

National University-Sudan
Faculty of Graduate Studies and Scientific Research
Faculty of Medical Laboratory Sciences



M.Sc. Medical Laboratory Sciences
Clinical Chemistry



M.Sc. Medical Laboratory Sciences

Clinical Chemistry

Introduction

Medical Laboratory Scientists play a pivotal role in health care. They provide invaluable information for diagnosis, treatment and prevention of diseases. Though so important, the Medical Laboratory sector in Sudan experiences an acute shortage in qualified staff complying with the continuous advances and innovations in medical technologies vis-à-vis instrumentations and procedures.

For this, the faculty of Medical Laboratory Sciences of the National University, provides master programs by course in:

Clinical Chemistry.

Microbiology and Infection control.

Histopathology and Cytology.

Hematology and Immun Hematology.

Parasitology and Medical Entomology.

General Objective

Qualify critical mass of Medical Laboratory staff to work in universities, research centers and in health care units.

Specific Objectives

The program qualifies the candidates to:

- Acquire state of the art Clinical Chemistry knowledge
- Develop apt skills to undertake routine quality control in Clinical Chemistry laboratories.
- Generate biological and diagnostic reagents.
- Maintain laboratory equipment in Clinical Chemistry laboratories.

Learning outcomes:

Upon completion of the program, successful candidate should be able to:

- Apply safety and abide by governmental regulations and standards of medical laboratory practices.
- Operate and maintain laboratory equipment used in Clinical Chemistry labs.
- Assure quality program in Clinical Chemistry labs.
- Perform routine and advanced biochemical tests in Clinical Chemistry labs.

Admission requirements

- Applicants must satisfy the general regulations set by the faculty of graduate studies and scientific research of the National University- Sudan for registration for master degrees.
- Eligible candidates are holders of:
 - (a) B.Sc. (Honors) in Medical Laboratory Sciences in: Clinical Chemistry from the National University or from an equivalent University or a college.
 - (b) B.Sc. Medical Laboratory Sciences in Clinical Chemistry plus qualifying or postgraduate diploma from the National University or from an equivalent University or a college.

Study program**Semester One**

Code	Course	Credit hours	Contact hours/week	
			Theory	Practical
CHM-611	Laboratory Procedures in Clinical Chemistry	3(2+1)	2	2
CHM-612	Instrumentations in Clinical Chemistry	3(2+1)	2	2
CHM-613	Quality Control in Clinical Chemistry	3(2+1)	2	2
CHM-614	Body Fluids	3(2+1)	2	2
CHM-615	Biochemical Changes in Metabolic Diseases	3(2+1)	2	2
CHM-616	Biochemical Changes in Renal Diseases	3(2+1)	2	2

Semester Two

Code	Course	Credit hours	Contact hours/Week	
			Theory	Practical
CHM-621	Endocrinology and Enzymology	3(2+1)	2	2
CHM-622	Biochemical Changes in Liver and Gastrointestinal Tract Diseases	3(2+1)	2	2
CHM-623	Toxicology, Therapeutic Drugs Monitoring and Tumors Markers	3(2+1)	2	2
CHM-624	Nutritional Assessment: Vitamins and Trace Elements	3(2+1)	2	2
CHM-625	Pregnancy, Inborn Errors of Metabolism and Neonatal Screening	3(2+1)	2	2
CHM-626	Diagnostic Molecular Techniques in Clinical Chemistry	3(2+1)	2	2

Semester Three

Code	Course	Credit Hours	Contact Hours	
			Theory	Practical
CHM-631	Dissertation	8(0+8)	0	16

Courses contents

CHM-611 Laboratory Procedures in Clinical Chemistry

Define Clinical Chemistry terms; Hazards in Clinical Chemistry laboratories; Identify units of measurement; Use of glassware in Clinical Chemistry laboratories; Preparation of solutions from solid substances and from stock solutions; Methods of concentration: molarity, normality and percentage; Methods of collection, storage and transport of specimens in Clinical Chemistry laboratories; Types of anticoagulants in Clinical Chemistry.

