Data Science Program

Curriculum Package

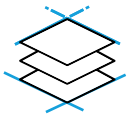
LIGHTHOUSE LABS

The Lighthouse Labs Experience

At Lighthouse Labs, we understand being a data scientist requires so much more than just learning how to read datasets, use and navigate popular data science tools, libraries, environments and workflows. From SQL to Python, machine learning and beyond, each module of our immersive, industry-driven curriculum is designed to equip you with a strong foundation of skills to help you succeed and grow as a data scientist. Throughout the program, you'll also benefit from the support of our diverse community of mentors, student success coordinators, and career services advisors.

Industry-Driven Education

On-Demand Mentorship



Real-World Portfolio

Personalized and Immersive

Continuous Feedback

At Lighthouse Labs, we're committed to building a diverse and inclusive learning community. If you need help and support, we're here for you — no matter where you are in the process.

Your Journey With Lighthouse Labs Will Help You To:

- Use popular data science tools, libraries, environments and workflows
- Apply various data wrangling techniques with a number of data types and representations
- Select the most effective data visualization method to tell a story from an existing dataset
- Recognize the fundamental concepts and applications of machine learning
- Implement algorithms to solve common machine learning problems
- Compare the opportunities and limitations of deep learning architectures
- Deploy your own machine learning model and develop data engineering pipelines
- Use artificial intelligence to solve business problems in the context of data science
- Present data science findings to both technical and non-technical audiences
- Work independently and collaboratively on Machine Learning projects in any sector
- Progress towards a career as a Data Scientist, Engineer, Analyst, or other data-driven role

Our annual **Student Outcomes Report** is a validation of our reputation for strong outcomes for our students - **an impressive 86% employment rate** for our Data Science graduates, with 81% of job-seeking Data Science graduates getting a job within 180 days of graduation.

Learn How to Learn

We've built a carefully crafted curriculum, informed by industry professionals, leading experts in data science, and technology experts who know what you need to succeed as a data science professional. Focused around four pillars of knowledge and skills essential to data science, our curriculum is complemented by tried-and-true reinforcement strategies designed to help you build key skills to succeed in an ever-changing landscape.

Data Science Pillars

Programming for Data Science
Python
Clean Code
Statistical Modelling
Frameworks and Libraries
Git, Command Line, APIs, and Virtual Environments

Data Analysis
Probability and Statistics
Data Ethics and Access
Extract-Transform-Load Process
SQL (PostgreSQL)
Data Types and Datasets
Data Manipulation
QA Processes
Pandas
NumPy

Data Tools
SQL
Jupyter Notebook
Data Wrangling
Data Visualization
Machine Learning
Data Engineering and DevOps
Deep Learning*
Tableau*
Excel
Large Language Models

Data Soft Skills
Communication and Presentation for Technical and Non-Technical Audiences
Teamwork
The Scientific Method
Experimental Design
Interview Skills

*Optional Self-Study Module

Our Educational Approach

On-Demand Mentorship

Our mentors are experienced, working professionals who coach students through roadblocks during their course while sharing key problem-solving strategies that will set them up for success and continual growth on the job. Students can reach out at any time to receive 1:1 coaching for both technical and career-related questions, job hunting tips, and interview pointers. Mentors also help students build their network, connecting them with other industry professionals.

Interactive, Immersive, and Collaborative

When it comes to learning something new, we're with you step by step. We'll show you how it's done, guide you through your first attempt and help you gain confidence with your new skills.

Research and Present Data Insights

The data science industry is constantly evolving. Data scientists need to be adaptable too. To inform business decisions, they need to be able to step back, research and navigate evolving data science tools, libraries, and workflows. You'll build these skills through short weekly reflections and presentation sessions, where we challenge you to tailor your presentations for various audiences. These reflections and presentations will become part of your technical portfolio — an invaluable asset you can use beyond graduation to demonstrate your experience presenting data insights.

Tech Interviews
Prepare for the real-world hiring process by completing a series of mock technical interviews with mentors.

Build Your Portfolio

Core Curriculum Projects
As a data scientist, your ability to quickly understand a need, contextualize data and present it in a meaningful way is paramount. That's why the program is dedicated to experimenting and building data science solutions. By the time you graduate, you'll have a diverse portfolio of data science explorations to show potential employers.

Midterm and Final Projects
Halfway through the program, you'll team up with your peers for your first major project — the Midterm. Together with your team, you'll have the opportunity to get creative and put your skills to the test as you replicate data science explorations within real-world contexts.

In the last two weeks of the program, it's your time to shine! The final project allows your team to use your collective creativity and newfound knowledge to develop a hypothesis and build a data science exploration from the ground up.

