Faculty of Applied Medical Sciences

Department of Medical Laboratory Technology

CLINICAL ROTATION TRAINING MANUAL

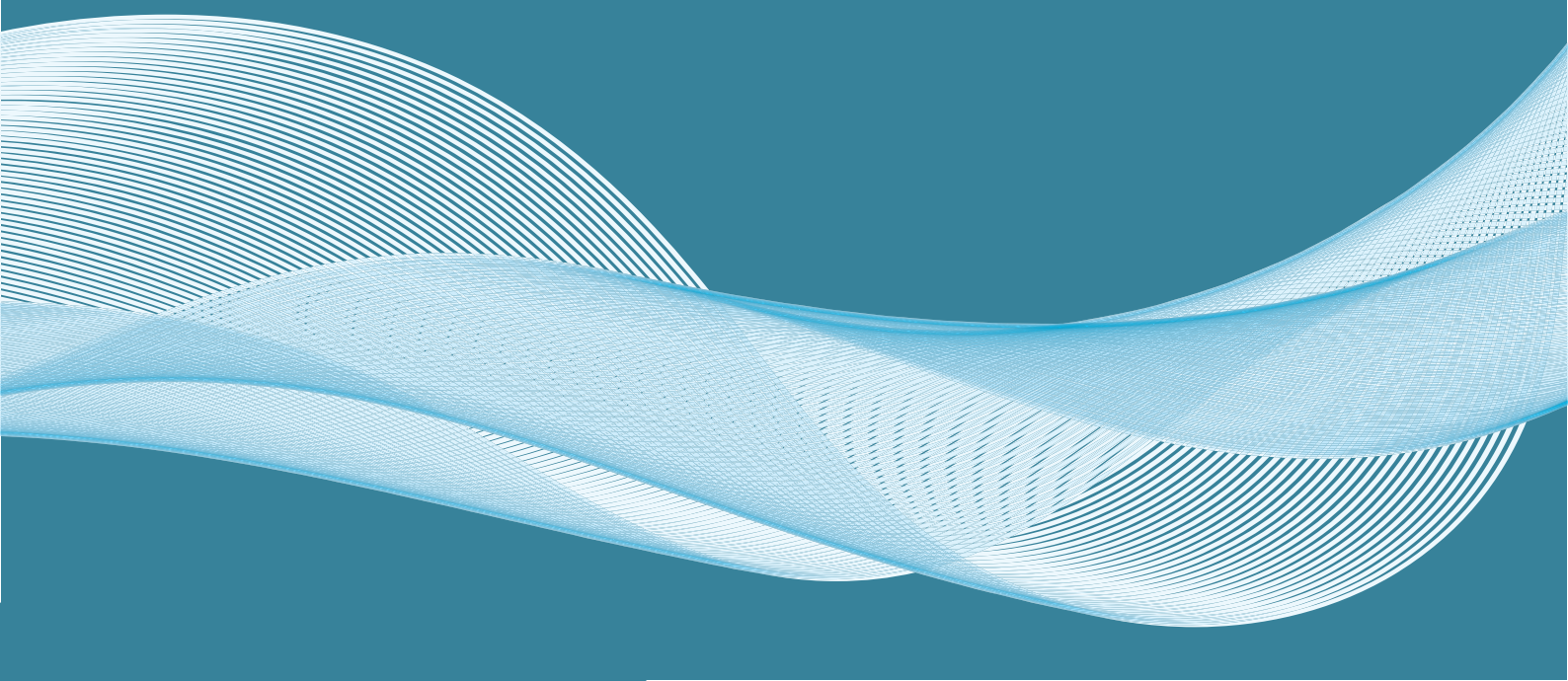
2021

Welcome to the Department of Medical Laboratory Technology. This manual was created to provide you, our 4th year MLT Students who will undergo Clinical Rotation an information resource for the rules and regulation in your last year in the University.

The Clinical rotation training will give you a hands-on training to simulate what is going on inside a hospital laboratory. This experience will let you appreciate the vast opportunity of making a difference in your chosen profession as a future Medical laboratory Technologist.

Please go over it and feel free to contact any of the Clinical training Committee members for any question and concerns. You can also visit the office of the department Supervisor.

The policies stated in this Manual are subject to change at any time at the sole discretion of the Department. From time to time, you will receive updated information regarding any changes in the policies.



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INTRODUCTION

The Department of Medical Laboratory Technology (MLT) is one of the paramedical courses offered in the Faculty of Applied Medical Science under the deanship of Dr. Hamad Al Amer. This BS in Medical Laboratory Technology (BSMLT) is a four-year degree program plus 1 year of internship that equips students with knowledge and skills in laboratory tests used in the detection, diagnosis, prevention, and treatment of diseases. This course is a paramedical field for which the student is prepared in many areas like in Blood Bank, chemistry, microbiology, hematology and other specialized courses. The future MLT professionals can enter careers in clinical laboratory work, academic research, public health, teaching and the pharmaceutical industry. They will not only contribute to the study, diagnosis and treatment of diseases but also of increasing significance in the appraisal of proven technical procedures and in the use of new, increasingly advanced instruments.

The Department of Medical Laboratory Technology (MLT) will develop the academic and technical skills of MLT students, preparing them from an academic environment to professional training. The academic emphasis will be on a skill set required for future success in the field of medical laboratory technology. A clinical rotation program during their last year in the University will develop them to have a hands-on training in the clinical laboratory of the department. Moreover, Medical Laboratory Technology students will also be encouraged to simultaneously develop a strong, independent scientific framework and a value-stricken attitude to be successful in their future professions.

