Global Startup Labs-Pro Montevideo 2020

**9am-12am Technical Track 1pm-4pm Business Track 4pm-5pm individual tutoring.**

Changes and adjustments expected.

**GSL Uruguay Business Track.**

**Curriculum Structure and Daily Planning**

Week 1

1. Day 1
   1. Learning Objectives
      1. Instructor and class introductions and the goals of the course
      2. Basics of what machine learning / data science are
      3. Basic needs to apply machine learning in business
      4. High-level skills required for entrepreneurship and intrapreneurship
   2. Schedule
      1. (1 hour) Introduction and Course Overview
      2. (1 hour) Introduction to Machine Learning
      3. (1 hour) Introduction to Entrepreneurship and Intrapreneurship
2. Day 2
   1. Learning Objectives
      1. How to brainstorm ideas for products or businesses
      2. How to select/filter the best ideas
      3. The customer discovery process for iterating on a product
      4. What a customer persona is and how to develop them
   2. Schedule
      1. (1 hour) Ideation
      2. (2 hours) Customer Discovery Process
3. Day 3
   1. Learning Objectives
      1. How to perform primary market research
      2. How to apply ideation specifically to machine learning and data science topics
      3. Introduction into e-commerce and ML
   2. Schedule
      1. (1 hour) Primary Market Research
      2. (1 hour) Ideation in Data Science and ML
      3. (1 hour) E-Commerce Intro
4. Day 4
   1. Learning Objectives
      1. Introduction into healthcare and ML
      2. Begin brainstorming with team and working on projects for the first time
   2. Schedule
      1. (1 hour) Healthcare Intro
      2. (2 hour) Work in Teams on Project

Week 2

Overview:

Week 2 will focus on all types of communications required for successful entrepreneurship and intrapreneurship. After learning the business aspects of machine learning applied to e-commerce, students will gain the tools to effectively communicate as a team and persuade an audience both with and without data. The week will end with a day full of presentations, practicing what was learned.

Day 1

Learning Objectives:

1. How organizational process apply to data science teams
2. How one case (Target) specifically applied the concepts, and what they could still improve on
3. Get more comfortable presenting ideas in front of class

Schedule:

1. E-commerce refresher (quick)
2. Organizational Processes Overview (1 hour)
3. Target Case Study (1 hour)
4. Initial project idea presentations (1 hour)

HW**:** Read Cialdini Artice & Communication Chapters

Day 2

Learning Objectives:

1. By the end of the team exercise, participants will be able to:
2. Listen to others with the intention of genuinely understanding their thoughts through the use ofactive listening techniques.
3. Use interpersonal skills to create constructive dialog.
4. Identify and understand the need for clear, concise communication(s) within an organization.
5. Learn how to strategically think about persuasive communications
6. Understand how to be rigorous with structure in business communications
7. Learn how to use principles of influence in persuasion
8. Gain confidence speaking in front of an audience

Schedule:

1. Leadership & Communication Exercise (1.5 hours)
   1. Legos
   2. Directions
2. 20 Minute Break
3. Communication Basics 1 (1.5 hours)
   1. PPT
4. Impromptu Pitches (.5 hours)
   1. Objects/Ideas for Pitches

HW**:** Read Communicating with Data Chapters

Day 3

Learning Objectives:

1. Learn how to effectively deliver speech by understanding dynamism and congruence
2. Demonstrate TOPT Framework for presenting slides
3. Explain how the concepts of encoding and decoding apply to communication
4. Identify common ways to encode graphs
5. Gain confidence in presenting graphs and data

Schedule:

1. Communication Basics 2 (1 hours)
   1. PPT
2. 10 Minute Break
3. Communicating with Data 1 (1.5 hours)
   1. PPT
4. 10 Minute Break
5. Impromptus Data Pitches (45 minutes)
6. Discussion of HW Assignments (25 minutes)

HW: Graph conversion due Friday

Day 4

Learning Objectives:

1. Learn how to describe the concept of the data to ink ratio and recognize excess ink
2. Learn how to properly adjust graphs to reduce cognitive load
3. Understand how to best pitch to an idea to a VC or to a company
4. Learn how to fine tune a pitch deck and make a team speech

Schedule:

1. Communicating with Data 2 (1 hours)
   1. PPT
2. 15 minute break
3. How to pitch to VC (1 hour)
   1. PPT
4. 15 Minute Break
5. Time to finish up pitch deck, get guidance, and practice (1.5 hours)

HW: Pitch deck with data to support due Friday

Day 5

Learning Objectives:

1. Gain individual confidence pitching graphs and data to an audience
2. Gain confidence and practice pitching an idea to a VC or company as a team

Schedule:

1. Graph Conversion 1 Presentations (1.5 hours)
   1. Break into two large groups
   2. Students provide content
2. 15 minute break
3. Team pitching competition (with data) (2 hours)
   1. Structure of competition
      1. Break into 4 smaller groups
      2. Top from each group presents to entire class
      3. Vote for top team

HW**:** Enjoy the weekend!

