**Certified Mobile and Web Developer Syllabus**

The high unemployment rate of Pakistanis and other under-developed nations in general, especially the educated youth, has been a source of deep concern. The currently national and global economic crisis has aggravated this acute problem. We have an “Educated Youth” but they do not know what they can do, nor do the employers. Many are trying to leave Pakistan and other under-developed countries, to search for greener pastors. To summarize the main sources of our concerns are as follows:

1. Growing "Educated Youth” population that is unable to translate the acquired education into successful careers.
2. Chronic unemployment resulting in widespread discontent and disillusionment.
3. Current national and global economic crisis aggravating this already acute problem.

 We believe following are the main causes for this:

1. Local industry evaporating at an ever-increasing pace making the historical sources of employment more and more defunct.
2. The wrong or inadequate skill set of our educated youth that does not match with the current job requirements of the regional and global markets.
3. The low standards and quality of our educational institutions.

In addition to the above causes, the following are the aggravating factors, which are making the problem much worse:

1. The failure of our universities and educational institutions to foresee the changing market dynamics and adjust accordingly.
2. The general disconnect between efforts and reward in our society resulting in unwillingness of our youth to focus and work hard towards long term goals.

**Framework for the Plan:**

We believe that we need to devise a plan to alleviate this problem given our particular circumstances and psychology of our people. The framework for the solution will be a multiple-step process:

1. Identify sectors of the global economy where there is a shortage of trained workforce.
2. Find a way to impart quality training to a large number of participants at low cost.
3. Find a way to motivate our unemployed to participate in the training program and excel.
4. Provide job placement services to the trained individuals.
5. Find a way to identify participants with entrepreneurial abilities and facilitate them through incubation.
6. After completion of the course the students would be awarded “Certified Mobile and Web Developer” designation and will be encouraged to pass the “[Senior Web Developer Nanodegree](https://goo.gl/DSb72K)” awarded by Google and Udacity

**Our Focus Area:**

Given the current global economic environment there is only one industry where there is a shortage of trained workforce: Software Industry. While the human resource problem is industry-wide, the Internet applications development is a sector in particular where the shortage of trained professionals has reached acute levels. And a specialized area within that sector is cloud and mobile computing which is set to see explosive growth in the next few years, unparalleled to anything else seen in the recent information technology revolution. It is this area that has our focus, as we believe it has the potential to become a catalyst for economic recovery and change our national fortunes.

**The Target and the Syllabus:**

Web (Chrome, Safari, Firefox, and Edge) and Mobile (Android and iOS) platforms have emerged as the dominant platforms for which most of the enterprise and consumer applications are being built today. Combined these platforms have a reach of over two billion devices and growing. On the server side cloud platforms from Amazon, Microsoft, Google and Heroku have taken over traditional hosting services space.

JavaScript/TypeScript is emerging as the first truly universal programming language, which delivers on the promise of “Write once and run everywhere”, both on the client as well as the server side. JavaScript is already the de-facto standard for web programming in the browser. With Node.js it is also becoming the standard way to write cloud computing services which can run on all cloud platforms thus avoiding vendor lock in. Node.js' package ecosystem, npm, has become the largest ecosystem of open source libraries in the world. JavaScript has now started to move into the mobile space as well with Cordova/PhoneGap, and Ionic frameworks and technologies. The Internet of Things (IoT) is that next big thing, and Node.js will play a key role in ensuring that companies are ready and able to fully leverage it.

We plan to train 100,000 developers in Pakistan to use these technologies to build Web and Mobile Applications and supporting Cloud Services. The best thing is that all these technologies are open source and completely free therefore make it wide spread adoption very cost effective.

In our program, we will ask students to complete the seven projects as required by the [Senior Web Developer Nanodegree](https://goo.gl/DSb72K) awarded Udacity and Google (also partially covers Front-End Web Developer Nanodegree). The complete details of the project and topics covered in the program and teaching material to be used are as follows:

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**Courses & Projects:**

**Course Set A: Fundaments of Web Development**

**A-101. Distributed Version Control using Git**

Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency. Git is now the most widely used source code management tool, with majority of professional software developers reporting that they use Git as their primary source control system.