PROGRAM GOALS & OBJECTIVES

The University of Tabuk- Medical Laboratory Technology program is designed to achieve the following goals and objectives:

GOALS

1. To provide a quality academic operation with the necessary knowledge and skills supported by competence in teaching and learning in the field of Medical Laboratory Technology
2. Promote research activities to develop skills in creative, critical and analytical thinking to advance knowledge in laboratory technology and to progress to higher levels of study.
3. To develop sound moral values, responsibilities, social and health awareness among students and faculty members so that they may lead and participate in community action for the promotion and preservation of health.

OBJECTIVES

1. Educate students to perform competently as medical laboratory technologists at the career-entry level;
2. Develop cognitive, affective and psychomotor skills in the performance of clinical laboratory procedures necessary for proper diagnosis, treatment and prevention of diseases;
3. Develop skills in creative, critical and analytical thinking to advance knowledge in clinical laboratory through innovative researches;
4. Develop leadership qualities to promote competence and excellence;
5. Spear-head and participate in community for the promotion and preservation of health;
6. Cultivate in students an appreciation for continuing education and the need for lifelong learning by providing the foundation for further study and advancement in many academic and professional areas.

MLT Graduate attributes

1. Intellectual-Conceptual, Integrative and Quantitative Abilities
    1.1 The ability to recognize problems identify causes and formulate solutions related to principles and techniques of clinical laboratory methodologies.

1.2 The ability to verify laboratory results in light of available information and previous laboratory data on the patient, disease correlation, procedural limitations, and the possibility of random and technical errors.

1.3 The ability to understand the concepts of quality assurance and effectively utilizes such program in the interpretation of qualitative and quantitative data and in problem solving.

1.4 The ability to utilize scientific acumen in lab test measurement calculations, reasoning, analysis, in the evaluation, modification, and performance of test methodologies and in determining reflex tests

2. Manual Dexterity: The ability to perform tasks following laboratory procedures and using laboratory equipment and apparatuses accurately and precisely in dealing with specimen collection, handling, integrity, and test analysis.
3. Communication: The ability to write and communicate orally lab results and information to members of the health care team in the most effective and efficient way.
4. Behavioural and Interpersonal Attributes: The ability to manage and adapt to changing environments with compassion, integrity, proper judgment, concern for safety to self and others, interest, motivation, responsibility, leadership, as well as the ability to maintain confidentiality of patient results.
5. Research and Life-Long Learning: The ability to identify and to address learning needs and curiosities in a rapidly changing world in ways sufficient to maintain their competence and to allow them to conduct research that contribute to the advancement of knowledge and newer developments in the field of profession.
6. Impact on Society: The ability to analyse the social and environmental aspects of medical laboratory technology activities in the promotion of health.

GENERAL DESCRIPTION OF CLINICAL ROTATION TRAINING

1. The clinical rotation is the fourth year level of MLT course.
2. The clinical rotation consists of the following courses namely: Hematology, Immunology, Microbiology, clinical Chemistry, Blood Banking, Urinalysis & Body fluids, Genetics & Molecular Biology, Parasitology and Histology and Cytology.
3. A one-hour tutorial is conducted in each CR course to supplement the hands-on training of the students. Usually, case study and presentations will be used as tools to critically analyze laboratory procedure, results and clinical significance.

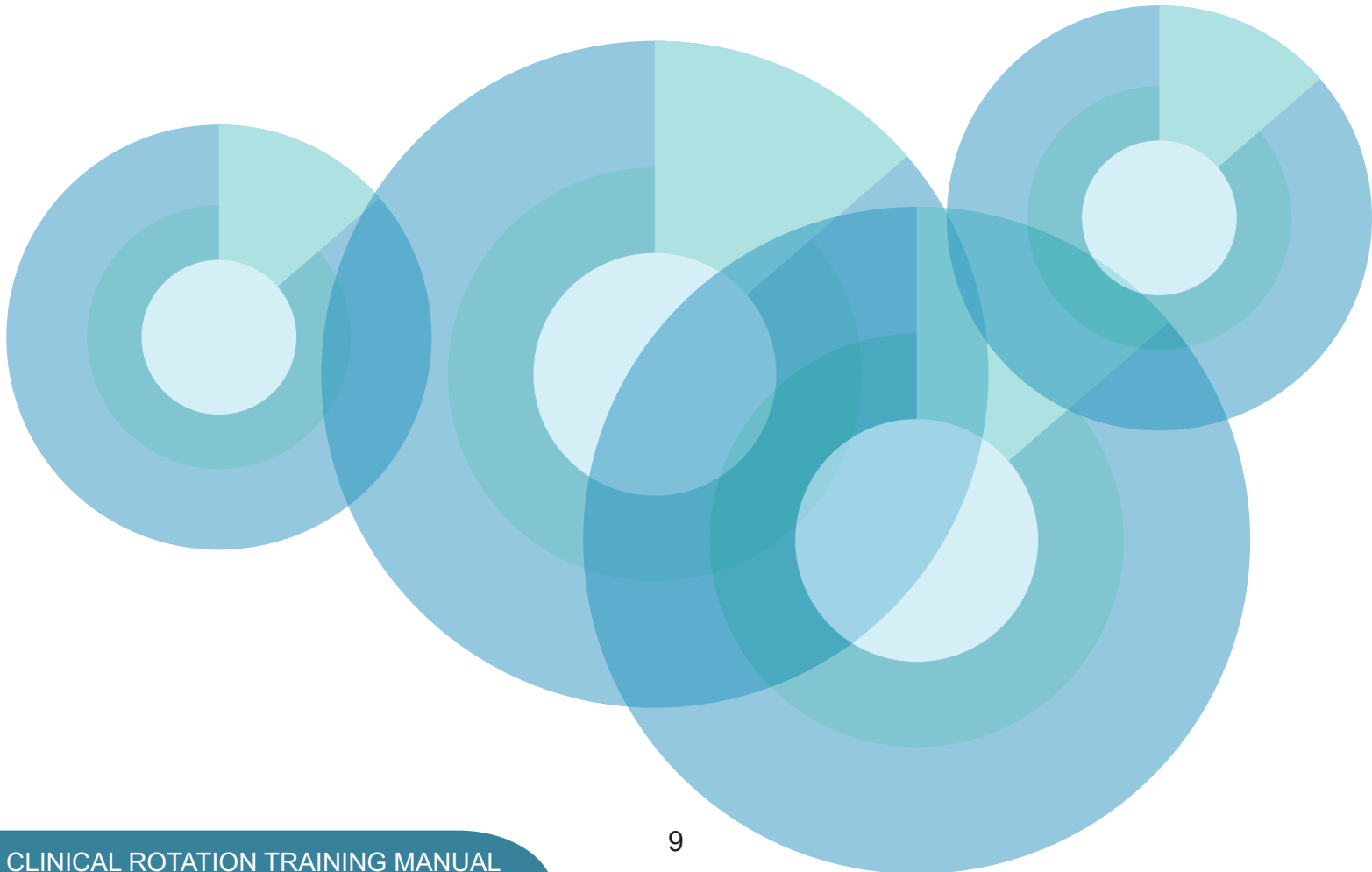
REQUIREMENTS FOR CLINICAL ROTATION (CR)

