Columbia Engineering Coding Boot Camp

FULL STACK FLEX PROGRAM

CURRICULUM OVERVIEW
FULL TIME

The digital revolution has transformed virtually every area of human activity—and you can be part of it as a web development professional. Columbia Engineering Coding Boot Camp is a 12-week Full Stack Flex course that gives you the knowledge and skills to build dynamic end-to-end web applications and become a full stack web developer.

The program is rigorous and fast-paced and covers both the theory and application of web development. As you gain proficiency, you'll use what you learn on real projects under the guidance of area employers. Plus, you'll have an impressive Professional Portfolio and the confidence to succeed as a web development professional.
Are you creative, curious and looking to reinvent yourself professionally? If so—or if any of the following describes your situation—enrolling in our coding boot camp could be a smart career move:

You’re considering a career change but not sure how to take the first step.

You’re happy in your current field, but want to move to another company—or stay put but shift from a non-technical into a technical position.

You want to engage more deeply with your current job—or boost your earnings and broaden your experience with freelance work.

You have an entrepreneurial idea and need the skills to go “all in” and launch your business.

You’re looking to learn valuable skills in a short amount of time.
You will graduate with full stack web development skills*, including:

**Browser Based Technologies**
- HTML5
- CSS
- Responsive Design
- CSS Frameworks (Bootstrap, Materialize)
- JavaScript
- jQuery
- Handlebars
- Cookies, Local Storage
- React.js

**Databases**
- MySQL
- MongoDB

**Node.js (Server Side Development)**
- Express
- Security and Session Storage
- User Authentication
- MERN Stack
  (MongoDB, Express.js, React.js, Node.js)

**Deployment**
- Heroku
- Git
- Github Pages

**Quality Assurance**
- Writing Tests

**Computer Science**
- Data Structures
- Algorithms

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*The material covered in this course is subject to change due to market demand.*
BUILDING ON THE BASICS

In web development as in sports, you can’t succeed without a solid grounding in the fundamentals. That’s why our curriculum begins with a deep dive into the basics of coding and data structure. That said, we recognize that the surest way to impress prospective employers and get job offers is to demonstrate your skills on real-world projects. You’ll have ample opportunity for hands-on involvement in outside projects, which will make up your Professional Portfolio.
Our graduates will be qualified for many different roles, including:

- Full Stack Developer
- Application Development Manager
- Frontend Web Developer
- Computer Programmer
- Backend Web Developer
- Web Designer
- Product Manager
- Email Developer
- Technical Project Manager
- Web Producer
- QA and Test Engineer
- Technical Business Analyst
- Software Developer
By the time you graduate, you can expect to be able to:

- Apply “social coding” accepted and best practices (including source control, issue tracking, functional feedback, etc.)
- Work independently or in a group on complex projects throughout the entire development lifecycle
- Build a frontend website either from scratch or by utilizing a frontend framework (such as Bootstrap)
- Understand the basics of troubleshooting and enhancing legacy code
- Deploy static and dynamic websites to the cloud
- Communicate the basics of serving a webpage and how the browser renders code
- Implement complex logical conditions to meet an objective
- Create RESTful API’s utilizing JSON as a data format
- Write SQL commands to perform Create, Read, Update and Delete commands
- Consume RESTful APIs properly utilizing REST verbs
- Create a full stack Single Page Application with AJAX communication
- Create robust web applications and services in Java
- Develop your vision for a website -- and then build it!
- Create session-based applications utilizing user authentication schemes that are well-known and widely used
- Expertly navigate the file system and terminal basics
PORTFOLIO PROJECTS

Your portfolio signals to employers that you are ready for primetime! You’ll build a substantial portfolio of projects that demonstrate your abilities across a wide variety of technologies.

DISCUSSION

Instructor-led discussions cover the background, history and use of a new technology or concept.

LAB WORK

You’ll put classroom teaching into practice individually and with a team to work on timed in-class exercises and projects.

