UDACITY

NANODEGREE PROGRAM SYLLABUS

SQL

Overview

Perform analysis on data stored in relational and non-relational database systems to power strategic decision-making. Learn to determine, create, and execute SQL and NoSQL queries that manipulate and dissect large scale datasets. Begin by leveraging the power of SQL commands, functions, and data cleaning methodologies to join, aggregate, and clean tables, as well as complete performance tune analysis to provide strategic business recommendations. Finally, apply relational database management techniques to normalize data schemas in order to build the supporting data structures for a social news aggregator.

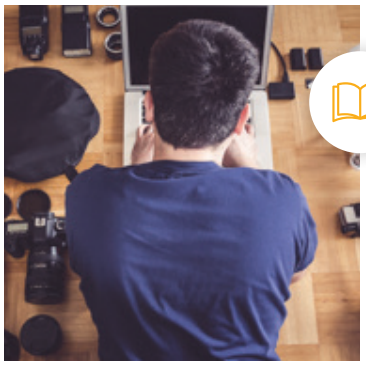
This Nanodegree program teaches the basic data-working skills needed to find and use insights gleaned from large repositories of data that have outgrown their current abilities with spreadsheets. In addition, it teaches students how to harness the full power of relational databases, as well as be aware of other types of databases that exist and know when to choose which type. The ideal student has aspirations to develop into a data professional, either in database management (IT) or in analytics (business).

Prerequisites: Anyone who has basic computer skills can understand and write SQL and NoSQL languages. You will need -

1. Basic computer skills
   - Familiarity with Operating systems (Windows and MacOS)
   - Familiarity and comfort using word processing programs (Microsoft Word, Google Docs, PDF)
   - Comfort using presentation software (PowerPoint, Keynote, Google Slides)
   - Comfort using Spreadsheet programs (Microsoft. Excel, Google Spreadsheets)

2. Basic understanding of data types (e.g., string, integer)
   - Comfort identifying the type of data held in a data table.

Estimated Time: 2 Months at 10 hours / week



Prerequisites: Basic understanding of data types

Flexible Learning: Self-paced, so you can learn on the schedule that works best for you.

Need Help? udacity.com/advisor Discuss this program with an enrollment advisor.

Course 1: Introduction to SQL

When it comes to extracting insights from stored data, SQL is one of the most versatile tools available. Learn how to execute core SQL commands to define, select, manipulate, control access, aggregate and join data and data tables. Understand when and how to use subqueries, several window functions, as well as partitions to complete complex tasks. Clean data, optimize SQL queries, and write select advanced JOINs to enhance analysis performance. Explain which cases you would want to use particular SQL commands, and apply the results from queries to address business problems.

Course Project
Deforestation Exploration

SQL is most commonly used to manipulate and analyze data to inform decision making. In this project, you will act as a data analyst for an organization on a mission to reduce deforestation around the world and to raise awareness about this important environmental topic. First, you'll clean any erroneous values in a table, join that table to another lookup table to bring in a new categorical and quantitative variable, and return a new view of all categories greater than a reference value. Then, you will create and execute SQL queries to perform calculations using variables from those disparate data sets to answer questions for stakeholders. Your analysis will help you better understand which countries and regions around the world seem to have forests that have been shrinking in size, and also which countries and regions have the most significant forest area. Lastly, you will compile your answers and summarize your analysis into a report that can be shared to a leadership team.

		LEARNING OUTCOMES
LESSON ONE	**Basic SQL**	• Write common SQL commands including SELECT, FROM, and WHERE • Use logical operators like LIKE, AND, and OR
LESSON TWO	**SQL JOINs**	• Write JOINs in SQL to combine data from multiple sources to answer more complex business questions • Understand different types of JOINs and when to use each type
LESSON THREE	**SQL Aggregations**	• Write common aggregations in SQL including COUNT, SUM, MIN, and MAX • Write CASE and DATE functions, as well as work with NULLs

LESSON FOUR	**SQL Subqueries & Temporary Tables**	• Write subqueries to run multiple queries together • Learn the types of subquery placement and formatting • Use temp tables to access a table with more than one query
LESSON FIVE	**SQL Data Cleaning**	• Learn and apply the basics of data cleaning strategies in SQL to normalize or create a column from existing data • Perform the appropriate data cleaning methodology based on goals for further analysis
LESSON SIX	**SQL Window Functions**	• Apply core window functions to tackle analysis tasks that require further targeting or segmentation • Use other window functions including RANK, NTILE, LAG, LEAD new functions along with partitions to complete complex tasks
LESSON SEVEN	**SQL Advanced JOINs and Performance Tuning**	• Learn how and when to use advanced joins (e.g., self joins) to write queries that run quickly across giant datasets • Learn the high-level tradeoffs with queries, including performance and what you can do to optimize them
LESSON EIGHT	**Project: Deforestation Exploration**	• Apply basic and advanced query techniques to compile strategic recommendations from a large dataset