The student should have:

1. Completed and passed all courses in Level 3,4,5, and 6 of the MLT curriculum except for some special cases as approved by the department.
2. No derogatory record of any disciplinary action.
3. Undergone Immunization for Hepatitis B & C. A proof of vaccination record is to be presented to the Clinical training committee before the promotion to the clinical rotation.

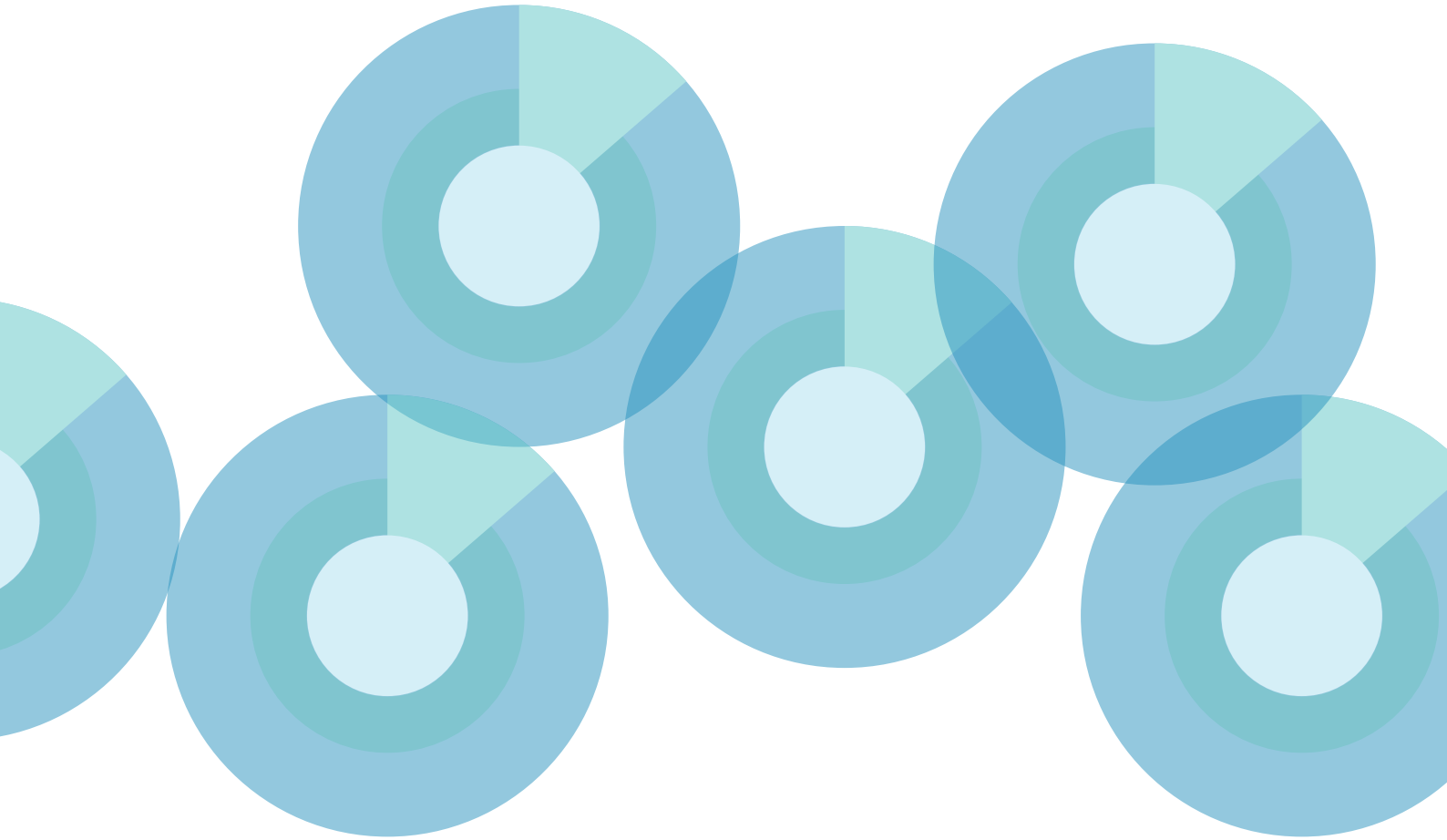
RULES AND REGULATION

1. Proper decorum must be observed at all time. Unpleasant behavior, loud language and other bad things of unbecoming of a Medical Laboratory Technology student in clinical rotation will not be tolerated.
2. CR students must wear the prescribed uniform which is a Blue Scrub suit and pants. White laboratory coats are to be worn over the scrubs at all time.
3. CR students are expected to present a highly credible appearance at all times. They should maintain a general good health and self-care with a well-groomed, and neat appearance. The hair appropriately cut and styled, the nails neatly trimmed. For the girls, excessive make-up, and putting on too much jewelry must be avoided.
4. In case of absence due to illness or valid reasons (i.e. death of the family, accidents, etc) the CR students must notify the Course Coordinators not later than three days form the first day of absence. Requirement of proof of evidence of illness like medical report and certificate from a credible Government Hospitals should be presented.
5. CR students should observe strict quality control in all the works they perform and must strictly follow laboratory procedures.
6. Strict compliance of laboratory policies, rules and regulations must be observed at all times.



PROFESSIONAL CONDUCT

1. Be polite and respectful at all time.
2. Maintain a strictly professional attitude towards fellow students, teachers and staff.
3. CR students should show respect for self and others. They should display positive attitude and integrity
4. CR students should practice the Universal Precautions to “treat all specimen as infectious and hazardous.”
5. Cheating in all forms must be avoided.
6. Perform all experiment procedure with caution and extra care.
7. Display professional attributes such as punctuality, professional behavior and cooperation



A. TUTORIAL SESSION

One-hour a week is spent for the student to get involved in case analysis discussion in the classroom. Some theories and principles will be discussed to supplement the results obtained in the practical sessions. Clinical significance of each laboratory protocol or test can be helpful in analyzing the result. Active participation by the use of student reporting and analysis will be integrated during this tutorial session. The teacher will just act as facilitator or designer of the classroom activities.

B. LABORATORY/ CLINICAL ROTATION

An actual performance of each test mimicking the hospital laboratory based on the checklist and formatted Laboratory requests. The courses are as follows with the following actual time:

	Course Code	Course Name	Actual Hours/week
1	MLT 401	CR- Hematology	hours 8
2	MLT 402	CR- Immunology	hours 8
3	MLT 403	CR- Microbiology	hours 6
4	MLT 407	CR- Clinical Chemistry	hours 6
5	MLT 408	CR-Blood Bank	hours 6

C. ATTENDANCE

