

6 Months Full Stack GIS Developer Course.

Training Module GVI®

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Course Version 4.0. Version released date April 2024

Printed in Republic of India.

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1. Introduction to Geographic Information Systems (GIS) - Concepts and Applications

- Understanding the basics of GIS: Definition, components and types of data.
- Real-world applications of GIS in various industries such as urban planning, environmental management and emergency response.
- Introduction to GIS software and tools - overview of popular platforms like ArcGIS, QGIS and Google Earth.

2. Fundamentals of Web Development - HTML and CSS Basics

- HTML (Hypertext Markup Language) fundamentals: Understanding the structure of HTML documents, tags, elements and attributes.
- Creating a basic HTML document: Headings, paragraphs, lists, links and images.
- Introduction to CSS (Cascading Style Sheets): Styling HTML elements, understanding selectors, properties and values.
- Implementing CSS to style HTML elements: Changing text properties, colors, backgrounds and borders.

3. Intermediate HTML and CSS - Layouts, Forms, Responsive Design

- Building layout structures with HTML: Introduction to divs, spans and semantic HTML5 elements.
- CSS Box Model: Understanding padding, borders, margins and how they affect element layout.
- Creating forms in HTML: Input types, labels, text areas and form validation.
- Introduction to responsive web design principles: Media queries, flexible grids and fluid layouts for different screen sizes.

4. Introduction to JavaScript - Syntax, Variables, Control Structures

- Basics of JavaScript: Introduction to scripting languages, role of JavaScript in web development.
- JavaScript syntax: Variables, data types (strings, numbers, booleans) and basic operators.
- Control structures in JavaScript: Conditional statements (if-else, switch),

loops (for, while) and functions.

- Hands-on exercises to practice JavaScript fundamentals: Writing simple scripts to perform calculations, manipulate HTML elements and handle user interactions.

5. Introduction to JavaScript Frameworks - React Basics

- Understanding the role of JavaScript frameworks in frontend development.
- Introduction to React.js: Virtual DOM, components, JSX syntax.
- Setting up a React development environment: Node.js, npm, create-react-app.
- Building a simple React application: Creating components, handling events and managing state.

6. Integrating Maps with Leaflet - Displaying Geospatial Data

- Introduction to Leaflet.js: Lightweight JavaScript library for interactive maps.
- Setting up Leaflet in a React application: Installing Leaflet dependencies, integrating with React components.
- Displaying geospatial data on a map: Adding markers, polygons and lines.
- Implementing map controls and interactions: Zooming, panning and layer controls.

7. Advanced React - State Management, Hooks

- State management in React: Understanding component state vs. props, setState method.
- Introduction to React Hooks: useState, useEffect, useContext, etc.
- Managing complex state with useContext and useReducer hooks.
- Implementing reusable custom hooks for managing stateful logic.

8. Advanced Leaflet - Adding Layers, Popups and Interactivity

- Working with Tile layers: Adding custom tile layers, including raster and vector tiles.
- Implementing popups on map markers: Displaying additional information on click events.
- Adding interactivity to the map: Handling user interactions such as mouse hover, click and drag.

- Incorporating external libraries with Leaflet: Enhancing map functionality with plugins like Leaflet.markercluster for clustering markers.

9. Introduction to Backend Development - Node.js Basics

- Understanding the role of backend development in web applications.
- Introduction to Node.js: Basics of event-driven, non-blocking I/O model.
- Setting up a Node.js development environment: Installing Node.js, npm and popular packages.
- Building basic server-side applications with Node.js: Creating HTTP servers, handling requests and responses.

10. Building RESTful APIs for Geospatial Data

- Understanding RESTful API architecture: Principles of Representational State Transfer (REST).
- Designing RESTful APIs for GIS applications: Defining endpoints, HTTP methods and request/response formats.
- Implementing CRUD operations for geospatial data: Creating, reading, updating and deleting spatial features.
- Securing RESTful APIs: Authentication, authorization and best practices for API security.

11. Database Management Systems - PostgreSQL/PostGIS Basics

- Introduction to relational database management systems (RDBMS): Overview of PostgreSQL.
- Setting up PostgreSQL database: Installation, configuration and basic administration.
- Introduction to PostGIS extension: Enabling spatial capabilities in PostgreSQL.
- Performing basic spatial queries with PostGIS: Retrieving geometries, calculating distances and intersections.

12. Spatial Queries and Analysis with PostGIS

- Advanced spatial queries with PostGIS: Performing buffer, overlay and spatial join operations.
- Implementing geospatial analysis with PostGIS functions: Calculating centroids, areas and lengths.
- Leveraging spatial indexes for performance optimization: Understanding R-tree indexing.
- Integrating PostGIS with backend APIs: Serving spatial data through

RESTful endpoints.

13. Advanced Geospatial Data Visualization - Heatmaps, Choropleth Maps

- Understanding advanced geospatial data visualization techniques.
- Introduction to Heatmaps: Visualizing density and distribution of point data.
- Implementing Heatmaps with libraries like Leaflet.heat or Mapbox GL Heatmap.
- Introduction to Choropleth Maps: Visualizing spatial patterns using thematic shading.
- Creating Choropleth Maps with GeoJSON data and color scales.

14. Introduction to Mapbox - Styling Maps, Adding Custom Data

- Overview of Mapbox: Introduction to Mapbox Studio and Mapbox GL JS.
- Customizing map styles with Mapbox Studio: Editing basemap styles, adding custom layers.
- Adding custom data to Mapbox maps: Uploading GeoJSON, CSV or shapefiles.
- Implementing interactive features with Mapbox GL JS: Popups, tooltips and interactivity.

15. Implementing Geocoding and Reverse Geocoding

- Introduction to Geocoding: Converting addresses or place names into geographic coordinates.
- Exploring geocoding services and APIs: Google Maps Geocoding API, Mapbox Geocoding API, etc.
- Implementing Geocoding functionality in web applications: Autocomplete search bars, location suggestions.
- Introduction to Reverse Geocoding: Converting coordinates into addresses or place names.

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