Textbook: [Git Essentials by Ferdinando Santacroce](http://www.amazon.com/Git-Essentials-Ferdinando-Santacroce/dp/1785287907/) (Chapters 1, 2, 3, and 5)

# Quizzes: 2

**A-102. HTML5 and CSS3 for Website and Application Development**

HTML5 and CSS3 have swept the web by storm in only few years. All the browsers now support these global Internet standards. We will teach the students to build and design websites and apps using these technologies.

Textbook: [HTML and CSS: Design and Build Websites by Jon Duckett](http://www.amazon.com/HTML-CSS-Design-Build-Websites/dp/1118008189/)

# HTML Quizzes: 1

# CSS Quizzes: 2

**A-103. Responsive Web Development**

One of the big challenges in web development is maintaining the site's compatibility across devices and their various display sizes, from desktop computers to tablets and mobile phones. This is where media queries come in handy. It makes building responsive websites easier and quicker. We will cover Responsive Web Design Fundamentals, and Responsive Images.

Learning Resources:

1. [Responsive Web Design Fundamentals](https://goo.gl/7jdAJ4)
2. [Responsive Images](https://goo.gl/mCqNyS)

# Quizzes: 1

**Project A Due: Build a Portfolio Site**

You will replicate a design mockup in HTML and CSS. You will develop a responsive website that will display images, descriptions and links to each of the portfolio projects you will complete throughout the course of the Front-End Web Developer Nanodegree.

Project required for: [Front-End Web Developer Nanodegree](https://goo.gl/28vXxz)

Project due after completing courses A-101, A-102, and A-103.

**Course Set B: Fundaments of Web Programming**

**B-201. JavaScript: The Universal Programming Language**

JavaScript is a high-level, dynamic, untyped, and interpreted programming language. It has been standardized in the ECMAScript language specification. Alongside HTML5 and CSS3, it is one of the three essential technologies of World Wide Web content production; the majority of websites employ it and all modern web browsers support it. With Node.js and Cordova it is also being used extensively in server side and mobile app development as well.

Textbook: [A Smarter Way to Learn JavaScript by Mark Myers](http://www.amazon.com/Smarter-Way-Learn-JavaScript-technology/dp/1497408180/)

# Quizzes: 6

**B-202. Introduction to jQuery**

In this course you'll learn how to traverse HTML documents, handle events, perform animations, etc. using jQuery.

Textbook: [A Smarter Way to Learn jQuery by Mark Myers](http://www.amazon.com/Smarter-Way-Learn-jQuery-Remember-ebook/dp/B01BN088MM/)

**Project B Due: Interactive Resume**

You will develop an interactive resume application that reads your resume content from a JSON file and dynamically displays that content within a provided template. You will use objects, functions, conditionals, and control structures to compose the content that will display on the resume.

Project required for: [Front-End Web Developer Nanodegree](https://goo.gl/28vXxz)

Project due after completing courses B-201 and B-202.

**Course Set C: Intermediate JavaScript and Fundaments of Web Tools**

**C-301. Intermediate JavaScript: Learn ES2015 and Babel**

ECMAScript 2015 which was initially called ES6 is the newest version of the JavaScript. ES2015 is a significant update to the language, and the first major update to the language since ES5 was standardized. Implementation of these features in major JavaScript engines is underway now. Babel is a JavaScript compiler and has support for the latest version of JavaScript through syntax transformers. These allow you to use new syntax, right now without waiting for browser support.

Textbook: [You Don't Know JS: ES6 & Beyond](http://www.amazon.com/You-Dont-Know-JS-Beyond/dp/1491904240/)

# Quizzes: 1

**C-302. Using Gulp**

Gulp is a streaming build system that helps a developer easily automates all the tasks they perform routinely and enhances their workflows.

Learning Resources:

[Developing a gulp Edge: The Streaming Build System](http://www.amazon.com/Developing-gulp-Edge-Streaming-System-ebook/dp/B00PVDODGI/)

[Gulp: the modern frontend factory by David Nowinsky](https://www.gitbook.com/book/davinov/gulp-book/details)

[Learn Gulp with TypeScript by Panacloud](https://github.com/panacloud/learn-typed-gulp)

# Quizzes: 1

**C-303. SASS for Reusable Design**

Develop efficient and streamlined CSS styles using Sass for any website or online application with minimal effort and maximum scope for reusability in future projects.

