Advanced Laboratory Information Management Systems (LIMS) Training Course

Professional Development Training Course Outline

Category	Biotechnology and Pharmaceutical Development	**Duration**	10 Days
Base Fee	$4,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The modern laboratory operates at the nexus of high-velocity data generation, stringent regulatory compliance, and a demand for accelerated results. A basic understanding of Laboratory Information Management Systems is no longer sufficient; organizations now require experts capable of advanced system configuration, data integrity enforcement, and seamless enterprise integration. This immersive course moves beyond user-level functions to empower participants as LIMS System Administrators and Solution Architects. You will master the complex art of workflow automation, developing custom business logic via scripting, deploying robust instrument integration, and leveraging Big Data analytics for strategic decision-making. The core focus is on transforming a LIMS from a mere data repository into a strategic laboratory informatics platform that drives digital transformation and demonstrable operational efficiency.

Advanced Laboratory Information Management Systems (LIMS) Training Course emphasizes real-world problem-solving using hands-on case studies from pharmaceutical QC, biobanking, and environmental testing sectors. We will delve into critical administrative topics like database schema management, advanced user access control, and high-availability server management, ensuring your LIMS deployment is scalable, secure, and fully validated. Successful completion equips you with the in-demand skills to lead LIMS implementation projects, ensuring data traceability, accelerating sample throughput, and guaranteeing complete adherence to global ALCOA+ data principles, positioning you as a central figure in your organization?ÇÖs Quality Assurance and Laboratory Operations strategy.

Programme Curriculum

Advanced Laboratory Information Management Systems (LIMS) Training Course

Introduction

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Course Duration

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Course Objectives

1. Strategically configure the LIMS backend for complex multi-site operations and enterprise-level master data management.
2. Design and implement advanced no-code/low-code workflows and business rules to maximize lab automation and eliminate manual data transcription.
3. Enforce 21 CFR Part 11 Electronic Signatures and maintain comprehensive, auditable GxP data integrity using advanced LIMS features.
4. Architect robust, bi-directional instrument integration using protocols like RESTful API and custom data parsers for seamless Scientific Data Management Systems connectivity.
5. Implement granular Role-Based Access Control and advanced security protocols to protect sensitive patient and IP data.
6. Develop and execute comprehensive LIMS validation protocols and navigate complex audit trails for external inspections.
7. Troubleshoot database queries, manage server health, and implement strategies for LIMS performance optimization and scalability.
8. Create dynamic management dashboards and complex analytical reports using SQL and LIMS reporting tools for real-time business intelligence.
9. Configure Out-of-Specification (OOS) and Out-of-Trend (OOT) workflows, and integrate Statistical Process Control (SPC) directly within the LIMS.
10. Master advanced sample storage management, hierarchical freezer tracking, and full Chain of Custody for critical biospecimens.
11. Understand and implement data exchange interfaces between LIMS and other enterprise systems like ERP (SAP) and Electronic Lab Notebooks (ELN).

12. Evaluate and manage deployment options including Cloud-based LIMS security, and deploy mobile LIMS applications for field data collection.
13. Utilize LIMS data to facilitate predictive analytics and contribute to the lab?ÇÖs overall digital twin strategy.

Target Audience

1. LIMS System Administrators.
2. Laboratory Managers/Directors.
3. Quality Assurance (QA) & Compliance Officers.
4. IT/Informatics Specialists.
5. LIMS Project Managers.
6. Process/Automation Engineers.
7. Senior Lab Analysts/Scientists
8. Validation Engineers.

Course Modules

Module 1: LIMS Architectural Deep Dive & Advanced Master Data Management

- Understanding the LIMS database schema
- Strategies for designing scalable and high-availability LIMS architecture
- Advanced Master Data control.
- LIMS system lifecycle.
- Developing a successful Data Migration strategy for historical laboratory data.
- Case Study: Migrating a multi-site pharmaceutical QC operation from a legacy LIMS to a modern, centralized cloud platform.