Absences will be dealt with strictly. Any student who incurs more than 25% absences of the total number of hours during the course of clinical rotation will be automatically be disqualified to take the Final Examination (as stipulated in the Student Guide and Student advisory policy). Tardiness or Late are NOT to be tolerated. The student must come on time for class and laboratory. Three (3) late or tardiness will be equivalent to one (1) unexcused absence.

Excused Absences should be considered with the following valid reasons:

A. Sickness with medical certificate as certified by the Government Hospital
B. Death of Immediate Member/s of the family (to be supported by a photocopy of death certificate
C. Accident (to be supported by certification or police report)
D. Important student activities/ functions as required by the University or Faculty (to be supported by letter from the University)

COURSE	ACTUAL HOURS	WEEKS 15	10%	20%	25%
Hematology	8	hours 120	12hour	hour 24	hour 30
Immunology	8	hours 120	12hour	hour 24	hour 30
Microbiology	6	hours 90	9hour	hour 18	hour 22.5
Clinical Chemistry	6	hours 90	9hour	hour 18	hour 22.5
Blood Banking	6	hours 90	9hour	hour 18	hour 22.5

The table above shows the actual number of hours with corresponding percentages for absences in each course. Please take NOTE that computation of the absences will be manual and be done by the course coordinator per week, to be verified by the head of the committee. The percentage of absences in the system is NOT the same with the actual one because of the placement of schedule; hence, the department will give consideration to the actual computation of the absences.

GRADING SYSTEM

It is expected that each student will successfully demonstrate competence in tutorial and laboratory works. A course syllabus or outline will be given to the student at the beginning of each term. Grades will be assigned according to the following:

INDICATORS	MARKS	
	Tutorial	Laboratory
Mid-term Examination	10	20
Evaluation/Activity a. Practical b. Faculty	10	10
Final Practical		30
Final Theoretical Examination	20	
SUB-TOTAL	**40**	**60**
TOTAL	100	

Each laboratory exercise must be approached in an organized fashion. This can be done by reading each exercise and generating a flowchart on what you are going to do before you come to the laboratory.

In addition, time will be allotted for one or more pre-lab orientation, which is intended to help provide information for you to prepare for lab each day. Posttests (oral and written) will also be administered to help gauge your performance and understanding of the laboratory procedure.

It is mandatory that each student is aware of the steps to be done as well as the materials and equipment that will be used for the day.

A. Laboratory Safety

Safety is of chief importance in the microbiology laboratory.

Several of the hazardous with which you will be working are capable of infecting humans under certain circumstances. In addition, the disinfectants, carcinogens, caustics and flames that will be used in this course will be hazardous to your health. The instructions for each procedure in which it is necessary to work with either a caustic or a carcinogenic compound will serve as a warning about the hazards and explain how harm can be avoided while using that particular compound. Warnings will not be given repetitively about other hazards. Instead, you will be expected to abide by the following safety rules.

