



الجامعة الوطنية - السودان
National University - Sudan

Higher Diploma Medical
Laboratory Sciences
Brochur



Introduction

Medical laboratory sciences are a challenging and rewarding health care profession that has great impact on patient care. Working in a variety of settings, medical laboratory scientists are essential members of the health care team who provide vital information about the status and function of the body and its systems. The data obtained by medical laboratory scientists is utilized in the diagnosis, treatment and prevention of disease. The need for highly qualified laboratory scientists who participate in research and teaching of undergraduates is increasing.

General objective

To prepare medical laboratory sciences students to raise their knowledge and skills.

Specific objectives

The program qualifies the candidates to:

- Apply safety and abide by governmental regulations and standards of medical laboratory practices.
- Explain the principles of infectious diseases, tumor markers, toxicants and blood bank.
- Discuss the pathological cases of cytogenetics, blood transfusion disorders, and epidemic parasitic infections.
- Operate and maintain laboratory equipment used in medical labs.
- Display quality programme in clinical chemistry labs.
- Articulate routine and advanced tests in medical labs.
- Integrate patient with community requirement during planning for laboratory services.
- Perform medical laboratory research targeting priority areas.

Learning outcomes

Upon successful completion of the program, the graduate shall be able to:

- Apply safety standards and abide by governmental regulations of medical laboratory practices.
- Perform routine and advanced tests across the medical laboratory disciplines.
- Operate, calibrate and maintain laboratory instruments and equipment.
- Implement and monitor quality management and quality control programmes in clinical laboratories.
- Design and conduct medical laboratory research and analyze and interpret data.
- Integrate patient and community requirements during the planning of laboratory services.

Admission requirements

- Applicants must satisfy the general regulations set by the faculty of graduate studies of the National University- Sudan for registration for postgraduate diploma degree.
- Eligible candidates are B.Sc. (Honors) in Medical Laboratory Sciences from the National University or from an equivalent University or a college. With either of the following grades :
- Bachelor (General or Honors) with grade Good at least
- Bachelor (General or Honors) with grade Pass plus qualifying courses during one semester, equivalent to 12 credit hours.

Study program

Semester One

Code	Course	Credit hours	Contact hours/Week	
			Theory	Practical
MOL-511	Molecular Biology Techniques	3 (2+1)	2	2
RES-512	Research Methods Applications	3 (2+1)	2	2
BIO-513	Biostatistics and Data Analysis	3 (2+1)	2	2
IMM-514	Clinical Immunology	3 (2+1)	2	2
MED-515	Professionalism and Medical Ethics	2 (2+0)	2	0
Total		14	10	8

Semester Two

Code	Course	Credit hours	Contact hours/Week	
			Theory	Practical
DPA-521	Diagnostic Pathology in Medical Laboratory Sciences	3 (2+1)	2	2
INS-522	Instrumentations in Medical Laboratories	3 (2+1)	2	2
MAN-523	Total Quality Management	2 (2+0)	2	0
EPI-524	Epidemiology	2 (2+0)	2	0
SEL-525	Selected Topics in Medical Laboratory Sciences	3 (2+1)	2	2
Total		13	10	6

Courses contents

MOL-511 Molecular Biology Techniques

DNA structure, function and replication; RNA structure, function, transcription and reverse transcription; Genetic code; Protein synthesis; Gene expression and cell signaling; Different types of mutations; Mendelian laws; Chromosomal cell structure, function and abnormalities; PCR technique; Extraction of DNA, RNA and Protein; Restriction Fragments Lengths Polymorphism (RFLP), gel electrophoresis and different DNA analysis tools. Practical: DNA and RNA

extraction; Polymerase Chain Reaction; Gel Electrophoresis; Real Time PCR; DNA sequencing (Demonstration).

RES-512 Research Methods Applications

Introduction to the research process; Statement of research problems, question and hypothesis; Biomedical literature review; Study designs (quantitative, qualitative and mixed approaches); Formulating research objectives; Types of data and variables; Introduction to biostatistics; Sample size and sampling techniques; Data collection tools; Data analysis; Proposal writing; Interpretation of research findings; Biomedical research ethics; Paper critique. Practical: Internet searching (PubMed/MyNCBI and MeSH); Proposal writing; Construction of questionnaire (Epi-Info); SPSS data entry, descriptive statistics and significance tests; GIS; Paper critique; Proposal discussion.

BIO-513 Biostatistics and Data Analysis

Introduction and describing data: frequency distributions and descriptive statistics; Introduction to inference; Sampling distributions and confidence intervals; Comparing paired samples; Statistical power; Conditions for test validity (assumptions); Assessing data normality and transformations; Analysis of Variance (ANOVA) and non-parametric alternatives; Multiple comparisons; Bivariate analysis - correlation and regression; Linear regression. Practical: Microsoft Excel; SPSS programme; Study type determination; Observational studies; Hypothesis testing; Statistical assessment of diagnostic tests; Correlation and regression.

