Diploma and Master of Science in Laboratory Medicine

Advances in technology and methodologies in the past decade have resulted in the introduction of a multitude of new laboratory diagnostic procedures. The gradual incorporation of these diagnostic methodologies in the working environment has necessitated that all diagnostic laboratory workers acquire the necessary knowledge and the practical competencies and attitudes required to reliably evaluate, perform, and interpret results of these tests. This is particularly relevant as most diagnostic procedures have now become automated and are dependent on commercially available kits, with new technologies replacing old methodologies at an increasing pace.

The Laboratory Medicine program has been established with the aim of offering advanced learning and practical training to:

- Science graduates planning a career in the area of laboratory medicine
- Technicians wishing to upgrade their expertise in specialized areas of laboratory medicine
- Personnel engaged in the practice of laboratory medicine, including physicians, who wish to specialize in laboratory medicine.

The program focuses on diseases representing a burden in the countries of the Arabian Gulf region and addresses specific issues (genetics diseases, malignancies, infectious agents, and nutritional disorders) which are of current relevant concern. The program seeks to foster interdisciplinary and inter-professional understanding and action.

Mission

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Vision

The Master in Laboratory Medicine program is of high relevance as it:

1. Helps in developing a focus for regional research, training
2. Serves in selected areas of Laboratory medicine
3. Helps to strengthen undergraduate programs in the field
4. Provides strategic direction and promote developmental continuity and stability
Program Objectives

- Meet the current needs for higher level technologists considering the rapid increase in knowledge and skills pertaining to modern methods of Laboratory Medicine.

- Train technologists engaged in the practice of laboratory medicine to perform advanced techniques utilizing modern instrumentation, assess methodologies, and critically appraise laboratory results.

- Train candidates to become proactive leaders in their laboratories on cost-benefit analysis of newly introduced techniques in relation to their clinical appropriateness and to identify the elements of total quality assurance in the laboratory.

- Train candidates to plan and carry out a research project relevant to the practical needs of their workplaces including the appraisal of literature relevant to their area of specialization, use of electronic retrieval and indexing, and online access of medical databases.

- Train candidates to respect the bioethical issues inherent in medical research involving humans or animals.
- To develop the communication skills, both oral and written, and to endow students with relevant competencies and attitudes required, including the use of Microsoft® Office, and the utilization of statistical packages for data evaluation.

Areas of Specialization

The one year program leads to a Diploma and the two-year program in Laboratory Medicine leads to a Master of Science degree in three major areas of Laboratory Medicine, namely:

- Clinical Biochemistry
- Medical Microbiology and Immunology
- Pathology (Hematology)

Methods of Learning

The curriculum is organized in modular form. Each module occupies for about one month, with three weeks of self-study preparation followed by an intensive 3 – 5 days face-to-face interaction in tutorials and laboratory sessions. Sessions are interactive with both instructor and student presentations which integrate both vertically with previous modules and horizontally across disciplines. The method of learning is student centered emphasizing a “hands on” experiential learning approach (with time allocated for both demonstrations and individual bench work) and concept-based, in keeping with the traditions of the College of Medicine and Medical Sciences (CMMS), Arabian Gulf University (AGU).

Seminars by faculty, students and invited speakers, plus workshops complement scheduled curricular activities.
Admission Requirements

Diploma and Master of Science

1. The applicant is a citizen of one of the Gulf Cooperation Council (GCC) countries or a citizen of an Arab country and is resident in one of the GCC countries.


3. A Bachelor's Degree (or equivalent) in one of the health professions, from a university recognized by AGU with a minimum overall average of “Good” to be considered for Diploma and a minimum overall average of “Very Good” to be considered for Master of Science.

4. Two years experience in a health-related profession relevant to the program being applied to (Fresh graduates may be considered, on merit).

5. Evidence of adequate proficiency in the English language (Minimum TOEFL Score of 450 or IELTS of 5.0).

6. A satisfactory personal interview.

Graduation Requirements

Diploma

- Successfully complete a minimum of 24 credit hours of course work.
- Obtain a minimum cumulative GPA of 2.0 out of 4.0.
- Satisfactorily complete a Diploma project assigned by the Academic Committee

Master of Science

- Successfully complete a minimum of 24 credit hours of course work.
- Obtain a minimum cumulative GPA of 3.0 out of 4.0.
- Carry out a laboratory-based research project and successfully defend a written thesis.