COURSE STRUCTURE

Over the course of 12 weeks, you’ll attend informative lectures and take part in a variety of individual and team exercises, working independently and in groups, in the classroom and at home. Homework assignments provide an opportunity to apply what you’ve learned and build on it. The goal is to give you a comprehensive learning experience so we model our program after real world corporate environments. This gives learners true insight into a “day in the life” of a full stack developer.
WE’RE HERE TO HELP

As you move up the learning curve, you’re likely to have questions around some of the concepts covered in class. We’re here to help—through in-person and virtual office hours, as well as a dedicated #slack channel where you can get assistance from instructors, support staff and your fellow learners. All work is done via Github, so you can create issues directly on your own projects for instructors to assist you in a truly asynchronous fashion. In addition to learning to code, you will have access to career services that will help you prepare for technical roles after graduation such as:

**Career Content and Practice Sessions**

**Database of Customizable Tools and Templates**
- Multiple Technical Resume Templates
- Github Best Practices
- Guidelines To Building A Portfolio
- Creating an Elevator Pitch
- Developing a Bio

**Online Career Events With Industry Professionals**

**Soft Skills Training**

**One-on-One Career Coaching**
BUILDING YOUR PORTFOLIO

It’s a fact: companies care about what you can do, not what you say you can do. For that reason, our curriculum teaches you how to put what you’ve learned to work on actual portfolio projects, ranging from simple HTML and CSS code samples to sophisticated Single Page Applications with backend databases.
Your Full Stack Portfolio Page

Once you complete our program, your portfolio page will help you showcase your work with links and descriptions to the projects you’ve created, code samples, and personal information that employers want to see. Think of your portfolio page as your new home on the web.

### Skills Needed
- HTML5
- CSS
- JavaScript
- Bootstrap
- Heroku
- Git

### Objectives
- Create a home on the web to showcase your skills
- Build a complete site from concept
- Commit code to a shared repository

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Javascript Based Game

Building a game has many components, and seemingly simple ones such as keeping track of state or playing over the Internet, can be deceptively complex. This game involves components like interface design, state management, edge cases, determining win paths...and, of course, fun! Participants also learn intangible skills, such as how to best tackle a difficult problem.

### Skills Needed
- HTML5/CSS
- JavaScript/jQuery
- Event and State Management
- Bootstrap

### Objectives
- Build a fully functional game
- Track winning and losing stats
- Apply logic skills to a real project
- Understand the basics of iteration

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Self-Selected Front End Project

This is a group project that forces you to think outside your comfort zone. You and your group will decide what to build and then build it—a frontend application that interacts with real-world services like Google Maps, Twitter and IMDb API.

### Skills Needed
- HTML5/CSS
- JavaScript/jQuery
- API Consumption
- Bootstrap
- Git
- Heroku

### Objectives
- Work in a group to build a project together
- Interact with third-party services
- Think in terms of mobile responsive design
- Read/write from/to a remote database
Full Stack Project

In your first full stack web application you’ll create an intuitive frontend/robust backend and scalable database.

<table>
<thead>
<tr>
<th>Skills Needed</th>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>HTML5/CSS</td>
<td>Track issue progress with industry standard tools</td>
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<tr>
<td>Interactivity (AJAX)</td>
<td>Communicate with team members asynchronously</td>
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<tr>
<td>JavaScript/jQuery</td>
<td>Design a MySQL Database Schema</td>
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<tr>
<td>MySQL</td>
<td>Create a full stack application</td>
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<td>State Management</td>
<td>Write project documentation</td>
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<td></td>
<td>Understand database relationships</td>
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<tr>
<td>Node.js</td>
<td>HTML/CSS</td>
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<tr>
<td>Sessions</td>
<td>Bootstrap</td>
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<tr>
<td>Express.js</td>
<td>MongoDB</td>
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ReactJS Site

Facebook’s ReactJS library allows developers to combine the layout and logic of HTML and JavaScript into a cleaner and more cohesive approach to coding. It’s abounding complexities and strict demands make the learning curve steep, but grasping the React paradigm will help you keep your code maintainable while at the same time impressing potential employers.

