

## **Minimum Standard for the conduct of BScMLT Degree courses in Colleges affiliated to KUHS**

### **1.Introduction**

BSc(MLT) course is a degree course in Medical Laboratory Technology. It is one of the practical oriented Courses dealing with various laboratory diagnostic procedures in the Health and allied sciences. The course is intended to produce specialized group of human resources in the field of Medical Laboratory Technology. After the course their service as a technologist shall be utilized in the diagnostic field of modern medicine, Homoeo, Ayurveda, Veterinary, fisheries departments as well as in academic and its research field. .

The quality of medical care has improved tremendously in the last few decades due to the advances in technology, thus creating fresh challenges in the field of healthcare. It is now widely recognized that health service delivery is a team effort involving both clinicians and non-clinicians, and is not the sole duty of physicians and nurses. Laboratory professionals that can competently handle sophisticated machinery and advanced protocols are now in high demand. Their role in diagnosis is vital to the successful treatment delivery. Effective delivery of medical laboratory services depends largely on the nature of education, training and appropriate orientation to develop the capacity to function as an integrated team. Considering the objectives of Medical laboratory professionals and their active role in the health delivery system it is most essential to ensure the implementation BScMLT course curriculum with prime importance. So the minimum facilities and the other requirements for the academic and training institutes for the conduct of the course is proposed.

### **2.Duration of the course – 4 years**

### **3.Eligibility**

+2 with/ Pre-Degree with Physics, Chemistry, Biology with 50% marks (usual relaxation for SC/ST/OBC and other eligible communities)

### **4.Intake**

30 students

### **5.Course Description**

#### **BScMLT is mainly a practical oriented course**

Subjects : First Year paper 1 A. Anatomy including Histology  
B. Physiology

II. Biochemistry I

III. Basic Microbiology and Immunology

IV. Basic Medical Laboratory Science & Haematology-I

Second Year	V. Biochemistry II VI. General Microbiology VII. Parasitology and Entomology VIII...Haematology-II & Clinical Pathology
Third Year	IX. Biochemistry III X. Cytology and Transfusion technology XI. Bacteriology XII. Electronics& Biomedical Instrumentation Technology
Fourth Year	XIII. BiochemistryIV XIV. Mycology, Virology and Applied Microbiology XV. Histotechnology and Cytogenetic XVI. Project

### **6.Infrastructure**

Sl. No.	Description	Nos	Specification
1	Area -Municipality Corporation - Other	& Limit	100 cents  200 cents
2	Building		1367 M <sup>2</sup> ,(14695 sq.ft). Institution shall be housed in the campus of the hospital where the clinical laboratory practice is intended to provide or within a radius of 8 kilometer of the campus.
3	Lecture halls	4	55 M <sup>2</sup> It shall be arranged to seat 30 students with good ventilation and lighting arrangements. These shall be built with good acoustics.
4	Seminar room	1	60 M <sup>2</sup> shall be arranged to seat 60 students with good ventilation and

		lighting arrangements, with movable window curtain, These shall be built with good acoustics, It shall be provided with necessary independent audio visual aids including over-head projector, slide projector and microphone.
5	Microbiology Laboratory	<p><b>Microbiology Laboratory</b></p> <p>1 120 M<sup>2</sup> (1290sq.ft) for 30 students  (1) 81(9x9) M<sup>2</sup> for exclusive Laboratory living space with adequate work benches of either one sided ( size 36 metre (6 rows) length ,75cm height and 75 cm breadth ) or double sided ( 18 meter(3 rows), 75cm height and 150 cm breadth) seating arrangements. It shall be provided with cupboard with lock and key, gas and water connections, ceramic wash basins with water taps (swan neck),tube lights. Adequate drainage facilities and electrical plug points to connect the three pin plugs of microscopes in each seat. One wash basins shall be fitted between two seats in case of one sided work benches or between four seats in case of double sided seats. Also the lab should have a side PCC slab of total length 12 metre (Breadth 75CM,Height-75CM ) with a minimum of 5 Nos.of 15Amp socket and 10Nos,of 5 Amp sockets with adequate distance so as to connect the Hot air oven ,incubator and other equipments. The Laboratory shall be fitted with ground glass writing board or white board so that all the students can have a direct view or with out turning not more than 90 ° from their seat.</p> <p>(2) Room/Cabin for Technical staff(7M<sup>2</sup>) preferably transparent glass fronted with clear view to the Lab.,</p>

