

CPSC S1xx: Introduction to Full-Stack Web Development

Pework & Module A

Programming Fundamentals Ruby Basics and Object Oriented - Programming Syllabus

Unit	Learning Objectives	Reference Topics	Competency Based Assignments	Hours
Pre-Work				
1	<ul style="list-style-type: none"> Understand the value and uses of version control with Git Complete the full Git project flow Work with the computer through the command line and BASH 	<ul style="list-style-type: none"> Git <ul style="list-style-type: none"> commit push pull remotes add fork merge BASH <ul style="list-style-type: none"> intro ls cd pipes 	<ul style="list-style-type: none"> Quiz: Git Basics Git Todo Git Flow Git Merge Conflicts Command Line Mystery 	15
2	<ul style="list-style-type: none"> Create basic web sites using HTML Publish sites to different web hosts Understand the distinction between styling and content 	<ul style="list-style-type: none"> Basic HTML <ul style="list-style-type: none"> Lists Tables Images Links Validations Site Publishing <ul style="list-style-type: none"> Publishing to FTP Publishing to Github Pages HTML5 <ul style="list-style-type: none"> Forms Media 	<ul style="list-style-type: none"> HTML Album Cover HTML Blog HTML Issue Bot 9000 HTML Map Contact Forms Code Along HTML5 Video Codealong HTML5 Semantic Elements Codealong 	15
		<ul style="list-style-type: none"> Video Semantic Elements 		
3	<ul style="list-style-type: none"> Understand how to use CSS to style HTML elements Lay block objects out using the box model Create interfaces for mobile and web 	<ul style="list-style-type: none"> CSS Selectors <ul style="list-style-type: none"> Class Id Element type Page Layout 	<ul style="list-style-type: none"> CSS Kitten Wheelbarrow CSS Graffiti Override CSS Issue Bot 9000 	5

