Higher Education Relevance and Quality Agency

National Accreditation and Quality Improvement Standards for Medical Laboratory Science Degree Program

First Edition
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ABBREVIATIONS

CEU	Continuing Education Unit
CPD	Continuing Professional Development
DVD	Digital Video Disk
EMLA	Ethiopian Medical Laboratory Science Association
FMOH	Federal Ministry of Health
HEI	Higher Education Institution
HERQA	Higher Education Relevance and Quality Agency
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technology
IQA	Internal Quality Assurance
IT	Information Technology
PH	Power of Hydrogen
SOP	Standard Operating Procedure
USAID	United States Agency for International Development
VHS	Virtual Host Storage
WFME	World Federation of Medical Education

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INTRODUCTION

Assuring the quality and relevance of higher education is recognized as a priority agenda both in the Education Sector Development Program IV and the Growth and Transformation Plan of Ethiopia. The Higher Education Proclamation 650/2009 mandated the Higher Education Relevance and Quality Agency (HERQA) to ensure that higher education institutions (HEIs) provide high-quality and relevant education. Moreover, in Article 22, the proclamation instructs all HEIs of Ethiopia to establish a reliable internal quality assurance (IQA) system.

The ultimate goal of IQA is to have a culture of quality care that ensures that quality is a focus of all the activities of an institution at all levels and is incorporated into the everyday work of the whole institutional community. A robust and transparent quality assurance system conveys confidence in the quality of the provision of a HEI to its staff, to students, to employers, and to other stakeholders.

Increased public expectation for quality and ethical health care is necessitating changes in what health professionals are taught and how they are taught. On the other hand, the increasing need to train more health workers coupled with rapid expansion in medical knowledge presents a serious challenge to the quality of education of health professionals including medical laboratory scientists. Despite these challenges, many HEIs training health care providers do not have well-functioning quality systems that have been cascaded to the department level.

In response, HERQA, in collaboration with the FMOH and Jhpiego (under the Strengthening Human Resources for Health Project funded by the U.S. Agency for International Development [USAID]), has developed these accreditation and quality improvement standards for medical laboratory science degree programs. The standards will serve the following purposes:

- Provide a framework against which medical laboratory science schools can measure themselves, identify the gaps, and implement quality enhancement programs.
- Guide regulatory authorities like HERQA to accredit medical laboratory science degree programs.
- Provide a framework for HERQA to conduct program-level quality audits and develop tailored feedback.
- Inform higher education institutions about the quality improvement standards in specific areas and encourage them to achieve the standards.

USE OF STANDARDS

It is the opinion of HERQA that the set of standards presented can be used nationally as a tool for quality assurance and improvement of undergraduate medical laboratory science education. This could be done in different ways, such as:

1. Medical Laboratory Science School Self-Evaluation of the Institution and Its Program

The primary intention of HERQA in introducing the standards as an instrument for quality improvement is to provide a framework against which medical laboratory science schools can measure themselves in voluntary self-evaluation and self-improvement of the program.

2. External Evaluation or Peer Review

The process described can be further developed by inclusion of evaluation and counseling from external peer review groups.

3. Combination of Self-Evaluation of Institution and Program and External Peer Review.

HERQA considers such a combination to be the most valuable method.

4. Recognition and Accreditation

Depending on local needs and traditions, this guideline can also be used by national or regional authorities/agencies dealing with recognition and accreditation of medical laboratory science schools.

DEFINITIONS

The following terms are used frequently in this guideline. Hence, it is important to define them to enhance understanding of the document.

Areas are defined as broad components in the structure, process, and outcome of medical laboratory science education.

Sub-areas are defined as specific aspects of an area, corresponding to performance indicators.

Standards (one or more) are specified for each sub-area using two levels of attainment, and each standard is given a specific number. The standards are structured in 10 areas and 37 subareas.

Basic standard means that the standard must be met by every medical laboratory science school and fulfilment demonstrated during evaluation of the school. *Basic standards are expressed by a* ***"must."***

Standard for quality improvement means that the standard is in accordance with international consensus about best practice for medical laboratory science schools and basic medical laboratory science education. Fulfilment of initiatives to meet some or all of such standards should be documented by medical laboratory science schools. Fulfilment of these standards will vary with the stage of development of the medical laboratory science schools, their resources, and educational policy. Even the most advanced schools might not comply with all standards. Standards for quality improvement are expressed by a **"should."**

Altogether, the document includes 212 basic standards and 118 quality improvement standards.

Annotations are used to clarify, amplify, or exemplify expressions in the standards. It should be strongly emphasized that the content of the annotations should not be seen as prescriptive for institutions. The annotations do not add new criteria or requirements. The listing of examples in annotations are in some cases exhaustive, in others not.

AREAS OF ACCREDITATION AND QUALITY IMPROVEMENT STANDARDS

HERQA has identified the following 10 aspects of operation, which will form the focus points for a quality audit model at program level in Ethiopian HEIs. They are closely related to the focus areas the Agency has been using for the past 9 years for institutional quality. The benefits, we believe, are twofold. One, using this model will help the Agency transfer the experience, knowledge, and skills acquired during the institutional quality audits undertaken so far to the program-level audit. Two, it will enable the Agency to conduct program-level audits in keeping with international norms, as most quality assurance agencies seem to be comfortable with the use of all aspects of operation stated in the 10 following areas when assessing programs:

1. Program Goals and Learning Outcomes
2. Governance, Leadership, and Administration
3. Educational Resources
4. Academic and Support Staff
5. Student Admission and Support Services
6. Program Relevance and Curriculum
7. Teaching-Learning and Assessment
8. Student Progression and Graduate Outcomes
9. Continual Quality Assurance
10. Research and Development and Educational Exchanges

1. PROGRAM GOALS AND LEARNING OUTCOMES

1.1 PROGRAM GOALS/AIMS

Basic Standards

The medical laboratory science training school/department **must:**

- Define its program goals and make them known to its constituency (B 1.1.1)
- Ensure that the goal of the program is in line with, and supportive of, the vision and mission of HEI (B 1.1.2)
- Outline in its statement of program goals that the trained medical laboratory scientists are:
  - Competent at a basic level and capable of undertaking the role of medical laboratory scientists as defined by the health sector (B 1.1.3)
  - Prepared and ready for postgraduate education (B 1.1.4)
  - Committed to lifelong learning (B 1.1.5)
- Ensure that the mission encompasses the needs of the community, the health care system, and other aspects of social accountability (B 1.1.6)

Quality Improvement Standards

The medical laboratory science training school/department **should** ensure that the goal addresses:

- Aspects of global health (Q 1.1.1)
- Health research attainment (Q 1.1.2)

Annotations

Program goals/outcomes are general statements of what the program intends to accomplish; they describe learning outcomes and concepts in general terms. They should also be consistent with the mission of the program and institution.

Constituency would include the leadership, staff, and students of the medical laboratory school as well as other relevant stakeholders.

Lifelong learning is the professional responsibility to keep up to date in knowledge and skills through appraisal, audit, reflection, or recognized continuing professional development (CPD). CPD includes all activities that medical laboratory scientists undertake, formally and informally, to maintain, update, develop, and enhance their knowledge, skills, and attitudes in response to the needs of their patients.

Social accountability would include willingness and ability to respond to the needs of society, patients, and the health and health-related sectors and to contribute to the national and international developments in medical laboratory science by fostering competencies in health care, medical laboratory science education, and research. This would be based on the school's own principles and in respect of the autonomy of universities. Social accountability is sometimes used synonymously with social responsibility and social responsiveness. In matters outside its control, the medical laboratory science school would still demonstrate social accountability through advocacy and by explaining relationships and drawing attention to consequences of the policy.

Aspects of global health would include awareness of major international health problems, and also of health consequences of inequality and injustice.

1.2 PARTICIPATION IN FORMULATION OF THE PROGRAM GOALS AND OUTCOMES

Basic Standard

The medical laboratory science training school/department **must:**

- Ensure that its principal stakeholders participate in formulating program goals and outcomes (B 1.2.1)

Quality Improvement Standard

The medical laboratory science training school/department **should:**

- Ensure that the formulation of its program goals and outcomes is based also on input from other relevant stakeholders (Q 1.2.1)

Annotations

Principal stakeholders include students, faculty, Ministry of Education, professional associations (Ethiopian Medical Laboratory Science Association [EMLA]), Ministry of Health, HERQA, education strategic center, and the public.

Other relevant stakeholders include community representatives, patient associations, and partners.

1.3 INSTITUTIONAL AUTONOMY AND ACADEMIC FREEDOM

Basic Standard

The medical laboratory science training school/department **must:**

- Have institutional autonomy to formulate and implement policies for which its faculty/academic staff and administration are responsible, especially regarding:
  - Design of the curriculum (B 1.3.1)
  - Use of the allocated resources necessary for implementation of the curriculum (B 1.3.2)

Quality Improvement Standard

The medical laboratory science training school/department **should:**

- Ensure academic freedom for its staff and students:
  - In addressing the actual curriculum (Q 1.3.1)
  - In exploring the use of new research results to illustrate specific subjects without expanding the curriculum (Q 1.3.2)

Annotations

Institutional autonomy would include appropriate independence from government and other counterparts (regional and local authorities, religious communities, private cooperations, the

professional unions, and other interest groups) to be able to make decisions about key areas such as design of curriculum, assessments, student admissions, staff recruitment/selection and employment conditions, research, and resource allocation.

Academic freedom would include appropriate freedom of expression, and freedom of inquiry and publication for staff and students.

1.4 EDUCATIONAL OUTCOMES/GRADUATE PROFILES/CORE COMPETENCIES OF THE PROGRAM

Basic Standards

The medical laboratory science training school/department **must:**

- Have clearly defined educational outcomes that are in line with and supportive of the program goals (B 1.4.1)
- Define the intended educational outcomes that students should exhibit upon graduation in relation to:
  - Their achievements at a basic level regarding knowledge, skills, and attitudes (B 1.4.2)
  - Their commitment to and skills in lifelong learning (B 1.4.3)
  - The health needs of the community, the needs of the health care system, and other aspects of social accountability (B 1.4.4)
- Ensure appropriate student conduct with respect to fellow students, faculty members, other health care personnel, and patients and their relatives (B 1.4.5)
- Make the educational outcomes known to the students and faculty (B 1.4.6)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Review the outcomes periodically in consultation with principal stakeholders to ensure that the educational outcomes are in line with the needs of the health sector and the society (Q 1.4.1)
- Specify outcomes related to engagement of the students in medical laboratory science research (Q 1.4.2)
- Ensure that educational outcomes address aspects of global health (Q 1.4.3)

Annotation

Educational outcomes refers to statements of knowledge, skills, and attitudes that students are expected to demonstrate at the end of a period of learning.

Refer to annotations in 1.1 for *lifelong learning* and *aspects of global health*.

Refer to annotations in 1.2 for *principal stakeholders*.

