The Curriculum

Web Developer

1. HTML, CSS & SCSS

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Estimated time: 6 weeks

The first weeks of training will introduce the languages HTML and CSS, which are needed as a foundation for all future web development.

Beginning with the most common HTML elements like headers, headlines, paragraphs and links, the participants will learn how to build the basic structure of a website and create well structured content.

As plain HTML doesn’t really look fancy in the browser, the basic HTML elements will get styled using the CSS stylesheet language. Formatted tables, colored texts, different fonts, multiple columns and many other layout features are used.

Facing the challenges of modern web development, where different devices, like desktop computers, tablets and mobile phones, access the web, the participants need a powerful tool to improve their layouts.
This is the time for frontend frameworks to join the game. The very famous Bootstrap framework, that is created and maintained by Twitter, is used to build responsive websites that scale to the screen size and enhance the user experience on all devices.

At the end of this unit the participants will build their very own portfolio website, using the framework components and semantic HTML5 elements.

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>
> You know what HTML really stands for? How to meet ladies.
>
> Mark Edwards

2. JavaScript

Estimated time: 6 weeks

HTML and CSS have been the building blocks for static websites, that contain structured content and can be read by browsers and users.

To extend the basic HTML structure with dynamic features, like forms that do math calculations, scrolling effects or animations, JavaScript is coming to the rescue.

Beginning with the basic concepts of the language, talking about Variables, Loops and more, the participants learn the basic principles of programming.

As soon as the basic toolset is known and lots of exercises have been done, the manipulation of DOM elements is the next big step. It allows the participants to enhance their portfolio websites with modern and dynamic features for navigations, carousels and zoom effects.

To reduce the amount of code needed, the jQuery library is introduced. It simplifies DOM manipulations, animations and more. There are a lot of ready build plugins, that enhance common UI elements, like sortable lists, drop-down buttons or datepickers.

Fetch API, which really isn’t a cleansing material, is used to load data dynamically from ressources like external APIs.

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> JavaScript is as related to Java as Carnival is to Car.
>
> Kyle Simpson

3. Git & Version Control

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Estimated time: 1 week

Version control systems are everywhere today, as they offer an easy but powerful way to store versions of your code and work on the same code base with a team of developers.

Beginning with the core principles of versioning, the participants learn how to install Git, create and manage repositories, update code and how to switch back to an older version.

After learning the basics, they continue with the management of branches and how the most common branching models work, that are used in teams today.

As Github is the most famous version control platform at the time of this writing, the next step is to learn how to use the Github service with additional features like pull requests, code reviews, markdown files and automatic code reverts.

Github is implemented in many tools for software development and the de-facto standard for distributed version control. In the last years it has also become part of the recruiting process at larger tech companies, who expect their applicants to have published code as open source or to be a contributor of open source projects.

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It is easy to shoot your foot off with git, but also easy to revert to a previous foot and merge it with your current leg.

Jack William Bell

4. React

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Estimated time: 3 weeks

Modern and feature-rich web applications need a lot of code to be written, if built with plain JavaScript and jQuery only.
Today’s JavaScript frameworks, like React, simplify many common tasks and are a powerful tool to build single page applications (SPA) that are faster and more flexible than the old page-reload.

Beginning with the “React way” of thinking and the basic concepts like components and templates, the participants learn to build more powerful websites and applications.

After mastering the basics the routing of URLs will be the next thing to explore and enables on-page navigation. Learning how to persist data in the user’s browser using local storage, to be able to use the same state of an application for multiple components, the basic application will be extended to a stateful one.

The participants will learn how to write a basic online shop with live editable products and how they can deploy the shop on Github pages and Google Firebase. They will have a real-world example of their work and their learning progress.

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> The Facebook codebase has over 20,000 React components, and that’s not even counting the mobile features.
>
> Dan Abramov

5. NodeJS & Express

Estimated time: 3 weeks

Using the React framework for the frontend of an application, the NodeJS & Express stack is offering powerful tools for the backend.

Beginning with the concept of client-server communication followed by the core concepts of NodeJS, the participants learn the difference between single- and multi-threaded applications.

The handling of events and some simple file operations allow the participants to build an easy chat application. The application will get refactored to use Websockets in a next step, so that it’s faster updating chat messages with better performance and uses modern technologies.