Course 2: Management of Relational & Non-Relational Databases

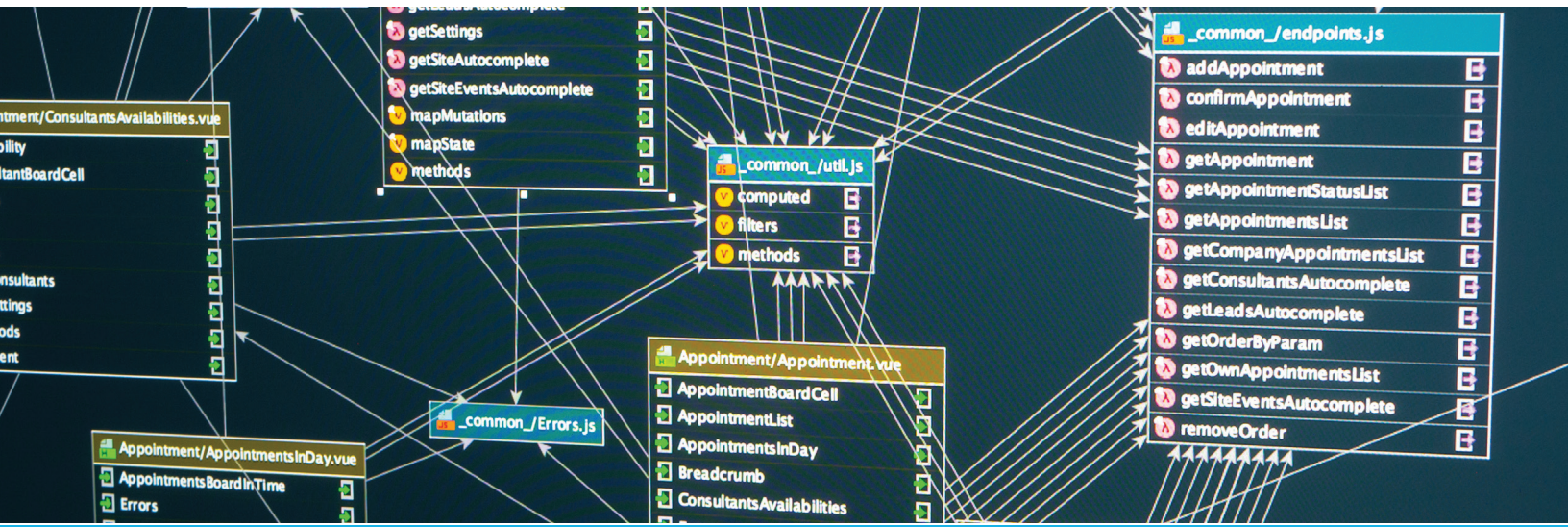
Databases need to be structured properly to enable efficient and effective querying and analysis of data. Build normalized, consistent, and performant relational data models. Use SQL Database Definition Language (DDL) to create the data schemas designed in Postgres and apply SQL Database Manipulation Language (DML) to migrate data from a denormalized schema to a normalized one. Understand the tradeoffs between relational databases and their non-relational counterparts, and justify which one is best for different scenarios. With a radical shift of paradigms, learn about MongoDB and Redis to get an understanding of the differences in behaviors and requirements for non-relational databases.

Course Project
Udiddit, a Social News Aggregator

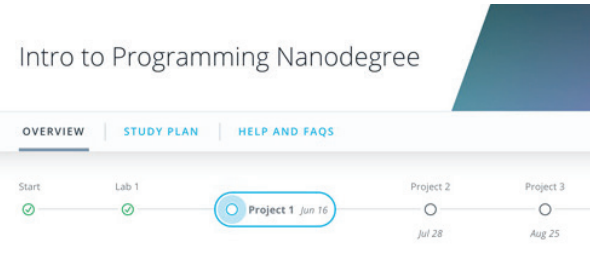
Many of today's most popular web applications have supporting database structures that allow them to customize and aggregate information within seconds. In this project, you will build the supporting data structures for Udiddit, a social media news aggregator site. First, you'll investigate the provided data model for potential errors such as lack of normalization, consistency rules, and proper indexing. Then, you will create a new, normalized database using DDL based on the denormalized one that is provided. Lastly, you will write DML queries to migrate the data from the denormalized schema to their normalized schema.