Career Services

Intro to Career Services: Meet the incredible Career Services team (which you'll have access to for life), who'll go over expectations, outline services, and get you thinking about what they want to do after graduation.

Resume Workshop: Curate and optimize your own data analytics resume then have a 1:1 sit down with our Career Services team to review it.

Interview Workshop: Learn how to prepare for and answer common interview questions.

Job Search Process: Explore about the next steps ahead of your job search with the Career Advisory Team. You'll also be filled in on upcoming Career Readiness Workshops, which will further assist you in job search readiness.

Our Tech Stack

While learning key data science languages and tools prepares you for your first role, a lifelong learning mindset amid a changing industry and landscape is vital. That's why we cover a myriad of tools and technologies vetted by subject matter experts, our network of employers, and members of the broader tech community — equipping you with marketable, industry-relevant digital skills.

Data Science Environment
Set up a data science environment on your own device using Anaconda, VSCode, Git, and Virtual Environments.

Coding
Learn programming basics, including Python, PostgreSQL, Git, and Jupyter Notebook.

Math Foundations
Dive into the basics of probability theory, statistics, and linear algebra using NumPy and Statsmodels.

Data Wrangling
Master the art of data acquisition, manipulation and preparation using Pandas, APIs, and the ETL process.

Databases
Discover relational and non-relational databases with a focus on PostgreSQL and SQLite.

Data Visualization
Learn the principles of graphical integrity and the guidelines for visualization context and guidelines with tools like Tableau (stretch content), Matplotlib, Seaborn, Plotly, and Geopandas.

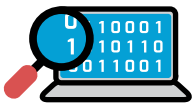
Machine Learning
Using sci-kit learn, Tensorflow and Keras, you'll explore elements of machine learning like supervised learning, unsupervised learning, deep learning (stretch content), using LLMs to perform NLP (Natural Language Processing) tasks, time series, and recommender systems.

Development Process
Move through design, experimentation (prototyping), production code, and deployment, mastering the development process while using tools like Pickle, Joblib, and Flask.

Curriculum Breakdown

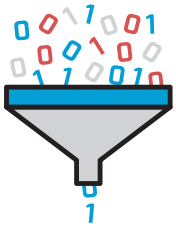
Prep Work

- Data analysis in spreadsheets
  - Introduction to data analysis and statistics
  - Data collection and cleaning
  - Analyzing data
  - Communicating with data
- The command line
- Version control
  - Git and Github



Transforming and Analyzing Data with SQL

- Database, types, components, and database management systems
- Cleaning and transforming data using SQL
- Implementing the ETL (extract, transform, load) process
- Descriptive and diagnostic analysis
- Quality assurance processes
- Data ethics and accessing data



Statistical Modelling with Python

- Data environment setup
- Python fundamentals and libraries, including Pandas and Numpy
- Accessing data from APIs using Python
- Cleaning, transforming, and loading data using Python
- Python libraries for statistical modelling
- Regression and classification models
  - Applying the correct model to a defined problem
- Performing EDA (exploratory data analysis) leveraging statistics and visualizations
- Applying statistical models and interpreting outputs

Data Visualization and Dashboards

- Data visualization basics including best practices
- Creating visualizations to communicate insights
- Building impactful and interactive dashboards

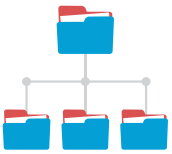
Midterm Project

Practice your skills from kick-off to demo with an end-to-end group project.

- Defining and outlining a business problem
- Combining data from different sources
- Cleaning and wrangling data
- Exploratory analysis
- Applying statistical models
- Interpreting and presenting patterns and insights

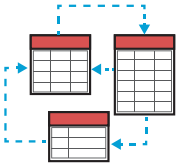
Math Foundations for Data Science

- Foundational linear algebra and calculus concepts and equations related to machine learning
  - Vectors and matrices
  - Determinants
  - Eigenthings and linear transformation
  - Matrix decomposition



Machine Learning

- Data preparation
- Feature engineering
- Sampling and dimensionality reduction
- Introduction to machine learning modelling
- Optimization with gradient descent:
  - Gradient descent
  - Stochastic gradient descent
- Training and evaluation
- Modeling techniques
  - Supervised
    - Logistic regression
    - Decision trees
    - Random forests
    - Boosting
  - Unsupervised
    - Hard clustering methods (K-means)
    - Hierarchical methods
    - Soft probabilistic clustering methods (DBSCAN)

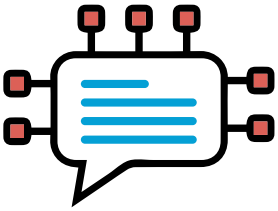


Data Engineering and DevOps

- Pipelines
  - ColumnTransformer
  - FeatureUnion
- Flask
- Object serialization
  - Joblib
  - Pickle

