



## Oscar Karlsson

MSc Science in Engineering

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in/oscar-karlsson-469044164

## Skills

- Stochastic Modeling
  - Time Series
  - Financial Modeling
  - Modern Regression Techniques
- Machine Learning
  - Reinforcement Learning
  - Neural Networks and Deep Learning
  - Optimization for Learning
- Applied Statistics
  - Markov Processes
  - Monte Carlo and MCMC
- Optimal Control
  - Stochastic Optimal Control
  - Learning Based Control
- Programming and Data Handling
  - Python
  - R
  - Java
  - SQL
  - Excel

## Languages

- English – Native Fluency
- Swedish – Native Fluency

## Professional Summary

I am a recently graduated Engineer with a focus on financial modeling, machine learning and control theory. I'm a curious problem solver, always looking to expand my horizons. I thrive when working in a team, truly great accomplishments are made when you build on each other's strengths, benefit from shared knowledge and develop together.

## Work Experience

### Care assistant - Nighttime

May 2023 - Aug 2023

Lunds Kommun

Lund, Skåne Län

- Individually managed list of visits, provided medicine by delegation, and adapted to additional and emergency visits requested by clients.

### Tutoring

2022

Astronomisk Ungdom

Lund, Skåne Län

- Tutored high-school students in Math and Physics for Astronomisk Ungdom

### Warehouse employee

July 2021 - Aug 2021 | June 2020 - Aug 2020

IKEA Indirect Material and Services AB

Älmhult, Kronobergs Län

- Operated forklift and handled picking to meet KPIs in largely unsupervised setting

## Volunteering

### International Mentor

Fall 2021 to Early Spring 2022

Lunds University

Lund, Skåne Län

- Introduced international students to student life in Lund, as well as assisting with logistical, practical and social elements of studying abroad

### Auditor/Cashier

2021-2024

LARA - Lund Aerospace and Rocketry Association

Lund, Skåne Län

- Served as an auditor (2021), and the cashier (2022-2024), as well as led smaller projects

## Education

### Master of Science in Engineering (Civilingenjör i Teknisk Fysik) Lund University

Aug 2020 - June 2025

Lund Skåne Län

- Specialized in Machine Learning (AI), Optimal Control and statistical tools for Time Series and Financial applications
- Wrote Master's thesis with Nordea in Copenhagen  
*Better hedging of CVA with Reinforcement Learning*  
Supervisors: Dr. Magnus Wiktorsson, Lund University; Shengyao Zhu, Nordea (now employed by SEB)
- Strong foundation in math, physics and programming from core coursework

### IB Bilingual Diploma

Katedralskolan Lund

Completed 2019

Lund Skåne Län

- Native Fluency in English and Swedish having lived in the United States and Sweden as well as completed the IB program

# Projects

**Master's Thesis – Better hedging of CVA with reinforcement learning** | *Python, PDEs/SDEs, ML, Stochastic Optimal Control*  
Spring 2025

- Wrote My Master's thesis under the supervision of Zhu Shengyao at the Nordea XVA desk and Dr. Magnus Wiktorsson from Lunds University, on applying ML techniques to hedge CVA (Credit Value Adjustment) on Interest Rate Swaps.
  - The project involved constructing a simulated market environment capturing key risks, and complexities associated with both CVA and IRS products. After much consideration, we used a one factor Hull White model for interest rate modeling, with a real world calibrated forward curve. We modeled defaults as being driven by a JCIR model, and generated data with various correlations between interest rate and default.
  - The project further involved designing and training a Reinforcement Learning Network to minimize risk metrics, which is handled as a stochastic optimal control problem. This stage involved network creation, RL environment design, from reward function to transformation of observations and outputs and problem aware hyper-parameter tuning.
  - The paper is available from Lunds University [🔗](#), and the code is made available on GitHub [🔗](#).

**Minor Programming Projects** | *Python, Numpy, Java, SQL, Data Scraping, Data Structures, Data Engineering*  
2020-2025

- Produced a variety of hobby programming projects through my time at the Uni for fun and to apply knowledge gained, some selected examples are:
  - Self taught SQL with mockup of rock-climbing tracking app. Interfaced between locally hosted MySQL server and Python through the use of pyodbc. Proved knowledge in both DDL in setting up database and DML through automated and manual insertion of synthetic data and construction of complex queries. [🔗](#)
  - Self studied and applied causal inference (ongoing) [🔗](#)
  - Built numerous small tools and experiments in Python and other languages. Fields range from comparing ML models' performance on synthetic data to practice tools for music.
- Additionally a contributor to the closed source KanjiKen app [🔗](#). Worked on backend and bugfixes.

# Courses in Selection

An electronically stamped and verifiable copy of my full degree is available on request.

<b>Financial Statistics</b> <i>Grade 5, Pass With Distinction</i>	2024 Fall A Level   7.5hp
<b>Financial Management</b> <i>Grade 4, Pass With Credit</i>	2024 Fall A Level   6.0hp
<b>Valuation of Derivative Assets</b> <i>Grade 5, Pass With Distinction</i>	2024 Fall A Level   7.5hp
<b>Optimization for Learning</b> <i>Grade 4, Pass With Credit</i>	2024 Fall A Level   7.5hp
<b>Network Dynamics</b> <i>Grade 5, Pass With Distinction</i>	2024 Spring A Level   7.5hp
<b>Linear and Logistic Regression</b> <i>Grade 4, Pass With Credit</i>	2024 Spring A Level   7.5hp
<b>Monte Carlo and Empirical Methods for Stochastic Inference</b> <i>Grade 5, Pass With Distinction</i>	2024 Spring A Level   7.5hp
<b>Learning Based Control</b> <i>Grade 4, Pass With Credit</i>	2024 Spring A Level   7.5hp
<b>Mathematical Statistics, Time Series Analysis</b> <i>Grade 4, Pass With Credit</i>	2023 Fall A Level   7.5hp
<b>Markov Processes</b> <i>Grade 5, Pass With Distinction</i>	2023 Fall G2 Level   7.5hp

# Programming Languages, Libraries and Computer Literacy

**Languages:** Java, Python, R, C (basics), Matlab, SQL

**Libraries/Frameworks:** Python: pandas, numpy, statsmodel, tensorflow, sklearn, torch, SB3 | R: MASS, dplyr

**Technologies:** Github, Jupyter & Python Notebooks, Linux, Windows and Office including Excel, TeX, Virtual Environments