2. GOVERNANCE, LEADERSHIP, AND ADMINISTRATION

2.1 GOVERNANCE OF THE PROGRAM

Basic Standard

The medical laboratory science training school/department **must:**

- Define its governance structures and functions including its relationships within the HEI (B 2.1.1)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- In its governance structures set out the committee structure, and reflect representation from:
  - Academic staff (Q 2.1.1)
  - Students (Q 2.1.2)
  - Principal stakeholders (Q 2.1.3)
- Ensure transparency of the work of governance and its decisions (through newsletters, web-information, disclosure of minutes, etc.) (Q 2.1.4)

Annotation

Governance means the act and/or the structure of governing the school. Governance is primarily concerned with department-related policymaking, the processes of establishing general program policies and also with control of the implementation of the policies. The program policies would normally encompass decisions on the mission, curriculum, admission policy, staff recruitment and selection policy, and decisions on interaction and linkage with the medical laboratory practice and health sector as well as other external relations.

Refer to annotation in 1.2 for *principal stakeholders*.

2.2 ACADEMIC LEADERSHIP OF THE PROGRAM

Basic Standards

The medical laboratory science training school/department **must:**

- Describe the responsibilities of its academic leadership for definition and management of the medical laboratory science educational program (B 2.2.1)
- Have a designated academic program leader (a medical laboratory scientist/ technologist who has a Master's or Doctoral Degree with a minimum of 2 years of experience in the academic area (B 2.2.2)

Quality Improvement Standard

The medical laboratory science training school/department **should:**

- Periodically evaluate its academic leadership in relation to achievement of its mission and intended educational outcomes (Q.2.2.1)

Annotation

Academic leadership refers to the positions and persons within the governance and management structures being responsible for decisions on academic matters in teaching, research, and community service. It may include head, unit coordinators/course leaders, as well as chairs of standing committees (e.g., for student selection, curriculum planning, and student counseling).

2.3 ADMINISTRATIVE STAFF AND MANAGEMENT

Basic Standard

The medical laboratory science training school/department **must:**

- Have adequate administrative and professional staff that are appropriate to:
  - Support implementation of its educational program and related activities (B 2.3.1)
  - Ensure good management and resource deployment (B 2.3.2)

Quality Improvement Standard

The medical laboratory science training school/department **should:**

- Formulate and implement an internal program for quality assurance of the management, including regular review (Q 2.3.1)

Annotations

Administrative staff in this document refers to the positions and persons within the governance and management structures being responsible for the administrative support to policymaking and implementation of policies and plans and would depending on the organizational structure of the administration include head and staff in the dean's office or secretariat, heads of financial administration, staff of the budget and accounting offices, officers and staff in the admissions office, and heads and staff of the departments for planning, personnel, and information technology (IT).

Management means the act and/or the structure concerned primarily with the implementation of the institutional and program policies including the economic and organizational implications, i.e., the actual allocation and use of resources within the medical laboratory science school.

2.4 EDUCATIONAL BUDGET AND RESOURCE ALLOCATION

Basic Standards

The medical laboratory science training school/department **must:**

- Have a clear line of responsibility and authority for resourcing the curriculum, including a dedicated educational budget (B 2.4.1)
- Allocate the resources necessary for the implementation of the curriculum and distribute the educational resources in relation to educational needs (B 2.4.2)
- Ensure that the budget allocation matches with student enrollment (B 2.4.3)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Have autonomy to direct/control the budget and resources in order to achieve its program goals and the intended educational outcomes of the curriculum (Q 2.4.1)
- Have a transparent system of responsibility and accountability in the allocation, distribution, and use of the budget and other resources (Q 2.4.2)
- In distribution of the resources, take in to account development in medical laboratory science sciences and health needs of the society (Q 2.4.3)

2.5 INTERACTION WITH HEALTH SECTOR

Basic Standards

The medical laboratory science training school/department **must:**

- Have constructive interaction with the health and health-related sectors of society and government (B 2.5.1)
- Formalize its collaboration (entering into formal agreements, stating content and forms of collaboration, and/or establishing joint contact and coordination committees as well as joint projects), including engagement of staff and students, with partners in the health sector (B 2.5.2)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Periodically review its interaction with the health and health-related sectors (Q 2.5.1)
- Interact with health and health-related sectors based on principles of mutual benefit and shared governance (Q 2.5.2)

Annotations

Constructive interaction would imply exchange of information, collaboration, and organizational initiatives that would facilitate education of medical laboratory scientists so as to equip them with the qualifications needed by society.

The health sector would include the health care delivery system, whether public or private, research institutions, and other medical laboratory science sectors.

The health-related sector would—depending on issues and local organization—include institutions and regulating bodies with implications for health promotion and disease prevention (e.g., with environmental, nutritional, and social responsibilities).

Mutual benefit would mean both parties in agreement gain value out of the interaction. For example, a medical laboratory science school sends students to certain medical laboratories for practice; in exchange, staff at the medical laboratories are given educational opportunities at the same school.

Shared governance would mean working together to make decisions for the good of both parties involved.

3. EDUCATIONAL RESOURCES

3.1 LECTURE HALLS/CLASSROOMS

Basic Standards

The medical laboratory science training school/department **must:**

- Have lecture halls/classrooms for group, tutorial, and seminar activities with adequate space (1.4m^2/student for group/tutorial and 1.6m^2/student for seminar) (B 3.1.1)
- Ensure that the rooms are equipped with:
  - Sufficient and comfortable chairs and tables (movable armchairs and/or chairs with tables (B 3.1.2)
  - Clean projection wall/screen (B 3.1.3)
  - Writing board with different colors of markers and board cleaner (B 3.1.4)
- Ensure that the rooms are well-illuminated (words written in pencil can be read in any corner of the room, and screen-projected words, pictures, and videos can be seen clearly without reflection from every corner) (B 3.1.5)
- Ensure that the rooms have adequate ventilation (open windows and /or AC, fans) (B 3.1.6)
- Have functional toilets separate for males and females near the classroom (B 3.1.7)
- Have a regular cleaning schedule and follow-up for the facility (B 3.1.8)
- Have a built-in overhead projector and/or LCD (liquid crystal display) with computer (B 3.1.9)
- Have a water source around/near the classroom (B 3.1.10)

Quality Improvement Standards

The medical laboratory science training school/department **should have:**

- A "smart classroom" (Q 3.1.1)
- Regular/scheduled facility inspection and maintenance services (Q 3.1.2)

Annotation

Smart classroom: A smart classroom is a traditional, lecture-style teaching space that has available technological equipment that can be used to aid and enhance instruction of a course. The traditional smart classroom is equipped with the basic technology that will enable students and/or teachers to connect their laptops to the video projector or to play a VHS (virtual host storage)/DVD (digital video disk) movie. The new standard TEC (technology-enhanced classroom) model includes:

- DVD/VHS combo
- RCA video and audio input
- Laptop VGA (video graphics array) and audio input
- Network connectivity
- Amplifier and speakers
- High-powered projector (3,000 lumens)
- Permanent projector screen (powered or pull-down)

3.2 OFFICE FOR STAFF

Basic Standards

The medical laboratory science training school/department **must have:**

- School dean/head office equipped with:
  - Printer, scanner, photocopy machine, and duplicating machine (B 3.2.1)
  - Fax and telephone (B 3.2.2)
  - Conference (meeting) table with chairs (B 3.2.3)
- Office for teaching and administration staffs with adequate space (2.0m^2/person) (B 3.2.4)
- The office for staff must be equipped with:
  - Computers with Internet access for each teaching staff (B 3.2.5)
  - Chairs and tables with drawers (B 3.2.6)
  - File cabinet and bookshelf (B 3.2.7)
  - Nearby toilets, separate for males and females (1toilet:20 instructors) (B 3.2.8)

Quality Improvement Standard

The medical laboratory science training school/department **should have:**

- A regular maintenance schedule for office equipment (Q 3.2.1)

3.3 SKILL DEVELOPMENT CENTER/LABORATORY/CLINICAL SIMULATION CENTER

Basic Standards

The medical laboratory science training school/department **must:**

- Have a laboratory to practice medical parasitology, hematology, medical microbiology (bacteriology, virology, mycology), molecular biology, immunology and serology, clinical chemistry, urinalysis, toxicology, and quality control (B 3.3.1)
- Ensure a learning environment that is safe for staff, students, patients, and relevant to their careers (B 3.3.2)
- Ensue that each laboratory room has:
  - Adequate space for skill demonstration, practice, and discussion (2.2 m^2/student) (B 3.3.3)
  - An adequate supply of functional laboratory equipment to learn essential competencies (with the ratio of one piece of equipment for six students in each lab session) (B 3.3.4) (See **Annex 3**: Laboratory Equipment and Chemicals)
  - Adequate supplies and chemicals as listed in the respective lab manuals (B 3.3.5)
  - A dedicated office (B 3.3.6)
  - Safety manuals, posted safety precautions, a fire extinguisher, an emergency shower, and infection prevention equipment (B 3.3.7)
  - Uninterrupted water and power supply for each bench (B 3.3.8)

- Adequate number of movable chairs, tables for each station, labeled shelf with locks, dust bin in all the stations, and storage (B 3.3.9)
- Audiovisual aids including video sets (B 3.3.10)
- Adequate illumination and ventilation (B 3.3.11)
- Adequate and up-to-date learning materials (reference books, checklists for all skills, standard operating procedures [SOPs], wall charts, posters, flow charts, electronic learning resources) (see Annex: Educational Resources) (B 3.3.12)
- A regular cleaning schedule and follow-up for the facility (B 3.3.13)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Ensure that the skills lab is properly organized, and managed by a dedicated skills laboratory manager (Q 3.3.1)
- Be accessible for students' independent practice (Q 3.3.2)
- Have a system for tracking all materials and equipment after each practice (Q 3.3.3)
- Have a central research lab (core lab) where the staff and students undertake medical laboratory science research activities (Q 3.3.4)
- Have a facility to house animals for the courses offered by the program and for research (Q 3.3.5)
- Have a regular maintenance schedule for the laboratory facility and equipment (Q 3.3.6)

Annotation

A safe learning environment would include provision of necessary information and protection from harmful substances, specimens and organisms, laboratory safety regulations, and safety equipment.