		<p>(3) Lab store 7 M<sup>2</sup> with sufficient slab/Almarah to place the glasswares, miscellaneous materials and chemicals.</p> <p>(4) Media room with a minimum area of 7M<sup>2</sup> (a glass sided cabin) with 2 meter PCC slab with granite or ceramic top and with sink, water and gas connection. There should have two 15 Amp socket and two 5Amp socket.</p> <p>(5) Washing room and sterilization section of 18M<sup>2</sup> with sufficient PCC slab with granite or ceramic top. It shall be fitted with 4 Numbers of 15 Amp and 3 No. of 5 Amp sockets.</p> <p>(6) Height adjustable revolving half chair or stool (30 Nos.)</p>
6	Pathology Laboratory	<p><b>1 Pathology Laboratory</b> 110M<sup>2</sup> (1183sq.ft) for 30 students (1) 81(9x9) M<sup>2</sup> for exclusive Laboratory living space and facilities like that of Microbiology Lab.</p> <p>(2) Room/Cabin for Technical staff (7M<sup>2</sup>) preferably transparent glass fronted with clear view to the Lab.</p> <p>(3) Lab store 7 M<sup>2</sup> with sufficient slabs to place the Laboratory wares and chemicals.</p> <p>(4) Washing room and Preparation section. section of 15M<sup>2</sup> with sufficient PCC slab with granite or ceramic top. It shall be fitted with 4 Numbers of 15 Amp and 3 No. of 5 Amp sockets.</p> <p>(5) Height adjustable revolving half chair or stool (30 Nos).</p>

7	Biochemistry Laboratory	1	<p><b>Biochemistry</b>  110M<sup>2</sup> (1183sq.ft) for 30 students  (1) 81(9x9) M<sup>2</sup> for exclusive Laboratory living space with adequate double sided work benches with 2 tier bottle rack ( Length18 meter(3 rows),100CM height and 150 cm breadth). It shall be provided with cupboard with lock and key, gas and water connections and ceramic wash basins with water taps (swan neck). Adequate drainage facilities with a corner sink (60X60X60CM) and electrical plug points (5Amp) to connect with minor equipments .One wash basins shall be fitted between four seats. Also the lab should have a side PCC slab of total length 12 metre (Breadth 75CM,Height-75CM ) with a minimum of 5 Nos.of 15Amp socket and 10Nos,of 5 Amp sockets with adequate distance so as to connect the Hot air oven ,incubator and other equipments. The Laboratory shall be fitted with ground glass writing board or white board so that all the students can have a direct view or with turning not more than 90 ° from their seat.</p> <p>(2) Room/Cabin for Technical staff (7M<sup>2</sup>) preferably transparent glass fronted with clear view to the Lab.</p> <p>(3) Lab store 7 M<sup>2</sup> with sufficient slabs to place the Laboratory wares and chemicals.</p> <p>(4) Instrument room 15 M<sup>2</sup>. with sufficient PCC slab with granite or ceramic top.(75</p>

		CM Breadth and 75 CM height)It shall be fitted with 4 Numbers of 15 Amp and 3 No. of 5 Amp sockets.water connection with swan neck taps and also with gas connection.
8	<b>Biomedical Instrumentation &amp; Biophysics laboratory</b>	<p>1 <b>Biomedical Instrumentation laboratory</b></p> <p>(1) 60 M<sup>2</sup> area with one writing board (ground glass/white Board) shall be fitted to have a direct view for all the students or with turning not more than 90°while they are working, two work benches to hold 30 seats. Each seat shall be fitted with two 5amps sockets and a total of 4Nos. of 15 Amps socket.</p> <p>(2) Height adjustable revolving half chair or stool 30 Nos.</p> <p>(3) Demonstration room-There shall be one demonstration room (30M<sup>2</sup>) fitted with strip chairs, overhead projector, Video and other audiovisuals aids so as to accommodate 30 students.</p> <p><i>(BMI &amp; Biophysics laboratory shall be shared by other courses also).</i></p>
9	<b>Anatomy and Physiology Lab</b>	<p>(1) Demonstration room-There shall be one demonstration room (30M<sup>2</sup>)m fitted with strip chairs, overhead projector, Video and other audiovisuals aids so as to accommodate 30 students.</p> <p>(2) Preparation room (15M<sup>2</sup>) to accommodate the laboratory technicians and preparation &amp; storage of equipments.</p> <p>(3) Museum- There shall be a museum provided with rack and shelves for storing and display of wet and dry specimens and embryological sections ,models etc</p> <p><i>(Anatomy and Physiology laboratory of</i></p>