	<ul style="list-style-type: none"> • Use the Bootstrap framework to increase speed of development 	<ul style="list-style-type: none"> • Box model • Overflow • Fluid Height • Float • Centering 	<ul style="list-style-type: none"> • Creating Columns Codealong • CSS Layout Quiz • ZHW Shoes Layout • Box Styles Codealong • Adding Responsive Features Codealong • Bootstrap Carousel Codealong 	
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4	<ul style="list-style-type: none"> • Create basic decision trees • Receive input from the Command Line • Manipulate strings • Work with Basic Looping 	<ul style="list-style-type: none"> • Conditionals <ul style="list-style-type: none"> • if • switch/c ase • Looping <ul style="list-style-type: none"> • while • for • do...whil e • Command Line Input <ul style="list-style-type: none"> • gets • Manipulating strings <ul style="list-style-type: none"> • reverse • upcase • interpola tion • gsub 	<ul style="list-style-type: none"> • More Vowels • Badges and Schedules • Deli Counter • Phone Number Formatter • Cartoon Collections • Jukebox CLI 	20
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5	<ul style="list-style-type: none"> • Why and when to use arrays • Work effectively with adding and removing from arrays 	<ul style="list-style-type: none"> • Adding <ul style="list-style-type: none"> • Push <ul style="list-style-type: none"> ◦ << • Removing <ul style="list-style-type: none"> • pop 	<ul style="list-style-type: none"> • My Each • Oxford Comma • Apples and 	20
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	<ul style="list-style-type: none"> • Acting on arrays with iteration and introspection • Retrieve, add and delete arrays nested inside other arrays 	<ul style="list-style-type: none"> • shift • Introspection <ul style="list-style-type: none"> • flatten • uniq • include • indexed access • Iteration <ul style="list-style-type: none"> • each • map • select • detect • Nested Data <ul style="list-style-type: none"> • 2D arrays • multi-di mension arrays 	<ul style="list-style-type: none"> • Holidays • Song Sorter • Tweet Shortener • Key for min value • Spotify API Lab 	
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6	<ul style="list-style-type: none"> • Why and When to use Hashes • Adding, removing and introspecting hashes 	<ul style="list-style-type: none"> • Adding <ul style="list-style-type: none"> ◦ []= method 	<ul style="list-style-type: none"> • Hashketball • NYC Pigeon Organizer 	25
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	<ul style="list-style-type: none"> Manipulating and normalizing data into nested hashes 	<ul style="list-style-type: none"> Removing and introspection <ul style="list-style-type: none"> select map detect Nested Data 	<ul style="list-style-type: none"> Apples and Holidays 	
Module A				
7	<ul style="list-style-type: none"> Understand why Object Orientation was created Understand the benefits of Object Oriented Programming Differentiate between Instances and Classes Implement Methods and Properties in Classes 	<ul style="list-style-type: none"> History of OO OO Patterns <ul style="list-style-type: none"> Separation of Concerns Managing Internal State Classes vs. Instances Classes have behaviors <ul style="list-style-type: none"> Methods Classes have attributes 	<ul style="list-style-type: none"> Class and Instances Lab Instance Methods Lab Instance Variables Lab Object Attributes Lab OO Meowing Cat 	20
		<ul style="list-style-type: none"> Instance Variables attr_accessor setters getters 		
8	<ul style="list-style-type: none"> Understand the Object Lifecycle Create an initializer 	<ul style="list-style-type: none"> Creating an init method <ul style="list-style-type: none"> setting Instance Variables in init Other Defaults 	<ul style="list-style-type: none"> Object Initialize Lab OO Basics 	15
9	<ul style="list-style-type: none"> Work with the concept of self Understand Class level constructs 	<ul style="list-style-type: none"> Class Constants <ul style="list-style-type: none"> Creation Why do we use them? Self Class Variables <ul style="list-style-type: none"> Why use them? Using as a collection of all created instances Class Methods <ul style="list-style-type: none"> understanding the all method Creating class methods Private Methods <ul style="list-style-type: none"> OO Programming as interface based programming How to define 	<ul style="list-style-type: none"> OO Basics w/ Class Constants OO School Domain OO Counting Sentences Class Variables and Methods Lab Ruby Puppy Advanced Class Methods Lab 	20
		access levels		
10	<ul style="list-style-type: none"> Be able to model a domain with OO principles Work with larger projects and chunk them into smaller segments 	<ul style="list-style-type: none"> Domain Modeling <ul style="list-style-type: none"> Deciding on properties Deciding on methods 	<ul style="list-style-type: none"> OO Email Parser Anagram detector OO Cash Register 	10

		<ul style="list-style-type: none"> • What should be public vs. private 		
11	<ul style="list-style-type: none"> • Understand the power of relating objects • Use a belongs to relationship • Use a has many relationship • Collaborate between two objects • Use a has many through relationship 	<ul style="list-style-type: none"> • Why Relationships are important • Belongs To <ul style="list-style-type: none"> • Adding to all class variable • Domain modeling a belongs to • Has Many <ul style="list-style-type: none"> • Reciprocal relationships • Domain modeling a belongs to • Adding to class variables in both directions • Collaborating Objects <ul style="list-style-type: none"> • Relation 	<ul style="list-style-type: none"> • Belongs to Object Lab • Has Many Objects Lab • Collaborating Objects Lab • OO My Pets • OO Kickstarter • OO Banking • Has Many Objects Through Lab 	25
		<p>ships that aren't ownership</p> <ul style="list-style-type: none"> • When to separate behavior s/attributes into new classes • Has Many Through <ul style="list-style-type: none"> • Domain Modeling Has Many Through • Has Many Through just two different has many relationships 		
12	<ul style="list-style-type: none"> • Understand the value of mass assignment • Use simple meta programming 	<ul style="list-style-type: none"> • Mass Assignment <ul style="list-style-type: none"> • Problem with manual assignment • Passing in an options hash • Meta programming <ul style="list-style-type: none"> • Using the send method • Using send to implement mass assignment 	<ul style="list-style-type: none"> • Mass Assignment Lab • Custom Errors • OO Triangle 	20
13	<ul style="list-style-type: none"> • Grab data from websites using Scraping • Integrate third party code using gems • Gem version control with Bundler 	<ul style="list-style-type: none"> • Gems and Bundler <ul style="list-style-type: none"> • Where to find gems • Open Source Licensing • How to choose gems • Installing and requiring gems • Using a Gemfile • Scraping <ul style="list-style-type: none"> • Nokogiri 	<ul style="list-style-type: none"> • Scraping Flatiron • Scraping Kickstarter 	5