3.4 CLINICAL TRAINING FACILITIES

Basic Standards

The medical laboratory science training school/department **must:**

- Define appropriate clinical/practicum site selection criteria that encompass but are not limited to:
  - Having an adequate client caseload and case mix as per the core competencies (B 3.4.1)
  - Having sufficient staff who are willing to be preceptors (B 3.4.2)
  - A range of clinical practice sites (primary, secondary, tertiary levels) and specialized research centers (B 3.4.3)
  - A standard of practice that matches what is taught in the school (B 3.4.4)
- Have a sufficient number and variety of practicum sites for mandatory and elective laboratory science practice experiences, including sites for practice in:
  - Regulatory affairs (B 3.4.5)
  - Basic molecular biology service (B 3.4.6)

- Health laboratory management (B 3.4.7)
- Advanced and research laboratory service (B 3.4.8)
- Community and public health microbiology service (B 3.4.9)
- Medical microbiology service (B 3.4.10)
- Medical parasitology service (B 3.4.11)
- Serology and immunology service (B 3.4.12)
- Hematology service (B 3.4.13)
- Medical laboratory science quality assurance services (B 3.4.14)

- Ensure the availability of necessary resources for giving the students adequate clinical experience, including national service delivery guidelines, personal protective equipment, learning tools (checklists, log books, SOPs) and other essential equipment. (B 3.4.15)
- Ensure easy accessibility of clinical practice sites including transport facilities to distant sites (B 3.4.16)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Periodically assess the quality of sites and preceptors in light of achieving curricular needs and identify potential additional sites when needed (Q 3.4.1)
- Discontinue relationships with the sites that do not maintain the preset quality criteria and are unable to do so after implementation of remediation plan (Q 3.4.2)
- Have discussion rooms (Q 3.4.3)
- Have a mini-library with essential reference books and guidelines in the clinical practice site (Q 3.4.4)
- Use accredited clinical practice sites (Q 3.4.5)

3.5 IT FACILITIES

Basic Standards

The medical laboratory science training school/department **must:**

- Ensure that students have access to computers with Internet connectivity (one computer for three students) (B 3.5.1)
- Have electronic educational resources available (B 3.5.2)
- Formulate and implement a policy that addresses effective use and evaluation of appropriate information and communication technology (ICT) for education (B 3.5.3)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Have subscriptions to educational websites/resources for staff and students' use (Q 3.5.1)
- Ensure that the IT center is accessible for student independent learning (outside of working hours) (Q 3.5.2)
- Have regular/scheduled IT facility inspection and maintenance services (Q 3.5.3)

3.6 LIBRARY

Basic Standards

The medical laboratory science training school/department **must have access to a library with:**

- A qualified librarian, an assistant, catalogue clerks, and other subordinates (B 3.6.1)
- A seating capacity to accommodate 25% of the total number of students at a time (B 3.6.2)
- A separate reading room for instructors (B 3.6.3)
- A catalogue system (B 3.6.4)
- Adequate illumination and ventilation, and be free from sound pollution (B 3.6.5)
- A nearby functional toilet with a water supply (B 3.6.6)
- Signs posted for appropriate behaviors (silence, no food and drinks, no smoking) (B 3.6.7)
- A schedule showing library working hours posted at the entry point (B 3.6.8)
- An adequate supply of recent textbooks and reference materials relevant to the courses taught, including textbooks for all students (in a ratio of 1:5 students) (B 3.6.9) (See **Annex 1**: Textbooks and Reference Books)
- Access to up-to-date and peer-reviewed journals (local and international) (B 3.6.10)
- Copies of relevant and updated national service delivery guidelines and protocols on priority health issues in the country (B 3.6.11) (See Annex 4: Lab Manuals/Guidelines/Charts/Safety Rules)

Quality Improvement Standards

The medical laboratory science training school/department **should have access to a library with:**

- An automated library system (system for recording and cataloging material and for ensuring the security of materials) (Q 3.6.1)
- A system to take feedback from users and update its services on a regular basis (Q 3.6.2)
- 24/7 access to services (Q 3.6.3)

Annotations

Catalogue system is a search and discovery tool that provides results from the library's online and print collections in a single search. It includes titles of printed books, journals, manuscripts, letters, and other material available at the library as well as links to the full text of millions of journal articles, digital images of graphics/illustrations, and manuscripts.

Automated library system: Library automation is the application of ICTs to library operations and services. The functions that may be automated are any or all of the following: acquisition, cataloging, public access, indexing and abstracting, circulation, serials management, and reference.

3.7 STUDENT AMENITIES

Basic Standards

The medical laboratory science training school/department **must:**

- Have an entity/unit responsible for student support, addressing academic, social, financial, and personal needs (B 3.7.1)
- Ensure safe and adequate student facilities including lounges, catering, student housing (if possible), and sports and recreational facilities (B 3.7.2)
- Allocate resources (budget, facilities, and qualified personnel) for student support programs (B 3.7.3)
- Ensure the availability of a student clinic, counseling, and social support units at institution level (B 3.7.4)
- Ensure that the different facilities on campus are accessible to students with disabilities (B 3.7.5)

Quality Improvement Standard

The medical laboratory science training school/department **should have:**

- Regular/scheduled facility inspection and maintenance services (Q 3.7.1)
- A student complex providing a variety of services (Q 3.7.2)

Annotation

Addressing social, financial and personal needs would mean support in relation to social and personal problems and events, health problems, and financial matters, and would include access to health clinics, immunization programs, and health/disability insurance as well as financial aid services in the form of bursaries, scholarships, and loans.

3.8 FINANCIAL RESOURCES

Basic Standard

The medical laboratory science training school/department **must:**

- Deploy financial resources to:
  - Support all aspects of the goals and strategic plan and ensure stability in the delivery of the program (B 3.8.1)
  - Allow effective faculty and support staff recruitment, retention, and development (B 3.8.2)
  - Maintain and improve physical facilities, equipment, and other educational and research resources (B 3.8.3)
  - Measure, record, analyze, document, and distribute assessment and evaluation activities (B 3.8.4)
  - Ensure experiential learning and preceptor support for smooth curriculum implementation (B 3.8.5)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Develop and maintain a broad base of financial support, including a program to acquire extracurricular funds through endowment income, consultancy services, grants, provision of continuing education, and other fundraising mechanisms (Q 3.8.1)
- Secure a budget for innovation in education, research, and other scholarly activities (Q 3.8.2)
- Allocate an uncommitted reserve of finance/budget to address unexpected issues (Q 3.8.3)

4. ACADEMIC STAFF, SUPPORT STAFF, AND PRECEPTORS

4.1 STAFF RECRUITMENT, AND DEVELOPMENT AND RETENTION POLICY/GUIDELINES

Basic Standards

The medical laboratory science training school/department **must:**

- Ensure the existence of a clearly stated, appropriate, and effectively implemented policy and procedure for recruitment and promotion of staff that outlines:
  - The type, responsibilities, and balance of the academic staff of the basic biomedical sciences, professional courses, and the behavioral and social sciences required to deliver the curriculum adequately (B 4.1.1)
  - The balance between staff teaching major and supportive courses, full-time and part-time staff, and academic and non-academic staff (B 4.1.2)
  - Equitable distribution of duties and responsibilities among the academic staff (B 4.1.3)
  - Promotion of staff to offices and academic ranks (B 4.1.4)
  - Criteria for scientific, educational, and clinical merit, including the balance between teaching, research, and service qualifications. (B 4.1.5)
  - The specific responsibilities of its academic staff and mechanisms for monitoring them (B 4.1.6)
- Ensure the existence of mechanisms and procedures for professional development and career advancement of the academic staff such as advanced training, specialized courses, pedagogical training, etc. (B 4.1.7)
- Have mechanisms to identify the human resource needs of the program and training needs of the staff (B 4.1.8)
- Have a system for orienting and mentoring of new academic staff (B 4.1.9)
- Ensure that each instructor has a technical update in the field of instruction in the past 2 years with a minimum of 30 continuing education units (CEUs) per year (B 4.1.10)
- Have an academic staff performance evaluation system that:
  - Is carried out regularly using standardized formats that are regularly updated (B 4.1.11)
  - Is performed by academic staff themselves, students, peers, and the department head (B 4.1.12)
  - Is specific and enables timely provision of constructive feedback to instructors (B 4.1.13)
  - Has documented results to be used for decision-making and staff development (B 4.1.14)
  - Encompasses technical knowledge, communication skills, teamwork, and attitudes/behavior (B 4.1.15)

Quality Improvement Standard

The medical laboratory science school/department **should:**

- Formulate and implement a performance-based incentive system (based on performance evaluation results) for the academic staff (Q 4.1.1)
- Develop and implement a staff retention policy (Q 4.1.2)
- In its policy for staff recruitment and selection, take into account criteria such as relationship to its mission, including significant local issues (Q 4.1.3)

Annotation

Significant local issues would include gender, ethnicity, religion, language, and other issues of relevance to the school and the curriculum.

4.2 TEACHING STAFF

Basic Standards

The medical laboratory science school/department **must:**

- Implement a ratio of academic staff to students of 1:20 for classroom teaching (B 4.2.1)
- Ensure that the number of students assigned for skills labs and practical attachments is feasible according to the specific profession and local context (B 4.2.2)
- Require the following qualifications of the academic staff:
  - Master's Degree or above to teach major professional courses; in addition, he/she must also have at least 2 years' experience in the related field (B 4.2.3)
  - Master's Degree, or Bachelor's Degree with at least 2 years' working experience in a related field for supportive and common courses (B 4.2.4)
  - First degree and above for all instructors in the following distribution (Doctor of Philosophy [PhD] 30%, Master's 50%, and first degree 20% or less) (B 4.2.5)
- Implement a ratio of full-time to part-time teaching faculty of at least 3:2 (60% and 40% respectively) (B 4.2.6)
- Assign one academic staff member to coordinate practical/clinical programs that facilitate practical learning (B 4.2.7)
- Assign a skills laboratory coordinator with a Bachelor's Degree in the specific profession (B 4.2.8)
- Ensure that each instructor has taken a course on teaching methodology that enables him/her to teach and assess medical laboratory science students effectively (B 4.2.9)

Quality Improvement Standards

The medical laboratory science school/department **should:**

- Implement a ratio of academic staff to students of 1:5 for practical teaching (Q 4.2.1)
- Require that all instructors (classroom, practical, and skills lab) have qualifications of Master's Degrees and above (Q 4.2.2)
- Ensure that instructors are involved in providing community services, preferably related to their specialty (Q 4.2.3)

Annotation

Qualifications of academic staff would mean appropriateness of the high-level trainings relevant to the course being taught. A school of medical laboratory science should have academic staffs with the following qualifications to teach major/professional courses: parasitologist, microbiologist, clinical chemist, hematologist, immunologist, serologist, molecular biologist, laboratory manager, etc.

4.3 PRECEPTORS

Basic Standards

The medical laboratory science school/department **must:**

- Have a written guideline/criteria for selection of preceptors who are working at medical laboratory science practice sites and providing service (B 4.3.1)
- Ensure that the preceptors:
  - Are at least Bachelor of Science graduates with a minimum of 2 years of service in the specific area of clinical laboratory practice (B 4.3.2)
  - Have a current license to practice medical laboratory science (B 4.3.3)
  - Maintain competency by completing relevant CPD courses (30 CEUs per year) (B 4.3.4)
  - Have formal training in teaching skills (B 4.3.5)
- Ensure that the preceptor-to-student ratio for the practice experience is sufficient to provide individualized instruction, guidance, and supervision (B 4.3.6)

Quality Improvement Standards

The medical laboratory science school/department **should**:

- Establish a mechanism to support preceptors' CPD as educators and practitioners in line with their responsibilities in the program (Q 4.3.1)
- Implement incentive and recognition mechanisms for the preceptors (Q 4.3.2)

Annotations

Preceptors refers to qualified medical laboratory scientists who are working on a full-time basis in the respective experiential practice sites and have signed a formal agreement with the higher education institutions to coach the students.

Guideline for selection of preceptors should include criteria such as desire to teach; having adequate time, teaching skills, and excellent communication skills; and having a clearly documented role and responsibilities.