			<i>medical/Dental/ Nursing courses of the same institute shall be shared for the BSc(MLT) course</i>
10	Auditorium/Examination Hall	1	200 M <sup>2</sup> to accommodate 200 people It shall be shared with other courses in the institute. It should installed with cc camera, TV with a nearby Examination cell with two computer, dual internet connection, , photocopier, scanner etc.
11	Store(chemical)	1	25 M <sup>2</sup> with adequate side slabs to keep the chemicals.
12	Store(General)	1	25 M <sup>2</sup> with adequate side slabs to keep the glass wares and miscellaneous items.
13	Library	1	100 M <sup>2</sup> with adequate number of chairs (chairs with back and arm rest) and table (preferably one table for each student). Library shall be a minimum of 1000 books with a minimum of 25 titles with 10 copies of text books and 1 copy of reference book in each related subjects (for a BSc (MLT) course with 30 admissions per year) .Also a minimum of 10 national and international journals. It should have E-journal facility with full text and back up availability. It shall be equipped with a minimum of 5 systems with multimedia support, a minimum of one system with scanner, printer facility, photocopier, toilets one each for gents and ladies, well lighted and ventilated or air conditioned.
14	common room with attached toilets for Boys	1	25M <sup>2</sup> with table and chairs to accommodate about 15 students
15	common room with attached toilets for Girls	1	25M <sup>2</sup> with table and chairs to accommodate 20 students
16	Common Toilets for Gents	1	6 M <sup>2</sup>
17	Common Toilets for Ladies	1	6 M <sup>2</sup>

18	<b>Staff Rooms</b>		
i	Principal	1	25 M <sup>2</sup> Bath attached and with sufficient furniture.
ii	Vice-Principal/ HOD (if any)	1	25 M <sup>2</sup> Bath attached and with sufficient furniture.
iii	Department office room	1	25 M <sup>2</sup> with sufficient furniture.
iv	Professors	3	15 M <sup>2</sup> Bath attached and with sufficient furniture.
v	Associate Professor s	3	15 M <sup>2</sup> Bath attached and with sufficient furniture.
vi	Asst. Professor s	2	20 M <sup>2</sup> Bath attached and with sufficient furniture.
vii	staff room óNon-teaching (Gents)	1	10 M <sup>2</sup> with sufficient furniture.
viii	staff room-Non-teaching (Ladies)	1	10 M <sup>2</sup> with sufficient furniture.
19	Other Teaching aids-		
	OHP	1	
	LCD projector	1	
	computer	5	
20	Separate Hostel for Boys for Girls	1 1	Hostel shall be to accommodate 120 students with sufficient living space and furniture.

### 21.Electricity:

There shall be continuous electricity supply round the clock with generator facility.

### 22.Sanitation and water supply:

Adequate sanitary facilities and safe continuous drinking water facilities must be provided for the teaching staff, students (men and women), technical and other staff as required.

### 23.Incineration facility/waste disposal facility:

There shall be an incineration facility. The central incineration facility of the Hospital /Institute shall be shared for the purpose.



**24. Hospital Facility-** The Hospital, Clinical, academic and hostel facilities should be owned by the same management or the charitable society formed for the purpose or the Government. Other forms of hospital facility like those governed by others Or by any forms of memorandum of understandings etc will not be permitted for the conduct of BScMLT course.

