



Quality Control Micro Biologist

VERSION 1

CURRICULUM / SYLLABUS

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Mapped to QP Codes	





Preamble

Quality control is an important element for all consumer centric products. Companies invest heavily on this. But there are two dimensions to it - (1) QC from statutory, compliance and audit (2) ensuring that quality is always ensured as commitment to customers, beating competition, and avoiding any customer issues arising out quality strain.

Key industry / product segments are - Food and Beverages , water industry, Pharmaceuticals, Herbal products, Dairy, Cosmetics, Nutraceuticals, Biotechnology, Healthcare, and various other consumer-centric industries where quality and safety define brand success.

Here comes the need for Quality Control – Microbiologist. In industries where consumers are the primary stakeholders, a QC Microbiologist plays a mission-critical role in ensuring product safety, regulatory compliance, contamination control, and brand integrity on regular basis. Unlike general scientists who may focus on research and development, a QC Microbiologist safeguards the final product before it reaches the market—protecting public health, preventing recalls, minimising financial loss, and strengthening consumer trust. They can support on regular basis in the entire value chain and it would help such manufacturing units so that statutory compliance and QC audits are well managed. Thus they are different from a QC audit professionals but professionals who facilitates QC so that there are no shocks and surprises.

Accordingly we have designed a course on Quality Control - Microbiologist who can bridge the gap and support real-time industrial quality assurance demands. The course is for graduates and post graduates in Bio Technology/ Microbiology/ Biochemistry/ Food technology.

The course ensures that by implementing stringent microbial monitoring systems, validation protocols, environmental surveillance, and risk assessment strategies, QC professionals can directly contribute to enhanced product reliability and market credibility—ultimately driving customer confidence and increasing sales.

Eligibility

B.Sc in any field of life science and chemistry postgraduates in these fields
The course can be taken up as upskilling program too
Those engaged in relevant industries can also join to upskill themselves



Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills

1. Understand QC Microbiologist role, regulatory perspective, industry landscape
2. Refresh yourself on Microbiology relevant to QC Labs connected to Culture media basics (types & applications, Sterilization principles (moist/dry/filtration), Contamination routes in QC labs
3. Get thorough exposure to QC Laboratory Setup, Instruments & Workflow including Equipment qualification (IQ/OQ/PQ – theory), Good laboratory practices (GLP), QC lab zoning, workflow design, daily checklist & workflow etc.
4. Will be able to Media, Reagents & Culture Handling in QC Labs with particular reference to Media performance testing (GPT), Reagent preparation & control, Media failure & OOS concepts etc.
5. Thorough hands on understanding of Microbiological Testing – Core QC Tests including Water microbiology (PW, WFI, potable), Product-wise testing logic etc.
6. Environmental Monitoring & Contamination Control with proficiency in Air, surface & personnel monitoring, Trending & interpretation of EM data, Common EM failures & corrective actions
7. Work level Proficiency in Documentation, Data Integrity & Compliance aligned to GDP principles & ALCOA+, Batch records & logbooks, Audit readiness & inspection mindset e
8. Quality Management Systems, Risk & CAPA lifecycle,
9. EHS, Biosafety & Waste Management, Chemical & biological hazards, Incident reporting & emergency response etc.
10. Industry Readiness & Internship Orientation

Relevant Industry

QC Microbiologists are typically required by following industries

1. Cosmetics, personal care, ayurvedic products
2. Pharma, In-house QC labs, pharma microbiology (QC Lab)
3. Food microbiology, safety testing, food & cosmetic testing, GLP, ISO, audit exposure
4. Dairy & beverages, Strong need for routine microbiology
5. Brewery & food processing
6. Beverage QC, Water & contamination control
7. Govt PSU, Structured QC microbiology
8. Formulations + QC labs
9. Water, waste water, food, hygiene microbiology,
10. Environmental microbiology



Course Anatomy

Total duration of the course 72 hours (of theory and practical sessions) PLUS Internship 60 hours

Theory - 30 hours
Practical, Project assignments - 42 hours

Course structure Extensive demo and exercise
Several projects on use of various tools
Capstone project

Training Delivery In Hybrid Mode with offline classes from campus with remote access through smart classroom
Managed through a LMS platform with separate web page for each batch

Training Input All digital content available through web page of the batch

Lesson Planning Flexible structure customised each week while making the weekly roster.

Course Delivery

Program Delivery Pedagogy

- Interactive theoretical sessions to cover fundamental and advanced concepts.
- Practical sessions in a controlled environment to apply theoretical knowledge.
- Real-world scenarios to enhance problem-solving skills.
- A comprehensive project to apply learning in a practical, real-world context.
- Regular quizzes, assignments, and exams to evaluate understanding and progress.