5. STUDENT ADMISSION AND SUPPORT SERVICES

5.1 STUDENT ADMISSION POLICY AND SELECTION

Basic Standards

The medical laboratory science school/department **must:**

- Have a written policy/guideline for student admission and selection that specifies:
  - Rationale, process of student selection, and minimum acceptance criteria/admission requirement according to the curriculum (B 5.1.1)
  - Course/credit exemption, course waiver (credits transfer), and substitution for non-generic students (B 5.1.2)
  - Existence of an entity responsible for student selection and admission that ensures transparency and fairness (B 5.1.3)
  - The process for transfer of students from other programs and institutions (B 5.1.4)
  - The process and criteria for selection of students with specials needs and from underserved populations (B 5.1.5)
  - The size of student intake in relation to its capacity and resource at all stages of the program (B 5.1.6)
  - A system for appeal for admission decisions (B 5.1.7)
- Ensure that the admission policy/guideline is in line with the institutional and national requirements (B 5.1.8)
- Ensure that student selection and admission process is transparent, free from discrimination, and in accordance with institutional polices and all applicable codes of laws (B 5.1.9)
- Be represented on the screening and selection committee/entity of the institution (B 5.1.10)
- Publish and disseminate to its constituency the admission policy and mechanism (B 5.1.11)

Quality Improvement Standards

The medical laboratory science school/department **should:**

- State the relationship between selection, the mission of the school, the educational program, and desired qualities of graduates (Q 5.1.1)
- Have a mechanism to assess the pre-entry knowledge, skill, and motivation of the applicants to be medical laboratory scientists, and use the result for selection of students (such as entrance exams and interviews, pre-exposure of the applicants to the actual professional practice, etc.) (Q 5.1.2)
- Have a system for student mobility, exchanges, and transfers, internationally (Q 5.1.3)
- Periodically review the admission policy/guideline and student intake in line with academic success of the students and the needs of the society in consultation with other relevant stakeholders and regulate it to the health needs of the community and society (Q 5.1.4)

Annotations

Admission policy would imply adherence to possible national regulation as well as adjustments to local circumstances. If the medical laboratory science school does not control the admission policy, it would demonstrate responsibility by explaining relationships and drawing attention to consequences, e.g., imbalance between intake and teaching capacity.

Admission criteria should include interest, pre-requisite knowledge and skills, background education, physical fitness, national exam grade requirements, and criteria for upgrading student selection.

The health needs of the society would include consideration of intake according to gender, ethnicity, and other social requirements (socio-cultural and linguistic characteristics of the population), including the potential need for a special recruitment, admission, and induction policy for underprivileged students and minorities.

5.2 STUDENT SUPPORT SERVICES

Basic Standards

The medical laboratory science school/department **must:**

- Ensure that medical laboratory science students have access to the following services:
  - Counseling on academic, health, and social issues that could otherwise affect their success in the program (B 5.2.1)
  - Student support addressing academic (e.g., remedial support, peer-assisted learning), social, and financial needs (B 5.2.2)
  - Access to basic 24/7 clinic services (B 5.2.3)
- Have a mechanism for students to appeal on matters related to student support services (B 5.2.4)
- Ensure that new students are effectively oriented about the program, academic rules and regulations, and the student support systems (B 5.2.5)
- Ensure support to extracurricular activities like student associations for sport, gender, and HIV (B 5.2.6)

Quality Improvement Standards

The medical laboratory science/training school/department **should:**

- Provide career guidance and advice on progression after completing the program (Q 5.2.1)
- Have a system/mechanism to evaluate and ensure the adequacy, effectiveness, and safety of the available student support services (Q 5.2.2)
- Ensure that medical laboratory science students have a student handbook that clearly indicates:
  - Student support systems and how to access them (Q 5.2.3)
  - Rights, responsibilities, and obligations of students in the school (Q 5.2.4)
  - School profile: brief history, organizational structure, etc. (Q 5.2.5)
- Support establishment of charity clubs (Q 5.2.6)

Annotations

Academic counseling would include questions related to choice of electives, clerkship trainings, postgraduate specializations, and career guidance. Organization of the counseling would include appointing academic mentors for individual students or small groups of students.

Addressing social, financial, and personal needs would mean support in relation to social and personal problems and events, health problems, and financial matters, and would include access to health clinics, immunization programs, and health/disability insurance as well as financial aid services in forms of bursaries, scholarships, and loans.

5.3 STUDENT REPRESENTATION

Basic Standard

The medical laboratory science training school/department **must:**

- Formulate and implement a policy that ensures participation of student representatives and appropriate participation in the design, management, and evaluation of the curriculum, and in other matters relevant to students (B 5.3.1)

Quality Improvement Standard

The medical laboratory science/ training school/department **should**

- Encourage and facilitate student activities and student organizations (Q 5.3.1)

Annotations

Participation of student representatives would include student self-governance and representation on the curriculum committee, other educational committees' scientific and other relevant bodies, as well as social activities and local health care projects.

To *facilitate student activities* would include consideration of providing technical and financial support to student organizations.

6. PROGRAM RELEVANCE AND CURRICULUM

6.1 PROGRAM RELEVANCE

Basic Standards

The medical laboratory science training School/Department **must:**

- Identify and address national health priorities, the needs of the society, the present and emerging role of the practitioner, and professional and legal requirements for practice (B 6.1.1)
- Be consistent with a basic scientific foundation (B 6.2.2)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Conduct a needs/market assessment, in consultation with key stakeholders and international trends, to ensure that it addresses the priority health care needs of the society (Q 6.1.1)
- Ensure that the program is consistent with international standards of the profession (Q 6.1.2)

6.2 CURRICULUM MODEL AND INSTRUCTIONAL METHODS

Basic Standards

The medical laboratory science/ training school/department **must:**

- Clearly define the curriculum model that enables the students to achieve the graduate competencies (B 6.2.1)
- Clearly state the instructional and learning methods employed in the curriculum based on contemporary education principles (B 6.2.2)

Quality Improvement Standards

The medical laboratory science school/department **should:**

- Organize the curriculum around sets of functions/competencies (competency-based) and oriented to professional practice, based on the future occupational practice of graduates (Q 6.2.1)
- Periodically review the curriculum to address societal needs and international developments in medical laboratory science practice (Q 6.2.2)
- Ensure that the curriculum has instructional methods that foster the ability of students to participate in scientific development and innovations (Q 6.2.3)

Annotations

Curriculum refers to the educational program and includes a statement of the intended educational outcomes, the content/syllabus, and experiences and processes of the program, including a description of the structure of the planned instructional and learning methods and assessment methods. The curriculum should set out what knowledge, skills, and attitudes the student will achieve.

Curriculum models would include models based on disciplines, organ systems, clinical problems/tasks, or disease patterns as well as models based on modular or spiral design.

Instructional methods encompass lectures, small-group teaching, problem-based or case-based learning, peer-assisted learning, practica, laboratory exercises, bedside teaching, demonstrations, skills training in the laboratory, field exercises in the community, and web-based instruction.

Contemporary educational principles would mean principles that:

- Stimulate, prepare, and support students to take responsibility for their learning
- Are student-centered and promote self-learning
- Prepare students to be professionals as well as lifelong learners

6.3 SCIENTIFIC METHODS

Basic Standards

The medical laboratory science school/department **must,** throughout the curriculum, teach:

- The principles of scientific method, including analytical and critical thinking (B 6.3.1)
- Medical research methods (B 6.3.2)
- Evidence-based medicine (B 6.3.3)

Quality Improvement Standard

The medical laboratory science school/ department **should:**

- Include elements of original or advanced research in the curriculum and ensure that students engage in research activities (Q 6.3.1)

Annotations

To *teach the principles of scientific method, medical research methods, and evidence-based medicine* requires scientific competencies of teachers. This training would be a compulsory part of the curriculum and would include that medical laboratory students conduct or participate in minor research projects.

Elements of original or advanced research would include obligatory or elective analytic and experimental studies, thereby fostering the ability to participate in the scientific development of medical laboratory science as professionals and colleagues.

6.4 BASIC BIOMEDICAL SCIENCES

Basic Standards

The medical laboratory science school/department **must** identify and incorporate in the curriculum:

- The contributions of the biomedical sciences to create understanding of the scientific knowledge (B 6.4.1)
- Concepts and methods fundamental to application in medical laboratory science practice (B 6.4.2)

Quality Improvement Standards

The medical laboratory science school/department **should,** in the curriculum, adjust and modify the contributions of the biomedical sciences to the:

- Scientific, technological, and clinical developments (Q 6.4.1)
- Current and anticipated needs of the society and the health care system (Q 6.4.2)

Annotation

The basic biomedical sciences would include anatomy, biochemistry, physiology, analytical chemistry, pharmacology, and toxicology.

6.5 BEHAVIORAL AND SOCIAL SCIENCES

Basic Standard

- The medical laboratory science school/department **must** identify and incorporate in the curriculum the contributions of the behavioral sciences and social sciences, and professional ethics that enable effective communication, program-specific decision-making, and ethical practices (B 6.5.1)

Quality Improvement Standards

The medical laboratory science school/department **should,** in the curriculum, adjust and modify the contributions of the behavioral and social sciences as well as medical ethics to:

- Scientific, technological, and clinical developments (Q 6.5.1)
- The current and anticipated needs of the society and the health care system (Q 6.5.2)
- The changing demographic and cultural contexts (Q 6.5.3)

Annotations

Behavioral and social sciences would depending on local needs, interests, and traditions include biostatistics, epidemiology, global health, anthropology, psychology, sociology, public health, and social medicine.

Professional ethics deals with moral issues in medical laboratory science practice such as values, rights, and responsibilities related to medical laboratory scientists' behavior and decision-making.

6.6 MEDICAL LABORATORY SCIENCES AND SKILLS

Basic Standards

The medical laboratory science school/department school **must**

- Identify and incorporate professional medical laboratory science courses in the curriculum to ensure that students acquire sufficient knowledge and professional skills to assume responsibility after graduation (B 6.6.1)
- Ensure that a reasonable part of the program is spent in practicing the essential skills for medical laboratory science practice in relevant settings (B 6.6.2)
- Specify the amount of time spent in training in major professional courses (B 6.6.3)

Quality Improvement Standards

The medical laboratory science school/department **should:**

- Adjust and modify in the curriculum the contributions of the professional medical laboratory science courses to:
  - Scientific, technological, and clinical developments and (Q 6.6.1)
  - The current and anticipated needs of the society and the health care system (Q 6.6.2)
  - Structure the different components of the professional skills training according to stages of the study program and in a manner that ensure early exposure of students to practice (Q 6.6.3)

Annotations

Professional medical laboratory science courses include immunology, molecular biology, clinical chemistry, body fluid analysis, bacteriology, hematology, histopathology, immunohematology, instrumentation, mycology, parasitology, virology, microbiology, quality assurance, serology, toxicology, urinalysis, vector biology, and health laboratory management (e.g., health care economics, practice management, communications, laws and ethical principles pertaining to practice, and the social and behavioral sciences in medical laboratory science).

A reasonable part would mean about one-third of the program.

Essential skills for medical laboratory science practice: Graduates from a medical laboratory science program must have an interest in health and a desire to assist individuals, groups, and populations in improving and enhancing health status, through quality medical laboratory service. In addition, they need information-gathering skills, critical thinking, cognitive skills, and psychomotor skills. They must also demonstrate the emotional health required for full use of their intellectual abilities, in the context of the physical, emotional, and mental demands of the program.