		<ul style="list-style-type: none"> Using CSS Selectors 		
14	<ul style="list-style-type: none"> Working in large ruby projects Understand how to break large problems down into smaller, workable chunk 	<ul style="list-style-type: none"> Domain Modeling Task Breakdown practice 	<ul style="list-style-type: none"> Playlister CLI Student Scraper Tic Tac Toe with AI CLI Data Gem Assessment 	5

Module B

Web Frameworks: Web Development with Rails Syllabus

Unit	Learning Objectives	Reference Topics	Competency Based Assignments	Hours
1	<ul style="list-style-type: none"> Understand the uses of SQL Understand the layout of basic databases Install and run basic commands with SQLite Use Aggregate functions 	<ul style="list-style-type: none"> SQL Introduction Installing SQLite SQL Basics <ul style="list-style-type: none"> SELECT INSERT UPDATE CREATE ALTER Using .sql files SQLite data types Aggregate Functions <ul style="list-style-type: none"> SUM COUNT MAX MIN 	<ul style="list-style-type: none"> Bear Organizer Aggregate Functions Lab 	5
2	<ul style="list-style-type: none"> Understand what a JOIN is Understand foreign keys in has many/belongs to relationships Understand Complex joins and Join tables 	<ul style="list-style-type: none"> Relational Databases <ul style="list-style-type: none"> History Relations as related to ruby object relations JOIN Statements <ul style="list-style-type: none"> foreign keys Left Outer Join Left Inner Join Sorting and Grouping Data <ul style="list-style-type: none"> ORDER BY GROUP BY Complex Joins <ul style="list-style-type: none"> Many-to-Man y 	<ul style="list-style-type: none"> SQL Crowdfunding Lab SQL Library Lab 	10
		<ul style="list-style-type: none"> relationships Join tables 		
	<ul style="list-style-type: none"> Understand how ruby can talk to SQLite Databases 	<ul style="list-style-type: none"> SQLite gem <ul style="list-style-type: none"> Execute create table results 	<ul style="list-style-type: none"> Pokemon Scraper 	10

4	<ul style="list-style-type: none"> Understand the value and power of ORMs build a simple ORM Work with the inheritance and meta-programming required for ORMs 	<ul style="list-style-type: none"> Mapping Objects to tables <ul style="list-style-type: none"> Working with string interpolating INSERT CREATE Table from attributes Mapping Tables to Objects <ul style="list-style-type: none"> Dynamically create attributes all method find methods Bi-Directional mapping <ul style="list-style-type: none"> UPDATE save checking for persistence Dynamic ORMs <ul style="list-style-type: none"> meta programming attributes Refactoring common behavior to super 	<ul style="list-style-type: none"> Mapping to Table Lab Mapping DB to Ruby Lab ORM update Lab ORM Bringing it all together Dynamic ORM Lab 	10
	<ul style="list-style-type: none"> Use ActiveRecord as an ORM Understand all the features ActiveRecord provides Use Rake tasks to perform database migrations 	<ul style="list-style-type: none"> ORM To Active Record <ul style="list-style-type: none"> Translate previous custom ORM methods into ActiveRecord method Use ActiveRecord ::Base 	<ul style="list-style-type: none"> Translating ORM to AR ActiveRecord Create, Read, Update, Delete Rake Lab Writing Migrations ActiveRecord Costume Store Activerecord 	15

