments on the content areas:** SEQs assignments are given to the residents on regular basis to enhance their performance during written examinations.
9. **Self-directed learning:** Self-directed learning residents have primary responsibility for planning, implementing, and evaluating their effort. It is an adult learning technique that

assumes that the learner knows best what their educational needs are. The facilitator's role in self-directed learning is to support learners in identifying their needs and goals for the program, to contribute to clarifying the learners' directions and objectives and to provide timely feedback. Self-directed learning can be highly motivating, especially if the learner is focusing on problems of the immediate present, a potential positive outcome is anticipated and obtained and they are not threatened by taking responsibility for their own Learning.

10. **Audio visual laboratory:** Audio visual material for teaching skills to the residents is used specifically in teaching endocrine challenge and suppression testing and procedure details.
11. **E-learning/web-based medical education/computer-assisted instruction:** Computer technologies, including the Internet, can support a wide range of learning activities from dissemination of lectures and materials, access to live or recorded presentations, real-time discussions, self-instruction modules and virtual patient simulations. distance-independence, flexible scheduling, the creation of reusable learning materials that are easily shared and updated, the ability to individualize instruction through adaptive instruction technologies and automated record keeping for assessment purposes.
12. **Research based learning:** All residents in the categorical program are required to complete an academic outcomes-based research project during their training. This project can consist of original bench top laboratory research, clinical research or a combination of both. The research work shall be compiled in the form of a thesis which is to be submitted for evaluation by each resident before end of the training. The designated Faculty will organize and mentor the residents through the process, as well as journal clubs to teach critical appraisal of the literature.

SECTION 4: COMPREHENSIVE EXAMINATION POLICY

4.1 ASSESSMENT STRATEGIES

Formative Assessment (Continuous Assessment)

- Case presentations: Regular case presentations to assess clinical knowledge, problem-solving, and communication skills.
- Journal clubs: Critical appraisal of research articles to evaluate literature analysis and critical thinking.
- Lab sign-out: Review of laboratory results to assess diagnostic skills.
- Clinical skills assessment: Observation of patient interviews, physical examinations, and procedural skills.
- MCQs and short-answer questions: Regular tests to evaluate knowledge and understanding.

Summative Assessment (End-of-Course or End-of-Year)

- Written exams: Comprehensive theory papers, including multiple-choice questions, short-answer questions.
- Practical exams: observed station practical examination, blood banking skills, bone marrow cases, coagulation studies.
- Research project: Submission and presentation of a research project, assessing critical thinking, scientific inquiry, and communication skills.

Additional Strategies

- Peer assessment: Students assess and provide feedback on each other's case presentations or journal clubs.
- Self-assessment: Students reflect on their learning, set goals, and identify areas for improvement.
- Mentorship: Regular meetings with experienced hematologists to guide and assess progress.
- Log book
- Portfolio
- Direct observation of procedural skills
- Observation of teaching
- Procedure based Assessment

4.2 ASSESSMENT SCHEME

Formative assessment

Summative assessment

Annual Examination marks

Yealy Examination marks will have three components.

- In training assessment 100 marks
- Mid training assessment 200 marks
- Internal Assessment: 100 marks
- Final Assessment 600 marks

In Training Assessment: Max marks 100

Theory (MCQs) 100 marks

Mid Term Assessment: Max marks 200

Theory (MCQs) 100 marks

Practical and Viva 100 marks

Final Assessment: Max marks 400

Theory 200 marks

- MCQs 100 marks
- SEQs 100 marks

Practical and Viva 200 marks

Internal Assessment: Max marks 100

- Presentation
- Journal Club
- Quiz

Thesis Max marks 100



Table of specifications
Final Term Assessment

MD Haematology

**Rawalpindi Medical University,
Rawalpindi**

Prepared by

Dr. Mohammad Shabih Haider Senior Lecturer, Pathology Department Rawalpindi Medical University	MBBS, MPHIL (HAEMATOLOGY), CHPE
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Table of Specification