6.7 CURRICULUM STRUCTURE, COMPOSITION, AND DURATION

Basic Standards

The medical laboratory science school/department **must:**

- Describe the content, extent, and sequencing of courses and other curricular elements to ensure appropriate coordination between biomedical, behavioral and social, and professional subjects (B 6.7.1)
- Clearly define the balance between theory and practice (at least one-third of the training time is dedicated for practical teaching) (B 6.7.2)
- Ensure that the total duration of training, credit hours per semester, and duration of practical attachments are clearly defined and consistent with the national standards (B 6.7.3)

Quality Improvement Standards

The medical laboratory science school/department **should,** in the curriculum:

- Ensure horizontal integration of associated sciences, disciplines, and subjects (Q 6.7.1)
- Ensure vertical integration of the professional sciences with the biomedical and the behavioral and social sciences (Q 6.7.2)
- Allow optional (elective) content and define the balance between the core and optional content as part of the educational program (Q 6.7.3)
- Define inter-professional educational opportunities (Q 6.7.4)
- Ensure early and longitudinal exposure of students to a variety of practice sites and community-based practices (Q 6.7.5)
- Describe the interface with complementary medical laboratory science practice (Q 6.7.6)

Annotations

Horizontal integration outlines the relationship between subjects taught at the same level of the program. This is demonstrated by parallel delivery of biomedical science and medical laboratory science fields, which then supports understanding of the medical laboratory science program. The student learns about the fundamental and basic health-related sciences and medical laboratory science-based diagnosis for quality medical laboratory diagnosis.

Vertical integration describes the process of taking information used at any one level and extending that through other levels of the program. It can also be used to articulate the relationship between fundamental, discipline-specific knowledge and professional practice. *Core and optional (elective) content* refers to a curriculum model with a combination of compulsory elements and electives or special options.

Inter-professional educational opportunities refers to occasions when students from two or more health professions learn together during all or part of their professional training, with the object of cultivating collaborative practice for providing client- or patient-centered health care.

Complementary medical laboratory science practices would include unorthodox, traditional, or alternative medical laboratory science practices.

6.8 PROGRAM MANAGEMENT

Basic Standards

The medical laboratory science school/department **must:**

- Have a functional curriculum committee under the education development center, which has the responsibility and authority for designing, implementing, and reviewing the curriculum to achieve its intended educational outcomes (B 6.8.1)
- In its curriculum committee, ensure representation of students and staff from all units/course teams of the school/department (B 6.8.2)
- Periodically review and update the curriculum at appropriate intervals and based on emerging evidence and the needs of the society, students' performance assessment results, and feedback from students and other stakeholders (B 6.8.3)

- Communicate and ensure that the curriculum is available to staff, students, and other stakeholders (B 6.8.4)
- Prepare and implement an academic calendar that indicates dates of registration, course adds/drops, practical attachments, final exams, class ends, vacation, graduation, and other major events (B 6.8.5)
- Ensure that the average time for graduation is in line with the program standard (5 years for regular and at least 6 years for evening programs, with the final year totally dedicated to clerkship) (B 6.8.6)

Quality Improvement Standards

The medical laboratory science school/department **should:**

- Plan and implement innovations in the curriculum by its curriculum committee (Q 6.8.1)
- Ensure representation of other stakeholders in the curriculum committee (Q 6.8.2)

6.9 LINKAGE WITH MEDICAL LABORATORY SCIENCE PRACTICE AND THE HEALTH SECTOR

Basic Standard

The medical laboratory science school/department **must:**

- Ensure operational linkage between the educational program and the subsequent stages of training or practice after graduation (B 6.9.1)

Quality Improvement Standards

The medical laboratory science school/department **should:**

- Ensure that the curriculum committee seeks input from the environment in which graduates will be expected to work, and modifies the program accordingly (Q 6.9.1)
- Considers program modification in response to opinions in the community and society (Q 6.9.2)

Annotations

The *operational linkage* implies identifying health problems and defining required educational outcomes. This requires clear definition and description of the elements of the educational program and their interrelations in the various stages of training and practice, paying attention to the local, national, regional, and global context. It would include mutual feedback to and from the health sector and participation of teachers and students in activities of the health team. Operational linkage also implies constructive dialogue with potential employers of the graduates as a basis for career guidance.

Subsequent stages of training would include postgraduate training and continuing professional development (CPD).

7. TEACHING-LEARNING AND ASSESSMENT

7.1 TEACHING-LEARNING

Basic Standards

The medical laboratory science training school/department **must:**

- Use contemporary teaching principles that stimulate, prepare, and support students to take responsibility for their learning including active learning methods, a student-centered approach, demonstration, and facilitative practice in classroom, skills lab, clinical, and community practice setting (B 7.1.1)
- Ensure that instructors devote much of the time to work with students individually or in small groups to guide learners, facilitate learning, evaluate each student's performance, and provide timely feedback (B 7.1.2)
- Ensure that instructors effectively plan and prepare for teaching (B 7.1.3)
- Use appropriate and relevant educational materials including national service delivery guidelines (B 7.1.4)
- Ensure the acquisition of knowledge, skills, and attitudes (KSA) for core competencies (B 7.1.5)
- Ensure that each course/module instructor provides a standardized syllabus for the course on the first day of class and thoroughly discusses it with the students (B 7.1.6)
- Ensure that instructors prepare and use a session plan that contains session objectives, an outline of key points, questions, and other group activities with needed materials for the students (B 7.1.7)
- Ensure that instructors identify and inform students about resources for in-depth reading on the session (B 7.1.8)
- Ensure that educational materials used during classroom and practical teaching are/have:
  - Content that agrees with the learning outcomes (content must be mapped with the learning outcomes) (B 7.1.9)
  - Up-to-date, factual, and technically correct (B 7.1.10)
  - Regularly revised (B 7.1.11)
- Ensure that instructors announce and use consultation hours to work with students individually or in small groups and support student learning (B 7.1.12)
- Prepare and implement a schedule for clinical practice/practical attachments (B 7.1.13)
- Have a mechanism to monitor and evaluate the teaching-learning process by instructors, preceptors, and students and use the result/feedback to improve learning (B 7.1.14)

Quality Improvement Standards

The medical laboratory science school/department **should:**

- Clearly define in the curriculum and demonstrate use of learning methods that may include:
  - Peer-assisted learning (Q 7.1.1)
  - Problem/case-based learning (Q 7.1.2)
  - Reflective learning using a portfolio (Q 7.1.3)

- Web-based instruction (Q 7.1.4)
- Field exercises in the community (community-based activities) (Q 7.1.5)

- Offer students the opportunity for an early immersion and longitudinal exposure to clinical/practical experience and community-based learning under supervision of senior professionals (Q 7.1.6)

Annotation

Standardized syllabus is a document that contains all basic information about the course. It should contain the course name and description, objectives, course logistics, teaching and assessment methods, course schedule that indicates the learning activities of each week/date, exam and assignment due dates, reading materials, course policy, grading system, and name and contact address of the course instructor.

Educational materials include handouts, textbooks, reference books, electronic learning media, and learning tools (SOPS, checklists, charts).

Schedule for clinical practice would mean a program that clearly indicates *duration* of attachment, names of students at each site, names of supervisors and preceptors for each group, rotation system, case presentation dates, and schedule of major activities. It should be prepared in consultation with the practice sites and communicated to supervisors, preceptors, and students before deployment.

Peer-assisted learning can be defined as the acquisition of knowledge and skills through active help and support among individuals of equal status or matched companions.

Problem/case-based learning is a teaching strategy in which students use "triggers" from the problem case or scenario to define their own learning objectives. Subsequently, they do independent, self-directed study before returning to the group to discuss and refine their acquired knowledge.

Reflective portfolio is defined as the collection of evidence that attests to achievement as well as personal and professional development through a critical analysis and reflection of its contents.

Web-based instruction is anywhere, any-time instruction delivered over the Internet or a corporate intranet to browser-equipped learners.

7.2 ASSESSMENT

Basic Standards

The medical laboratory science school/department **must:**

- Have assessment policies/guideline that clearly define:
  - A range of assessment methods used for formative and summative evaluation (B 7.2.1)
  - The frequency and timing of exams (B 7.2.2)
  - Criteria for setting pass marks (B 7.2.3)

- Grading, promotion, repetition, dismissal re-admission, and number of allowed retakes (B 7.2.4)
- A system for appeal for assessment results (B 7.2.5)
- A quality assurance process of assessment practices (B 7.2.6)

- Use a variety of methods for both knowledge and performance assessment:
  - At least two of the following methods are used for knowledge assessment: oral exam, written exams (multiple-choice questions, essay, short answer), assignments, project works, case presentations, and seminars (B 7.2.7)
  - At least one of the following methods is used for performance assessment: structured observation, review of the portfolio, and evaluation of tasks performed by students (B 7.2.8)
- Administer both formative and summative assessment on continuous basis and make sure that:
  - The final exam of each course is comprehensive and accounts for not more than 40% of the total mark and the remaining is based on continuous assessment (B 7.2.9)
  - Each instructor provides timely, specific, constructive, and positive feedback to students on the basis of assessment results (B 7.2.10)
  - A mechanism is in place to provide special support to students with poor performance based on assessment results (B 7.2.11)
- Ensure confidentiality and security of student assessment processes and assessment results/academic records (B 7.2.12)
- Ensure autonomy of the school and its academic staff in the management of student assessment (B 7.2.13)

Quality Improvement Standards

The medical laboratory science school/department **should:**

- Have an exam committee that ensures the validity and reliability of student assessment by:
  - Ensuring that each method of assessment and exam questions are prepared as per the standard (Q 7.2.1)
  - Supporting the staff to prepare a blueprint for each assessment to ensure that assessment methods match the learning outcomes and cover all portions of the course (Q 7.2.2)
- Support staff to conduct item analysis and use the result for decision-making (Q 7.2.3)
- Establish and run a functional exam bank (Q 7.2.4)
- Use the following methods for performance assessment:
  - Objectively structured practical exam (Q 7.2.5)
  - 360-degree evaluation (Q 7.2.6)
- Ensure that the majority (>50%) of written assessment items/questions test higher-order cognitive domains (Q 7.2.7)
- Adjust the number and nature of examinations of curricular elements to encourage both acquisition of the knowledge base and integrated learning (Q 7.2.8)

- Administer a comprehensive qualifying exam before students are deployed for internship/clerkship to prepare them for the national licensure exam (Q 7.2.9)

Annotations

*Formative and summative assessment***:** formative assessment is assessment used to improve student learning and performance by giving feedback, while summative assessment is used to decide if the student has to move to the next stage of learning. Both should be conducted on a continual basis.

Higher-order cognitive domains include application, synthesis, and evaluation.

Portfolio is a collection of papers and other forms of evidence that learning has taken place. It provides evidence for learning and progress toward learning objectives. Reflecting upon what has been learned is an important part of constructing a portfolio.

Validity is the ability of an assessment to measure what it is supposed to measure. Validity is not about the method but refers to the evidence presented to support or refute the meaning or interpretation assigned to assessment results.

Reliability is the reproducibility or consistency or generalizability of assessment scores. An assessment result is said to be reliable if students will get the same score if they re-take the exam.

Blueprint is a clear, written recipe for an exam that ensures all content (knowledge, skills, and attitude) is covered fairly and the test is a balanced sample of all the learning objectives that students have to master.

Item analysis refers to a statistical technique that helps instructors identify the effectiveness of their test items. In the development of quality assessment and specifically effective multiple-choice test items, item analysis plays an important role in contributing to the fairness of the test along with identifying content areas that maybe problematic for students.

