echo

Front-End Development Diploma

Fundamentals to Advanced Data Visualization

A comprehensive educational curriculum designed to build responsive, interactive, and visually stunning web applications using state-of-the-art web technologies and methodologies.

LEVEL	CURRICULUM VERSION	INSTITUTION
Beginner to Intermediate	**2026.1**	**Echo Academy**

Program Overview & Learning Pathway

Welcome to the **Front-End Development Diploma (Fundamentals)** at Echo Academy. This program is thoroughly structured to take students from pure coding novices to confident modern front-end developers. We bridge the gap between static design layouts and fully functional, interactive, and data-rich user interfaces.

The Learning Roadmap

Phase 1

Web Architecture & Responsive Layouts

Deep dive into semantic HTML5, CSS essentials, Flexbox, Grid, and the BEM methodology. Build professional-grade layouts that scale flawlessly on all screen sizes.

Phase 2

Responsive Frameworks & Modern Styling

Harness Bootstrap, component-based CSS transitions, transformations, and complex responsive principles for fast and dynamic UI building.

Phase 3

JavaScript Fundamentals & DOM Manipulation

Develop critical programming logic. Manipulate the DOM dynamically, handle custom user interactions/events, and store local persistent data on the client.

Phase 4

Asynchronous JS, APIs, & ES6+

Work with JSON, fetch real-world external APIs, and master the event loop, Promises, and modern async/await patterns.

Phase 5

Data Visualization & Interactive Dashboards

Learn D3.js, bind data to SVG shapes, map scales and axes, and create complex dynamic data visualizations.

> **The "Learn-by-Doing" Philosophy**
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> Every technical milestone is anchored by a high-fidelity real-world project. Theoretical lectures are immediately followed by practical laboratory builds to simulate actual industry workflows.

Phase-by-Phase Course Syllabus

Phase 1: Web Structure & Layout Systems

Students establish a rock-solid coding foundation, focusing on semantic markup and robust styling architectures.

HTML5 & Accessibility • Semantic HTML structure • Accessible forms & user input validation • Multimedia tags (audio, video, picture) • WCAG accessibility guidelines	**CSS Foundations** • Typography, colors & cascade rules • Box Model (margin, border, padding) • Positioning systems & z-indexing • Sleek, reusable CSS custom properties
Flexbox Layouts • Flex directions & alignment • Responsive wrapping • Ordering & proportional scaling	**CSS Grid** • Grid templates & areas • Implicit vs. Explicit grids • Gap structures & auto-fit/fill

Phase 2: Modern Styling & Component Methodologies

Transitioning from basic styles to advanced scalable components and responsive structural frameworks.

Responsive Design & CSS Variables • Media Queries & Breakpoints • Mobile-First styling strategies • BEM (Block, Element, Modifier) naming	**Transitions, Animations & Bootstrap** • Transitions & 2D/3D transformations • Keyframe animations • Bootstrap 5 components & Grid

Phase 3: JavaScript Core & Interactive UIs

Introducing functional logic. Programmatically interacting with and modifying web document nodes.

JS Language Basics	Interactive DOM & Web Storage
• Data types, Operators & Variables • Control flow, loops, and conditions • Functions, Scope & Closures • Arrays & Object manipulation	• DOM element selection & traversal • Event Listeners and Bubbling • Dynamic styling & classes • Local Storage persistence

Phase 4: Modern JS & Asynchronous Data Interfaces

Connecting the application to external endpoints to query, process, and map live data asynchronously.

Modern JavaScript (ES6+)	Asynchronous APIs
• Arrow functions, Destructuring & Rest • Array methods: Map, Filter, Reduce • Modules (import/export syntax)	• Promises & Promise chaining • Async / Await syntactic sugar • Fetch API (GET, POST, Headers)

Phase 5: Advanced Data Visualization with D3.js

Transform raw API resources into beautifully structured SVG charts, adding a specialized dimension to the diploma.

D3.js Core Concept	Interactive Data Art
• SVG canvas design & styling • Data binding principles (`.data()`)	• Dynamic scales, ranges & coordinate axes • Smooth layout transitions & animations

Capstone Portfolio Projects

Students construct an impressive professional web development portfolio containing 7 key projects:

1. Professional Portfolio Website

HTML5 / CSS3 / BEM

A highly personalized responsive landing page detailing projects, code repositories, and built with optimized accessibility standards.

2. Bootstrap Business Website

Bootstrap 5 / Grid System

A fast-loading business interface integrating grids, tabs, accordion FAQs, modals, and carousel slides.

3. Dynamic Product Management Dashboard

JavaScript / Arrays / Forms

An interactive admin panel allowing staff to add, search, filter, edit, and delete catalogue items dynamically.

4. Real-time Weather App

REST API / Async Await / JSON

An app querying active geographical coordinates to display local temperature, pressure, and weather trends on custom modern cards.

5. Interactive D3.js Data Visualization Dashboard

D3.js / SVG / Event Listeners

Interactive dashboard pulling API telemetry, charting charts (Bar, Scatter, or Area) with customized hover states.

Learning Outcomes

- Build modern, responsive, and cross-device compatible websites from scratch.
- Develop complex interactive UI features using programmatic modern JavaScript.
- Incorporate REST APIs, process live JSON resources, and manage responsive client states.
- Apply high-standard CSS architectures like BEM, Grid, Flexbox, and modern CSS Variables.
- Synthesize raw datasets into meaningful, animated charts using the powerhouse D3.js framework.