Training Course on Creating Custom Workflows with QGIS Processing Framework

Professional Development Training Course Outline

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

Course Introduction

The power of Geographic Information Systems (GIS) lies not only in visualizing spatial data but also in transforming and analyzing it to derive meaningful insights. QGIS, as a leading open-source GIS software, offers unparalleled capabilities for spatial data manipulation. The QGIS Processing Framework, a robust and intuitive environment, empowers users to automate complex geospatial tasks, build custom geoprocessing models, and create highly efficient workflows. This training course delves into leveraging this framework to streamline repetitive operations, enhance analytical capabilities, and ultimately boost productivity in diverse geospatial applications.

Training Course on Creating Custom Workflows with QGIS Processing Framework focuses on practical, hands-on learning, guiding participants through the intricacies of building, managing, and deploying custom workflows. By mastering the QGIS Processing Framework, professionals can unlock new levels of efficiency, reduce manual errors, and scale their spatial analyses, transforming raw data into actionable intelligence. Embrace the future of geospatial automation and elevate your GIS expertise with this essential training.

Programme Curriculum

Training Course on Creating Custom Workflows with QGIS Processing Framework

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10 days

Course Objectives

1. Gain comprehensive proficiency in utilizing the QGIS Processing Toolbox for diverse spatial analysis tasks.
2. Understand the core principles and benefits of automating repetitive geospatial workflows.
3. Develop advanced skills in constructing complex geoprocessing models using the intuitive Graphical Modeler.
4. Implement efficient batch processing techniques for running algorithms on multiple datasets simultaneously.
5. Learn foundational PyQGIS scripting to extend Processing Framework functionalities and create bespoke algorithms.
6. Design flexible models with user-definable parameters for adaptable and reusable workflows.
7. Chain multiple algorithms effectively to build sophisticated, multi-step analytical pipelines.
8. Optimize data handling within workflows for improved performance and data integrity.
9. Develop strategies for identifying and resolving errors in complex geoprocessing models.
10. Implement clear and concise documentation for custom workflows to ensure reusability and knowledge transfer.
11. Learn methods for sharing custom models and ensuring seamless deployment across different QGIS environments.
12. Explore techniques for integrating external geospatial tools and libraries within the QGIS Processing Framework.
13. Apply learned skills to solve practical, industry-specific geospatial challenges through customized workflows.

Organizational Benefits

- Automate tedious tasks, significantly reducing manual processing time and freeing up resources for higher-value activities.
- Standardize spatial analysis processes, minimizing human error and ensuring consistent results across projects.
- Leverage the open-source nature of QGIS to reduce reliance on expensive commercial GIS software licenses and proprietary tools.
- Facilitate faster and more robust spatial analysis, leading to data-driven insights and better strategic decisions.
- Easily apply complex analyses to large datasets, enabling organizations to handle growing data volumes and diverse projects.
- Documented custom workflows serve as institutional knowledge, ensuring continuity and easier onboarding for new team members.

- Equip staff with advanced skills in geospatial automation, fostering innovation and problem-solving capabilities.
- Accelerate project timelines by automating critical geoprocessing steps, leading to quicker turnaround times.

Target Audience

- GIS Analysts & Specialists.
- Environmental Scientists & Researchers.
- Urban Planners & Developers.
- Data Scientists & Analysts.
- Consultants & Project Managers.
- Students & Academics.
- Government & NGO Personnel.
- Anyone interested in Geospatial Automation.

Course Outline

Module 1: Introduction to QGIS and the Processing Framework

- Overview of QGIS interface and core functionalities.
- Introduction to the QGIS Processing Toolbox and its algorithms.
- Understanding the concept of geoprocessing and its importance.
- Setting up the Processing options and providers.
- **Case Study:** Cleaning up a basic street network dataset using common geoprocessing tools.

Module 2: Running Basic Processing Algorithms

- Exploring common vector and raster analysis algorithms.
- Executing single algorithms with various input parameters.
- Understanding algorithm outputs and result management.
- Accessing and interpreting the Processing Log.
- **Case Study:** Calculating the buffer zone around points of interest (e.g., schools) to identify potential service areas.

Module 3: Introduction to the Graphical Modeler

- Understanding the purpose and interface of the Graphical Modeler.
- Adding input layers, algorithms, and outputs to a model.
- Connecting algorithms to form a simple processing chain.
- Saving and loading custom models.
- **Case Study:** Building a model to reproject a dataset and then clip it to a specific administrative boundary.

Module 4: Advanced Graphical Modeler Techniques

- Using conditional branching and iterative processes within models.
- Implementing user-defined parameters for flexible model execution.
- Working with expressions and variables in the Modeler.
- Embedding sub-models for modular workflow design.
- **Case Study:** Creating a model to calculate population density within user-defined areas, allowing the user to specify the population field and area boundary.

Module 5: Batch Processing with the Processing Framework

- Understanding the concept and benefits of batch processing.
- Configuring batch processing for multiple input layers.
- Automating repetitive tasks across numerous datasets.
- Handling diverse input types in batch mode.
- **Case Study:** Processing elevation data for 10 different watersheds, calculating slope and aspect for each in a single batch operation.