		<ul style="list-style-type: none"> Rake <ul style="list-style-type: none"> Create custom rake tasks Explain Rakefile Migrations <ul style="list-style-type: none"> Explain value of migrations Write change migrations Run migrations without rake Run migrations with rake 	TV-show	
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6	<ul style="list-style-type: none"> Understand associations in ActiveRecord Map ActiveRecord association to previous associations in ruby 	<ul style="list-style-type: none"> ActiveRecord Macros <ul style="list-style-type: none"> has many belongs to has many :through migrations with relationships 	<ul style="list-style-type: none"> Activerecord- TVland 	5
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7	<ul style="list-style-type: none"> Understand the history and current status of HTTP Work with the HTTP Request cycle in ruby and Rack Understand Rack as HTTP Middleware 	<ul style="list-style-type: none"> Working with the Internet <ul style="list-style-type: none"> HTTP Verbs What is a protocol HTTP Request headers URLs HTTP Responses 	<ul style="list-style-type: none"> Rack Todo Rack Lab 	5
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		<ul style="list-style-type: none"> Params accessing params Rack <ul style="list-style-type: none"> Using the params hash Value of middleware 		
8	<ul style="list-style-type: none"> Implement the HTTP Request/Response Cycle with Sinatra Understand the value of MVC and how to 	<ul style="list-style-type: none"> Sinatra in app.rb Sinatra as a gem Simple GET requests in 	<ul style="list-style-type: none"> Sinatra Hello World Sinatra Basic Routes Lab Sinatra Basic 	10
	<p>implement it in Sinatra</p> <ul style="list-style-type: none"> Render front end with ERB templating 	<p>sinatra</p> <ul style="list-style-type: none"> Moduler Sinatra applications Shotgun Sinatra Routing <ul style="list-style-type: none"> Different HTTP Verbs in Sinatra MVC <ul style="list-style-type: none"> Values of MVC Separation of Concerns How MVC works in Sinatra Views <ul style="list-style-type: none"> Templating in line ruby 	<p>Views Lab</p> <ul style="list-style-type: none"> Sinatra Views Lab 	
9	<ul style="list-style-type: none"> Understand how to gather user input through forms Work with form data to create responses Create and parse nested forms to create multiple models in one submit 	<ul style="list-style-type: none"> Dynamic Routes <ul style="list-style-type: none"> Symbol routing syntax params hash Basic Forms <ul style="list-style-type: none"> Create HTML Forms Post those forms to your application Parse form data to create model objects MVC with forms <ul style="list-style-type: none"> full flow from form to controller, to model creation Nested Forms <ul style="list-style-type: none"> Using the name attribute of input elements discuss the 	<ul style="list-style-type: none"> Dynamic Routes Lab Basic Sinatra Forms Lab Sinatra MVC Lab Sinatra Nested Forms Super Sinatra Forms 	15
		<p>value of a nested form</p> <ul style="list-style-type: none"> use the nested params hash. 		
10	<ul style="list-style-type: none"> Be able to persist small amounts of data to the browser with sessions Understand the basic flow of logging in/out 	<ul style="list-style-type: none"> Browser data <ul style="list-style-type: none"> What are sessions What are cookies inspecting cookies and sessions in a browser Sessions in Sinatra <ul style="list-style-type: none"> Setting the sessions hash Authentication <ul style="list-style-type: none"> Explain registration 	<ul style="list-style-type: none"> Basic Sessions Lab Sinatra Logging in and logging out Sinatra Sessions 	5

		<ul style="list-style-type: none"> • Login creates a session • logout destroys the session 		
11	<ul style="list-style-type: none"> • How to integrate active record into sinatra • Using multiple controllers in sinatra 	<ul style="list-style-type: none"> • ActiveRecord and Sinatra <ul style="list-style-type: none"> • Migrations • rake and sinatra • REST <ul style="list-style-type: none"> • mapping routes to activerecord actions • choosing routes constructively • Multiple Controllers <ul style="list-style-type: none"> • mechanics of multiple controllers • How controller choose their view 	<ul style="list-style-type: none"> • RESTful routes lab • Sinatra Messages • Playlister Sinatra • NYC Sinatra 	15