Marks Distribution	Units/Topics	No. of Questions	Eligibility for Exam
<ul style="list-style-type: none"> • WRITTEN & CLINICAL MARKS 400 • THESIS 100 TOTAL MARKS 500 <i>Written- Two papers</i> Paper 1 will comprise 100 single best answer type Multiple Choice Questions one mark each. 1 marks each for every MCQ no negative marking. (2hours and 30mins) Paper 2 will comprise of 10 SEQs of 10 marks each (2 hours and 30 minutes)	Paper I (100 MCQs)		1. Completion of 4 year training 2. Year One, MTA, Year three Assessment should be passed. 3. All internal and external rotations to be completed.
	1. Diagnosis and management of anaemias	20	
	2. Blood banking techniques and components	20	
	3. Haemostasis, coagulation and bleeding disorders	20	
	4. Benign and malignant hematological disorders	20	
	5. Bone marrow failure syndromes and bone marrow transplant	10	
	6. Quality control/assurance in Hematology	05	
	7. Hematological disorders in systemic diseases	05	
	Paper II (SEQs)		4. Cumulative score of 75% in Continuous Internal
	1. Diagnosis and management of anaemias	02	
	2. Blood banking techniques and components	01	
	3. Haemostasis, coagulation and bleeding disorders	02	

<p>Both papers will be conducted on same day.</p> <p><u>Written exam should be passed (pass marks=60%) to appear in clinical exam.</u></p> <p>Clinical: OSCE=200 marks Morphology 10 stations of 10 Marks each- 12 minutes for each station Coagulation 8 static ospe stations of 5 Marks and 2 observed performance stations of 5 marks each-8 minutes for each station Transfusion 8 statistic ospe stations of 5 Marks each and 2 observed performance stations-8 minutes for each station</p> <p>Thesis = 100 marks Presentation – 30 Marks Discussion- 70 Marks</p> <p>Pass percentage= Accumulative pass percentage is 60% with separate at least 55% in each component(i.e morphology, coagulation , transfusion) Written papers should be passed separately. OSCE must be passed separately. Thesis should have atleast 60% score to qualify.</p>	4. Bone marrow failure syndromes and bone marrow transplant	01	<p>assessments of all training years.</p> <p>5. No dues certificate.</p>
	4. Benign and malignant white cell disorders	02	
	6. Quality control/ assurance in Hematology	01	
	7. Hematological disorders in systemic diseases	01	
	Clinical		
	Morphology cases	10	
	Coagulation	10	
	Transfusion	10	

Table of Specification (Unit wise)

Contents	Learning Objectives:	Teaching Strategies	Formative Assessment	Time Allocation	Modes of Assessment	
					MCQs	SEQ

<p>Diagnosis and management of anaemias</p> <ul style="list-style-type: none"> • Iron deficiency anemia • Megaloblastic anaemia • Hereditary Hemolytic anaemias • Anaemia of chronic disorder • Acquired hemolytic anaemia • Thalassemia • Lead poisoning • Pure red cell aplasia 	<ul style="list-style-type: none"> • Identify the laboratory features of iron deficiency, megaloblastic anaemia, hemolytic anaemias • Identify the clinical features of these anemias • Describe the pathogenesis and clinical features of thalassemia • Enlist the treatment options of these anaemias 	<p>Seminar, Small group discussion, bedside teaching, lectures</p>	<p>Log Book</p> <p>WPBA Multisource feedback 360° Performa DOPS MiniCEX</p>	<p>20%</p>	<p>20</p>	<p>2</p>
<p>Contents</p>	<p>Learning Objectives</p>	<p>Teaching Strategies</p>	<p>Formative Assessment</p>	<p>Time Allocation</p>	<p>MCQ</p>	<p>SEQ</p>
<p>Blood banking technique and component preparation</p> <ul style="list-style-type: none"> • Donor selection criterion • Forward /reverse grouping • Coombs test • Antibody screening and identification • Component preparation • Component quality control • Transfusion reactions • Screening of blood components • Quality assurance in transfusion medicine • Blood grouping discrepancies • Massive transfusion protocol 	<ul style="list-style-type: none"> • Enumerate the types and management of transfusion reactions • Develop knowledge regarding the component preparation and quality control of blood components • Understanding of responsibilities of hematologist in blood bank • Learn the steps for ensuring quality assurance in blood bank • Knowledge of massive transfusion protocol 	<p>Seminar, SGD, Blood bank rotation, Lectures</p>	<p>Log Book</p> <p>WPBA Multisource feedback 360° Performa DOPS MiniCEX</p>	<p>15%</p>	<p>20</p>	<p>1</p>