1. Items (such as personal belongings and unnecessary equipment) which are not to be used for the protocol are to be placed in the lockers to remove mechanical hazards and to avoid possible contamination.
2. Keep work area / bench tops clean and in order at all times. Disinfect area before, after and periodically during the experiment.
3. Eating, smoking and drinking are absolutely forbidden at all times within the laboratory.
4. Keep your hands and all objects away from your mouth. Develop the habit of keeping your hands below your shoulders while inside the laboratory.
5. Alert everyone if you smell gas or distinct odors and try to locate the source of the leak.
6. Place all discarded slides and cover glasses in disinfecting solutions. All non-infectious solid waste like paper, cotton and match sticks should be placed in appropriate waste receptacles provided

for that purpose.

7. In case of emergencies and personal accidents, such as cutting or pricking of the fingers or splashing materials in the eye, notify immediately the instructor-in-charge and administer proper first aid.

8. When using flame, do it cautiously and turn it off when you will not be using it for a long period of time, especially when you will be working with your microscope.

9. Loitering and making noise will not be tolerated.

10. At the end of the laboratory period, put away all apparatus, clean and turn off the microscopes to their proper places, clean work area and turn off all outlets.

11. Always wash hands with soap and water before and after working.

12. Appropriate use of Personal Protective Equipment (PPE)

    a. Laboratory mask and gloves:

        i. Should be worn in the laboratory when handling sterile and potentially hazardous material

        ii. Should be disposable

        iii. Should be checked periodically throughout the course of the experiment for damages and contamination

        iv. Should not come in unnecessary contact with body surfaces and inanimate objects

    b. Laboratory goggles (if available)

        i. Should be worn when procedures involve steps that may produce sparks or splashes such as heating

        ii. Should be worn when handling lacrimatory substances

    c. Laboratory gown:

        i. Should be worn at all times in the laboratory

        ii. Should never be laid on work tables/bench tops

        iii. Should be taken off when leaving the laboratory

        iv. Should be washed and dried in between laboratory meetings

B. Laboratory Notebook

Maintain an up-to-date group notebook of all laboratory exercises. This data notebook or laboratory log book should use the same format as the preliminary report on your manual with some additional information as instructed by the faculty-in-charge. The questions for research need not be included. Integrate the laboratory exercises into your notebook and supplement them to maintain a full record of your activities in the laboratory, as well as the results you obtain and the interpretations and conclusions you make from them. This will be assessed every after experiment to assure that you are developing good record-keeping habits and will be a major basis for your performance grade.

CLASSIFICATION OF HAZARDS IN CLINICAL LABORATORY

Biosafety Levels:

A. Biosafety Level I

   a. Work involving well-characterized agents not known to cause disease in healthy adult humans, and of minimal potential hazard to laboratory personnel and the environment

   b. No special precautions beyond the universal/standard precautions

B. Biosafety Level II

   a. Work involving agents of moderate potential hazard to personnel and the environment.

   b. Restricted access, training on the hazard(s) of the infectious agents, sterilization of waste, standard "sharps" handling, PPE required, etc.

   c. Immunization is advised, if available

C. Biosafety Level III

   a. Clinical, diagnostic, teaching, research, or production facilities in which work is done with indigenous or exotic agents which may cause serious or potentially lethal disease as a result of exposure by the inhalation route

   b. As above, plus higher level of training and supervision, biological safety cabinets (Level III), a two-door airlock system, immunization

D. Biosafety Level IV

   a. Work with dangerous and exotic agents which pose a high individual risk of aerosol-transmitted laboratory infections and life-threatening disease.

   b. As above, plus higher level of training and supervision, biological safety cabinets (Level IV)

DESCRIPTION OF THE DIFFERENT COURSES IN CLINICAL ROTATION

Hematology- Clinical Rotation	
Topics (Competencies) to be learned and trained 1. Blood collection, anticoagulant and other safety 2. RBC count, hematocrit and hemoglobin determination 3. WBC and differential count of blood & other body fluids 4. Clotting and bleeding time and clot retraction Time 5. Protime and Activated Plasma Thromboplastin Time 6. Erythrocyte Sedimentation Rate Determination 7. Malarial Smear 8. Osmotic Fragility test 9. Platelet and Reticulocyte Counts 10. Cell Count of Exudates and transudates 11. Lupus Erythematosus Preparation 12. Coulter Counter and other Automated Procedures 13. Reporting of Results in LIS 14. Special tests	
Contact Hours	120 hours/semester
Examination	Midterm (Written and Practical) Quizzes Final Exam (Written and Practical)

Immunology- Clinical Rotation	
Topics (Competencies) to be learned and trained: 1. Natural, acquired Immunity and complement system 2. Immunological Test for detection of antigens and antibodies –principles, procedure and interpretation of test • VDRL/RPR • TPHA • FTA/ Abs • Rhematoid Factor • CRP • ASO • Brucella • Widal • Other Bacterial detection and STD • Viral Infection (Hepatitic and HIV) • Fungal Infection • L.Parasitic Infection including Malaria • Autoimmune Disorders 3. Hypersensitivity 4. Tumor immunology (Tumor markers, oncoproteins) 5. Automation, ELISA 6. Other Special Tests 7. Reporting using LIS	
Contact Hours	120 hours/semester

Microbiology- Clinical Rotation	
Topics (Competencies) to be learned and trained: 1. Sample Collection, transport, processing and staining of specimen 2. Culture Media Preparation 3. Inoculation of different specimen (clinical sample) 4. Differentiation and Identification of Microorganism • Microscopic • Cultural Method • Biochemical method • Automated Method using API, Vitek system, etc. • Molecular Method • Animal Inoculation 5. Antibiotic Susceptibility Testing (AST) 6. Reporting of Results in LIS 7. Multi-resistant Microorganisms- special Test and procedure (E-test, special media, DDST method, etc.)	
Contact Hours	90 hours/semester