Objectively structured practical exam is a performance-based exam. During the exam, students are observed and evaluated as they go through a series of eight or more stations. It allows assessment of multiple competencies. It is ***objective***, because examiners use a checklist for evaluating the trainees; ***structured***, because every student sees the same problem and performs the same tasks in the same time frame; and ***practical*** because the tasks are representative of those faced in real practical situations.

360-degree evaluation consists of measurement tools completed by multiple people in a student's sphere of influence. Evaluators usually are faculty, other members of the health care team, peers, patients, families, and community members. It can be used to assess interpersonal and communication skills, teamwork ability, management skills, decision-making professional behaviors, and some aspects of patient care.

Encouragement of integrated learning would include consideration of using integrated assessment, while ensuring reasonable tests of knowledge of individual disciplines or subject areas.

8. STUDENT PROGRESSION AND GRADUATE OUTCOMES

Basic Standards

The medical laboratory science training school/department **must:**

- Have a mechanism to monitor student performance and progress regularly (B 8.0.1)
- Trace level of and reasons for student attrition and take actions to minimize it (B 8.0.2)
- Ensure that the final qualifications achieved by the graduates are in line with the formulated and expected learning outcomes of the program (B 8.0.3)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Have a system to link the program and potential employers and facilitate graduate employment (Q 8.0.1)
- Have a mechanism to trace employability, performance at the workplace, and satisfaction of its graduates/employers and use the finding to influence the curriculum (Q 8.0.2)
- Implement strategies and programs to broaden the professional horizons of students and enhance their performance in areas such as scientific inquiry, scholarly concern for the profession, and the relevance and value of research through:
  - Inviting guest lecturers (Q 8.0.3)
  - Participating in curricular and extracurricular activities (Q 8.0.4)
  - Arranging panel discussions with senior experts in different areas of medical laboratory science practice (Q 8.0.5)
  - Supporting students and academic staff to participate in national and international scientific conferences (Q 8.0.6)
  - Organizing white coat ceremonies that welcome students into the profession of medical laboratory science (Q 8.0.7)

9. CONTINUAL QUALITY ASSURANCE

Basic Standards

The medical laboratory science training school/department **must:**

- Have a functional internal quality assurance unit leading the quality assurance system with clearly defined duties/responsibilities and lines of communication (B 9.0.1)
- Allocate a budget to the quality assurance unit to carry out responsibilities (B 9.0.2)
- Assign a qualified person to lead the unit (minimum of 2 years of teaching experience, training in educational quality assurance, training in teaching and assessment of health care providers) (B 9.0.3)
- Conduct quality assessment using the internal quality standard tool (at least annually), and develop and implement clear strategies/work plans to fill the gaps identified (B 9.0.4)
- Have a system for regular curriculum evaluation and review (at least every 5 years) (B 9.0.5)
- Seek external quality audit and verification by HERQA or peer institutions and work on the recommendations given to ensure continual quality (B 9.0.6)

Quality Improvement Standards

The medical laboratory science training school/department **should:**

- Have a well-organized, functional, and vibrant internal quality assurance unit that is responsible for monitoring and evaluation of input, process, output, and impact of the educational program (Q 9.0.1)
- Systematically seek, analyze, and respond to teacher and student feedback. (Collect student and instructor comments using a structured questionnaire or suggestion book, take corrective action, and document) (Q 9.0.2)
- Conduct external verification by peer institutions/schools every 2 years (Q 9.0.3)
- Conduct review meetings with representatives from practice sites, industries, and professional bodies annually to evaluate the effectiveness of learning experiences (Q 9.0.4)
- Develop the structure, governance, and management of the organization to cope with changing circumstances and needs and, over time, accommodate the interests of the different groups of stakeholders (Q 9.0.5)

10. RESEARCH AND DEVELOPMENT AND EDUCATIONAL EXCHANGES

Basic Standards

The medical laboratory science school/department **must:**

- Formulate and implement a staff development policy that allows a balance of capacity between teaching, research, and service functions (B 10.0.1)
- Have a clearly set research agenda for academic staff as well as to students in line with the country's priority health care and developmental needs (B 10.0.2)
- Allocate a sufficient budget and facility to support research and staff exchange (B 10.0.3)
- Ensure that each academic staff member as a part of a research team undertakes research and publishes one article in national/international journals at least every 2 years (B 10.0.4)
- Ensure that the research findings of the school are used to improve learning, community services, and program and professional development (B 10.0.5)
- Allocate a budget for students' research/directed studies (for transportation, data collection, chemical/reagent purchase, stationery) (B 10.0.6)

Quality Improvement Standards

The medical laboratory science school/department **should:**

- Have thematic research areas in line with the country's priority health care and developmental needs (Q 10.0.1)
- Ensure that each academic staff as a member of a research team undertakes research and publishes at least one article in a reputable journal every year (Q 10.0.2)
- Formulate and implement a policy for national and international collaboration with other educational institutions, industries, and research centers (Q 10.0.3)
- Facilitate regional and international exchange of staff and students by providing appropriate resources, and ensure that the exchange is purposefully organized, taking into account the needs of staff and students (Q 10.0.4)
- Support active participation of staff in relevant professional conferences, seminars, workshops, and other academic activities at national and international levels so as to improve education and research (Q 10.0.5)

ANNEX 1. TEXTBOOKS AND REFERENCE BOOKS

Reference books required for the program

No.	Course List	List of Reference Books Required for the Course	Year of Publication	Remarks
1.	Basic Immunology	1. Bryant NJ. *Laboratory Immunology and Serology,* 3rd ed. Serological Services Ltd. Toronto, Ontario, Canada. 2. Abbas AK and Lichtman AH. *Cellular and Molecular Immunology*, 5th ed. 3. Keogan MT, Wallace EM, and O'Leary P. *Concise Clinical Immunology for Health Professionals.* 4. Roitt IM and Delves PJ. *Essential Immunology*, 3rd ed.	Most recent edition	If the course is not given to another group (from other program)
2.	Basic Molecular Biology	1. Alberts B et al. *Molecular Biology of the Cell*, 4th ed. 2. Surzycki S. *Basic Techniques in Molecular Biology.* 3. Lodish H et al. *Molecular Cell Biology*, 3rd ed. 4. Monroe JG. *Molecular Biology of B-Cell and T-Cell Development.*	Most recent edition	
3.	Clinical Chemistry I and II	Burtis CA and Ashwood ER. *Tietz Textbook of Clinical Chemistry*, 5th ed. W.B. Saunders, USA. 1. Arneson W and J Brickell J. *Clinical Chemistry, A Laboratory Perspective*, F. A Davis Company, USA. 2. Kaplan L. *Clinical Chemistry, Theory, Analysis, Correlation*, 4th ed., Mosby, Inc. 3. Bishop ML et al. *Clinical Chemistry: Principles, Procedures, Correlations*, 3rd ed.	Most recent edition	
4.	Introduction to Medical Bacteriology and Diagnostic Bacteriology	1. *Baron's Medical Microbiology*, 4th ed. 2. *Jawetz, Melnick, and Adelberg's Medical Microbiology*, 24th ed. 3. *Brown A. Benson's Microbiological Application: Laboratory Manual in General Microbiology*, 8th ed. 4. Ray CG and Sherris JC; Ryan KJ, (ed.). *Sherris Medical Microbiology: An Introduction to Infectious Disease*, 4th ed. 5. Cheesbrough M. *Medical Laboratory Manual for Tropical Countries, Microbiology, Volume II*, 2nd ed. Tropical Health Technology and Butterworth-Heinemann.	Most recent edition	
5.	Health Laboratory Management	1. Hudson J. *Principle of Clinical Laboratory Management: A Study Guide and Workbook.* 2. Bersch C. *Laboratory Information Systems Continue to Add Features That Contribute to Maximizing Personnel and Cost Containment.* 3. Attener R and Warner R. *Introduction to Management.*	Most recent edition	
6.	Hematology I and II	1. Harmening DM. Clinical *Haematology and Fundamentals of Hemostasis*, 4th ed. 2. McKenzie SB. *Clinical Laboratory Hematology.* 3. Robinson SH et al. *Hematology Pathophysiologic Basis for Clinical Practice*, 3rd ed.	Most recent edition	
7.	Histopathology	1. Luna LG. *Histopathologic Methods and Color Atlas of Special Stains and Tissue Artifacts.* 2. Stevens A and Lowe J. *Histology.* 3. *Basic Pathology*, 6th ed.	Most recent edition	

No.	Course List	List of Reference Books Required for the Course	Year of Publication	Remarks
8.	Immunohematology	1. Hillyer CD et al. *Blood Banking and Transfusion Medicine: Basic Principles and Practice,* 2nd ed. 2. *Guidelines and Principles for Safe Blood Transfusion Practice, Introductory Module*. World Health Organization. 3. Quinley ED. *Immunohematology: Principles and Practice*, 2nd ed. 4. *AABB Technical Manual*, 15th ed.	Most recent edition	
9.	Instrumentation	1. Burtis CA and Ashwood ER. *Tietz Texbook of Clinical Chemistry*, 5th ed. W.B. Saunders, USA. 2. Arneson W and Brickell J. *Clinical Chemistry, A Laboratory Perspective*, F. A. Davis Company, USA. 3. Samuel K, Gebru M, and Melaku T. *Lecture Note Series on Laboratory Instrumentation*, Carter Center, 2008.	Most recent edition	
10.	Introduction to Medical Laboratory Sciences	1. Linne, JJ and Ringsrud KM. *Basic Laboratory Techniques for the Medical Laboratory Technician*, 4th ed. 2. WHO, *Manual of Basic Techniques for a Health Laboratory*. 3. Cheesbrough M. *District Laboratory Manual for Tropical Countries, Cambridge University Press, Vol. I.*, 2000. 4. Cheesbrough M. *District Laboratory Manual for Tropical Counties, Vol. II.*, Cambridge University Press, 2000.	Most recent edition	
11.	Medical Mycology	1. Kwon-Chung KJ and Bennett JE. *Medical Mycology*. 2. Alexopoulos CJ, Mims CW, and Blackwell M. *Introductory Mycology*. 3. Blevins K and Kern M. *Medical Mycology: A Self-Instructional Text.* 4. Kavanagh K (ed.). *Medical Mycology: Cellular and Molecular Techniques*.	Most recent edition	
12.	Medical Parasitology I and Medical Parasitology II	1. Cheesbrough M. *District Laboratory Manual for Tropical Countries, Cambridge University Press, Vol. I*, 2000. 2. Dailey MD. *Essentials of Parasitology*, 6th ed. 3. Schmidt GD. *Essentials of Parasitology*, 4th ed.	Most recent edition	
13.	Medical Virology	1. *Principles and Practice of Clinical Virology*, 5th ed. John Wiley & Sons, England. 2. *Principles and Practice of Clinical Biology*, 6th ed. John Wiley & Sons, Ltd., Publication. 3. Wagner EK. *Basic Virology*, 3rd ed. 4. Murray PR, Rosenthal KS, and Pfaller MA. *Medical Microbiology*, 5th ed., Mosby, Inc.	Most recent edition	
14.	Principles of Genetics	1. Suzuki DT and Griffiths AJF. *An Introduction to Genetic Analysis*, 4th ed. 2. Hart DL et al. *Genetics: Principles and Analysis*, 4th ed. 3. Snustad DP. *Principles of Genetics*, 3rd ed.	Most recent edition	

