



Dr. B. Lal Institute of Biotechnology

An Exclusive Biotechnology Institute

Department: Dr. B. Lal Skill Academy

Domain: Healthcare & Medical Biotechnology

Course Name: Certification in Medical Biotechnology

Course Description: The 6 months course is focused on the theoretical and practical aspects of biotechnology involved in healthcare sector. The theoretical concepts of the different areas of biotechnology are backed up with the practical and hands-on training experience. This is further backed up with the basic principles and handling of the advanced instruments involved in the current healthcare especially diagnostic services such as RT-PCR, VITEK, etc. In addition, the course also includes essential skills required for placement such as safety, first aid, infection control, soft skills, etc. Introduction to research methodology, sales and marketing and quality control are the major highlights of the course which would open avenues for placements.

Eligibility: Graduate and post graduate students in biotechnology, microbiology, life sciences and allied sciences.

Instruction methodology: Hybrid mode and practical exposure in laboratories

S. No.	Module/ Duration	Syllabus	Venue	Resource person
1.	Laboratory organization (3 days)	Introduction to the laboratory set up for a diagnostic and research laboratory. Enlisting of all the major instruments and equipments present in the laboratory. Standard operating procedures (SOPs) for all the instruments to be used. The standard storage method for all the instruments is also to be included. Good laboratory practices (GLPs) to be followed in the laboratory including the rules to be followed during the entry as well as exit from the laboratory.	Visit to labs at BIBT & DBCL	AK, AM, DBCL
2.	Introduction to medical biotechnology	<u>Introduction to Biotechnology – 3 days</u> What is biotechnology? Different facets of biotechnology including red, green, white, yellow, blue and golden biotechnology. Techniques involved in biotechnology and their applications in the three	Classroom	AK

<p>and their facets</p> <p>(72 days)</p>	<p>basic thrust areas including health care, food and environmental biotechnology with special emphasis on health care and diagnostics and pharmacy.</p> <p><u>Introduction to Microbiology – 17 days</u></p> <p>What is microbiology? Normal microflora of the human body and most common human pathogens. Standard techniques involved in isolation of pure colonies from the given samples including serial dilution, spread plate, pour plate and streak plate methods. Microscopic characterization of the colonies including standard staining and differential staining techniques to be followed by biochemical characterization for the identification of microbes. Antibiotic sensitivity assay for the differentiation between sensitive and resistant microbes. Applications of microbiology in the healthcare sector.</p> <p><u>Introduction to Molecular Biology – 28 days</u></p> <p>Brief introduction to central dogma and the basic molecular processes of the cell including replication, transcription and translation. Standard molecular biology techniques involving isolation of genomic and plasmid DNA from both prokaryotic and eukaryotic cells. Qualitative and quantitative analysis of the isolated DNA by Agarose Gel Electrophoresis and spectrophotometry. Amplification of the DNA by Polymerase chain reaction and different variants such as Multiplex, Colony, SNP detection, etc. of PCR technique as per requirements. Steps involved in recombinant DNA technology including restriction digestion, DNA extraction from the Agarose gel, competent cell preparation and transformation. Applications of molecular biology in the healthcare sector.</p> <p><u>Introduction to Immunology & Biochemistry – 12 days</u></p> <p>Basic concepts of immune system pertaining to humans involving lymphoid organs and lymphatic cells. Standard immunological techniques involving blood group typing, immunodiffusion and immunoelectrophoresis techniques and ELISA. Correlation of immunology with biochemistry of the human body and its role in disease diagnosis. Basic biochemical analysis for the identification of well-being of a person involving all the major metabolites affected during various medical conditions.</p> <p><u>Introduction to Genomics & Proteomics (including Bioinformatics) – 12 days</u></p> <p>Introduction to bioinformatics and its role in genome sequencing and proteome analysis and their correlation with Human Genome Project and genetic disorders. Introduction to major genome and proteome databases, sequence retrieval databases, alignments, protein modelling and structure</p>	<p>Lab 2</p> <p>Lab 3 & Lab 4</p> <p>Lab 1 & Lab 3</p> <p>Lab 3, Lab 4 & Outsourcing</p>	<p>AR/AM</p> <p>AK/AN</p> <p>AK</p> <p>AK/AN</p>
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		prediction. Protein characterization techniques such as SDS-PAGE, Western Blotting and protein purification techniques such as chromatography also to be included.		
3	Equipment Handling 35 days	<p><u>SOPs of all instruments – 4 days</u></p> <p>Standard operating procedures for all the instruments to be used in diagnostic and research laboratory including basic instruments like weighing balance, pH meter, centrifuge, magnetic stirrer, autoclave, laminar air flow, etc. and specialized instruments like thermal cycler, spectrophotometer, sonicator, etc. Applications of each of these instruments.</p> <p><u>Calibration and maintenance of equipments – 3 days</u></p> <p>Maintenance of each of the above instruments and their regular calibration.</p> <p><u>Introduction to advanced techniques and future trends in laboratory sciences – I & II - 28 days</u></p> <p>Introduction to advanced microbiological equipments including Bactec & Vitek for automated analysis of the microbial colonies and RT-PCR & automated RNA extraction. These will include the SOPs of the automated instruments, their maintenance, calibration and their applications.</p>	Lab 1 to 4 Lab 1 to 4 DBCL	AK/AM AM/RB DBCL
4	Essentials (30 days)	<p><u>Personal Hygiene – 2 days</u></p> <p>It would involve the presentation of human personnel at the work place, the rules and regulations to be followed and the personal hygiene measures to be taken according to the work specifications.</p> <p><u>Safety & first-aid – 5 days</u></p> <p>In case of mishap such as cuts, wounds, fire or spillage of chemicals or reagents, the safety measures and the first aid to be carried out will be covered in this section. It would also include the use of certain basic medicines like analgesics, antipyretics, nausea, headaches, etc. to be consumed under emergency conditions.</p> <p><u>Bio-medical waste management – 3 days</u></p> <p>The waste collected post the experimentation including diagnostics, research or any other such activity to be segregated and disposed accordingly. This would include disposal of unused or used samples, syringes, chemicals, gels, toxic waste, etc.</p> <p><u>Professional behavior – 3 days</u></p> <p>This section would comprise of soft skills, presentation and behavioral aspects to be maintained at the workplace and also to deal with certain critical situations with supervisor or mentees.</p>	DBCL DBCL DBCL Classroom	QA/QC DBCL DBCL AV