CHM-612 Instrumentations in Clinical Chemistry

Operating instruments in Clinical Chemistry laboratories; Interpretation of results of: flame spectrophotometer, immunofluorescence, automated chemical analyzer, electrophoresis, ELISA, PCR, gas analyzers, and chromatography.

CHM-613 Quality Control in Clinical Chemistry

Purpose of quality control program; Steps of quality assurance; Preparation of control materials and standard operating procedures; Documentation of results: calibration, performance, maintenance checks, malfunctions, and corrections.

CHM-614 Body Fluids

Body fluid compartments: composition and measurements; General characteristics of CSF, synovial, amniotic and peritoneal fluid.

CHM-615 Biochemical Changes in Metabolic Diseases

Measurement and metabolism of carbohydrates, amino acids, proteins and lipids

CHM-616 Biochemical Changes in Renal Diseases

Renal anatomy and physiology; Urine formation; Urinalysis; Abnormalities of renal function: nephritis and nephritic syndromes; Renal failure and renal stones.

CHM-621 Endocrinology and Enzymology

Use of enzymes in diagnosis; Classification of enzymes; Enzymatic kinetics; Enzyme profiles in disease: liver, bone, prostate, muscle and heart; Use of enzymes as analytical reagents; Biosynthesis; Chemistry and physiological function of hormones and inborn errors of hormones metabolism; Endocrine glands: hypothalamic-pituitary-adrenal axis, thyroid, parathyroid, adrenal (cortex, medulla) and gonads.

CHM-622 Biochemical Changes in Liver and Gastrointestinal Tract Diseases

Measurement of bilirubi: total protiens, albumin and liver enzymes: AST, ALT, ALP, GGT and 5NT in liver disorders.

CHM-623 Toxicology, Therapeutic Drugs Monitoring and Tumors Markers

Applied toxicology; Measure of drugs in the blood; Identification of tumors markers types.

CHM-624 Nutritional Assessment: Vitamins and Trace Elements

Classification and functions of vitamins and trace elements; Vitamin deficiency disorders and vitamins overdose; importance of trace elements.

CHM-625 Pregnancy, Inborn Errors of Metabolism and Neonatal Screening

Types, causes and laboratory tests of inborn errors of metabolism; Screening tests of neonates ; laboratory investigations of pregnancy.

CHM-626 Diagnostic Molecular Techniques in Clinical Chemistry

Define diagnostic molecular biology; Role of molecular biology in Clinical Chemistry laboratories; Identify molecular techniques in Clinical Chemistry; Applications of molecular techniques in diagnosis of chemical changes in body fluids.

CHM-631 Dissertation

Write a research proposal; Conduct a piece of research: Data collection, analysis, interpretation and presentation. Dissertation writing: abstract, introduction, literature review, methodology, results, discussion, conclusions and recommendations, references. Dissertation assessment; Dissertation oral examination

Human resources and facilities

Teaching staff: Three assistant professors

Three Lecturers

Two lab technologists

One lab assistant

One medical lab attendant

Facilities: Three lecture rooms: 70 seats each

Clinical Chemistry laboratory: 60 seats

University main library : 400 seats.

E. Library : 250 seats.

Duration of the program: Three semesters 16 weeks each

Teaching modules

Lectures, small group discussions, seminars, practicals, residential field training , tutorials and assignments.

Teaching language: English.

Examinations Regulations

- Abide by the examinations rules of the general regulations of the graduate studies of the National University-Sudan
- 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.
- Duration of the research shall be 16 weeks. If need be, an extension of 4 weeks is allowed if approved by the program coordinator.
- Exceeding the aforementioned period (four weeks) the student has to settle a one semester extra fees to allow her/him an extension of extra four weeks.
- Expiring the extension periods without completing the dissertation, the student shall be dismissed from the program.
- A student scoring less than 60% in the dissertation oral examination will be allowed only one chance for oral defence. In such case the student should settle one semester fees.
- All students shall sit for oral examination at the end of the 3rd semester.

Assessment: Continuous assessment 30%

Final examination 70%

Grading system: A⁺ (90-100) 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, based on the of recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

**M.Sc. Medical Laboratory Sciences
Clinical Chemistry**