Program outline

Diploma

The Diploma program is a one-year program organized as follows:

The curriculum is organized around two semesters (of 16 weeks duration each). The first semester consists of core courses organized in 6 modules, while the second semester is devoted to specialized courses.
The first two semesters are spent in formal classroom and laboratory learning. Interactive resource sessions and laboratory activities allow the students to widen their horizons, share experiences and acquire up-to-date laboratory methodology.

Diploma requirements include 24 credit hours of courses and 4 credit hours for the project (Total = 28 credit hours).

**Master of Science**

The Master of Science program is a 2-year program organized as follows:

The curriculum is organized around four semesters (of 16 weeks duration each). The first semester consists of core courses organized in 6 modules, while the second semester is devoted to specialized courses.

The first two semesters are spent in formal classroom and laboratory learning. Interactive resource sessions and laboratory activities allow the students to widen their horizons, share experiences and acquire up-to-date laboratory methodology.

The third and fourth semesters are dedicated to the research project and thesis writing.

**During the First Year**

- The first semester program consists of basic modular courses common to all students.

- In the second semester, students in each specialization follow a distinct curriculum with modular courses in their selected specialty areas.

**During the Second year**

The Master of Science candidate undertakes further specialized training and a research project. At the conclusion of the research project, the student is required to submit a thesis and to defend it in front of an examining committee.

Thesis Research work is spread over the two semesters of the second academic year. Topics for the thesis will be decided in consultation with the Director of the program taking into consideration the students’ interests and ongoing research activities in each department. Thesis work can be partly performed by the student in his/her institution provided that a qualified supervisor is identified and technical facilities are available to carry out the planned experiments. Internal and external examiners evaluate the written dissertation and examine the student orally.

The Master of Science degree requirements include 24 credit hours of courses and a 12 credit hour thesis to be completed within two academic years (Total = 36 credit hours).

The program is implemented by the Director and decisions are made by the Academic Committee consisting of members representing, the major specialties in the program.
Objectives for Clinical Biochemistry

The program focuses on the acquisition of knowledge, skills and attitudes relevant for a career in the field of advanced diagnostic Clinical Biochemistry in areas related directly or indirectly to human health (such as screening, diagnosis, monitoring, and prognosis).

At the end of the program the students are expected to demonstrate:

• Acquisition of an understanding of the general principles of Clinical Biochemistry.

• An understanding of the operation of the Core Laboratory concept as regards both computer and analytical aspects.

• Appreciation of the range of specialization within the discipline of Clinical Biochemistry such as fluid and electrolyte balance; acid-base balance; cardiac, liver kidney and bone functions, in health and disease, nutritional aspects of Clinical Biochemistry, endocrinology, tumor markers, inborn errors of metabolism, toxicology, therapeutic drug monitoring; and trace metal analysis.

• An understanding of the present and future applications of molecular biology to the practice of Clinical Biochemistry.

Objectives for Medical Microbiology & Immunology

The program focuses on the acquisition of knowledge, skills and attitudes relevant for a career in the field of advanced diagnostic microbiology and immunology in areas related directly or indirectly to human health (such as laboratory diagnosis of infections, food and water examination). To this end, a strong partnership is maintained with the public and private health sectors.

At the end of the Program students are expected to demonstrate:

• Acquisition of a solid understanding of general principles of Microbiology and Immunology and recent advances in both fields.

• A thorough understanding of the principles underlying the modern applications of molecular biology in medicine.

• The ability to cope with the continuous progress in the highly dynamic areas of microbiological diagnosis, infectious diseases and immunology.

• The ability to detect and identify, in a specimen, different clinically relevant fastidious, unusual or uncultivable pathogens involved in human diseases and to be familiar with modern methods of their isolation and identification.

Objectives for Pathology

The program focuses on the acquisition of current knowledge of basic principles of pathology and their application to diagnosis particularly in hematology. Exploration of basic concepts of disease pathogenesis will be addressed.
This process will be encouraged by participation in seminars, journal review sessions, clinicopathological conferences and a research project.

**At the end of the Program, students are expected to demonstrate:**

- Acquisition of an understanding of general principles of pathology and recent developments in this area.

- Competence in applying the knowledge of these principles to diagnostic approaches in the area of hematology.

- Competence in performing basic techniques in molecular biology as applied to hematology.

- Ability to collaborate with clinical colleagues in developing a specific research project.

**Outline of Courses**

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Diploma and Master of Science Core Courses</th>
<th>12 Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Module 1</td>
<td>Evidence-based laboratory diagnosis, lab safety and quality management</td>
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<tr>
<td>Module 2</td>
<td>Preservation and transmission of genetic information and principles of bioethics</td>
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<td>Module 3</td>
<td>Molecular techniques and instrumental analysis</td>
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<td>Module 4</td>
<td>Cell biology</td>
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<tr>
<td>Module 5</td>
<td>Host-parasite interactions</td>
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</table>

In the second semester, students join their respective departments and take one of the following four sets of courses, depending on their specialization.

