# Learning Analytics Report - 2021 Winter Base SPOC
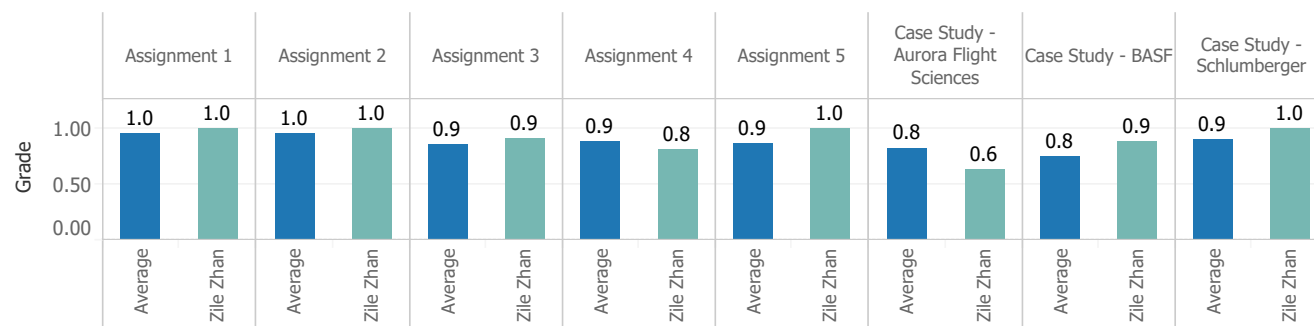
MIT xPRO × TOUCH

| Full Name | University | College | |
|-----------|-----------|---------|---|
| Zile Zhan | Xiamen University | School of Economics | |
| Average | Average | Average | |

## Achievement Summary

| Full Name | Rank | Final Grade | Total Time on SPOC |
|-----------|------|-------------|--------------------|
| Zile Zhan | Top 10% | 104.0% | 53.2 |
| Average | Average | 100.9% | 31.8 |

## Grade for Each Assignment



## Time (hrs) on Each Module

| Full Name | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | Live Session |
|-----------|-----|------|-----|-----|-----|------|-----|-----|--------------|
| Zile Zhan | 1.0 | 16.0 | 6.0 | 6.0 | 9.0 | 10.0 | 5.0 | 0.2 | 12.0 |
| Average | 1.0 | 5.1 | 5.3 | 4.6 | 4.8 | 5.0 | 5.1 | 0.9 | 12.0 |

## Engagement



## Learning Efficiency

"AI+X" Blended Learning

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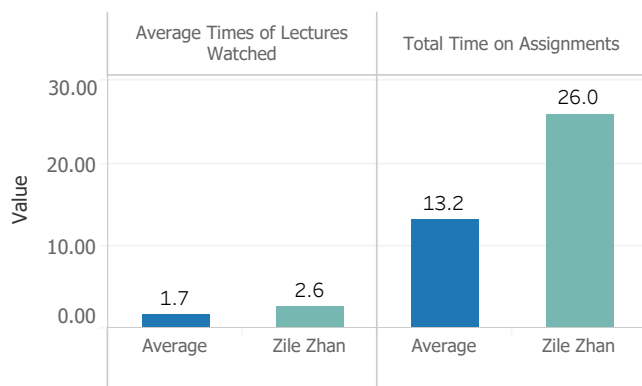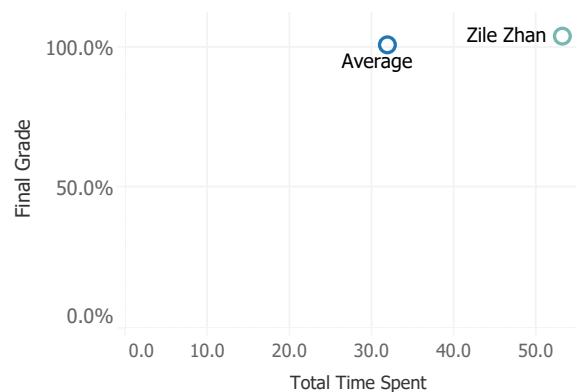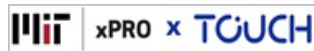
This Learning Analytics Report summarizes performance in  an  in-depth Small Private Online Course (SPOC) focused on AI and Machine Learning. Over six weeks, every student participating in this course learns about ordinary and partial differential equations, optimization, regression and classification, and probabilistic methods. Through pre-recorded lectures and live sessions with industry experts, students are exposed to fundamental knowledge that can be applied to numerous fields and disciplines.

