Data Quality Metrics and Improvement for Research Training Course

Professional Development Training Course Outline

Category	Research and Data Analysis	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In today’s data-driven world, the success of research projects across disciplines hinges on the accuracy, reliability, and completeness of data. Data Quality Metrics and Improvement for Research Training Course is designed to equip researchers, data analysts, and institutional data stewards with cutting-edge skills and tools to measure, assess, and enhance data quality. With the proliferation of big data, artificial intelligence, and machine learning in research environments, ensuring high-quality data governance, data integrity, and standardization is no longer optional—it is imperative. This course leverages real-world case studies, industry best practices, and hands-on tools to help participants apply data profiling, validation, and cleansing techniques effectively.

Whether you're managing large datasets in health, education, agriculture, or social sciences, poor data quality can significantly compromise the validity of research outcomes. This training addresses the core dimensions of data quality—accuracy, completeness, consistency, timeliness, validity, and uniqueness—while also diving deep into data quality frameworks, key performance indicators (KPIs), and continuous improvement methodologies. Participants will walk away with practical strategies for implementing sustainable data quality improvement plans, backed by metrics that align with organizational and research objectives.

Programme Curriculum

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Course Objectives

Participants will be able to:

1. Define key data quality metrics used in modern research environments.
2. Evaluate the impact of poor data quality on research validity.
3. Identify common data anomalies and errors using profiling tools.
4. Apply automated and manual data cleansing techniques.
5. Understand data completeness, consistency, accuracy, and timeliness.
6. Design and implement a data quality management plan (DQMP).
7. Use data validation frameworks to ensure reliability and trust.
8. Leverage AI and machine learning tools for data anomaly detection.
9. Create customized data quality dashboards using BI tools.
10. Incorporate data governance and metadata standards.
11. Align data quality efforts with institutional compliance standards.
12. Perform root cause analysis to address recurring data issues.
13. Evaluate and improve data quality KPIs across the data lifecycle.

Target Audiences

1. Research Scientists
2. Data Analysts
3. University Lecturers & Academic Researchers
4. Institutional Data Managers
5. Public Health Researchers
6. AI & ML Developers in Research
7. Government Policy Analysts
8. Graduate Students & PhD Candidates

Course Duration: 10 days

Course Modules

Module 1: Introduction to Data Quality in Research

- Overview of data quality importance
- Dimensions of data quality
- Data quality and research integrity
- Introduction to key metrics
- Risk of poor data
- *Case Study: Clinical trial data misclassification*

Module 2: Data Profiling and Exploration Tools

- Tools for data profiling
- Detecting outliers and duplicates
- Visual profiling techniques
- Profiling structured vs unstructured data
- Profiling in Python and R
- *Case Study: Education dataset profiling using OpenRefine*

Module 3: Data Validation Strategies

- Data validation types
- Rule-based and automated validation
- Tools for validation scripting
- Validating real-time data
- Quality rule libraries
- *Case Study: Real-time COVID-19 data validation in healthcare*

Module 4: Data Cleaning and Standardization Techniques

- Addressing missing and incorrect values
- Normalizing text data
- Deduplication methods
- ETL tools for cleaning
- Data quality firewalls
- *Case Study: Standardizing survey responses in public policy research*

Module 5: Metrics and Key Performance Indicators (KPIs)

- Defining measurable data quality goals
- Selecting the right KPIs
- KPI dashboards
- Benchmarking and baselining
- KPI alignment with research goals
- *Case Study: KPI implementation in academic database systems*

Module 6: Root Cause Analysis for Data Errors

- Identifying causes of recurring errors
- Fishbone and Pareto analysis
- Interviewing data stakeholders
- Documentation practices
- Preventive action planning
- *Case Study: Analyzing missing values in agricultural surveys*

Module 7: Advanced Techniques Using AI and ML

- ML algorithms for anomaly detection
- Natural language processing for unstructured data
- Reinforcement learning in data correction
- Predictive modeling based on quality metrics
- Integrating AI into pipelines
- *Case Study: AI-driven validation in financial research data*

Module 8: Data Governance and Metadata Standards

- Role of metadata

- Governance policies
- Data stewardship roles
- Compliance frameworks
- FAIR data principles
- *Case Study: Metadata governance in environmental research data*

Module 9: Data Quality in Big Data Environments

- Characteristics of big data and quality challenges
- Hadoop and Spark quality checks
- Distributed data cleaning methods
- Real-time vs batch quality analysis
- Toolkits: Apache Griffin, Talend
- *Case Study: Improving quality in a large-scale sensor dataset*

Module 10: Continuous Improvement and Auditing

- PDCA cycle for data quality
- Scheduling audits
- Quality checkpoints in workflows
- Team collaboration
- Feedback loops
- *Case Study: Ongoing quality improvement in demographic research*

Module 11: Data Quality in Survey Research

- Common survey design flaws
- Response validation
- Handling nonresponse bias
- Pretesting and pilot studies
- Technology for mobile survey validation
- *Case Study: Voter survey data correction post-election*

Module 12: Quality Assurance in Secondary Data Use

- Assessing third-party data
- Licensing and use rights
- Risk management strategies
- Historical dataset cleansing
- Integrating multiple datasets
- *Case Study: Reprocessing WHO datasets for local use*

Module 13: Creating Data Quality Dashboards

- Dashboard tools and software
- Custom metrics visualization
- Interactive filtering and drill-down
- Role-based access
- Embedding dashboards in workflows
- *Case Study: Dashboarding for climate change research outputs*

Module 14: Ethical and Legal Considerations

- Data privacy laws
- Institutional Review Board (IRB) compliance
- Ethical frameworks in data use

- Transparency and reproducibility
- Consent and anonymization
- *Case Study: Managing sensitive mental health data*

Module 15: Capstone Project and Final Evaluation

- Choose a dataset
- Conduct a data quality assessment
- Apply improvement techniques
- Present dashboard and report
- Peer and instructor feedback
- *Case Study: End-to-end quality improvement on real-world dataset*

Training Methodology

- Interactive lectures with hands-on sessions
- Tool demonstrations (OpenRefine, Python, Talend, Tableau)
- Group discussions and peer review
- Real-world case study analysis
- Capstone project with instructor evaluation
- Certificate of completion with performance badge

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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