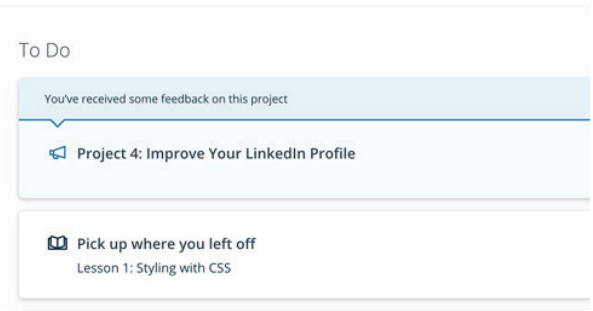
	LEARNING OUTCOMES	
LESSON ONE	**Normalizing Data**	• Organize data in a format suitable for relational databases • Get a grasp on database normal forms
LESSON TWO	**Data Definition Language (DDL)**	• Write common SQL commands with CREATE TABLE and ALTER TABLE • Use different data types to model real-world situations
LESSON THREE	**Data Manipulation Language (DML)**	• Write common SQL commands with INSERT, UPDATE, and DELETE • Use SQL functions to manipulate numbers, strings, and dates

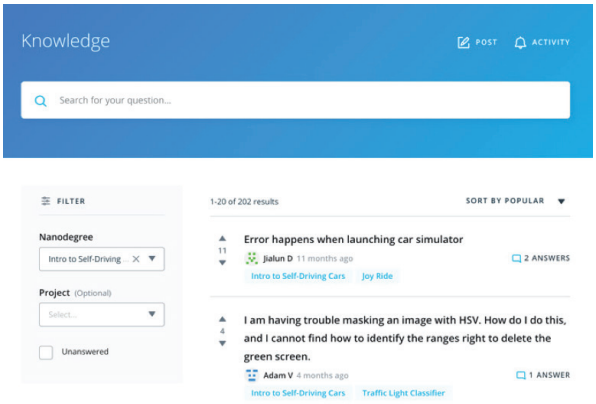
LESSON FOUR	**Consistency with Constraints**	• Implement business rules at the database level using SQL commands with CONSTRAINT, UNIQUE, PRIMARY KEY, and CHECK • Formalize the relations between tables using SQL FOREIGN KEY and its variations
LESSON FIVE	**Performance with Indexes**	• Fix some slow SQL queries by introducing database indexes with the SQL command CREATE INDEX • Introspect SQL queries through the query planner with EXPLAIN and EXPLAIN ANALYZE • Assess whether a use-case is a good candidate for indexing
LESSON SIX	**Intro to Non-Relational Databases**	• Articulate why non-relational databases were created, and what are their tradeoffs compared to relational databases • Add, modify, and query data in a MongoDB database • Use the right MongoDB design patterns for various real-life situations • Add, modify, and query data in a Redis database • Use Redis as a standalone database to build the data part of a small application

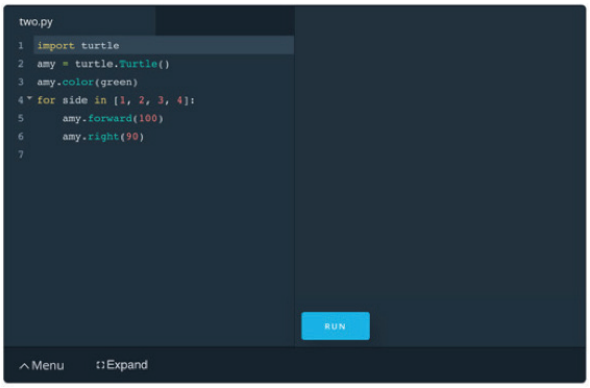


Our Classroom Experience









REAL-WORLD PROJECTS

Build your skills through industry-relevant projects. Get personalized feedback from our network of 900+ project reviewers. Our simple interface makes it easy to submit your projects as often as you need and receive unlimited feedback on your work.

KNOWLEDGE

Find answers to your questions with Knowledge, our proprietary wiki. Search questions asked by other students, connect with technical mentors, and discover in real-time how to solve the challenges that you encounter.