Clinical Chemistry- Clinical Rotation	
Topics (Competencies) to be learned and trained: 1. Proper Patient preparation, specimen collection and handling 2. Metabolic Blood Test (Principles, Diseases/Disorders/reference Values) • Water balance and electrolytes • NPN • Glucose test • Lipids and dysproteinemia • Specific Proteins • Liver Function test • Kidney Function test • Enzymology • Proper Instrumentation and calibration • Quality control and assurance	
Contact Hours	90 hours/semester

Blood Banking (Immuno-hematology)- Clinical Rotation	
Topics (Competencies) to be learned and trained: 1. Blood Collection system and screening of donors and recipients 2. Blood storage and preservation 3. ABO and Rh blood group techniques 4. Minor and major cross-matching procedures 5. Blood components preparation 6. Compatibility Testing 7. Transfusion reaction & Therapy 8. Blood Genetics 9. Antibody detection and identification (panel) 10. Reporting of Results in LIS 11. Other special tests	
Contact Hours	90 hours/semester

XI. TABLE OF ACTIVITIES (SYLLABI)

MLT 401- Hematology Clinical Rotation SYLLABUS

Week	Topic- Tutorial	Activities - Practical
1	Revision Hematology 1	Introduction & Orientation ✓ Distributing the schedule of activities ✓ Describe the clinical rotation program ✓ Describe the absence calculation policy; and grading system. ✓ Hematology Lab Safety
		Revision for Practical Hematology – 1
2	Revision Hematology 2	Revision for Practical hematology – 2
3	Revision Hematology 2	Samples in Hematology Deparment: ✓ Types ✓ Forms attached with samples ✓ Inclusion & exclusion criteria's ✓ Handling ✓ Saving & storing ✓ Effects on parameters after storing ✓ Routine & Special hematology tests
4	Automated in hematology ✓ CBC differential, hematology analyzer ✓ Coagulation Analyzer	CBC – Differential, Hematology Analyzer ✓ Principle : impedance & Scattering ✓ Quality control ✓ Errors & Maintenance ✓ Result sheet & Histogram ✓ Parameters ✓ Actions in case of up normal results
5	Anemia cases ✓ Iron metabolism and Iron deficiency anemia ✓ Sideroblastic anemia	Samples of anemias cases ✓ Run on CBC analyzer ✓ Results interpretations & actions ✓ Extra procedures to confirm the results
6	Thalassemia cases ✓ Alpha thalassemia ✓ Beta thalassemia	Samples of thalassemia cases ✓ Run on CBC analyzer ✓ Results interpretations & actions ✓ Extra procedures to confirm the results
7	Sickle cell anemia cases	Samples of Sickle cell anemia cases ✓ Run on CBC analyzer ✓ Results interpretations & actions ✓ Extra procedures to confirm the results
8	Leukemia cases ✓ Acute ✓ chronic	Samples of Leukemia cases ✓ Run on CBC analyzer ✓ Results interpretations & actions ✓ Extra procedures to confirm the results
9	Midterm exam	
10	Lymphoma cases ✓ Multiple myeloma ✓ Myeloproliferative disorders	Samples of Lymphoma cases ✓ Run on CBC analyzer ✓ Results interpretations & actions Extra procedures to confirm the results
11	Coagulation disorders cases ✓ Platelets disorders ✓ Bleeding disorders	Coagulation Analyzer ✓ Principle : impedance & Scattering ✓ Quality control ✓ Errors & Maintenance ✓ Results ✓ Parameters ✓ Actions in case of up normal results (Mixing Studies)

12	Thrombophilia cases	Samples of Coagulation Disorders ✓ Perform Pt, PTT ✓ Result interpretation & action ✓ Extra Procedures to confirm the Results
13	Revision	
14	Final exam	