A more thorough survey of topics covered in this SPOC (in both pre-recorded and live lectures) can be found in the list below:

| Pre-Recorded Lectures | Live Sessions |
|---|---|
| **Introduction, Review of Linear Algebra and Matrix Operations, and Modeling Fundamentals**: Introduces Ordinary Differential Equations, as well as the Forward Euler Method and other Higher-Order and Implicit Method for utilizing ODEs. | Surrogate Modeling for Simulations and Data |
| **More Modeling and Simulation**: Introduces Partial Differential Equations (PDEs), Boundary Conditions, and Linear and Nonlinear Systems. | Convolutional Neural Networks for Computer Vision & Natural Language Processing |
| **Optimization and Data-Driven Modeling**: Introduces the topic of Optimization, as well as Least Square Problems, Gradient Descent, Newton's Method, and Parameter Estimations. | Machine Learning in Quantitative Finance |
| **From Optimization to Machine Learning**: Introduces Regression and Classification | Atomistic Simulation |
| **Probabilistic Methods**: Introduces Probabilistic Methods such as Monte Carlo Simulation, Probabilistic Forecasting, and Sensitivity Analysis. | Natural Language Processing |
| **Case Studies and Summary**: Applies all previous learning to real-world examples and gives students the chance to see how what they learned can be applied. | Computer Vision and Image Processing |

| Total Pre-Recorded Lecture Hours | Total Live Session Hours | Total Hours |
|---|---|---|
| 26 | 12 | 38 |

The student has recently completed this in-depth SPOC in the field of AI. This analytics report gives a summary of performance throughout the entire SPOC, including pre-recorded lectures, live sessions with core faculty and industry experts, and the implementation of data-related projects. The course is designed to provide a systematic view of machine learning fundamentals including modeling, simulation, optimization, and probabilistic methods, along with their applications. Upon completion of the course, the student will have the confidence to solve real-world problems by themselves in the future.

"AI+X" Blended Learning

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Massachusetts Institute of Technology

*This is to certify that*

# Zile Zhan

*has successfully completed*

## Machine Learning, Modeling, and Simulation Principles

**TOUCH**

| **Touch Education Technology** | **Sanjay Sarma** | **Youssef M. Marzouk** |
|---|---|---|
| "AI+X" Blended Learning program in collaboration with Massachusetts Institute of Technology | Vice President for Open Learning | Professor of Aeronautics & Astronautics |
| | Professor of Mechanical Engineering | Faculty Co-Director, MIT Center for Computational Science and Engineering |
| | Massachusetts Institute of Technology | Massachusetts Institute of Technology |

**Valid Certificate ID:** 7769e305-380e-4f0f-9e52-b98c6e5dc40a

# TOUCH

My dear colleagues,

For the past twelve weeks, I have been Zile Zhan's Project Lead for a Project Based Learning (PBL) program in machine learning and quantitative finance. In this time, I have grown to appreciate Zile not only as a student who was a pleasure to teach, but also as an individual with striking team spirit.

I specialize in stochastic analysis and machine learning methods in solving optimization problems in mathematical finance, in particular in the areas of valuation of derivatives securities, optimal portfolio strategies, and short-term market prediction. I have also worked with asset management companies on designing advanced valuation models as well as published academic research in reputable journals of applied probability and mathematical finance. During this time, I have come across a wide range of individuals. With them all in mind, I say that Zile has definitely held her own in this challenging PBL program.

Over the course of the 12-week program Zile had a great deal of responsibility, including conducting research on prediction of Bitcoin returns using a hybrid approach based on informers and convolutional neural networks, writing a paper summarizing her research, and presenting her research findings to myself and other colleagues. I interacted with Zile on a weekly basis throughout the entirety of the program through online live sessions and offline support, and have witnessed her growth first-hand.

At the time of the PBL program, Zile was a junior at the Xiamen University School of Economics. During completion of their project, she has demonstrated a sound knowledge of finance by identifying a series of useful indicators in measuring the price dynamics of cryptocurrencies, giving in detail the economic interpretations behind each explanatory variable. Besides, she conducted an adequate qualitative analysis of the network-fitted models, highlighting how they can be linked to the fundamental theories of finance. The processing of raw market data also showed she is confident and proficient in applying various standard tests in time series analysis.

I anticipate that Zile will leverage the skills and experiences from her time in the PBL in many exciting and fruitful aspects of her life. She has expressed desire to contribute to quantitative finance, and has identified her first endeavor in preparing to do so as pursuing this opportunity. I believe Zile would be a good candidate for this.

It is with great pleasure that I recommend Zile to you. Please do not hesitate to let me know if I can be of further assistance to you regarding his application. You can reach me via email at _academic@touchedu.io_.

Thank you very much for your time and consideration.

**TOUCH**

**Project Lead Signature:**

DocuSigned by:

*Weixuan Xia*

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**Name: Weixuan Xia**

**Title: Researcher in Mathematical Finance at the Questrom School of Business of Boston University**

**Date:** 6/3/2021

**Academic Team Signature:**

DocuSigned by:

*Chris Gunnell*

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**Name: Chris Gunnell**

**Title: Senior Academic Coordinator**

**Date:** 6/4/2021