Week 3

Overview:

Week 3 will be a continuation of what students have learned in communication and organization, progressing to considerations in determining decision-making units within an organization and how to navigate implementation. From an industry and technical perspective, this week will focus on healthcare and the potential machine learning applications in diagnosis, drug discovery, and healthcare operations.

Day 1

Learning Objectives:

1. Learn about specific applications and challenges of using machine learning in diagnosis
2. Learn about applications of using machine learning in hospital operations

Prework:

Schedule:

1. (1 hour) Machine learning in clinical health
2. (20 min) Brainstorming session
3. (1 hour) Machine learning in diagnosis
4. (20 min) Brainstorming session

HW: Read about <https://www.iterativescopes.com> and <https://www.biofourmis.com>

Day 2

Learning Objectives:

1. Understand decision-making units and decision-making processes when acquiring a customer or initiating an internal project
2. Understand windows of opportunity and triggers in a decision-making context
3. Learn how to apply these concepts to a new idea or venture

Schedule:

1. (2 hours) Decision Making Units and Decision Making Processes
   1. (20 min) DMU activity
   2. (20 min) Customer acquisition process activity
   3. (20 min) Sales length activity
   4. (30 min) Sales funnel activity
   5. (30 min) Window of opportunity activity

Day 3

Learning Objectives:

1. Understand the components of a business model and how to identify them
2. Learn how to generate a business model based on targeted customers and value creation, and assess how it fits with competitive and internal considerations

Schedule:

1. (3 hours) Business Models
   1. (1 hour) Identify and present business model of healthcare startups
   2. (1 hour) Business model idea generation activity

Day 4

Learning Objectives:

1. Understand basic pricing concepts
2. Understand how to compare and select among different pricing approaches
3. Learn how to apply pricing concepts to a business or internal idea

Schedule:

1. (2.5 hours) Pricing
   1. (1.5 hours) Pricing activity

HW: Read Yale Healthcare Case Competition

Day 5

Learning Objectives:

1. Apply knowledge of healthcare and machine learning to a specific case and activity

Prework: Read Yale Healthcare Case Competition

Schedule:

1. (20 min) Introduce Yale Healthcare Case Competition
2. (2 hours) Work in groups
3. (15 min) Break
4. (1 hour) Presentations and reports

Week 4

Overview:

Week 4 will focus on machine learning applications in financial technology (fintech) and provide students with an introduction to basic financing and decision-making for entrepreneurial ventures or new project initiatives within a company. Within fintech, the week will cover several examples and case studies in insurance, banking, and lending. Finally, this week will be the culmination of the GSL project and pitch competition, including guided team development time and the final presentations.

Day 1

Learning Objectives:

1. Understand the concept of Net Present Value (NPV)
2. Understand how NPV applies to business decision-making
3. Learn about applications of machine learning in lending and risk assessment

Prework: Read LendingClub case study

Schedule:

1. (20 min) Re-introduction to machine learning in fintech
2. (1.5 hours) Introduction to Net Present Value
3. (15 min) Break
4. (1 hour) LendingClub case study

HW: Read Lemonade case study

Day 2

Learning Objectives:

1. Understand how financing works in an entrepreneurial setting
2. Learn the basic components of a term sheet
3. Understand venture capital decision-making
4. Learn about applications of machine learning in insurance

Prework: Read Lemonade case study

Schedule:

1. (1.5 hours) Financing a Startup
2. (15 min) Break
3. (1 hour) Lemonade case study

Day 3

Individual projects tutoring.

Day 4

Individual projects tutoring.

Day 5

Pitch competition.

**GSL Uruguay Technical Track: Machine Learning**

**Curriculum Structure and Daily Planning**

Week 1

W1 Overview: The first week introduces the tools required and lays the necessary technical foundation required to be a good AI practitioner. It focuses on AWS, Jupyter, exploratory data analysis, and basic machine learning with scikit-learn in Python. It also provides a first look on how to work with text and high-dimensional data sets.

