Generalized Linear Models (GLM) and Generalized Additive Models(GAM) Training Course

Professional Development Training Course Outline

Category	Research and Data Analysis	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In the rapidly advancing world of data science and statistical modeling, understanding and applying Generalized Linear Models (GLM) and Generalized Additive Models (GAM) has become essential for professionals working with complex data. Generalized Linear Models (GLM) and Generalized Additive Models (GAM) Training Course provides a comprehensive introduction and deep-dive into the theory, application, and interpretation of GLMs and GAMs. Using real-world datasets, learners will build predictive models, assess performance, and generate actionable insights across diverse domains such as health analytics, marketing, environmental studies, and more.

Whether you're a data scientist, biostatistician, or business analyst, this course equips you with practical skills to model non-normal data, handle non-linear relationships, and extend linear regression models using flexible and powerful tools. With rich case studies, trending examples, and step-by-step guidance in R and Python, learners will gain both conceptual clarity and technical competence to build impactful models in today's data-driven environments.

Programme Curriculum

Generalized Linear Models (GLM) and Generalized Additive Models (GAM) Training Course

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Course Objectives

1. Understand the foundations of Generalized Linear Models and their components.
2. Define and apply link functions for different distribution families.
3. Use Poisson regression and logistic regression for count and binary data modeling.
4. Interpret model coefficients and assess goodness-of-fit metrics.
5. Handle overdispersion and zero-inflated models in real datasets.
6. Explore the flexibility of Generalized Additive Models (GAM) in modeling non-linearity.
7. Apply smooth terms and splines in GAMs using R (mgcv) and Python (pyGAM).
8. Conduct model diagnostics and validate assumptions with residual analysis.
9. Integrate cross-validation and penalized regression techniques.
10. Visualize complex model results using interactive data visualization tools.
11. Implement real-world projects using GLM and GAM in healthcare, marketing, and ecology.
12. Compare performance between linear, GLM, and GAM frameworks.
13. Build interpretable machine learning models with modern statistical software.

Target Audiences

1. Data Scientists
2. Biostatisticians
3. Epidemiologists
4. Marketing Analysts
5. Environmental Researchers
6. Actuarial Scientists
7. Public Health Professionals
8. Machine Learning Engineers

Course Duration: 5 days

Course Modules

Module 1: Introduction to GLM

- Understanding Linear Regression Limitations
- Introduction to GLM Components: Random, Systematic, and Link
- Distribution Families: Gaussian, Binomial, Poisson
- Role of Link Functions
- Software Demonstration in R and Python
- **Case Study:** Predicting admission rates using logistic regression

Module 2: Logistic Regression Modeling

- Binary Outcomes and Logit Link
- Odds Ratios and Model Coefficients
- Model Fit Statistics (AIC, BIC)
- ROC Curves and Confusion Matrix
- Hands-on Coding in R & Python
- **Case Study:** Customer churn prediction in telecom industry

Module 3: Poisson and Count Data Models

- Poisson Distribution and Canonical Link
- Overdispersion and Quasi-Poisson Models
- Zero-Inflated Poisson (ZIP) Modeling
- Application in Insurance and Epidemiology
- Model Interpretation Techniques
- **Case Study:** Modeling disease incidence rates

Module 4: Introduction to GAM

- Why Use GAMs? Flexibility and Non-linearity
- Spline Functions and Smooth Terms
- Estimating Smoothing Parameters
- Visualizing Smooth Functions
- R (mgcv) and Python (pyGAM) Use
- **Case Study:** Modeling pollutant impact on health

Module 5: GAM Model Building and Interpretation

- GAM Formula Syntax and Model Building
- Checking Smoothness & Selecting Knots
- GAM Model Fit and Residuals
- Interpretation of Non-linear Terms
- Combining Linear and Smooth Predictors
- **Case Study:** Website traffic modeling

Module 6: Advanced Topics in GLM/GAM

- Penalized Regression and Ridge/Lasso in GLMs
- Hierarchical GAMs and Mixed Models
- Bootstrapping and Resampling Techniques
- Comparing GLM/GAM vs ML Models
- Ensemble Approaches using GAMs
- **Case Study:** Loan default prediction using penalized GAM

Module 7: Model Diagnostics and Validation

- Residual Analysis and Leverage
- Cross-Validation and Model Tuning
- Dealing with Collinearity and Outliers
- Calibration Curves and Lift Charts
- Automated Reporting Tools
- **Case Study:** Healthcare outcome modeling

Module 8: Capstone Project and Presentation

- Select Your Domain (Health, Marketing, Environment)
- Model Selection and Data Cleaning
- Implement GLM and GAM Frameworks
- Visualize and Interpret Results
- Peer Review and Instructor Feedback
- **Case Study:** Full project from raw data to business decision

Training Methodology

- Interactive lectures and expert-led demonstrations
- Hands-on coding with R and Python in every module

- Group discussions on real-world problems
- Weekly quizzes and knowledge checkpoints
- Capstone project with peer review and certification

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	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com