Module 6: Introduction to PyQGIS for Customization

- Fundamentals of Python scripting in QGIS.
- Accessing QGIS functionalities through the PyQGIS API.
- Running simple PyQGIS scripts in the Python Console.
- Understanding QgsVectorLayer, QgsRasterLayer, and other core classes.
- **Case Study:** Writing a simple PyQGIS script to count features in multiple layers and report the results.

Module 7: Creating Custom Processing Scripts with PyQGIS

- Developing custom algorithms using Python scripts for the Processing Framework.
- Defining input parameters and output types for custom scripts.
- Integrating custom scripts into the Processing Toolbox.
- Debugging PyQGIS scripts for effective problem-solving.
- **Case Study:** Developing a custom script to calculate a normalized difference vegetation index (NDVI) from Sentinel-2 imagery, allowing the user to specify red and NIR bands.

Module 8: Advanced Data Management in Workflows

- Strategies for handling large datasets efficiently within workflows.
- Optimizing data storage formats (e.g., GeoPackage) for performance.
- Managing temporary layers and outputs in models and scripts.
- Working with spatial databases (PostGIS, SpatiaLite) in workflows.
- **Case Study:** Designing a workflow to import and clean large-scale LiDAR point cloud data, then convert it to a Digital Elevation Model (DEM) and save it to a PostGIS database.

Module 9: Error Handling and Robust Workflow Design

- Identifying common errors in geoprocessing workflows.
- Implementing error trapping and graceful exits in PyQGIS scripts.
- Strategies for validating input data and parameters.
- Utilizing the Processing History and Log for debugging.
- **Case Study:** Building a robust workflow for street network analysis that includes checks for geometry validity and displays informative error messages if issues are detected.

Module 10: Integrating External GIS Tools

- Connecting QGIS Processing with external software (e.g., GRASS GIS, SAGA GIS).
- Utilizing algorithms from various providers within the Processing Toolbox.
- Understanding the strengths and weaknesses of different external tools.
- Configuring external applications within QGIS.
- **Case Study:** Combining QGIS's vector processing capabilities with GRASS GIS's raster analysis tools to model hydrological flow paths.

Module 11: Publishing and Sharing Custom Workflows

- Packaging custom models and scripts for sharing.
- Creating user-friendly interfaces for complex workflows.
- Best practices for documenting models and scripts for wider use.
- Distributing custom tools within an organization or community.
- **Case Study:** Preparing a "Site Suitability Analysis" model for sharing with non-GIS specialists, including clear instructions and intuitive input options.

Module 12: Advanced Spatial Analysis Workflows

- Developing workflows for advanced statistical spatial analysis.
- Implementing network analysis and routing models.
- Creating time-series analysis workflows.
- Automating multi-criteria decision analysis.
- **Case Study:** Building a workflow to identify optimal locations for a new medical clinic based on population density, existing facilities, and transportation accessibility.

Module 13: Cartographic Production Workflows

- Automating map layout creation using the Print Layout Atlas.
- Generating multiple maps from a single template.
- Integrating dynamic text and map elements.
- Exporting maps in various formats (PDF, image, web maps).
- **Case Study:** Creating an automated map series for a national park, with each map showing a different recreation area and its facilities.

Module 14: Version Control and Collaborative Workflow Development

- Introduction to version control systems (e.g., Git) for QGIS projects.
- Collaborative development of custom workflows and scripts.
- Managing changes and conflicts in shared models.
- Best practices for team-based geospatial development.
- **Case Study:** Collaborating with a team to develop and refine a complex flood risk assessment model using shared repositories.

Module 15: Future Trends and Advanced Topics

- Exploring new features and developments in the QGIS Processing Framework.
- Introduction to advanced PyQGIS topics (e.g., plugins, widgets).
- Leveraging cloud computing for scalable geospatial processing.
- Discussions on emerging trends in geospatial automation and AI integration.
- **Case Study:** Discussing the potential for integrating machine learning algorithms within QGIS workflows for predictive spatial analysis (e.g., wildfire prediction).

Training Methodology

Our training employs a **blended learning approach** designed for maximum engagement and practical skill acquisition. This includes:

- **Hands-on Exercises:** Extensive practical sessions where participants apply concepts directly in QGIS, building models and writing scripts.
- **Instructor-Led Demonstrations:** Clear and concise demonstrations of key functionalities and best practices.

- **Real-World Case Studies:** Application of learned techniques to practical scenarios, fostering problem-solving skills.
- **Interactive Discussions:** Encouraging questions, sharing experiences, and collaborative learning.
- **Problem-Based Learning:** Challenging participants with real-world problems to solve using the QGIS Processing Framework.
- **Individual & Group Projects:** Opportunities to work on tailored projects, reinforced by instructor feedback.
- **Comprehensive Training Materials:** Detailed course notes, sample datasets, and code snippets for future reference.
- **Post-Training Support:** Access to instructors for a limited period to assist with post-course implementation challenges.

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

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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