Contents	Learning objectives	Teaching strategies	Formative assessment	Time allocation	MCQ	SEQ
Hemostasis, coagulation disorders and bleeding disorder <ul style="list-style-type: none"> Intrinsic and extrinsic pathway Hemophilia Von Willebrand disease Platelet function defects Immune thrombocytopenic purpura Hereditary and acquired thrombophilia Diagnosis and management of arterial and venous thrombosis Lupus anticoagulant and antiphospholipid syndrome Mixing studies Disseminated intravascular coagulation 	<ul style="list-style-type: none"> Knowledge of the bleeding and clotting disorders Modalities for detection of these disorders and their management Assessment of patients presenting with arterial and venous thrombosis Factors affecting platelet function studies Factors affecting the thrombophilia screening Develop an understanding of lupus anticoagulant and antiphospholipid syndrome Knowledge of disseminated intravascular coagulation pathogenesis and laboratory features 	Seminar, SGD, bedside teaching, Rotation in Hemophilia center, Lectures	Log Book WPBA Multisource feedback 360° Performa DOPS MiniCEX	20%	20	2
Contents	Learning objectives	Teaching strategies	Formative Assessment	Time allocation	MCQ	SEQ
Benign and malignant white cell disorders <ul style="list-style-type: none"> Causes of eosinophilia, neutrophilia, lymphocytosis,, monocytosis Chidak higashi syndrome Kostman syndrome Severe congenital neutropenia Acute lymphoblastic leukemias Acute myeloid leukemia Chronic myeloid leukemia Polycythemia vera 	<ul style="list-style-type: none"> Discuss the causes of eosinophilia, neutrophilia, lymphocytosis, monocytosis Knowledge of inheritance pattern of Chidak Higashi syndrome, Kostman syndrome and pathogenesis Describe the pathogenesis and laboratory 	Seminar, SGD, bone marrow slide session teaching, Lectures	Log Book WPBA Multisource feedback 360° Performa DOPS MiniCEX	20%	20	2

<ul style="list-style-type: none"> Essential thrombocythemia Myelofibrosis Chronic neutrophil leukemia Chronic eosinophilic leukemia Myelodysplastic syndrome Lymphomas 	<ul style="list-style-type: none"> features of leukemias Describe the classification, pathogenesis and laboratory features of myeloproliferative disorders and myelodysplastic syndromes Describe the classification and laboratory features of lymphomas 					
Contents	Learning objectives	Teaching strategies	Formative assessment	Time allocation	MCQ	SEQ
Bone marrow failure syndromes and bone marrow transplant <ul style="list-style-type: none"> Aplastic anaemia Fanconi anaemia Dyskeratosis congenita Diamond blackfan anaemia Schwaman diamond syndrome Congenital amegakryocytic thrombocytopenia Thrombocytopenia with absent radii Indications and complications of bone marrow transplant 	<ul style="list-style-type: none"> Understanding of pathophysiology and laboratory diagnosis of aplastic anaemia Understanding the pathogenesis and clinical features of bone marrow failure syndromes Developing an understanding of indications and complications of bone marrow transplant Learning the grading and staging of graft vs host disease 	Seminar, Small group discussion, bedside teaching, Lectures	Log Book WPBA Multisource feedback 360° Performa DOPS MiniCEX	10%	10	1
Contents	Learning objectives	Teaching strategy	Formative assessment	Time allocation	MCQ	SEQ
Quality control/assurance in Hematology	<ul style="list-style-type: none"> Understand the principles of quality control and assurance 	Seminar, Small group discussion,	Log Book WPBA	5%	05	1