Sl. No.	Description	Nos	Specification
1	Bed strength		300 beds
2	Out patients		600 patients daily
3	Clinical labs	3	Biochemistry, Microbiology, Pathology (Cytology, Histopathology, Pathology and Hematology)
4	Blood Bank	1	Blood Bank with facilities for preparation of blood components.
5	<b>Staffs</b> (a) Laboratory Technicians/ Technologists/ Laboratory scientist with the qualification of BSc(MLT) / DMLT qualification approved by Govt of kerala and Kerala University of Health Sciences. (c) Laboratory Attendant/Cleaner <b>(All staff should be with Govt./PMC /KUHS approved qualifications)</b>	1:2 (15 Nos)	Clinical laboratories and blood bank shall be with adequate space and work benches to occupy the staff and trainees. The staff student ratio is 1:2 .ie For a four year BSc(MLT) course with 30 admissions per year should have a minimum of 15 numbers of Laboratory Technicians/ Technologists/ Laboratory scientist with Govt and KUHS approved BScMLT / DMLT qualification.

The students should be sent to training in Nuclear medicine, Virology and laboratories of excellence. Institution will make suitable conveyance facilities.

**25. Minimum Clinical lab facilities and Specimens required are as follows:**

**Clinical Biochemistry lab :**

Average number of specimens /month : 5000

**Clinical Microbiology lab :**

Average number of specimens /month : 2000

**Clinical Pathology lab**

Average number of specimens /month : 4000

**Blood banking**

Average number of transfusion /month : 200

**Histotechnology lab :**

Average number of specimens /month : 300

**Cytology lab :**

Average number of specimens /month : 200

**26. Average number of specimens available per month for the following investigations:**

i) Total urine samples:	500
ii) Total stool samples :	50
iii) Total blood routine tests :	500
v) Biochemistry analysis including hormones	2500
vi) Culture and sensitivity :	300
vii). Biopsies for histopathology investigations	200
viii) special investigation/month	10
ix) Cytology specimens :	100
x) Available number of Blood Donor grouping :	600
xi) Total number of Blood transfusion/month :	200

**27. Staff**

<b>Sl. No.</b>	<b>Designation</b>	<b>No. of posts</b>	<b>Qualification</b>
1	Principal	1	1) MBBS and MD in Pathology/ Microbiology/ Biochemistry OR BSc(MLT) and MSc(MLT) 2) 10 years of Post PG teaching experience in MLT in any Institute or Medical College approved by the Kerala University of Health Sciences and Govt. of Kerala

2	Vice-Principal / HOD		<p>(1) MBBS and MD in Pathology/ Microbiology/ Biochemistry OR BSc(MLT) and MSc(MLT)</p> <p>2) 10 years of Post PG teaching experience in MLT in any Institute or Medical College approved by the Kerala University of Health Sciences and Govt. of Kerala (Senior most Professor will be the Vice-Principal / HOD)</p>
3	Professor in MLT (One each in Microbiology, Pathology and Biochemistry)	3	<p>1) MBBS and MD in Pathology/ Microbiology/ Biochemistry OR BSc(MLT) and MSc(MLT)</p> <p>2) 10 years of Post PG teaching experience in MLT in any Institute or Medical College approved by the Kerala University of Health Sciences and Govt. of Kerala</p>
4	Associate Professor in MLT (One each in Microbiology, Pathology and Biochemistry)	3	<p>1) MBBS and MD in Pathology/ Microbiology/ Biochemistry OR BSc(MLT) and MSc(MLT)</p> <p>2) 8 years of regular Post PG teaching experience in MLT in any Institute or Medical College approved by the Kerala University of Health Sciences and Govt. of Kerala</p>
5	Assistant Professor one each in Microbiology, Pathology and Biochemistry)	6 (2 each in Microbiology, Biochemistry and Pathology)	<p>MSc(MLT) in the concerned subject <i>In the absence of MScMLT holders a maximum of 3 (1 in each subjects) Lecturers with BScMLT qualification shall be posted</i></p>
6	Asst. Professor in Anatomy	1 each	MD in ANATOMY OR

			MSc in aNATOMY OR BSc(MLT) and MSc(MLT) with teaching experience in Anatomy
7	Asst. Professor physiology	1	MD in physiology OR MSc in physiology OR BSc(MLT) and MSc(MLT) with teaching experience in physiology
8	Asst.Professor- Entomology	1	MSc Entomology
8	Biomedical Engineer	1	BTech in Biomedical Engineering/Electronics/Applied Electronics or equivalent.
9	Lab Technicians	3	DMLT
10	Junior Laboratory Assistant	1	VHSE-MLT
11	Store Keeper (Medical lab)	1	VHSE-MLT
12	Administrative Assistant/Officer (if more than one allied course available, it shall be shared)	1	Graduate with experience in administration for 3 years. Degree or Diploma in Hospital Management preferred.
13	Clerk	1	Graduate with computer knowledge
14	Cleaner	3	Pass in VIII <sup>th</sup> std

**(All faculties and staffs should be with Govt./PMC and KUHS approved qualifications)**

Part time teachers or guest faculties shall be posted only for teaching the following subjects like Anatomy, Physiology, Entomology and Biomedical instrumentation.