STUDENT HUB

Leverage the power of community through a simple, yet powerful chat interface built within the classroom. Use Student Hub to connect with your fellow students in your Executive Program.

WORKSPACES

See your code in action. Check the output and quality of your code by running them on workspaces that are a part of our classroom.

QUIZZES

Check your understanding of concepts learned in the program by answering simple and auto-graded quizzes. Easily go back to the lessons to brush up on concepts anytime you get an answer wrong.

CUSTOM STUDY PLANS

Preschedule your study times and save them to your personal calendar to create a custom study plan. Program regular reminders to keep track of your progress toward your goals and completion of your program.

PROGRESS TRACKER

Stay on track to complete your Nanodegree program with useful milestone reminders.

Learn with the Best

Ziad Saab

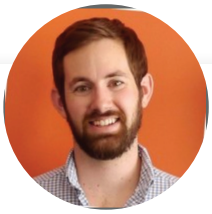
SOFTWARE DEVELOPER &
CO-FOUNDER DECODEMTL

Ziad is a seasoned software developer who loves mentoring and teaching. Currently working as an independent contractor, he previously co-founded and taught full-stack web development at DecodeMTL, Montreal's first web development bootcamp.

Malavica Sridhar

PRODUCT MANAGER, WAYMO

Mal Sridhar is currently a Product Manager at Waymo. Prior to her current role, she was a Senior Product Manager at CircleUp. Mal started her career as a management consultant at McKinsey & Company and is passionate about leveraging data to transform industries.



Derek Steer

CEO & CO-FOUNDER, MODE

Derek will introduce you to the SQL language and how to use SQL queries to analyze data in relational databases. Derek is the Co-Founder and CEO of Mode Analytics. He has worked as a data analyst in various companies, including Microsoft, Yammer, and Facebook.

All Our Nanodegree Programs Include:

EXPERIENCED PROJECT REVIEWERS

REVIEWER SERVICES

- Personalized feedback & line by line code reviews
- 1600+ Reviewers with a 4.85/5 average rating
- 3 hour average project review turnaround time
- Unlimited submissions and feedback loops
- Practical tips and industry best practices
- Additional suggested resources to improve

TECHNICAL MENTOR SUPPORT

MENTORSHIP SERVICES

- Questions answered quickly by our team of technical mentors
- 1000+ Mentors with a 4.7/5 average rating
- Support for all your technical questions

PERSONAL CAREER SERVICES

CAREER COACHING

- Personal assistance in your job search
- Monthly 1-on-1 calls
- Personalized feedback and career guidance
- Interview preparation
- Resume services
- Github portfolio review
- LinkedIn profile optimization

Frequently Asked Questions

PROGRAM OVERVIEW

WHY SHOULD I ENROLL?

Employers are looking for professionals with SQL skills. Currently, **SQL is the most in-demand skill**, higher than even programming languages like Python, Java, and JavaScript. In fact, there are currently over 440,000 jobs that mention SQL on LinkedIn worldwide, which encompasses the broad range of roles that require knowledge of SQL, including titles like product analyst, data analyst, data scientist, business analyst, product manager, software engineer, and more!

With the SQL Nanodegree program, you will be equipped to know when to utilize SQL to provide data-backed insights into complex business strategies. With Udacity, you will get an in-depth instruction on how to leverage the power of SQL to pull insights from relational databases, and learn the situational differences of using relational databases versus non-relational databases like MongoDB and Redis. In this Nanodegree program, you won't just learn how to use SQL, you will get hands-on experience with projects, including building a clone of the popular social news aggregation and discussion web site, Reddit!

WHAT JOBS WILL THIS PROGRAM PREPARE ME FOR?

This program will help you apply your data anlysis skills in roles such as Data Analyst, Product Analyst, Business Analyst, Product Manager, Data Modeler, Data Scientist, and more that necessitate knowledge of SQL.

HOW DO I KNOW IF THIS PROGRAM IS RIGHT FOR ME?

If you are interested in a career in Data Science or simply want to hone your data analysis skills, then this program is right for you.

The SQL Nanodegree program teaches the basic data-working skills needed to find and use insights gleaned from large repositories of data that have outgrown their current abilities with spreadsheets. In addition, it teaches students how to harness the full power of relational databases, as well as be aware of other types of databases that exist, and know when to choose which type. The ideal student has aspirations to develop into a data professional, either in database management (IT) or in analytics (business).