<table>
<thead>
<tr>
<th>Skills Needed</th>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>ReactJS</td>
<td>Building an app powered by the MERN stack: MongoDB, Express, ReactJS and Node</td>
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<tr>
<td>React Router</td>
<td>Creating data-rich React components that you can mix and match throughout your app’s pages.</td>
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<tr>
<td>JSX</td>
<td>Incorporating pre-programmed Node packages from the NPM community</td>
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<tr>
<td>Babel</td>
<td>HTML/CSS</td>
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<td></td>
<td>Bootstrap</td>
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<td>MongoDB</td>
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<td>Git</td>
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Web Applications with Java

Learning Java will provide you with a firm foundation in one of the most popular and employable technologies both locally, and within the larger world of web development.

Skills Needed
- HTML/CSS
- Java
- Maven
- Git

Objectives
- Create a Java based project
- Use Java to build database-backed, dynamic applications
- Build RESTful APIs and Services
- Build a foundation in classical Object-Oriented Programming and Design in Java
- Develop familiarity with core J2EE APIs

Final Project

You will work independently or break out into groups to collaborate on a final project. You will come up with your own project and actually build it. The skills you learn during this project will truly help you to prepare for your first interviews and jobs!

Skills Needed
- Everything you’ve learned!

Objectives
- Define project scope
- Quality Assurance testing
- Responsive Design
- Deployment
- Code Organization
<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>What You’ll Learn</th>
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| **Module 1:** Mastering The Browser (Weeks 1-2) | When most people think of the "Internet," their mind immediately conjures up their web browser. We dive into detail about how the browser works and what exactly the source code comprising a web page does. | » Creating a web page from scratch  
» Mastering terminal commands  
» JavaScript and its most beloved child, jQuery |
| **Module 2:** API and JSON (Weeks 3-4) | The advent of the API has rapidly propelled the pace of innovation in technology. Being able to communicate with other systems enables you to do even more with yours. | » Consuming RESTful APIs  
» Parsing JSON to extract meaningful data  
» Using AJAX to update data on a website without having to hit that "refresh" button in the browser |
| **Module 3:** Server Side (Weeks 5-7) | Have you ever wondered how websites originate? They typically come from computer programs called "servers," but did you know that servers do so much more? Interacting with databases and even other servers! Learn how to write back-end JavaScript code with Node.js. | » Writing Node.js server code to serve static web pages  
» Querying large amounts of data and answering questions from MySQL and MongoDB Databases  
» Incorporating the Express framework to combine these server-side technologies with client-facing web pages—the full stack begins here |
| **Module 4:** Learn to MERN (Weeks 8-9) | After studying the front and back ends, you’ll be ready to tackle different approaches for building full stack applications. In this module, we’ll teach you how to create complex web applications with Facebook’s React technologies. | » Grasping the intricacies of building data-bound user interfaces with the ReactJS library  
» Applying this knowledge with your experience with Node, MongoDB and Express to create REMN applications |
| **Module 5:** Java (Week 10) | Java is a mature programming language trusted across the software industry to build safe, scalable, and robust applications. | » Create scalable web apps, APIs, and Services  
» Take a deep dive into core Java and Object-Oriented Programming  
» Build a foundation in common build tools for Java projects, such as Maven |
| **Module 6:** Computer Science Fundamentals (Week 11) | Computer science fundamentals are essential to web development so our curriculum includes a deep dive into the basics of coding and algorithms. | » Applying computer science to JavaScript  
» Studying which data structures to use for specific problems  
» Understanding which searching and sorting algorithms are most efficient for particular use cases |
| **Module 7:** Final Project (Week 12) | Throughout the course, you’ve developed an impressive portfolio of projects to show future employers. This final project is all yours. Use all of the technologies you’ve learned and make something distinctly your own. | » Dreaming up something fantastic and understanding the bounds of reasonable and achievable |