MLT 402- Immunology tutorial Syllabus

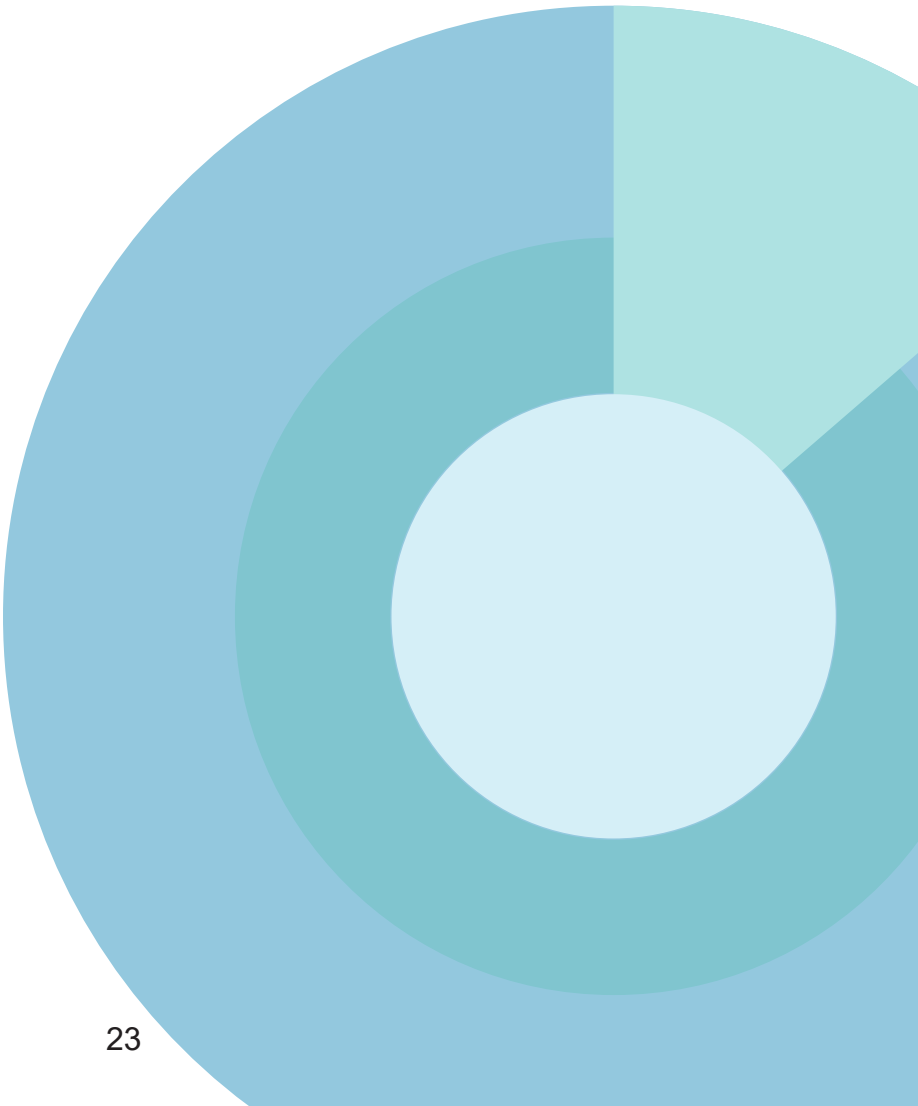
Week	Topic – Tutorial	Activity- Practical
1	Course overview and CSTF Discussion	✓ Serial Dilution to Detect Cold Reacting Antibodies
2	Define terms used in immunological testing	✓ Hemolysin Titer ✓ Detection of IgE Antibodies
3	Basic Immunologic Procedures - Precipitation	✓ Urine Pregnancy Testing
4	Basic Immunologic Procedures - Agglutination	✓ ABO Slide Agglutination Test
5	Light scattering techniques	✓ C-Reactive Protein (CRP) Testing
6	Passive immunodiffusion	✓ Rheumatoid Factor (RF) Testing & Antstreptolysin O (ASO) testing
7	Immunoelectrophoretic techniques	✓ Rapid Plasma Reagin (RPR) Testing ✓ Venereal disease research laboratory (VDRL)
8	Complement fixation technique	✓ Radial Immunodiffusion
9	Labeled immunoassays- Classification of immunoassays	✓ Immunoelectrophoresis
10	Labeled immunoassays – immunofluorescence	✓ Infectious Mononucleosis
11	Labeled immunoassays - Immunoassays	✓ Cold Agglutinin Titer
12	Serological Diagnosis Of infectious agents -1	✓ ELIZA
13	Serological Diagnosis Of infectious agents -2	✓ Streptozyme

Week	Tutorial (Topics)	Practical (Activities)
1	Orientation Strategy, Groupings	Orientation Clinical Rotation Policy & Grouping
2	Overall Scenario and review in Microbiology Diagnostic Laboratory -Flowchart in Micro lab	Specimen collection, disinfection, safety, specimen rejection criteria, specimen processing, request form and result form (case study and various valid and invalid samples) Media preparation, factors affecting the preparation and QC
3	Group 1- Microbiological diagnosis of Specimen from Skin and Eyes	Staining of bacteria (simple, differential) and examining various colony morphology, Microscopic, Cultural, Biochemical and summary of identification scheme
4	Group 2- Microbiological diagnosis of Specimen from Nervous System	Skin and nasal swab culture (sample collection guidelines, culture and identification)
5	Group 3- Microbiological diagnosis of Specimen from Circulatory & Cardiovascular System	CSF and other sterile body fluids culture(sample collection guidelines, culture and identification)
6	Group 4- Microbiological diagnosis of Specimen from Respiratory System	Blood culture(sample collection guidelines, culture and identification)
7	Mid-Term Exam	
8	Group 5- Microbiological diagnosis of Specimen from Digestive System	Sputum and throat swab culture(sample collection guidelines, culture and identification)
9	Group 6- Microbiological diagnosis of Specimen from Reproductive System	Stool culture(sample collection guidelines, culture and identification)
10	Group 7- Microbiological diagnosis of Specimen from Lymphatic System	Urine culture vaginal and (sample collection guidelines, culture and identification)
11	Group 8- Microbiological diagnosis of Specimen from Eyes & Ears	Ear and Eye swab culture(sample collection guidelines, culture and identification)
12	Group 9- Antibiotic Susceptibility Test	Kirby Bauer method and other AST methods
13	Group 10- Multiresistant Microorganism- Diagnosis	Automation in Microbiology/Hospital visit
14	Quiz & Review	Final Exam
15	FINAL EXAMINATION	

MLT 403- MICROBIOLOGY CLINICAL ROTATION- SYLLABUS

MLT 408- BLOOD BANK CLINICAL ROTATION SYLLABUS

Week	TOPIC-TUTORIAL	ACTIVITIES - PRACTICAL
1	Introduction & Orientation	Blood withdrawal, preparation of cell suspension & preparation of controls for Blood typing
2	Blood Bank design	ABO Typing : (slide method, tube method)
3	Blood bank Reception	Sub groups of A
4	Donation process	Rh Typing : (including weak D Ag)
5	Blood Typing	Direct Antihuman Globulin
6	The Antihuman Globulin Test	Indirect Antihuman Globulin
7	Antibody screening and identification	Antibody screening and identification
Midterm Exam		
8	Compatibility testing	Compatibility testing
9	Blood issuance	Antenatal serology and Investigation of HDN & AIHA
10	Blood components, storage and transportation	Emergency blood issue & emergency BB techniques
11	Hemolytic transfusion reactions	Investigation of a transfusion reaction
12	Automation and new technologies in blood banks	Blood banks requests forms; documents
13	Special cases of Transfusion	Blood bank cases