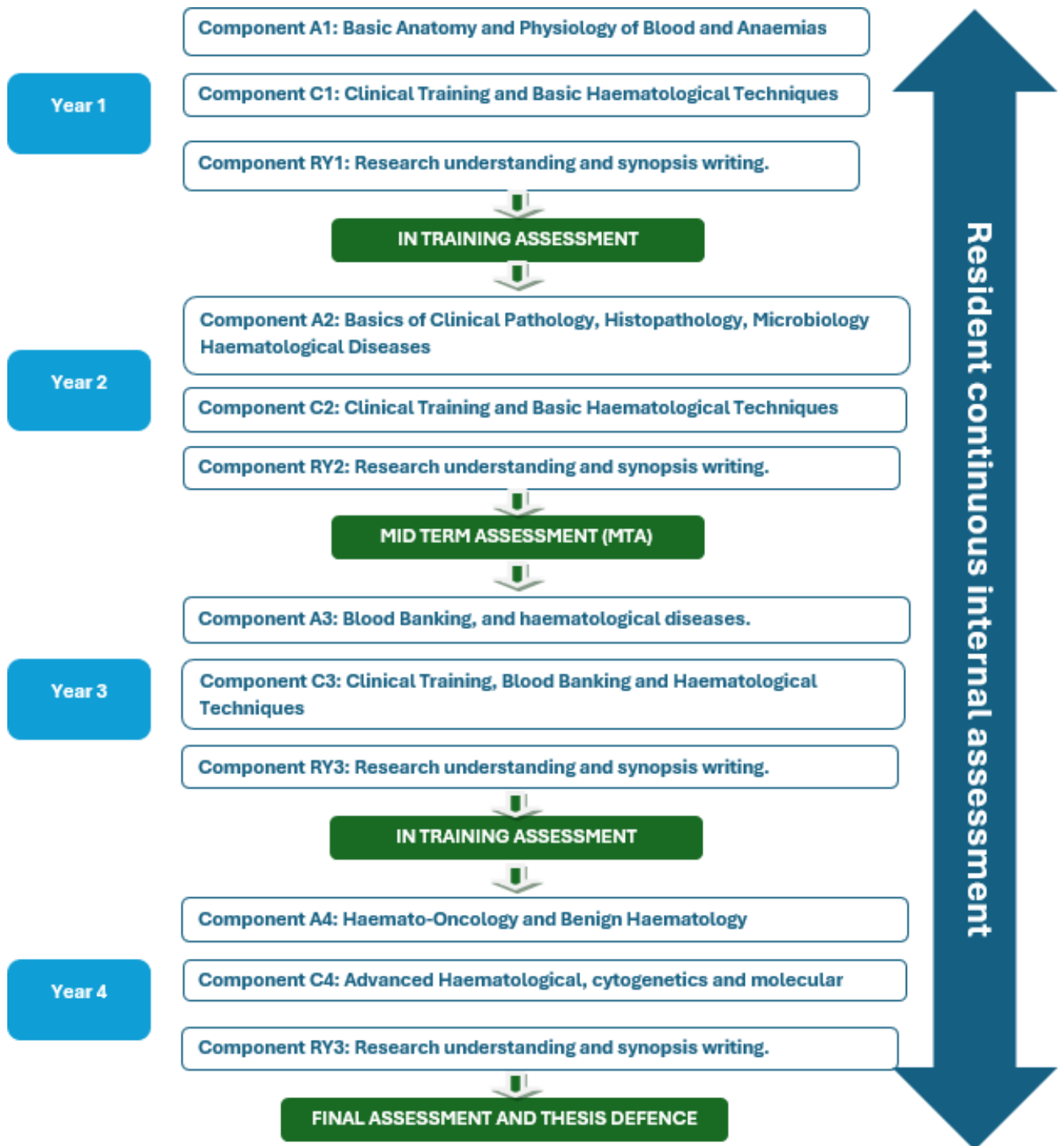
<ul style="list-style-type: none"> Quality control and assurance Definition of range, linearity, standard deviation, accuracy, shift, trend, precision and bias Causes of random errors Causes of systemic errors LJ Charts 	<ul style="list-style-type: none"> Learn the definition of linearity, shift, trend, accuracy, precision and bias Learn the causes of random and systemic errors and how to identify them by LJ charts 	self-directed learning, Lectures	Multisource feedback 360° Performa DOPS MiniCEX			
Contents	Learning objectives	Teaching strategy	Formative assessment	Time allocation	MCQ	SEQ
Hematology in systemic diseases <ul style="list-style-type: none"> Hematological manifestations in renal diseases Haematological manifestations of liver disease Hematological manifestations of tuberculosis Hematological manifestations of iron overload 	<ul style="list-style-type: none"> Describe the various hematological changes in systemic diseases and their pathogenesis Enumerate the laboratory investigations required for their evaluation 	Seminar, Small group discussion, bedside teaching, lectures	Log Book WPBA Multisource feedback 360° Performa DOPS MiniCEX	7.5%	05	1

References

REFERENCES

- Harden, R.M., 2006. *The Integration Ladder: A Tool for Curriculum Planning and Assessment. Medical Teacher*, 28(7), pp. 711-715.
- Harden, R.M. and Laidlaw, J.M., 2012. *Becoming a Reflective Practitioner. Medical Teacher*, 34(5), pp. 358-367.