IMM-514 Clinical Immunology

Review of the immune system; Gene arrangement and maturation of lymphocytes and granulocytes; TCR and B-cell receptor arrangement and accessory molecules; Tumour immunotherapy; Dendritic cells and antigen processing/presentation; Microbiome/immune/environment interactions; Hypersensitivity reactions; Autoimmunity and tolerance; Neuro-immune interactions and immune-surveillance; Advanced immunological techniques used in research and diagnosis; Tumor-associated macrophages; Macro-

phages and infection. Practical: Estimation of anti-nuclear antibodies; Rheumatoid arthritis IgM measurement; Detection of allergen-specific IgE; Anti-phospholipid measurement.

MED-515 Professionalism and Medical Ethics

Principles of medical ethics; Informed consent; Confidentiality; Conflicts of interest; Issues in laboratory medicine ethics; Ethics in research; Definition and concepts of professionalism; Communication skills with colleagues and patients; Ethics in the training period; Human social behavior; Ethical versus legal obligations.

DPA-521 Diagnostic Pathology in Medical Laboratory Sciences

Pathology of Tuberculosis; Pathology of hepatitis; Mycetoma; Schistosomiasis; Cancer genetics; Molecular pathology of breast cancer; Screening of pap smear for cervical cancer and FNA of breast cancer; Histopathology and immunohistochemistry of gastric and breast biopsies; Anemias and Hb disorders; Leukemias; Lymphomas; Disorders of the endocrine system; Enzymology; Renal problems. Practical: Cultures and stains of Mycobacterium tuberculosis; Immunological tests for mycetoma; Karyotyping, ISH and FISH techniques; Screening of abnormal pap smear; H&E, special stains and tumor markers; Examination of peripheral blood and bone marrow; Hormone, enzyme and renal profile tests.

INS-522 Instrumentations in Medical Laboratory Sciences

Basic instruments in the lab (microscope, autoclave, water bath and oven); Theory of photometric measurement; Turbidimetry and Nephelometry; Atomic Absorption, ISE and Flame Photometry; Electrophoresis; Chromatography (thin layer, gas and HPLC); Immunoassay (RIA, FIA, ELISA); Molecular techniques (PCR, Microarray, hybridization); Flowcytometry; Blotting techniques; Histopathological instruments; Automation in chemical pathology, hematology and microbiology. Practical: Operation of colorimeter and spectrophotometer; Turbidimetry and Nephelometry; Atomic absorption and flame photometer; Electrophoresis; ELISA; Chromatography; PCR; Microtome

and tissue processor; Cell count analyzer; Autoanalyzers; Safety standards in equipment handling.

MAN-523 Total Quality Management

Introduction to total quality management; Essential elements of a quality management system; Organization and management of the clinical laboratory; Design of clinical laboratory and biosafety; Administration in the clinical laboratory; Good laboratory practice; Quality assurance and quality control in the clinical lab; Control sera; Statistical quality control; Methods evaluation; Standard operating procedures; Accreditation.

EPI-524 Epidemiology

Scope of epidemiology; Measurement of disease frequency, population impact and dynamics of infectiousness; Public health problems; Routine data sources; Case-control, cohort and interventional studies; Error measurement; Confounding; Research synthesis; Environmental epidemiology; Genetic and molecular epidemiology.

SEL-525 Selected Topics in Medical Laboratory Sciences

Basic concepts of infection control; Nosocomial infections; Hospital construction and engineering controls; Parasitism and the epidemiology of parasitic infections; Control of parasitic diseases; Organization and quality control in blood banking; Compatibility testing and special cases for blood transfusion; Blood products: types, usage and preparation; Introduction to toxicology, TDM and tumor markers; Application of toxicology in the clinical lab; Types of toxicants and dose measurements; Methods and applications of immunohistochemistry; Immunofluorescent technique. Practical: Hand hygiene; PPE donning and doffing; Sterilization testing; Measurement of PSA and CRP; Blood products preparation; Transfusion reaction tests; Immunological diagnosis of parasitic infection; Tumor marker expression studies.

Human resource and facilities

Teaching Staff: Ten staff for the theoretical part (Associate Professors and Assistant Professors)

Ten Lecturers for the practical part

Facilities: One Lecture Room 150 seats

Two Teaching Laboratories 100 seats each

Duration of the program: Two semesters, 18 weeks each.

Teaching Modules

Lectures, tutorials, group discussions, assignments, case studies, problem-based practice and practical sessions.

Teaching Language: English.

Examinations regulations

- Abide by the examinations rules of the general regulations of the graduate studies of the National University-Sudan.
- Assessment includes both formative assessment (student feedback and group discussions) and summative assessment (written and practical examinations).
- The pass mark for any course is 60%, and the student must succeed in both the theoretical and the practical components of each course.
- A student failing any supplementary examination should repeat the course.
- A student scoring less than 60% in the theoretical and / or the practical components of a specialization subject should sit for a supplementary examination.
- Each student shall conduct a supervised piece of research.

Assessment:	Continuous assessment	30%
	Final examination	70%

(For courses including practical sessions: continuous assessment (theory + practical) = 20%, Final Theory Exam = 32%, Final Practical Exam = 48%).

Grading system: : (A+ ≥ 90) (A = 80- 89) (B+ = 75- 79) (B = 70-74) (C+ = 65-69) (C = 60-64) (F < 60)

Award of the degree

The Scientific Council of the National University-Sudan, based on the recommendation of the Board of the Faculty of Graduate Studies , shall award the successful candidate a:

Higher Diploma in Medical Laboratory Sciences



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Better **World**