ENROLLMENT AND ADMISSION

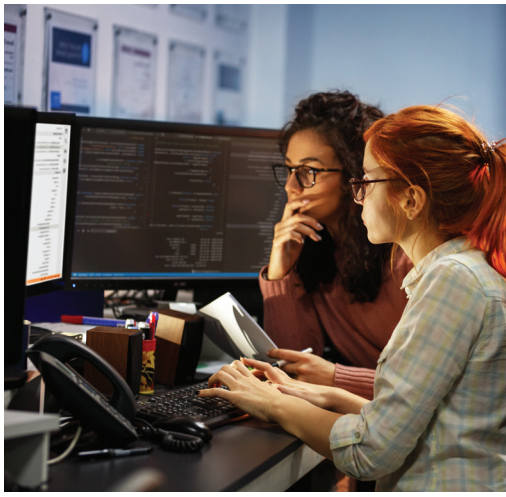
DO I NEED TO APPLY? WHAT ARE THE ADMISSION CRITERIA?

There is no application. This Nanodegree program accepts everyone, regardless of experience and specific background.

FAQs Continued

WHAT ARE THE PREREQUISITES FOR ENROLLMENT?

We strongly believe that anyone who has basic computer skills can understand and write SQL and NoSQL languages. Therefore, the prerequisites for this Nanodegree program are the following:



Basic computer skills

- Familiarity with Operating systems (Windows and MacOS)
- Familiarity and comfort using word processing programs (Microsoft Word, Google Docs, PDF)
- Comfortable using presentation software (PowerPoint, Keynote, Google Slides)
- Comfortable using Spreadsheet programs (Microsoft Excel, Google Spreadsheets)

Basic understanding of data types (e.g., string, integer)

- Comfortable identifying the type of data held in a data table.

IF I DO NOT MEET THE REQUIREMENTS TO ENROLL, WHAT SHOULD I DO?

If you would like to pursue a career in Data Science, and are a beginner when it comes to programming, the Programming for Data Science with Python is a good fit. If you already have experience with programming with Python, you can try the **Data Analyst** or the **Intro to Machine Learning with PyTorch** Nanodegree programs.

If you would like to pursue a career in business, try one of the **Business Analytics**, **Marketing Analytics**, or **Product Manager** Nanodegree programs.

TUITION AND TERM OF PROGRAM

HOW IS THIS NANODEGREE PROGRAM STRUCTURED?

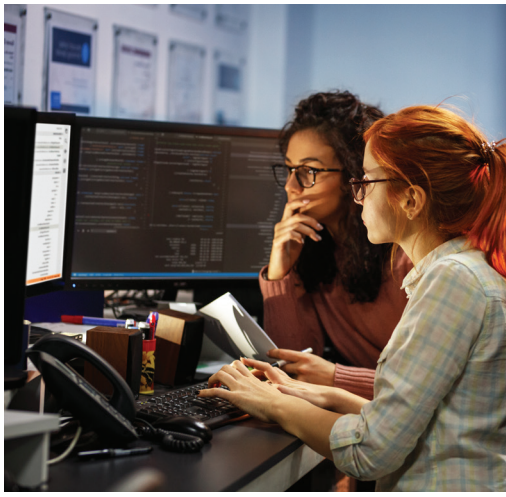
The SQL Nanodegree program is comprised of content and curriculum to support two projects. Once you subscribe to a Nanodegree program, you will have access to the content and services for the length of time specified by your subscription. We estimate that students can complete the program in two months, working 10 hours per week.

Each project will be reviewed by the Udacity reviewer network. Feedback will be provided and if you do not pass the project, you will be asked to resubmit the project until it passes.

FAQs Continued

HOW LONG IS THIS NANODEGREE PROGRAM?

Access to this Nanodegree program runs for the length of time specified in the payment card above. If you do not graduate within that time period, you will continue learning with month to month payments. See the **Terms of Use** and **FAQs** for other policies regarding the terms of access to our Nanodegree programs.



CAN I SWITCH MY START DATE? CAN I GET A REFUND?

Please see the Udacity Program **Terms of Use** and **FAQs** for policies on enrollment in our programs.

SOFTWARE AND HARDWARE

WHAT SOFTWARE AND VERSIONS WILL I NEED IN THIS PROGRAM?

For this Nanodegree program, you will need a desktop or laptop computer running recent versions of Windows, Mac OS X, or Linux and an unmetered broadband Internet connection. For an ideal learning experience, a computer with Mac or Linux OS is recommended.

You will use SQL, NoSQL, Postgres, SQL DDL, and SQL DML in this Nanodegree program.