Textbook: [Sass Essentials by Alex Libby](http://www.amazon.com/Sass-Essentials-Alex-Libby/dp/1782174303/)

# Quizzes: 1

**Project C Due: Meet-Up Event Planner**

You will build a responsive web application that allows the user to establish a meet-up event. The goal is to create an app that is a joy to use on both desktop and mobile. The application must allow someone to name their event, search for a host location (using a location API like Foursquare), set the capacity of the event, the start and end times, and input a description of the event.

Project required for: [Senior Web Developer Nanodegree](https://www.udacity.com/course/senior-web-developer-nanodegree--nd802)

Project due after completing courses C-301, C-302, and C-303.

**Course Set D: Marching Towards Web Apps**

**D-401. Client-Side Data Storage including IndexedDB**

One of the most useful features of today’s modern browsers is the ability to store data right on the user’s computer or mobile device. Even as more people move toward the cloud, client-side storage can still save web developers a lot of time and money, if you do it right. This hands-on guide demonstrates several storage APIs in action. You’ll learn how and when to use them, their plusses and minuses, and steps for implementing one or more of them in your application. Ideal for experienced web developers familiar with JavaScript, this course also introduces several open source libraries that make storage APIs easier to work with.

Textbook: [Client-Side Data Storage: Keeping It Local by Raymond Camden](http://www.amazon.com/Client-Side-Data-Storage-Keeping-Local/dp/1491935111/)

# Quizzes: 1

**D-402. Using Service Worker**

Rich offline experiences, periodic background syncs, push notifications— functionality that would normally require a native application—are coming to the web. Service workers provide the technical foundation that all these features will rely on.

Learning Resources:

1. [Introduction to Service Worker](http://www.html5rocks.com/en/tutorials/service-worker/introduction/)
2. [Making A Service Worker: A Case Study](https://www.smashingmagazine.com/2016/02/making-a-service-worker/)

# Quizzes: 1

**Project D Due: Public Transportation App**

You will build an application that allows users to select a departure and arrival train station, and see a list of trains, times, and durations. A default train schedule will be provided that should be used when the application is offline. If a network connection exists, the application will query an endpoint that provides “real-time” status updates on trains and delay information.

Project required for: [Senior Web Developer Nanodegree](https://www.udacity.com/course/senior-web-developer-nanodegree--nd802)

Project due after completing courses D-401 and D-402.

**Course Set E: Web Apps for Everyone**

**E-501. Introduction to Web Accessibility**

This introduction should help you understand how people with disabilities use the web, the frustrations they feel when they cannot access the web, and what you can do to make your sites more accessible.

Learning Resource: [Introduction to Web Accessibility](http://webaim.org/intro/)

**Project E: Restaurant Reviewer**

You will develop a restaurant review application with a focus on accessibility. You will remotely access JSON files containing restaurant information (including name, a photograph, address, cuisine type and operating hours) as well as JSON files containing review information for each restaurant (name of reviewer, date of review, 5-star rating and comments). The reviews application must include an application header, and a menu providing multiple ways to filter the restaurants (by cuisine, by location, etc). When viewing a specific restaurant, current reviews must be displayed along with a form for the user to submit their own review.

Project required for: [Senior Web Developer Nanodegree](https://www.udacity.com/course/senior-web-developer-nanodegree--nd802)

Project due after completing course E-501.

**Course Set F: Professional Web Apps**

**F-601. TypeScript: A Typed and Scalable Approach to JavaScript**

TypeScript lets you write JavaScript the way you really want to. TypeScript is a typed superset of JavaScript that compiles to plain JavaScript. Any browser. Any host. Any OS. It is developed by Microsoft and is Open Source.

Learning Resource: [Learn TypeScript by Panacloud](https://github.com/panacloud/learn-typescript)

# Quizzes: 2

**F-602. Angular 2 using TypeScript**

Angular 2 is a development platform for building mobile and desktop web applications. Millions of developers are using it to develop web and mobile apps. It is also open source and developed by Google.