No.	Course List	List of Reference Books Required for the Course	Year of Publication	Remarks
15.	Professional Ethics	1. *Ethiopian Medical Laboratory Association Code of Ethics for Medical Laboratory Technologists Practicing in Ethiopia*. 2. *Medical Ethics Manual*, World Medical Association. 3. *International Federation of Biomedical Laboratory Science (IFBLS) Code of Ethics*, IFBLS General Assembly of Delegates.	Most recent edition	
16.	Public Health Microbiology	1. Mahon CR, Lehman DC, and Manuselis G. *Textbook of Diagnostic Microbiology*. 2. Doyle MP (ed.), Beuchat LR (ed.), and Montville TJ. *Food Microbiology: Fundamentals and Frontiers*. 3. Yousef AE, Carlstrom C, and Yousef A. *Food Microbiology: A Laboratory Manual*.	Most recent edition	
17.	Quality Assurance in Medical Laboratory Sciences	1. Kaplan L. *Clinical Chemistry, Theory, Analysis, Correlation*, 4th ed., Mosby, Inc. 2. Kemper RE. Quality, TQC, TQM. 3. Paszko C et al. *Laboratory Management Systems Expanded and Revised*.	Most recent edition	
18.	Serology	1. Bryant NJ. *Laboratory Immunology and Serology*, 3rd ed. Serological Services Ltd., Toronto, Ontario, Canada. 2. Tizard I. *Immunology: An Introduction*, 4th ed., Saunders Publishing. 3. Turgeon ML. *Immunology and Serology in Laboratory Medicine,* 3rd ed.	Most recent edition	
19.	Toxicology	1. Williams PL, James RC, and Roberts SM (eds.). *Principles of Toxicology: Environmental and Industrial Applications*, 2nd ed, Wiley-Interscience, New York. 2. Ballantyne B, Marrs TC, and Turner P. "Fundamentals of toxicology," in *General and Applied Toxicology*, Ballantyne B, Marrs T, and Turner P (eds.), M. Stockton Press, New York. 3. Eaton DL and Klassen CD; Klassen C (ed.), "Principles of toxicology," in *Casarett and Doull's Toxicology: The Basic Science of Poisons*, 5th ed., McGraw-Hill, New York.	Most recent edition	
20.	Urinalysis and Body Fluids	1. Strasinger SK. *Urinalysis and Body Fluids*, 5th ed. 2. Cheesbrough M. *District Laboratory Manual for Tropical Countries, Vol. II*, Cambridge University Press, 2000. *3.* Ross DL and Neely AE. *Textbook of Urinalysis and Body Fluids.* 4. Bishop ML et al. *Clinical Chemistry: Principles, Procedures, Correlation*, 3rd ed. 5. Burtis CA and Ashwood ER. *Tietz Textbook of Clinical Chemistry*, 3rd ed.	Most recent edition	
21.	Vector Biology	1. Marquardt RS, and Grieve RB. *Parasitology and Vector Biology*, 2nd ed. 2. Johanssen OA and Riley WA. *Handbook of Medical Entomology.* 3. Mullen G and Durden L. *Medical and Veterinary Entomology*, 2nd ed.	Most recent edition	

Textbooks required to run the program

No.	Course List	List of Textbooks Required for the Course	Year of Publication	Remarks
1	Basic Immunology	Goldsby RA and Kindt TJ. *Kuby Immunology*, 5th ed.	Most recent edition	
2	Basic Molecular Biology	Alberts B, Johnson A, Lewis J, Raff M, Roberts K, and Walter P. *Molecular Biology of the Cell*, 4th ed.	Most recent edition	
3	Clinical Chemistry I and II	Burtis CA and Ashwood ER. Tietz *Fundamentals of Clinical Chemistry*, 5th ed. W.B. Saunders, USA.	Most recent edition	
4	Introduction to Medical Bacteriology and Diagnostic Bacteriology	Koneman EW. *Koneman's Color Atlas and Textbook of Diagnostic Microbiology*, 6th ed.	Most recent edition	
5	Health Laboratory Management	Harmening DM. *Laboratory Management: Principles and Processes*. Prentice-Hall Inc., Upper Saddle River, New Jersey.	Most recent edition	
6	Hematology I and II	Rodak BF. *Hematology Clinical Principles and Applications.*	Most recent edition	
7	Histopathology	Bancroft JD. *Theory and Practice of Histological Techniques*, 5th ed.	Most recent edition	
8	Immunohematology	Blaney KD and Howard PR. *Basic and Applied Concepts of Immunohematology*, 2nd ed.	Most recent edition	
9	Instrumentation	Burtis CA and Ashwood ER. *Tietz Textbook of Clinical Chemistry*, 5th ed. W.B. Saunders, USA.	Most recent edition	
10	Introduction to Medical Laboratory Sciences	Turgeon ML. *Linne & Ringsrud's Clinical Laboratory Science: The Basics and Routine Techniques.*	Most recent edition	
11	Medical Mycology	Reiss E, Shadomy HJ, and Lyon GM. *Fundamental Medical Mycology*.	Most recent edition	
12.	Medical Parasitology I and Medical Parasitology II	*Practical Guide to Diagnostic Parasitology*, 2nd ed.	Most recent edition	
13.	Medical Virology	Murray PR. *Medical Microbiology*.	Most recent edition	
14.	Principles of Genetics	Hart DL et al. *Genetics: Principles and Analysis*, 4th ed.	Most recent edition	
15.	Professional Ethics	Beauchamp TL and Childress JF. *Principles of Biomedical Ethics.*	Most recent edition	
16.	Public Health Microbiology	Burlage RS. *Principles of Public Health Microbiology.*	Most recent edition	
17.	Quality Assurance in Medical Laboratory Sciences	Inhorn SL. *Quality Assurance Practices for Health Laboratories.*	Most recent edition	
18.	Serology	Stevens C. *Clinical Immunology and Serology: A Laboratory Perspective*, 3rd ed.	Most recent edition	
19.	Toxicology	Klaassen CD. *Casarett & Doull's Toxicology: The Basic Science of Poisons*, 6th ed.	Most recent edition	
20.	Urinalysis and Body Fluids	Ringsrud KM and Linne JL. *Urinalysis and Body Fluids: A ColorText and Atlas*.	Most recent edition	
21.	Vector Biology	Service MW. *Medical Entomology for Students*, 2nd ed.	Most recent edition	

ANNEX 2. SUGGESTED PERIODICALS/ JOURNALS, DICTIONARIES AND ENCYCLOPEDIAS

Periodicals/Journals

No.	List of Periodicals/Journals	Year of Publication	Number of Copies per 50 Students or 1 Class	Remarks
1.	*Ethiopian Journal of Health Development*	2000 and latest	5	
2.	*Ethiopian Medical Journal*	2000 and latest	5	
3.	*American Journal of Clinical Pathology*	2000 and latest	5	
2	*African Journal of Laboratory Medicine*	2000 and latest	2	
5.	*East Africa Medical Journal*	2000 and latest	2	

Program/subject-specific dictionaries

No.	List of Dictionaries	Year of Publication	Number of Copies per 50 Students or 1 Class	Remarks
1.	Medical dictionary	2000 and latest	4	

Program/subject-specific encyclopedias

No.	List of Encyclopedias	Year of Publication	Number of Copies per 50 Students or 1 Class	Remarks
1.	Medical encyclopedia	2000 and latest	2	

ANNEX 3. LABORATORY EQUIPMENT/ APPARATUS AND CHEMICALS

Equipment/apparatus for medical microbiology

No.	List of Equipment/Apparatus	Quantity/Volume	Description
1	Microscope	1 per 2 to 4 students	Binocular
2	Electrical bench centrifuge	1	
3	Autoclave	1	
4	Water bath	1	
5	Hot-air oven	1	
6	Refrigerator	1	
7	Incubator	1	
8	Beam/electronic balances	1	
9	PH meter	1	
10	Vortex mixers	1	
11	Wire loop	25	
12	Microscopic slides	50 pack of 100 pcs	
13	Bunsen burner/spirit lamp	10	
14	Colony counter	1	
15	Petri dish	100	
16	Filter funnel	5	
17	Cover slides	100 pack of 100 pcs	

Chemicals reagents and consumables for medical microbiology

No.	List of Chemical Reagents and Other Consumables	Quantity/Volume	Description
1	Carbol fuchsin	4 bottles	
2	3% acid alcohol	4 bottles	
3	Methylene blue	4 bottles	
4	Crystal violet	4 bottles	
5	Gram's iodine	4 bottles	
6	Alcohol acetone	4 bottles	
7	Safranine /neutral red	4 bottles	
8	Methanol/ethanol	4 bottles	
9	Physiological saline	4 bottles/bags	
10	Lugol's iodine	4 bottles	
11	Formaline	4 bottles	
12	Ether	4 bottles	
13	Gauze	4 roll	
14	Filter paper	4 pack	
15	Applicator stick	4 pack	
16	Sodium hypochlorite	4 bottles	
17	Sodium hydroxide	4 bottles	
18	Potassium hydroxide	4 bottles	

No.	List of Chemical Reagents and Other Consumables	Quantity/Volume	Description
19	Culture media: • Kligler iron agar • MacConkey • Amies-transport medium • Alkaline peptone water • Nutrient agar • Sabroaud agar • SS agar • DCA agar • MNYC agar	1 tin each	
20	Antibiotic discs of different kinds, e.g., • Bacitracin disk • Optochin disk • Novobiocin	1 pk each	
21	Biochemical media: • Litmus milk • Bile salt/sodium deoxycholate • Hydrogen peroxide • DNAse agar • Motility indole urea medium • Sulphanilic acid • Alphanapthylamine • Zinc dust • Nitrate broth • Oxidase reagent • Oxidation-fermentation medium • Sterile paraffin oil (liquid paraffin)	1 tin each	

Equipment/apparatus for medical parasitology

No.	List of Equipment/apparatus	Quantity/Volume	Description
1	Microscope	1 per 2/4 students	Binocular
2	Electrical bench centrifuge	1	
3	Volumetric flask	20	
4	Measuring cylinder	20	
5	Beaker	20	
6	Beam and electronic balances	1	
7	PH meter	1	
8	Microscopic slides	100 pk of 100 pcs	
9	Bunsen burner/spirit lamp	10	
10	Micrometer	5	
11	Petri dish	20	
12	Filter funnel	25	
13	Cover slides	100 pk of 100pcs	
14	Conical/centrifuge tubes	100	
15	Round bottomed tubes	100	

Chemicals reagents and consumables for medical parasitology

No.	List of Chemicals Reagents and Other Consumables	Quantity/Volume	Description
1	Carbol fuchsin	4 bottles	
2	3% acid alcohol	4 bottles	
3	Methylene blue	4 bottles	
4	Microhematocrit tube	10 pk of 100 pcs	
5	Kato thick smear: • Screen stainless steel, plastic 60–105 mesh • Template • Spatula, plastic • Hydrophilic cellophane • Forceps Zinc sulphate		
6	Methanol/ethanol	4 bottles	
7	Physiological saline	4 bottles/bags	
8	Lugol's iodine	2 bottles	
9	Formaline	4 bottles	
10	Ether	4 bottles	
11	Gauze	4 roll	
12	Filter paper	4 pk	
13	Applicator stick	10 box	
14	Sodium hypochlorite	4 bottles	
15	Wright's stain	4 bottles	
16	Giemsa stain	4 bottles	
17	Sodium acetic acid formaldehyde(SAF)	4 bottles	
18	Occult blood test: Acetic acid Ethanol Hydrogen peroxide Aminophenazone crystals		
19	Cellophane/scotch tape	4 roll	
20	Cotton swab	4 pack	
21	Tongue Depressor	4 pk	
22	Xylene	2 bottles	
23	Immersion oil	4 bottles	