<table>
<thead>
<tr>
<th>Semester 2</th>
<th>Specialized courses in Clinical Biochemistry</th>
<th>12 Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Module 1</td>
<td>Carbohydrates</td>
<td></td>
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<tr>
<td>Module 2</td>
<td>Lipids</td>
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<td>Module 3</td>
<td>Proteins and Body Fluids</td>
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<tr>
<td>Module 4</td>
<td>Gastrointestinal tract and nutrition</td>
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<tr>
<td>Module 5</td>
<td>Endocrinology and therapeutic drug monitoring</td>
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<thead>
<tr>
<th>Semester 2</th>
<th>Specialized courses in Medical Microbiology &amp; Immunology</th>
<th>12 Credit Hours</th>
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<tbody>
<tr>
<td>Module 1</td>
<td>Vector-borne infections</td>
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<tr>
<td>Module 2</td>
<td>Gastrointestinal and food-borne infections</td>
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<tr>
<td>Module 3</td>
<td>Respiratory infections</td>
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Module 4: Central nervous system infections  
Module 5: Sexually transmitted infections

<table>
<thead>
<tr>
<th>Semester 2</th>
<th>Specialized courses in Pathology</th>
<th>12 Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Sub-specialty: Hematology</td>
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<tr>
<td>Module 1</td>
<td>Anemia (1): Nutritional deficiency state and other acquired anemias</td>
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<tr>
<td>Module 2</td>
<td>Anemia (2): Genetic disorders of hemoglobin and other hemolytic anemias</td>
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<tr>
<td>Module 3</td>
<td>Disorders of myeloid cells</td>
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<tr>
<td>Module 4</td>
<td>Lymphocytic disorders</td>
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<tr>
<td>Module 5</td>
<td>Disorders of hemostasis and transfusion medicine</td>
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<td></td>
<td>Project for Diploma</td>
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</tbody>
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Semester 3: Specialized seminars and workshops

Master of Science thesis research protocol

Semester 4: Specialized seminars and workshops

Master of Science thesis research protocol

Total Credit hours for Diploma project: 4 Credit hours

Total Credit hours for Master of Science thesis: 12 Credit hours

Total Curriculum:

Total Credit Hours for Diploma: 28 Credit hours

Total Credit Hours for Master of Science: 36 Credit hours
**Summary of Program**

<table>
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<th>Program</th>
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| Target Candidates            | - Science graduates planning a career in the area of laboratory medicine.  
                              | - Technicians with interest in upgrading their expertise in specialized areas of laboratory medicine.  
                              | - Personnel engaged in the practice of laboratory medicine, including physicians, who wish to specialize in laboratory medicine. |
| Admission Requirements       | - Bachelor of Science degree (“Good” for Diploma and “Very Good” for Master of Science)  
                              | - Nomination/ No objection letter from the Ministry of Higher Education of applicant’s country of residence (GCC citizens).  
                              | - Proficiency in English (TOEFL 450 / IELTS 5.0)  
                              | - Working experience in area of desired specialty  
                              | - Satisfactory personal interview. |
| Duration of Program          | Diploma - 1 year  
                              | Master of Science - 2 years |
| Program Outline              | Semester 1 Core courses  
                              | Semester 2 Specialized courses  
                              | Semester 3 Diploma / Thesis research project  
                              | Semester 4 Research and final submission of written Thesis/Report |
| Curriculum Delivery          | All modules start with a period of 3 weeks of self-study and preparation, followed by 1 week of classroom / laboratory-based study. |
| Total Credit Hours           | Diploma – 28 Credit Hours  
                              | Master of Science – 36 Credit Hours |

**PROGRAM FACULTY**

**Director**  
Professor Khalid M. Bindayna

**Academic Committee**  
Prof. Khalid M. Bindayna (Chair and Coordinator, Microbiology & Immunology Subspecialty)  
Dr. Durjoy Shome (Coordinator, Pathology Subspecialty)  
Prof. Wassim Almawi (Coordinator, Clinical Biochemistry Subspecialty)  
Dr. Abdulrahman Y Ismaeel (Member)  
Prof. Hayder Ahmed Giha (Member)

**Academic Faculty**

Dr. Abdulrahman Y Ismaeel
Communication & Correspondence

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