Applications of Machine Learning

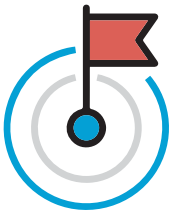
- Recommender engines
  - Matrix factorization
  - Collaborative filtering
  - Collaborative filtering with DL
- NLP (Natural Language Processing)
  - Applying FNN, RNN, and CNN
  - Word2Vec, word/sentence embeddings, cosine distance
  - Topic modelling
  - Dimensionality reduction techniques (tSNE / UMAP)
  - Sentiment analysis
- Time Series Analysis
- A brief overview of DL with attention



Large Learning Models (LLM) for NLP

Apply knowledge of LLMs to effectively address a variety of NLP tasks, such as sentiment analysis, summarization, and entity recognition.

- Prompt & query development
- Adapt pre-trained LLMs for domain-specific NLP tasks
- Execute end-to-end NLP projects
- Ethical considerations and practices in data science, specifically in the context of NLP

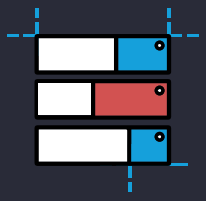


Final Project

It's time to put all your skills to the test with this final project! Here you'll demonstrate your ability to:

- Understand the problem
- Design a solution
- Combine data from different sources
- Build prototypes
- Evaluate your work
- Deploy solutions
- Present the results

Optional Self-Study Modules



Deep Learning

If you want to learn more about Deep Learning, you can dive into this optional module! While you can always connect with mentors if you have questions, this is a self-study module with no classroom component.

- Introduction to neural networks
- Back-propagation with gradient descent
- Architecture
  - RNN (Recurrent Neural Network)
  - LSTM (Long Short-Term Memory)
  - CNN (Convolution Neural Network)
- Tensorflow Core 2.0 (Keras API)

Data Visualization and Dashboards with Tableau*

Get to know the basics of Tableau and create a variety of visualizations, including bar charts, line graphs, scatter plots, and maps, and customize these visualizations to communicate data insights effectively.

- Create purposeful visualizations in Tableau to communicate business insights
- Turn complex data into easily consumable visual insights in Tableau
- Create interactive and impactful stakeholder-facing dashboards in Tableau that are best suited to communicate insights

*This self-study module is only available to students after graduation as bonus material to take your learning further post-program.

A Support Ecosystem Adapted to Your Needs

Proactive Student Support

Support from the day you apply to the day you graduate.
We pride ourselves on our hands-on, proactive education approach, so you can expect daily and weekly check-ins from Student Success Coordinators to track your progress and support your student experience.

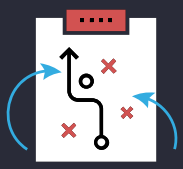
Accessible Education

We're committed to building a diverse and inclusive learning community. If you need help and support as a student, we're here for you. Accessibility is not one-size-fits-all, so neither is your accommodation plan. We work with each student to develop personalized plans that support their individual needs.

Learn more about accommodations and accessibility at Lighthouse Labs on our website.

Launch Your Career

Career Services is the lifetime support we offer our graduates throughout their careers. From connecting them with their first job in tech post-graduation to mid-career boosts, our team will work with you at any stage in your career to identify your goals and help guide you to achieve them.

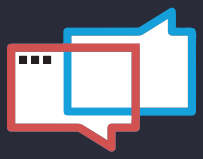


Personalized Coaching

Our team will work with you to map out a rigorous career plan, then help you achieve it.

Resume and Interview Help

Detailed feedback and tips will help you perfect your points of contact with potential employers.



Connect with Employers

Tap into our vast network of leading tech employers through events, networking, and more.

Our Career Services team maintains relationships with an ever-growing network of industry contacts, keeping their finger on the pulse of what employers are looking for in this fast-paced industry. We hustle from day one, and we expect you to do the same. Finding a job is no easy task, but whether you're pivoting from a dierent role or looking for your first position ever, we'll be there to support you every step of the way.

Life After Lighthouse

Community

As an alum, you remain an active part of our community. We host Demo Days, guest speakers, and exclusive alumni events on the regular.

You also gain access to our Alumni Discord channel, where you can keep in touch with your peers, organize educational and social events, and hear about recurring alum events.

Continuous Learning

As a Lighthouse Labs alum, you will always have access to our curriculum and its future iterations — yes, until the end of time.

Your access to our learning platform never expires. You'll benefit from ongoing lecture notes and learning resources as we continue to iterate our world-class curriculum.

READY TO CONQUER DATA?

Apply Now

LIGHTHOUSE LABS

www.lighthouselabs.ca