		<ul style="list-style-type: none"> • ActiveRecord associations in Sinatra <ul style="list-style-type: none"> • join tables • mapping tables to controllers 		
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12	<ul style="list-style-type: none"> • Translate Sinatra concepts into Rails concepts • Work with Rails File System to serve files using MVC 	<ul style="list-style-type: none"> • Sinatra to Rails <ul style="list-style-type: none"> • Router • Controllers • Models • Views • Static Requests <ul style="list-style-type: none"> • ERB rendering • Rails generator file structure 	<ul style="list-style-type: none"> • Rails Hello World Lab 	5
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13	<ul style="list-style-type: none"> • Understand Routing and REST • Create routes that connect to the appropriate action 	<ul style="list-style-type: none"> • RESTful Routing <ul style="list-style-type: none"> • method definitions as http verbs • what are the different methods • Dynamic Routing <ul style="list-style-type: none"> • Similarities to Sinatra • How dynamic routing fits into REST 	<ul style="list-style-type: none"> • RESTful index action lab • Dynamic Request Lab 	15
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14	<ul style="list-style-type: none"> • Create dynamic views with ActionView • Collect user input using form_for and rails scaffold 	<ul style="list-style-type: none"> • Rails URL Helpers <ul style="list-style-type: none"> • difference between path and route • Using this with link_to • Create Action <ul style="list-style-type: none"> • manual form tags • POST action • Edit/Update Action <ul style="list-style-type: none"> • difference between form and 	<ul style="list-style-type: none"> • Rails URL Helper Lab • Rails Form Tag Lab • Rails Create Action Lab • Rails Index/Show/New/Create Lab • Rails form_for Lab • Formal Affair Rails • Rails form_for 	20
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		<ul style="list-style-type: none"> • Form_for 	<ul style="list-style-type: none"> • Rails Blog Scaffold 	
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		<ul style="list-style-type: none"> • using automated view helpers • passing in instance variables to helpers • assumed routes • Generators <ul style="list-style-type: none"> • when to use scaffold • how to generate scaffold • understanding all the scaffolding creates 		
15	<ul style="list-style-type: none"> • Understand the power of validations • Create custom validations • Work with built in validations • Display validation errors to users 	<ul style="list-style-type: none"> • Validation callbacks <ul style="list-style-type: none"> • presence • uniqueness • numeric • regex matching • Custom validations • Errors <ul style="list-style-type: none"> • The @errors variable • Describing errors in form_for • resolving errors 	<ul style="list-style-type: none"> • Blog Associations • Validations 	10
16	<ul style="list-style-type: none"> • Use ActiveRecord in Rails • Understand complex many to many through • Using AR to search and sort through data 	<ul style="list-style-type: none"> • Associations <ul style="list-style-type: none"> • through • Domain modeling • Working with JOIN tables • Searching <ul style="list-style-type: none"> • Where • Find • ordering • AREL 	<ul style="list-style-type: none"> • Pollywog Ranch • Simple Search • Arel Labs • BnB Associations 	25
17	<ul style="list-style-type: none"> • Understand the power of refactoring to components • Use partials for collections, forms and other reusable views • Use helpers to remove logic from views 	<ul style="list-style-type: none"> • Partials <ul style="list-style-type: none"> • Collection Partials • Form Partials • Cross Controller Partials • Helpers <ul style="list-style-type: none"> • Presenter Pattern • Logic in Views • Cross controller helpers 	<ul style="list-style-type: none"> • Flatiron BNB Methods • Programmer Profile Partials 	10

Module C

Javascript: Creating Interactive and Performant Front Ends with Javascript Syllabus