**28. List of equipment to be required for the student's Practical lab for a batch of 30 students**

**Biochemistry**

<b>Sl. No.</b>	<b>Name of the equipment</b>	<b>No</b>
1	Colorimeter	3
2	U.V. Spectrometer	1
3	Flame Photometer	1
4	Deionizer	1
5	Chromatographic apparatus with sprayer	1
6	Electrophoresis apparatus with power pack -Agar gel PAGE	1 1
7	PH Meter	1
8	Electronic Balance(sensitivity 1mg)	1
9	Balance-Analytical	1
10	Vortex mixer	1
11	Centrifuge ,Remi model/ISI, rotary head, bucket of 15 ml capacity, speed up to 10,000 rpm.	1
12	Hot-air-oven 18x18x18"	1
13	Lab incubator size 24x24x24 "	1
14	Water bath 24x18x18"	1
15	Heater-Electric	2
16	*Double distillation apparatus(All glass)	1
17	Glucometer	1
18	Reagent Dispenser	2
19	Micropipette fixed volume - with various volume	10
20	Refrigerator double door =/> 285L	1
21	Micro pipette with variable volume	5

**29. Microbiology**

<b>Sl. No.</b>	<b>Name of the equipment</b>	<b>No</b>
1	Lab Incubator 18x18x18"(1 No), 24x24x24"-(1No) Incubator with ISI specification, with Inner chamber and perforated tray made up of stainless steel, with temperature regulator up to 100	2

	°C, sensitivity +/-1°C, digital display	
2	Hot air oven 18x18x18"(1 No), 24x24x24"-(1No) with inner chamber and perforated tray made up of s.s, with power indicator, heat control, heat regulator up to 300°C, sensitivity of +/- 1°C.and digital display	2
3	Autoclave vertical,24x18" – 1No vertical type made up of gun metal with 2000 W immersion coil, with safety valve, pressure gauge, heat resistant gasket with perforated removable inner bucket, size diameter 18ö and height 24ö	1
4	Steam jacketed Autoclave minimum 12" diameter	1
5	Water bath 24x18x12" Water bath with inner chamber made up of stainless chamber (ss), perforated tray, temperature regulator up to 100°C, sensitivity+/- 1°C, chamber Size 24öx18öx12ö	2
6	Centrifuge,Remi	1
7	Heater with GI element	2
8	VDRL Shaker	1
9	Microscope, rechargeable, LED monocular microscope, stain resistant enamel finished body, Fully anti fungal coated optical system with high resolution ,monocular head with 360 degree rotation ,wide field eye-piece-5x&10x/18mm. Double layer mechanical stage 120x120x/60x30 mm. Plan Achromatic/ apochromatic objectiveó (DIN) 4x,10x/15X, 40X &100X Oil immersion objective NA=/>1.25,wide field compensating eye-piece-5X&10X, and Abbes condenser with NA=/> 1.25,with iris diaphragm, blue filter , with battery back up for a minimum of 6 hours (preferably carton& student microscope/ equalent model) Quadruple nose-piece, S-LED illumination cool with adjustable illumination	30
10	Bacterial colony counter	1
11	Inspissator to contain 50 tubes	1
12	Seitz filter mount -with150mm disc(1 No),100mm disc(1 No)	2
13	Vacuum pump,with a capacity to create up to -1000mm of Hg	1
14	Fluorescent Microscope ,with achromatic/apochromatic objectiveó4X, 15X, 40X &100X with NA=/>1.25,eye-piece-5X&10X	1
15	Meat minser	1