Module 2: LIMS System Security and Role-Based Access Control (RBAC)

- Implementing granular RBAC based on user roles
- Configuring security settings for 21 CFR Part 11 compliance
- Setting up multi-factor authentication (MFA) and integration with corporate LDAP/Active Directory.
- Data masking and GDPR/HIPAA compliance for sensitive research or patient data.
- Managing privileges to restrict access to configuration tools, raw data, and report generation.
- Case Study: Designing a compliant security model for a Biobanking LIMS that manages both research and clinical trial data.

Module 3: Advanced Workflow and Business Rules Configuration

- No-code/Low-code tools for building complex, branching laboratory workflows.
- Developing conditional logic and state transitions for samples
- Using LIMS scripting languages to create custom business rules and calculations.
- Automating sample login, batch creation, and worklist generation based on external triggers.
- Integrating external approval gates and notifications into the standard workflow.
- Case Study: Automating a complex environmental water quality testing workflow with auto-calculation of final compliance scores.

Module 4: Instrument Integration Architecture and Parsers

- Understanding common LIMS connectivity protocols
- Developing and testing robust data parsers to extract results from raw instrument files.

- Configuring bi-directional integration
- Strategies for instrument master data management and calibration/maintenance tracking.
- Integrating LIMS with a central Scientific Data Management System
- Case Study: Implementing a fully automated integration between a High-Performance Liquid Chromatograph and the LIMS for auto-result capture and audit logging.

Module 5: Laboratory Automation and Robotics Integration

- LIMS interface requirements for connecting with automated liquid handlers and robotics.
- Configuring plate maps and managing high-density microtiter plate sample tracking.
- Designing workflows to support high-throughput screening (HTS) and automated batch processing.
- Managing exceptions and errors in an automated workflow
- Using LIMS data to schedule and optimize the robotic work queue.
- Case Study: Optimizing a large-scale genomics sequencing lab workflow to manage thousands of samples per batch using robotic integration.

Module 6: Advanced Sample and Storage Management

- Implementing hierarchical freezer management and graphical storage visualization tools.
- Configuration of stability studies.
- Mastering sample pooling, sub-sampling, and aliquoting with full traceability.
- Using barcode, RFID, and QR code technologies for efficient sample identity control.
- Managing reagents, standards, and inventory consumption tracking within test workflows.
- Case Study: Setting up a comprehensive Biobank to track over 1 million frozen biospecimens with environmental monitoring alerts.

Module 7: Quality Control (QC) and Statistical Process Control (SPC)

- Configuration of QC checks, control charts, and acceptance limits.
- Designing the workflow for Out-of-Specification (OOS) investigations and root cause analysis.
- Implementing Out-of-Trend (OOT) alert mechanisms and escalation procedures.
- Configuring LIMS to manage proficiency testing and inter-laboratory comparisons.
- Using LIMS tools to track instrument calibration, maintenance, and analytical method validity.
- Case Study: Building an OOS workflow in a manufacturing QC lab to flag raw material failures and trigger automated retesting.

Module 8: Custom Reporting and Business Intelligence Dashboards

- Developing complex Certificate of Analysis (CoA) and final reports using built-in report writers.
- Creating dynamic management dashboards for real-time Key Performance Indicators (KPIs) like TAT and throughput.
- Using SQL and the LIMS database schema for ad-hoc querying and data extraction.
- Integrating LIMS data with external BI tools via API or direct connectivity.
- Generating regulatory compliance reports and audit-friendly documentation packets.
- Case Study: Designing a real-time executive dashboard to monitor the daily performance and bottleneck areas of an industrial testing lab.

Module 9: LIMS Validation Planning and Execution

- Understanding the LIMS validation lifecycle and regulatory expectations.