Unit	Learning Objectives	Reference Topics	Competency Based Assignments	Hours
1	<ul style="list-style-type: none"> Understand the similarities between ruby and javascript Know when javascript is the correct language to use Use Javascript to do basic programming tasks 	<ul style="list-style-type: none"> JS Basics <ul style="list-style-type: none"> How to run JS code How to read JS tests JS Data Types <ul style="list-style-type: none"> Hashes Variables Functions Strings Math Object Literals JS Control Flow <ul style="list-style-type: none"> if statements looping 	<ul style="list-style-type: none"> JS Debugging JS isBetween FizzBuzz Donut Lab 	20
2	<ul style="list-style-type: none"> Use closures to modify variable scope Understand prototypical inheritance 	<ul style="list-style-type: none"> Closures <ul style="list-style-type: none"> Lexical scope Scoping with Var Anonymous Functions Inheritance <ul style="list-style-type: none"> Prototypes Constructors Classes as Hashes 	<ul style="list-style-type: none"> Space Invaders JS Tweet Shortener Triangle.js Robot Simulator JS Tic Tac Toe 	10
3	<ul style="list-style-type: none"> Understand when and how to use jQuery Work with other Libraries Use Selectors in JS 	<ul style="list-style-type: none"> Basic jQuery <ul style="list-style-type: none"> JS Libraries History of jQuery the \$ selector CSS Selectors in JS <ul style="list-style-type: none"> Selectors iteration Convenience Methods 	<ul style="list-style-type: none"> jQuery Calculator jQuery OO Tic Tac Toe Task Lister Flickr Image Search 	10
4	<ul style="list-style-type: none"> Query and parse a JSON API Update on screen content dynamically 	<ul style="list-style-type: none"> AJAX <ul style="list-style-type: none"> JSON parsing Using \$.ajax Async Javascript Displaying results JSON 	<ul style="list-style-type: none"> Temperature Visualizer Spotify with AJAX Inflation Calculator Cars Lazy Loading 	30

		<ul style="list-style-type: none"> Understanding APIs Reading API Documentation 		
5	<ul style="list-style-type: none"> Intro to how rails talks to javascript Optimize your javascript with Asset Pipeline How to build APIs for Javascript consumption 	<ul style="list-style-type: none"> Consuming APIs from Ruby <ul style="list-style-type: none"> Using Faraday Popular Gems Building APIs <ul style="list-style-type: none"> Returning Basic Strings JSON Serializatio n Using Built in to_json Active Model Serializer 	<ul style="list-style-type: none"> JS Manifests Lab CSS Manifests Lab Bootstrap Example Rails Lab Basic APIs Lab Refactoring APIs Lab DIY JSON Serializer Lab Using to_json Lab Receiving API POSTs Lab jQuery Tic Tac Toe Rails App with a jQuery Front End 	15

2Week Student Projects Syllabus

During this portion of the course students are tasked with working solo to create a project. This course provides an in-depth opportunity for student to demonstrate their learning accomplishments and get a feel for what working at a company is really like.

Students are divided randomly and begin with an initial pitch session. Students are tasked with pitching three different ideas that they are passionate about. Instructors take the pitches and then choose the final project that the students work on. Instructors choose projects based on difficulty and feasibility given the time constraints of the course. Specifically, the projects are required to have the following items to meet the minimum bar of difficulty:

- Must work directly with an API
- Must have > 3 Models and Controllers
- Must use helper methods to remove logic from views
- Must include at least two complex joins
- Must have some AJAX functionality

Unit	Learning Objectives	InClass Lectures	Lab Activities
1	<ul style="list-style-type: none"> Understand developer flow with GIT 	<ul style="list-style-type: none"> Git <ul style="list-style-type: none"> branches Feature Branches Advanced Merge Conflict GitHub <ul style="list-style-type: none"> Pull Requests Issues 	none
2	<ul style="list-style-type: none"> Break a large project into workable chunks 	<ul style="list-style-type: none"> Minimum Viable Products <ul style="list-style-type: none"> Choosing priority features User Stories Project Management <ul style="list-style-type: none"> Dividing work Agile Workflow 	none