1. Day 1:
   1. Learning Objectives:
      1. Instructor and class introductions and the goals of the course
      2. Basics of data science and machine learning
      3. Applications of ML in business
      4. Logistics overview
   2. Schedule:
      1. (1 hour) Machine setup for Python
         * Installing packages
      2. (1 hour) Introduction to AWS
      3. (1 hour) Introduction to Jupyter Notebook
2. Day 2:
   1. Learning Objectives:
      1. How to work with data in Python
      2. Basic concepts in Data Science
      3. Exploratory data analysis
   2. Schedule:
      1. (1 hour) Reading and writing different data types in python
      2. (2 hours) Analyzing data using pandas and scikit-learn in Python
3. Day 3:
   1. Learning Objectives:
      1. Understanding the basics of regression
      2. Feature creation
      3. Interpreting model results
   2. Schedule:
      1. (1 hour) Building a simple linear model from scratch
      2. (1 hour) Iterating over different model configurations
      3. (1 hour) Analyzing model results
4. Day 4:
   1. Learning Objectives:
      1. Introduction to ML models
      2. Working with high-dimensional data
      3. Interpreting results and analyzing trade-offs
   2. Schedule:
      1. (2 hours) Building penalized regression and tree-based models
      2. (1 hour) Comparing results and ensembles
5. Day 5:
   1. Learning Objectives:
      1. Developing ML projects:
         * Data and ML pipelines
         * Iterative implementations
   2. Schedule:
      1. (1 hours) ML pipelines
      2. (2 hours) Guided team project

Week 2

W2 Overview: The second week jumps straight into deep learning models and focuses on Natural Language Processing (NLP) applications. It shows how to work with text data in a more broad and generalized way. The models are discussed with an application to e-commerce.

1. Day 1:
   1. Learning Objectives:
      1. Understanding use of text data
      2. Discuss applications and challenges
         * UGC, Social media, unstructured reports
      3. Basic DL models with text data
   2. Schedule:
      1. (1 hour) Introduction to embeddings
      2. (1 hour) Examples with pre-trained models
      3. (1 hour) Transfer learning with pre-trained models
2. Day 2:
   1. Learning Objectives:
      1. Introduction to TensorFlow and Keras
      2. Embeddings and text modelling with TF
   2. Schedule:
      1. (1.5 hour) Data processing examples with Keras
      2. (1.5 hour) Basic text modeling with Keras
3. Day 3:
   1. Learning Objectives:
      1. Understanding the Instacart grocery data set
      2. Extension of embeddings to a more general concept
   2. Schedule:
      1. (1 hour) Data prep for grocery data
      2. (1 hour) Building skip-gram model for learning product embeddings in gensim
      3. (1 hour) Analyzing model results
4. Day 4:
   1. Learning Objectives:
      1. Extending embeddings
   2. Schedule:
      1. (2 hours) Building skip-gram model for learning product embeddings in Keras
      2. (1 hour) Analyzing model results
5. Day 5:
   1. Learning Objectives:
      1. Summarizing week’s learning
      2. Discussing extensions to other industries
   2. Schedule:
      1. (3 hours) Guided team project

Week 3

W3 Overview: The third week further deep-dives in to deep learning models with a focus on computer vision. It starts with an explanation of how to work with images and then builds image classifiers from ground-up. We discuss face matching applications and then move to applications in health-care.

1. Day 1:
   1. Learning Objectives:
      1. Understanding use of image data
      2. Discuss applications and challenges
         * Health care, AlphaZero, Satellite, UGC, social media,
   2. Schedule:
      1. (1 hour) Introduction to deep neural networks
      2. (1 hour) Examples with pre-trained models
      3. (1 hour) Transfer learning with pre-trained models
2. Day 2:
   1. Learning Objectives:
      1. Building a simple CNN for image classification
   2. Schedule:
      1. (3 hours) Dog vs. Cat classification
3. Day 3:
   1. Learning Objectives:
      1. Advanced architectures for face recognition
   2. Schedule:
      1. (3 hours) Celebrity face matching model
4. Day 4:
   1. Learning Objectives:
      1. Healthcare applications – pneumonia detection using X-rays
   2. Schedule:
      1. (3 hours) Building, testing, and analyzing models in Keras
5. Day 5:
   1. Learning Objectives:
      1. Summarizing week’s learning
      2. Discussing extensions to other healthcare applications
   2. Schedule:
      1. (3 hours) Guided team project

Week 4

W4 Overview: We consolidate our learning for the past 3 weeks with an exercise in the FinTech space. We focus on a consumer loan lending problem and try to predict who will default on their loan. The goal is to apply our learnings to a new and exciting problem space. The 2-day lesson is designed as a guided, individual exercise.

Day 1:

* 1. Learning Objectives:
     1. Understand the use of analytics in FinTech
        + Discuss applications and challenges
     2. Introduce loan lending data, define problem, and design solutions
     3. Models to implement:
        + Penalized regression
        + Boosted Trees
        + SVM
        + Neural Networks
  2. Schedule:
     1. (0.5 hours) ML and FinTech
     2. (2.5 hours) Work on loan lending data to predict default

Day 2:

* 1. Learning Objectives:
     1. More modeling applications in FinTech
  2. Schedule:
     1. (1.5 hours) Continue working with loan lending data
     2. (1 hour) Discussion on solutions and improvement
     3. (0.5 hour) Concluding thoughts and takeaways

Day 3

Individual projects tutoring.

Day 4

Individual projects tutoring.

Day 5

Pitch competition.