MLT 407- CLINICAL CHEMISTRY CLINICAL ROTATION SYLLABUS

WEEK	TOPIC - TUTORIAL	ACTIVITIES – PRACTICAL
1	Introduction and Orientation, Lab Safety	Orientation
2	Basic Instrumentation - Spectrophotometer - Electrophoresis - Immunoassay techniques	Types of instruments, physical chemistry and techniques Fundamental principles used in clinical instrument designs.
3	Basic Instrumentation - Flame photometer - Chemistry Autoanalyser - Chromatography	Random sampling on instruments.
4	Carbohydrate metabolism - Diabetes mellitus (Typed of diabetes& Diagnosis) - glucose testing (FBS PPBS and Random)	FBS blood sample
5	Carbohydrate metabolism - OGTT (Oral Glucose Tolerance Test). - Glycosylated Hemoglobin	OGTT blood sample Glycated Hemoglobin samples
6	Renal Function Assessment - NBN(Urea, Uric Acid) - Electrolytes,(Na, K, Cl)	Synthetic and / or natural samples of Urea and uric acid tests Electrolytes sampling.
7	Renal Function Assessment - Creatinine Clearance.	Creatinine Clearance blood withdrawals, 24 hours urine collection
8	Liver Function Assessment - Bilirubin - Total Protein, albumin	Direct and indirect bilirubin. Calculate the A/G ratio.
9	Liver Function Assessment - Liver Enzymes (ALT, Ast, GGT, ALP)	Synthetic and / or natural samples of liver enzymes
10	Cardiovascular Assessment - Lipid Profil	Synthetic and / or natural samples of Cholesterol, HDL, LDL, and Triglycerides
11	Cardiovascular Assessment - Cardiac Function Enzymes (CK, LDH)	Cardiac enzymes, principles
12	Quality Assurance in Clinical Chemistry and revision.	Quality Assurance in Clinical Chemistry. Define and give examples of the terms: accuracy, precision, calibration

FOURTH YEAR STUDENT CLINICAL ROTATION

EVALUATION FORM

Student Name: _____

Rotation: _____

	Item	Always (4)	Most of the time (3)	Average (2)	Sometimes (1)	Never (0)
1	Attendance and Punctuality الحضور والالتزام بالمواعيد					
2	Accepts constructive criticism and guidance تقبل التوجيهات و النقد البناء					
3	Establishes relationship with staff and colleagues التواصل الجيد مع طاقم العمل والزملاء					
4	Informs supervisor/team when mistakes occur إبلاغ المشرف أو طاقم العمل عند حدوث الأخطاء					
5	proper uniform and laboratory coat الانضباط باللبس الطبي الذي يتطلبه التدريب					
6	Follows safety procedure and policies (SOP) اتباع تعليمات السلامة(ربط الشعر , لبس القفازات..)					
7	Recognize limitations and seeks help when needed معرفة الحدود والقيود المتبعة وطلب المساعدة بهذا الشأن					
8	Reports accidents and breakages immediately التبليغ الفوري عن الحوادث و كسر الأدوات					
9	Maintain clean, orderly work area المحافظة على نظافة وترتيب منطقة العمل					
10	Proper disposing of disposable and samples الادوات المستهلكة والعينات بطريقة سليمة					
	Total					

Lab Coordinator: _____ Lab Assistant/Demonstrator: _____

FOURTH YEAR STUDENT CLINICAL ROTATION EVALUATION FORM

Student Name: _____

Rotation: _____

	Item	Always (4)	Most of the time (3)	Average (2)	Sometimes (1)	Never (0)
1	Performs assigned tasks responsibly and in a timely manner المقدرة على إكمال المهام بمسئولية وفي الوقت المحدد					
2	Accepts constructive criticism and guidance تقبل التوجيهات و النقد البناء					
3	Establishes relationship with staff and colleagues التواصل الجيد مع طاقم العمل والزملاء					
4	Informs supervisor/team when mistakes occur إبلاغ المشرف أو طاقم العمل عند حدوث الأخطاء					
5	Assumes responsibility/ initiatives for his/her own education اتخاذ الطالب/ة زمام المبادرة و تحمل المسئولية على مستوى تعليمه/ها					
6	Learns new procedures in a reasonable amount of time المقدرة على تعلم مهارات جديدة في زمن مناسب					
7	Recognize normal and abnormal results المقدرة على معرفة النتائج الطبيعية وغير الطبيعية					
8	Performs and accurately interpret quality control procedures المقدرة على إجراء وتفسير الطرق المتبعة لضبط الجودة					
9	Understands the theoretical basis for the laboratory tests فهم القواعد النظرية للاختبارات المعملية					
10	Records and reports results correctly تسجيل نتائج العينات وكتابة التقارير بصورة صحيح					
	Total					

Clinical Coordinator: _____ Lab Assistant: _____

CLINICAL TRAINING COMMITTEE

Contact Information

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ACKNOWLEDGEMENT

This is to certify that I, the undersigned have read and fully understood the clinical rotation training manual. This is to certify further that I fully agree to abide by the said policies.

CONFORME:

_____ _____

Student's Signature above Printed Name Date