4.3 ROAD MAP OF MD TRAINING DIAGNOSTIC HAEMATOLOGY



4.4 TABLE OF SPECIFICATIONS

Sr.no	Content Area	Cognitive level	Mode of Assessment	Weightage In theory	Weightage in practical
1.	Diagnosis and management of Anemias	Evaluation Analysis	MCQs SEQS OSCE	20% 20%	10%
2.	Blood banking techniques and component preparation	Understanding Evaluation Analysis	MCQs SEQS Practical based assessment	20% 20%	30%
3.	Haemaostasis, coagulation disorders and bleeding disorders	Understanding Evaluation Analysis	MCQs SEQS Practical based assessment	20% 20%	20%
4.	Hematooncology , leukemias, lymphomas Myeloproliferative neoplasms, plasma cell dyscrasias, MDS	Understanding Evaluation Analysis	MCQs SEQS OSCE	20% 20%	30%
5.	Benign white cell disorders	Understanding Evaluation	MCQs	10%	10%
6.	Minor rotations	Understanding	MCQs	10%	

SECTION 5: RESEARCH AND THESIS WRITING

5.1 RESEARCH CYCLE

- Student will select topic and get it approved by the end of 1st semester.

Student will write synopsis and get it approved in first year.

In the 2nd year student will get the synopsis approved from BASR and ethical committee of the institute.

In the 3rd year student will start research work and write down the thesis.



Research Planner of 4 Years University Residency Program

5.2 RESEARCH & THESIS WRITING

Research and Thesis have to be completed during training period. Research topic selection is must in first year. Synopsis writing and approval from DRB, IRF & BASR are must in second year of training. In third year of training Thesis should be written, while in first six months of fourth year Thesis should be completed and after appropriate defense it should be approved by BASR.

5.2.1 Research Experience & Workshops

The active research component program must ensure meaningful, supervised research experience with appropriate protected time for each resident while maintaining the essential clinical experience. Residents must learn the design and interpretation of research studies, responsible use of informed consent, and research methodology and interpretation of data. The program must provide instruction in the critical assessment of new therapies and of the medical literature. Residents will be advised and supervised by qualified staff members in the conduct of research

To help conduction of Research and facilitate Thesis writing following workshops are mandatory during training that will be organized by RMU:

- A. Communication skills
- B. Computer & IT skills days
- C. Synopsis writing
- D. Research Methodology & Biostatistics
- E. Reference Manager (Endnote)
- F. Clinical Research

Each resident will participate in at least one clinical research study to become familiar with

1. Research design
2. Research involving human subjects including informed consent and operations of the Institutional Review Board and ethics of human experimentation
3. Data collection and data analysis
4. Research ethics and honesty
5. Peer review process

This usually is done during the consultation and outpatient clinic rotations.

Research Article or Statistical Report of one Disease

Components of article writing for Resident Research Journal or Statistical Report of one disease are mandatory in First while optional in Third year.

5.2.2 Thesis

The candidates shall prepare their synopsis as per guidelines provided by Institutional Research Forum/Ethical Review Board (IRF/ERB) and Board of Advanced Studies & Research (BASR). The research topic must consist of a reasonable sample size and sufficient numbers of variables to give training to the candidate to conduct research, collect and analyze data. Synopsis of research project should be approved in 2nd year of MD program by IRF/ERB and BASR. In 3rd year Thesis work should be completed, and in 4th year it should be approved from BASR.

Submission / Evaluation of Synopsis

The Residents shall prepare their synopsis as per guidelines provided by the Board of Advanced Studies & Research, available on university website.

The research topic in clinical subject should have 70% component related to basic sciences and 30% component related to applied clinical sciences. The research topic must consist of a reasonable sample size and sufficient numbers of variables to give training to the candidate to conduct research, to collect & analyze the data.

Synopsis of research project shall be got approved by the end of the 2nd year of MD program. The synopsis after review by an Institutional Review Committee shall be submitted to the University for Consideration by the Board of Advanced Studies & Research, through the Principal / Dean /Head of the institution.

Submission of Thesis

Thesis shall be submitted by the candidate duly recommended by the Supervisor.

The minimum duration between approval of synopsis and submission of thesis shall be one year.

The research thesis must be compiled and bound in accordance with the Thesis Format Guidelines approved by the University and available on website.

The research thesis will be submitted along with the fee prescribed by the University.

Thesis Evaluation

The Resident will submit his/her thesis at least 06 months prior to completion of training.

The Thesis along with a certificate of approval from the supervisor will be submitted to the Registrar's office, who would record the date / time etc. and get received from the Controller of Examinations within 05 working days of receiving.