		<p><u>Infection control & prevention – 5 days</u></p> <p>All the routine causes of infections in the samples, workplace or human personnel will be shared depending on the type of work carried out. This will be followed by the prevention and treatment strategies for the same.</p> <p><u>Rights and responsibilities – 2 days</u></p> <p>The sense of responsibility and ownership of the assigned work will be taught in this section which is to be maintained. In addition, the basic rights during an employment such as number and nature of leaves, reporting authority, etc. to be covered.</p> <p><u>Basic computer knowledge – 4 days</u></p> <p>Basic computer knowledge including parts of a computer and their operations. Basic working of Microsoft office in detail including Word, Excel, Power point, etc. to be covered.</p> <p><u>Soft skills & communication – 6 days</u></p> <p>This section will cover basic reading and writing skills in a professional set up. It would also include the verbal communication skills during a meeting, presentation or a discussion.</p>	<p>DBCL</p> <p>Classroom</p> <p>DBCL</p> <p>Classroom</p>	<p>QA/QC</p> <p>AV</p> <p>KN</p> <p>AV/AK</p>
5	<p>Sales & Marketing</p> <p>(15 days)</p>	<p>Importance of sales and marketing in healthcare industry and knowledge upgradation</p> <p>Brief introduction about sales process involving basic hygiene of sales, steps of sales, approaching the customer, approach In retail selling, determining the need in sales (observing, listening, questioning), product presentation, handling customer objection, customer buying signals, effective selling, etc.</p> <p>The 7-step sales process - Prospecting, Preparation, Approach, Presentation, handling objections, Closing, Follow-up (in class discussion and on field execution).</p> <p>Marketing key highlights including online and offline branding.</p> <p>Daily tasks for BDM - Daily doctor Calls plan, Discipline & Punctuality, Appearance, Proper working bag setup, Dr. Meeting, Observations, Presentation detailing in doctor chamber, Confidence & Self Starter, Objection handling, Knowledge of customer and product.</p> <p>Customer identification- Identification of Territory, Doctor addition in LIMS, Doctor addition in MSL, Monitoring of Business, Revision of MSL</p>	<p>DBCL</p>	<p>Sales and Marketing Team</p>

		MSL & account management- Territory Management, MSL Management, Visit Pattern. Business model & tie-up - Models of Association, Pre requisites of association, Tie up, Negotiation Points according to Business, Required Documents for Tie up		
6	Quality assurance (15 days)	Basics of quality assurance: Requirement and Applicability of QMS, Basic Quality Control practices: Types, Categorization, Process, Actions, Requirement and Types of QA programme, Quality Validations, Quality Documentation Accreditation systems: Purpose of Accreditation system, Types of Accreditation system, Process of Accreditation Major lab errors: What are errors, Type of errors, RCA & CAPA analysis on errors and their closure. Audit system: Types of audit, Process of Audit: Checklist preparation, Gaps identification, Report preparation, Closure of audit gaps Sensitization on current best practices in laboratory	DBCL	DBCL
7	Research Methodology (5 days)	Introduction to hypothesis building, research objectives, experimentation plan, results and statistical analysis. Scientific writing and communication, research proposal and project reports.	BIBT Classroom/ Lab	AK
7	Field Visit (5 days)	Visit to research and clinical laboratory	Industry tie-ups, DBCL	AV, AK

Resource persons:

AK – Dr. Aakanksha Kalra

AN – Dr. Aditi Nag

AR – Ms. Apoorva Rana

AM – Ms. Akansha Mathur

AV – Ms. Anubhuti Vyas

DBCL – Dr. B. Lal Clinical Laboratory Pvt. Ltd., Ms. Priyanka Vijay, Ms. Smishtha Gupta

RB – Mr. Rajeev Bora

RRKN – Dr. Ravi Ranjan Kumar Niraj

KN – Ms. Khushboo Nehera