Textbooks:

[Angular 2 Development with TypeScript by Yakov Fain and Anton Moiseev](https://www.manning.com/books/angular-2-development-with-typescript)

[ng-book 2 by Ari Lerner, Felipe Coury, Nate Murray and Carlos Taborda](https://www.ng-book.com/2/)

Learning Resources: [Learn Angular 2 by Panacloud](https://github.com/panacloud/learn-angular2)

# Quizzes: 3

**F-603. Reactive Programming with RxJS using TypeScript**

Reactive programming is revolutionary. It makes asynchronous programming cleaner, intuitive, and robust. We will discover how to use the RxJS library to write programs in a simpler way, unifying asynchronous mechanisms such as callbacks and promises into a single, powerful construct. Learn to think about your programs as streams of data that you can transform by expressing what should happen, instead of having to painstakingly program how it should happen.

Textbook: [Reactive Programming with RxJS by Sergi Mansilla](http://www.amazon.com/Reactive-Programming-RxJS-Asynchronous-JavaScript/dp/1680501291)

Learning Resource: [Learn RxJS with TypeScript by Panacloud](https://github.com/panacloud/learn-typed-rxjs)

**Project F Due: Corporate Dashboard**

You must develop a corporate dashboard application using a front-end MVC framework of your choosing. The dashboard application must contain a header (with the currently selected dashboard’s name); a menu, allowing the user to navigate between dashboards; and the primary dashboard display area. You should find, or create, your own data files in CSV and JSON formats to provide data to the dashboards. The required dashboards are:

1. A geospatial view, identifying the number of employees at various company locations.

2. A “key metrics” view, containing components displaying: the number of open issues, a line chart reflecting number of paying customers over a period of time, and a bar chart reflecting number of reported issues over a period of time.

3. A “data view” of all issues, with an appearance similar to a spreadsheet, that is sortable and filterable.

Project required for: [Senior Web Developer Nanodegree](https://www.udacity.com/course/senior-web-developer-nanodegree--nd802)

Project due after completing course F-601, F-602 and F-603.

**Course Set G: Professional Mobile Apps**

**G-701. Android and iOS Apps with Ionic 2**

Ionic 2 lets you build great mobile apps for the Google and Apple app stores using HTML 5, CSS 3, and JavaScript/TypeScript. Ionic 2 is built on top of Angular 2.

Learning Resource: [Ionic 2 Framework](http://ionicframework.com/docs/v2/)

**G-702. Hybrid Mobile Apps using Cordova**

Developing a mobile app requires extensive knowledge of native programming techniques for multiple platforms. Apache Cordova lets you use your existing skills in web development (HTML, CSS, and JavaScript) to build powerful mobile apps. Your apps also get the power of integration with native device features like the camera and file system.

Textbook: [Apache Cordova in Action by Raymond K. Camden](http://www.amazon.com/Apache-Cordova-Action-Raymond-Camden/dp/1633430065/)

**Project G Due: Hybrid Mobile App Project**

In this capstone project, students will build their own application using signature native application features such as device sensor access, offline-first, and more.

Project required for: [Senior Web Developer Nanodegree](https://www.udacity.com/course/senior-web-developer-nanodegree--nd802)

Project due after completing course F-601 and F-602.

**Course Set H: Building Scalable Servers using NoSQL and Realtime Databases**

**H-801. Building Servers with Node.js, Express with MongoDB**

Express.js is a Node.js web application server framework, designed for building single-page, multi-page, and hybrid web applications. It is the de facto standard server framework for Node.js. We will focus on developing cloud services using TypeScript.

Textbooks:

1. [Express in Action by Evan M. Hahn](https://www.manning.com/books/express-in-action)
2. [Mongoose for Application Development by Simon Holmes](http://www.amazon.com/Mongoose-Application-Development-Simon-Holmes-ebook/dp/B00ESX15LS/)

Learning Resource: [Learn Express with TypeScript by Panacloud](https://github.com/panacloud/learn-typed-express)

# Quizzes: 3

**H-802. Realtime Databases with Firebase**

Store & sync data with Firebase NoSQL cloud database. Data is stored as JSON, synced to all connected clients in realtime, and available even when the app goes offline.