The Controller of Examinations will submit a panel of eight assessors within 07 days for selection of four examiners by the Vice Chancellor. The Vice Chancellor shall return the Final

panel within 05 working days to the Controller of Examinations for processing and assessment. In case of any delay the Controller of Examination would bring the case personally to the Vice Chancellor.

The Supervisor shall not act as an examiner of the candidate and will not take part in defense of thesis.

The Controller of Examinations will make sure that the Thesis is submitted to examiners in appropriate fashion and a reminder is sent after every ten days.

The thesis will be evaluated by the examiners within a period of 06 weeks.

In case the examiners fail to complete the task within 06 weeks with 02 fortnightly reminders by the Controller of Examinations, the Controller of Examinations will bring it to the notice of Vice Chancellor in person.

In case of difficulty in find an internal examiner for thesis evaluation, the Vice Chancellor would, in consultation with the concerned Deans, appoint any relevant person as examiner in supersession of the relevant Clause of the University Regulations.

There will be two internal and two external examiners. In case of difficulty in finding examiners, the Vice Chancellor would, in consultation with the concerned Deans, appoint minimum of three, one internal and two external examiners.

The total marks of thesis evaluation will be 100 and 60% marks will be required to pass the evaluation.

The thesis will be considered accepted, if the cumulative score of all the examiners is 60%.

The clinical training will end at completion of stipulated training period but the candidate will become eligible to appear in the Final Examination at completion of clinical training and after acceptance of thesis. In case clinical training ends earlier, the slot will fall vacant after stipulated training period.

Open Defense Policy

1. There shall be a standing list of external examiners for Haematology department consisting of persons of eminence in the field of research. The list shall be updated from time to time by the board of studies of faculty concerned and approved by the research board. The external examiners will be requested to critically examine the thesis for its suitability for the award of MD degree.
2. The candidate shall in the first instance submit six unbound copies of his/her completed thesis along with an application on prescribed form for the evaluation of his/her thesis, duly forwarded by his/her supervisor and the chairman of the department.

3. Two for External Examiners, One for examination section, one for department office and one for the supervisor
4. Out of the Examiners List, Vice Chancellor will nominate two External Examiners for thesis Evaluation and Viva Voce Examination. Supervisor of the candidate will also be part of Viva Voce Examination
5. The viva-voce examination shall be open to the public but the evaluation will be done only by the panel of examiners.
6. If External Examiners will suggest any corrections, the candidate will correct the thesis and get verified and certified by the supervisor.
7. After corrections have been incorporated in accordance with the comments of external examiners, four copies of the final hard-bound thesis be submitted: i. One for examination section ii. One for central library iii. One for departmental office iv. One for supervisor
8. If the candidate fails to satisfy the examiners in the viva-voce examination he/she may be given a chance to defend the thesis for the second and final time within a period of six months.
9. A candidate who successfully completes all the requirements shall be awarded, with the approval of the research board and the syndicate, the degree of MD under the seal of the university.
10. The vice-chancellor may approve the recommendations of the research board on behalf of the syndicate regarding the award of MD degree to the candidate.

5.2.3 Evaluation & Monitoring of the Training Program

The proposed / suggested evaluation of the training program will be done by:

- a. Head of the department / Supervisor
- b. Head of the institution.

Evaluation of the Trainee

360° evaluation of trainee as per HEC policy by:

- Head of institute
- HOD
- Supervisor
- Mentors
- Faculty members

- Demonstrators
- Laboratory technologists
- Academic staff
- Other students
- Patients

Students will be evaluated on the basis of:

- Attendance record
- Performance of the scheduled / desired activity
- Participation in discussion (tutorial and seminar etc.)
- Efficiency and effort put in the assignment (lectures, demonstration, Computer training etc)
- Quiz
- Practical work
- Presentation and Computing skills

Compulsory Activities

- Library (thesis writing)
- Laboratory training

5.3 LOG BOOK

The trainees must maintain a log book and get it signed regularly by the supervisor. A complete and duly certified log book should be part of the requirement to sit for MD Haematology examination.

5.4 Supervisor Certificate

It is certified that Dr. _ son/ daughter/ of _____

student **MD Haematology** has completed theoretical, practical and all scheduled availing training programs.

He/ she have attended all required Journal Club/ Seminars has presented __topics in journal club, and has completed all assignments allocated to his/her account. He appeared in __tests, out of __his/her tests score is graded as __.

Name of the Supervisor