Hands on training

- Media preparation and sterilization techniques (autoclaving, filtration)
- Aseptic handling and microbial culture techniques (streaking, spread plate)
- Isolation and identification of microorganisms using staining and biochemical tests
- Operation of laboratory instruments (laminar airflow, incubator, autoclave)
- Environmental monitoring (air, surface, and personnel sampling methods)
- Water microbiological testing (membrane filtration and MPN methods)
- Antibiotic sensitivity testing (Kirby-Bauer method)



Broad Coverage and Lesson Structure

	Topic	Total Hours	Theory hours	Lab hours	Industry Focus / Remarks
SECTION A : Introduction, Orientation and Refresher					
Module 1 : Orientation to QC Microbiology & Industry Landscape					
	Role of QC Microbiologist in pharma, food, water, cosmetics	1	1		Cross-sector exposure
	Regulatory overview: CDSCO, FSSAI, BIS, WHO-GMP, ISO	1	1		Audit & compliance mindset
	Differences in QC approach across industries	1	1		Industry comparison
	Lab hierarchy, QC vs QA, career pathways	1	1		Career clarity
Module 2 : Basic Microbiology Refresher for QC Labs					
	Microbial classification relevant to QC	1	1		QC-specific microbes
	Cell structure, spores, fungi, yeast	1	1		Contamination relevance
	Growth kinetics & control measures	1	1		Preservation & control
	Culture media basics (types & applications)	2	1	1	Industry media usage
	Sterilization principles (moist/dry/filtration)	2	1	1	Process control
	Contamination routes in QC labs	1	1		Failure prevention
SECTION B : QC Labs, Media handling, Testing					
Module 3 : QC Laboratory Setup, Instruments & Workflow					
	QC lab zoning & workflow design	1	1		GMP layout
	Equipment overview: incubators, autoclaves, LAF, BSC	2	1	1	Daily QC operations
	Equipment qualification (IQ/OQ/PQ – theory)	2	1	1	Regulatory requirement
	Cleaning, sanitation & disinfection strategy	1	-	1	Contamination control
	Good laboratory practices (GLP)	1	1		Audit focus
	QC lab daily checklist & workflow	1	-	1	Industry readiness
Module 4 : Media, Reagents & Culture Handling					
	Types of media used in QC labs	1	1		Product-based selection
	Media preparation theory & controls	2	1	1	Error prevention
	Media sterilization & storage principles	1		1	Compliance
	Media performance testing (GPT)	2	1	1	Audit critical



	Reagent preparation & control	1		1	Traceability
	Media failure & OOS concepts	1	1		Deviation handling
Module 5 : Microbiological Testing – Core QC Tests					
	Total viable count (TVC)	2	1	1	Routine QC testing
	Pathogen testing concepts	2	1	1	Food & pharma safety
	Sterility testing – principles & failures	2	1	1	High-risk testing
	Environmental monitoring theory	2	2		Cleanroom QC
	Water microbiology (PW, WFI, potable)	2	1	1	Utilities QC
	Product-wise testing logic	2	2		Industry adaptation
SECTION C : Monitoring, Documentation, Quality Management					
Module 6 : Environmental Monitoring & Contamination Control					
	Cleanroom classification (ISO, EU GMP)	2	2		Regulatory compliance
	Air, surface & personnel monitoring	2	1	1	Contamination tracking
	Trending & interpretation of EM data	1		1	Data-driven QC
	Common EM failures & corrective actions	1	1		CAPA linkage
Module 7 : Documentation, Data Integrity & Compliance					
	GDP principles & ALCOA+	2	2		Audit readiness
	SOP structure & control	2	2		Document lifecycle
	Batch records & logbooks	2	2		Traceability
	Deviations, OOS & OOT	2	2		Investigation mindset
	Audit readiness & inspection mindset	2	2		Regulatory success
Module 8 : Quality Systems, Risk & CAPA					
	Basics of Quality Management Systems	2	2		QMS foundation
	Risk assessment tools (theory)	1	1		Preventive QC
	CAPA lifecycle	2	2		Corrective systems
	Change control & impact assessment	1	1		Controlled change
SECTION D : Bio safety and Industry readiness					
Module 9 : EHS, Biosafety & Waste Management					
	Biosafety levels & lab safety	1	1		Placement requirement
	Chemical & biological hazards	1	1		Risk mitigation
	Biomedical & microbial waste management	1	1		Compliance
	Incident reporting & emergency response	1	1		Safety culture
Module 10 : Industry Readiness & Internship Orientation					
	QC interview expectations	2	2		Placement prep



	Lab ethics & professional behavior	1	1		Workplace conduct
	Internship dos & don'ts	1	1		On-site survival
	Resume & documentation readiness	1	1		Employability
	Real QC case discussions	1		1	Industry thinking
	TOTAL	72	55	17	