Learning Resources:

<https://www.firebase.com/>

# Quizzes: 1

**Project H Due: Full Stack Mobile and Web Project**

In this capstone project, students will build their own end-to-end application with mobile and web client apps using REST API’s and realtime databases.

Project due after completing program.

**Course Set I: Getting Ready for the Job Tests and Interviews**

**I-901. Data Structures and Algorithms with TypeScript**

We will offer solutions to complex data structures and algorithms. We will discuss multiple solutions for each problem each coded in TypeScript. The knowledge gained will also come in handy in job interviews for computer scientists.

Textbook: [Data Structures and Algorithms Made Easy by Narasimha Karumanchi](http://www.amazon.com/Data-Structures-Algorithms-Made-Easy/dp/1468108867/)

**Advanced Optional Courses**

**1001. PostCSS for Web and Mobile Design**

PostCSS is a tool for transforming CSS with JS plugins. These plugins can support variables and mixins, transpile future CSS syntax, inline images, and more. PostCSS takes CSS and turns it into a form of data that JavaScript can manipulate. JavaScript-based plugins for PostCSS then perform said code manipulations. PostCSS itself doesn’t change your CSS, it just paves the way for plugins to perform whatever transformations they’ve been designed to make.

Textbook: [Mastering PostCSS for Web Design by Alex Libb](http://www.amazon.com/Mastering-PostCSS-Design-Alex-Libby-ebook/dp/B019H21R3K/)

Learning Resource: [PostCSS Deep Dive](http://webdesign.tutsplus.com/series/postcss-deep-dive--cms-889)

# Quizzes: 1

**1002. Docker - Build, Ship, and Run Any App, Anywhere**

We want to learn how to Build, Ship and Run our Typed Node.js apps using Docker

Textbooks: [Using Docker: Developing and Deploying Software with Containers by Adrian Mouat](http://www.amazon.com/Using-Docker-Developing-Deploying-Containers/dp/1491915765/)

[The Linux Command Line](http://linuxcommand.org/tlcl.php)

Learning Resource: https://docs.docker.com/windows/

**1003. Data visualization and interactive graphics using D3.js and Snap.svg**

SVG is an excellent way to create interactive, resolution-independent vector graphics that will look great on any size screen. D3.js used for creating interactive graphics and data-driven SVG applications. Snap.svg is a JavaScript SVG library for the modern web.

Textbook: [D3.js in Action by Elijah Meeks](https://www.manning.com/books/d3-js-in-action)

Learning Resource: [Snap.svg](http://snapsvg.io/)

**1004. UX Design for Mobile Developers**

Covers the techniques that great designers use to plan and prototype amazing apps before any code is written.

Learning Resource: [UX Design for Mobile Developers](https://www.udacity.com/course/ux-design-for-mobile-developers--ud849)

**1005. Software Design Patterns with TypeScript**

Design patterns are solutions to software design problems you find again and again in real-world application development. Patterns are about reusable designs and interactions of objects.

Textbook: [Design Patterns: Elements of Reusable Object-Oriented Software](http://www.amazon.com/Design-Patterns-Elements-Reusable-Object-Oriented-ebook/dp/B000SEIBB8/)

By Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides

**1006. Programming Internet of Things (IoT)**

We will show you how to build web applications that connect devices to the Internet of Things, using JavaScript/TypeScript and the Node.js platform. We will learn how to control or monitor hardware from web browsers, mobile devices and servers. Devices within the IoT, such as sensors, beacons and wearables, generate large floods of requests. Node.js is well-suited for managing these requests via streams that can be processed and monitored very efficiently.

Textbooks:

[Node.js for Embedded Systems by Patrick Mulder](http://www.amazon.com/Node-js-Embedded-Systems-Patrick-Mulder/dp/1491928999/)

**1007. Using Braintree and Stripe Payment Services API’s**

We will learn how to use Braintree and Stripe Payment Services API to get paid from around the world.

Learning Resources:

[Stripe Docs](https://stripe.com/docs)

[Braintree Docs](https://www.braintreepayments.com/)

Zia Khan, MBA, MSE, MAC, MA, CPA and CMA

Eight Microsoft Most Valuable Professional (MVP) Awards 2007 to 2014

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