As modern web applications need a lot of features, the use of a framework - and in our case Express - is the next logical step.
Express is introduced with its core concepts of routing, templating and the MVC (Model View Controller) pattern.

The goal of this unit is to build a RESTful AJAX API, that can be used to connect frontend frameworks like React or any other frontend like mobile devices.

At the end of this unit the participants will have built a chat application and a directory of restaurants, that can be searched by keywords and filtered by tags and categories.

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> A few years ago, it would have been unthinkable to implement server software in JavaScript.
>
> Guillermo Rauch

6. SQLite & MongoDB

Estimated time: 4 weeks

Most modern web applications need databases to store structured data, like contacts, recipes and more.

Beginning with the concepts of relational databases, the participants learn to create basic database layouts.

SQLite with Sequelize as an easy ORM (Object-relational mapping) is used to store, update and delete data in a relational database. The participants learn how to read and update data based on conditions and how relational associations work.

MongoDB is used as a second database, to learn about the NoSQL concept with schemas, models and documents. The participants learn how to create, update and delete entries and how to filter entries based on conditions, like they did for SQLite.

An important part of this unit is to talk about common pitfalls of database design and how to avoid them.

Both databases are used to build small demo applications that the participants can showcase on their portfolio websites.

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> Complex applications combine different types of problems, so picking the right language for each job may be more productive than trying to fit all aspects into a single language.
>
> Pramod J. Sadalage

7. Testing & Deployment

Estimated time: 2 weeks

Writing good code that still works after lots of modifications and years later can be a difficult task, especially in large applications with thousands of lines of code.

To enhance code quality and to prevent developers breaking one part of an application by modifying a different one, modern applications are combined with tests that run after every code change that is made, to check if the full application still works.

In times of automatic deployments to production servers, that are done quite often today, this is an important add-on for large code bases. Every time a test fails, the code will not be published to live servers so that good tests can prevent the application from breaking. The developers are informed that something needs to be fixed and the new code can only be deployed after the fix.

But ... testing does not help to prevent everything as the tests can only be as good as the developers and they need continuous updates with code changes, too. A test that passes could also be an old test that didn’t get updated - which leads to a false positive.

The participants learn how to deploy websites and applications with modern zero-downtime deployments, how to write tests and how to setup the deployment process in a way that it prevents developers from pushing breaking changes to the live system.

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I didn't fail the test, I just found 100 ways to do it wrong.

Benjamin Franklin

8. Project Management

Estimated time: 2 weeks

The success of larger software projects is dependent on good project management and planning.

Beginning with the most common project management pitfalls (like the old waterfall model), the participants learn about modern software development methodologies and tools.

Scrum and Kanban are lightweight agile project management frameworks with broad applicability for managing and controlling iterative and incremental projects of all types.

The participants will learn about roles and structures used by both frameworks and how they are used in real-world projects of well-known companies.

The project management knowledge will be used for the final project, that all participants create and that you can read about on the next page.

The participants will plan and develop a project and use one of the agile methodologies to manage it. They will create Gantt diagrams, burn-down-charts, split the project into small pieces, define milestones, etc.

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> If you always do what you've always done, you'll always get what you always got.
>
> James P. Lewis

9. Final Project

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Estimated time: 7 weeks

After learning all the basics of web development, with different technologies, frameworks and project management methodologies, the participants will work on a real project for 2 months.

They will create a larger application with a real-world use case (may be for an NGO) and the participants have to do everything from project planning to project management, software development and testing of the software.

The participants have to work in small teams that focus on different parts of the application at the same time. They need to react to change requests, communicate with the clients and ensure code quality.

When the final project is finished, the participants get a fews days of presentation training and will prepare for an event at which they showcase their work to the other classes and modern tech companies.

The showcase event is a chance for external companies to convince participants to do an internship with them.

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> Don't watch the clock; do what it does. Keep going.
>
> Sam Levenson

10. Summary

Note: The duration of each unit is estimated and may vary, based on The participants’ knowledge levels and pace of learning.

6 weeks	HTML, CSS & SCSS
6 weeks	JavaScript & jQuery
1 week	Git & Version Control
3 weeks	React
3 weeks	NodeJS & Express
4 weeks	SQLite & MongoDB
2 weeks	Testing & Deployment
2 weeks	Project Management
7 weeks	Final Project