16	UV lamp-Portable	1
17	Deep freezer-20°C	1
18	Balance – electronic , digital with sensitivity 10 mgm-1 No and sensitivity 1 gm ó 1 No	2
19	Analytical balance, With weight box and fractional weights	1
20	Safety cabinet with laminar flow, Laminar flow apparatus-class óII model,ISI, with quality assured HEPA filtration,	1
21	Deionizer	1
22	Binocular Microscope, with high resolution, A= $\geq$ 1.25,plan achromatic	1
23	Refrigerator with two compartment,285 CC	2
24	Vortex mixer	1
25	Steam jacketed Autoclave	1
26	Millipore filtration unit	1
27	Lovibond comparator with phenol red and Bromothymol blue disc standard	1
28	Anaerobic Jar to contain 12 plates	2
29	ELISA reader with washer	1

### **30. Pathology**

<b>Sl. No.</b>	<b>Name of the equipment</b>	<b>No</b>
1	Microscope, rechargeable, LED monocular microscope, stain resistant enamel finished body, Fully anti fungal coated optical system with high resolution ,monocular head with 360 degree rotation ,wide field eye-piece-5x&10x/18mm. Double layer mechanical stage 120x120x/60x30 mm. Plan Achromatic/ apochromatic objectiveó (DIN) 4x,10x/15X, 40X &100X Oil immersion objective NA= $\geq$ 1.25,wide field compensating eye-piece-5X&10X, and Abbes condenser with NA= $\geq$ 1.25,with iris diaphragm, blue filter , with battery back up for a minimum of 6 hours (preferably cartonø student microscope/ equalent model) Quadruple nose-piece, S-LED illumination cool with adjustable illumination	30
2	Microtome with ISI/AO spensor with knives	2

3	Histokinete	1
4	Centrifuge ,Remi model/ISI, rotary head, bucket of 15 ml capacity, speed up to 10,000 rpm.	1
5	Heater with GI elemnt	1
6	Water bath24x18"	1
7	Balance-Electronic (sensitivity10 mg)	1
8	Hot air oven 18x18x18"(1 No)	1
9	Lab incubator 24x24x24"	1
10	Distillation apparatus(All glass)	1
11	Analytical balance	1
12	Haemocytometer	30
13	Haemoglobinometer	30
14	Colorimeter	2
15	Microtome knife	1
16	Knife sharperner	1
17	Analytical balance	1
18	Refrigerator 285L	1
19	Micropipette fixed volume	5
20	Micropipette variable volume	5
21	Glasswares including graduated pipettes	

### **31. Biomedical Instrumentation laboratory**

**Practical items required: (For 30 students in each batch)**

<b>Sl. No.</b>	<b>Name of the equipment</b>	<b>No</b>
1	Cathode Ray Oscilloscope (C.R.O)	1
2	MultiMeters – digital	15
3	MultiMeters -Analog	15
4	Soldering Iron	15
5	Lead	500 gm
6	De-soldering pump	15
7	Tweezers	15
8	Pliers	15
9	Screw driver set	15
10	Printed circuit board (P.C.B.)	30
11	Components testing and holding base	30
12	Transformers – step down – in all voltage ratings	30
13	Wires – Single strand	15 rolls



	multi strand	15 rolls
14	Resistors – all values	200 each
15	Capacitors – all values	100 each
16	Inductors – all values	30 each
17	I.C. tester equipment	1
18	Diode values	30
19	Transistors – different values	100
20	Diodes (IN 4001)	100
21	Zener diodes – different voltage rating	100
22	Variable power supply	30
23	Flux	10 pkts
24	Computer with sufficeient softwares	15

**32. Glass wares, chemical and reagents for the practical as per the syllabus for a batch of 30 students.**

**33. Furniture:** Office Table with cup board - 15 nos

Chairs with arm rest - 15 Nos

Almarah/wall drops sufficient Nos

Jefferson chair/table & chair/Desk& bench for 4 year students

Director's office table

Executive Chairs

Chairs in the Visitor's Launch

Chairs ,Table, Almarah and furniture for Librarian

Chairs and Table in the Library for students

Chairs in seminar hall for 60 students

**34. Miscellaneous items-**

Computer 6 2 nos

Printer - 1No

Scanner - 1 No

Photocopier - 1 No

LCD Projector - 1 No

Consumables & minor items- sufficient Nos.

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