Equipment/apparatus for Hematology, immunohematology, and serology

No.	List of Equipment/Apparatus	Quantity/Volume	Description
1	Microscope	1 per 2/4 students	Binocular
2	Semi-automated hematology analyzer	1	
3	Microhematocrit centrifuge	1	
4	Water bath	1	
5	Refrigerator	1	
6	Beam/electronic balances	1	
7	PH meter	1	
8	Electrical bench centrifuge	1	
9	Tourniquet	30	
10	Round bottomed test tubes	100	
11	EDTA tubes	100	
12	Vacutainer barrel	30	
13	Microscopic slides	100 pk of 100 pcs	
14	Hemocytometer	30	
15	Hemoglobinometer	30	
16	Hemocue	10	
17	Spectrophotometer	1	
18	ESR/Westergreen tube	30	
19	ESR/Westergreen rack	30	
20	Micropipettes	10	
21	Rotator	1	

Chemicals reagents and consumables for hematology, immunohematology, and serology

No.	List of Equipment/Apparatus	Quantity/Volume	Description
1	Blood lancet	100 pk of 100pcs	
2	Syringe with needle	100 pk of 100pcs	
3	Ethanol/methanol	4 bottle	
4	Microhematocrit tubes	100 pk	
5	Vacutainer needles	100 pk	
6	EDTA	100	
7	Trisodium citrate	2 bottles	
8	Wright's stain	4 bottles	
9	Giemsa stain	4 bottles	
10	2% acetic acid	4 bottles	
11	1% hydrochloric acid	4 bottles	
12	1% ammonium oxalate	4 bottles	
13	Hinkelman's fluid	4 bottles	
14	Differential tally counter	2	
15	1% new methylene blue/1% Brilliant cresyl blue	2 bottles	
16	Drabkin's solution	2	
17	Normal saline	2	

No.	List of Equipment/Apparatus	Quantity/Volume	Description
20	Anti-sera: • Anti-A • Anti-B • Anti-D • Antihuman globulin reagent	3 bottles each	
21	Bovine albumin	3 pk	
22	HIV rapid test kits: • KHB • StatPak • Unigold	3 bottles	
23	HCG test kit	2 pk	
24	Hepatitis test kit	2 pk	
25	H. pylori test kit	2pk	
26	ASO test kit	2 pk	
27	Widal test kit	2pk	
28	Weil felix test kit	2pk	
29	VRDL test kit	2pk	

Equipment/apparatus for clinical chemistry and urinalysis

No.	List of Equipment/Apparatus	Quantity/Volume	Description
1	Water bath	1	
2	Micropipettes	10	
3	Micropipette tips	10 pks	
4	Semi-automated chemistry analyzer	1	
5	Microscopic slides	100 pk of 100 pcs	
6	Cover slides	100 pk of 100 pcs	
7	Bench centrifuge	1	
8	Test tubes	100	
9	Beam/electronic balances	1	
10	Flasks	10	
11	Beaker	20	
12	Burette with stand	1	
13	Urinometer	5	
14	Refractometer	5	

Chemicals, reagents and consumables for clinical chemistry and urinalysis

No.	List of equipment/apparatus	Quantity/Volume	Description
1	AST reagents	2 pk	
2	ALT reagents	2 pk	
3	ALP reagents	2 pk	
4	Cholesterol/triglycerides reagents	2 pk	
5	Glucose reagents	2 pk	
6	Protein reagents	2 pk	
7	Total+ direct bilirubin reagents	2pk	
8	Electrolyte tests: • Calcium • Iron • Magnesium, etc.	2 pk	
9	Creatinine reagents	2 pk	
10	Urea reagents	2 pk	
11	Ferritin	2 pk	
12	Multistx	2 pk	
13	PH meter: • Litmus paper or Nitrazine paper	2 pk	
14	Bendict's/Fehling's solution	2 bottles	
15	Sodium nitroprusside reagent	2 bottles	
16	Acetone powder reagent	2 bottles	
17	10% ferric chloride	2 bottles	
18	Sulphosalycilic acid	2 bottles	

N.B: Checklist tables can be prepared based on facility categories (e.g., equipment, chemicals, etc.) depending on the nature of the program and the lab.

ANNEX 4. LAB MANUALS/GUIDELINES/CHARTS/SAFETY RULES

No.	List of Manuals/Guidelines	Number of Copies/Lab	Remarks
	Clinical Chemistry	25	
	Bacteriology	25	
	Medical Parasitology	25	
	Medical Virology	25	
	Urine and Body Fluid Analysis	25	
	Hematology	25	
	Immunohematology	25	
	Histopathology	25	
	Introduction to Medical Laboratory Sciences	25	
	Medical Mycology	25	
	Public Health Microbiology	25	

Charts

No.	List of Charts/Plates	Number of Copies /Lab	Remarks
	Parasitology (protozoa and helminth) color plates	25	
	Microbiology (bacteria, virus, and fungus) color plate	25	
	Urine sediment (cast) color plate	25	
	Hematology (RBC, WBC, platelet) color plate	25	

Safety rules

No.	List of Safety Rules	Number of Copies/Lab	Remarks
1	Basic safety precautions	3/lab	To be posted
2	Sample collection, processing, and storage	3/lab	To be posted
3	Reagent preparation, handling, and storage	3/lab	To be posted

ANNEX 5. INDICATIVE SOURCES OF EVIDENCE FOR VERIFICATION OF STANDARDS

Indicative sources of evidence for verification of the standards for Area 1: Program goals and outcomes

- Employer survey
- Curriculum
- Academic brochures and prospectus or bulletin
- Documentation on stakeholders' input (proceedings)
- Institution's website
- Matrix of mission and vision of the HEI program goals
- Matrix of programs aims and educational outcomes
- Interviews with stakeholders, senior management, academic staff, and students
- Matrix of educational outcomes with the national scope of practice for medical laboratory science professionals

Indicative sources of evidence for verification of the standards for Area 2: Governance, leadership, and administration

- School/institute legislation and personnel policy
- Staff recruitment, promotion, development and appraisal policies, procedures/criteria
- Staff job description and workload document
- Memorandum of Understanding signed with stakeholders
- Minutes of meetings at school, departmental/unit, and different standing committee levels
- Interviews with management staff, school leaders, department/unit heads, administrative/academic staff, and student representatives
- Staff statistics

Indicative sources of evidence for verification of the standards for Area 3: Educational resources

- Document on asset inventory
- Interviews with school leader, librarian, department heads, academic staff, coordinator of experiential program, students, and administration staff.
- Observation/survey of offices, classrooms, computer lab, skills lab, library, storage for skills lab materials, conference rooms, practice site, and other facilities indicated in the standard
- Document indicating facility cleaning and maintenance schedule
- Memorandum of Understanding signed with practicum sites
- Proceedings of review meetings conducted with clinical practice sites
- Documents indicating strategic plan, operational work plan, and budget plan

Indicative sources of evidence for verification of the standards for Area 4: Academic staff, support staff, and preceptors

- Legislation, policy, and guidelines
- Staff recruitment, promotion, development, and appraisal procedure/criteria
- Documents on staff job descriptions and workload
- Documented evidence on academic staff engagement in teaching, research, and community services
- Documents on academic staff members' and preceptors evaluation results and feedback
- Minutes of meetings at departmental, school, and standing/ad-hoc committee level
- Interviews with senior management, deans, department heads, coordinator of the experiential training, academic staff, and student representatives
- Guidelines and tools for experiential training/placement evaluation
- Staff statistics
- Student enrollment data
- Lecture timetable
- Filled-in staff appraisal form

Indicative sources of evidence for verification of the standards for Area 5: Student admission and support services

- Student handbooks
- Documents on student counseling; career guidance; etc.
- Student enrollment statistics
- Student admission policy/guideline
- Policies on student transfer, credit transfer, course exemption, and waiver
- Interviews with senior management, dean of students, student council, students, academic, and administration staff
- School website
- Infrastructure for student support services (clinic, sport, and lounge, etc.)
- Documentation on announcements about admission
- Documentation on appeal mechanism
- Documentation on orientation program
- Documentation on tutorial and supportive courses

Indicative sources of evidence for verification of the standards for Area 6: Program relevance and curriculum

- Curriculum development guideline/procedures
- Minutes of meetings of committees dealing with curriculum development, approval, monitoring and review at department, school/institute level
- Curriculum review reports

- Course catalogues (showing the structure and aims of each program, course aims, descriptions, indicative activities, and book lists)
- Interviews with senior management, school leader, department heads, academic staff, students, graduates, and employers

Indicative sources of evidence for verification of the standards for Area 7: Teaching-learning and assessment

- Curriculum
- Syllabus for major and supportive courses
- Handouts of major and supportive courses
- Schedule for clinical practice
- Guideline for experiential training
- Consultation hours posted on offices
- Exam papers of major and supportive courses
- Checklist for skill teaching and assessment
- Legislation of the HEI/school
- Examination and assessment guideline
- Report of external examiners
- Academic calendar
- Examination committee reports and minutes
- Reports of reviews of teaching, learning and assessment
- Observation of classroom sessions, practice sessions, skills lab sessions
- Interviews with school leader, department heads, academic staff, coordinator of experiential program, students, and preceptors

Indicative sources of evidence for verification of the standards for Area 8: Student progression and graduate outcomes

- Registrar's office reports
- Data on student attrition and graduation rates
- Reports on graduate tracer studies
- Reports on employer satisfaction studies
- Employer feedback reports
- Lists of employer contacts
- Records on students' years of stay in the school (enrollment to graduation)
- Records on engagement of students in scholarly and extracurricular activities
- Formal documents on educational and scholarship linkages, students extracurricular activities, etc.
- Interviews with senior management, registrar, coordinator of experiential training, academic staff, students, graduates, employers, etc.

Indicative sources of evidence for verification of the standards for Area 9: Continual Quality Assurance

- Internal Quality Audit manual for medical laboratory science program
- IQA guideline
- Assessment results and intervention strategy documents on IQA
- Minutes of meetings of IQA unit
- Reports on curriculum review/appraisal
- Legislation of the HEI/school
- Interviews with school leader, department heads, academic staff, coordinator of experiential program, students, and preceptors

Indicative sources of evidence for verification of standards for Area 10: Research, development, and educational exchanges

- Policy documents on budget and facility allocation for academic staff/student research
- Document on identified priority research areas of the school/institute and the country
- Policy on research and obligatory publication in reputable national/international journals for each academic staff for existence, appraisal, and promotion
- Reports and dissemination documents of research findings of academic staff/students

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5. Performance Standards for HIV/AIDS Education in Ethiopia in Medical Laboratory Science Schools, September 2008, Jhpiego-Ethiopia.
6. Basic Medical Education WFME Global Standards for Quality Improvement. The 2012 Revision, World Federation of Medical Education Office, University of Copenhagen, Denmark, 2012.