- Developing and documenting Validation Master Plans, User Requirement Specifications (URS), and Functional Specification (FS).
- Authoring and executing Installation Qualification (IQ), Operational Qualification (OQ), and Performance Qualification (PQ) protocols.
- Managing change control and re-validation procedures for system updates and configurations.
- Strategies for maintaining a continuous state of validation/compliance post-implementation.
- Case Study: Developing the OQ and PQ scripts for a new LIMS module controlling stability studies in a GxP environment.

Module 10: Electronic Lab Notebook (ELN) and LIMS Integration

- Distinguishing LIMS vs. ELN functionality and identifying optimal integration points.
- Implementing a unified informatics experience for scientists using combined LIMS/ELN platforms.
- Configuring bi-directional data flow for experiment context and final results
- Managing sample creation and test ordering from an ELN directly into the LIMS.
- Strategies for ensuring data integrity and audit trail continuity across both systems.
- Case Study: Integrating an R&D LIMS with a dedicated ELN to ensure all research data is connected to a final archived sample.

Module 11: Enterprise Resource Planning (ERP) Integration

- Mapping LIMS data fields to ERP system requirements for business processes.
- Configuring interfaces to automate batch/lot release from the LIMS to the ERP system.
- Automating customer order entry and invoicing using LIMS and ERP data.
- Managing inventory and financial data synchronization between the two systems.
- Implementing robust error handling and monitoring for enterprise data exchange.
- Case Study: Establishing a validated interface between a Manufacturing LIMS and SAP to automate the final product lot release process.

Module 12: Cloud and Web-Based LIMS Deployment

- Understanding the differences, security implications, and trade-offs of Cloud vs. On-Premise LIMS.
- Best practices for data security, encryption, and backups in a SaaS LIMS environment.
- Configuring mobile LIMS applications for field data collection and sample tracking.
- Strategies for optimizing LIMS performance over a Wide Area Network.
- Disaster recovery planning and business continuity for a cloud-hosted LIMS.
- Case Study: Deploying a secure, web-based LIMS for an oil and gas environmental testing company with remote field sampling teams.

Module 13: Advanced Troubleshooting and Performance Tuning

- Techniques for analyzing database performance.
- Troubleshooting common LIMS-related network and server errors.
- Using system logs and audit trails to diagnose complex workflow or data corruption issues.
- Developing and managing automated job schedulers for routine maintenance and tasks.
- Implementing monitoring tools to track user activity, system load, and resource utilization.
- Case Study: Diagnosing and resolving a system-wide slowdown caused by poorly optimized custom SQL reports running during peak hours.

Module 14: LIMS Project Management and Vendor Selection

- Developing a comprehensive LIMS Request for Proposal and evaluation matrix.
- Managing user expectations and implementing a robust Organizational Change Management plan.
- Strategies for successful vendor management and negotiation of implementation contracts.
- Developing a realistic LIMS project timeline and budget for enterprise deployment.
- Post-Go-Live support, bug tracking, and continuous process improvement strategies.
- Case Study: Evaluating three different LIMS vendors based on industry-specific requirements for a new biotech startup.

Module 15: Emerging Trends in Laboratory Informatics

- The role of Artificial Intelligence (AI) and Machine Learning (ML) in LIMS data analysis and predictive quality control.
- Integration with Digital Pathology and advanced imaging systems.
- Exploring Blockchain for immutable data storage and supply chain traceability.
- The future of No-Code LIMS platforms and citizen developer empowerment.
- Using LIMS data to facilitate Real-World Data (RWD) projects and translational research.
- Case Study: Reviewing how a large diagnostics lab is piloting AI/ML tools within their LIMS to predict equipment failures and optimize maintenance schedules.

Training Methodology

The course utilizes a blended, highly **practical, and hands-on** methodology to ensure true competency:

- Interactive Lectures.
- Hands-on Configuration Labs.
- Real-World Case Studies & Simulations
- Peer Group Problem-Solving.
- Expert Q&A and Troubleshooting Clinics.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call +254769199797

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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