



CAS ETH in Machine Learning in Finance and Insurance

9-month programme beginning on March 1, 2025

Machine Learning & AI in Finance and Insurance

With breakthroughs in Generative AI and large language models (LLMs), AI has surged to the top of the corporate agenda. As the financial services industry evolves, integrating AI and machine learning has become a necessity. Machine learning, the backbone of AI, empowers systems to learn from data, adapt, and make decisions autonomously, transforming everything from risk management to personalized customer experiences.

At the ETH FinsureTech Hub, we believe the financial services sector is uniquely positioned to leverage these advancements, offering some of the most compelling use cases in today's technological revolution.

The CAS ETH in Machine Learning in Finance and Insurance places you at the forefront of this transformation. Whether you are making strategic decisions, engineering AI-driven systems, or leading innovation, a solid grasp of machine learning is essential.

Our programme stands out for its academic rigour and deep connection to real-world challenges. You will gain a solid understanding of machine learning methods and practical experience in applying them to pressing challenges in finance and insurance, ranging from optimizing investment strategies to predictive modeling.

Sincerely,

Bastian, Patrick and Josef



Josef Teichmann
Professor of Mathematics
Head of Department of Mathematics
ETH Zurich



Patrick Cheridito
Professor of Mathematics
Director, RiskLab
ETH Zurich



Bastian Bergmann
Executive Director
ETH FinsureTech Hub
ETH Zurich

Your Journey into Machine Learning & AI

Build competence beyond buzzwords.

Many executive programmes focus broadly on Artificial Intelligence (AI), often staying at a high level. The CAS ETH in Machine Learning in Finance and Insurance offers something different — a deep dive into the core of AI: machine learning.

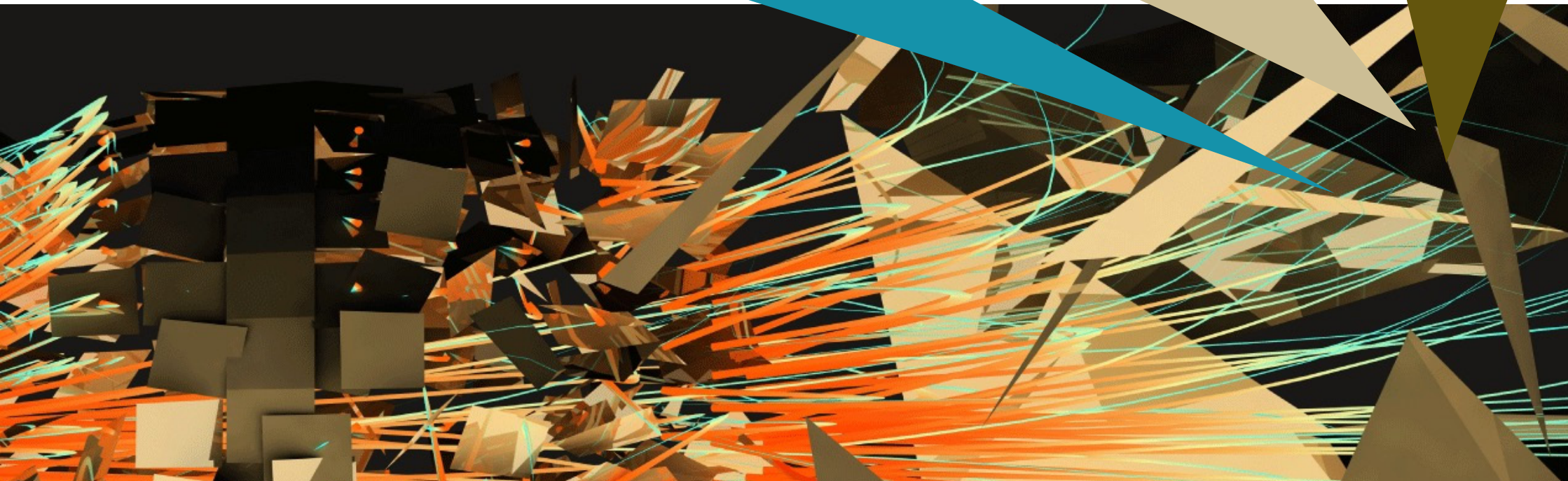
Machine learning is not just another buzzword; it's the engine driving modern AI's most impactful innovations. While many program-

mes gloss over the technical complexities, we believe that true leadership in the age of AI requires a deep understanding of the algorithms and data driven methods that power these technologies.

This focus on machine learning, rather than just the surface-level aspects of AI, is what sets our programme apart.

Certification

Upon successful completion of the programme, you will be awarded a Certificate of Advanced Studies (CAS) from ETH Zurich. This certification is a powerful testament to the enhanced skills and critical thinking abilities you will develop.





Operationalizing AI Governance

ETH CAS Machine Learning 2024

June 6, 2024

Dr. Lisa Bechtold
Head of AI Governance
Zurich Insurance Group

«Governing AI solutions goes far beyond the dimensions of technology and regulatory compliance: Today, the way we use AI is an integral element of the business strategy.»

Lisa Bechtold,
Head of AI Governance, Zurich Insurance Group
Guest Speaker

What you will learn

Master core concepts and acquire practical skills.

Through engaging lectures, hands-on projects, and direct interactions with industry experts, you will understand how leading banks, insurance companies, and fintechs are applying machine learning to enhance risk management, detect fraud, and solve complex efficiency challenges. You will emerge with a solid grasp of what machine learning and AI really are and can offer to the financial services industry, enabling you to make a meaningful impact in integrating machine learning technologies within your organization.

Key Learnings:

- **Foundations of Machine Learning:** The basics of machine learning, including deep dives into supervised and unsupervised learning problems relevant to finance and insurance, as well as advanced deep learning methods and large language models.
- **Industry-Relevant Applications:** The full value chain of a machine learning project, from designing IT architecture and machine learning pipelines, to model deployment, and maintenance.
- **Responsible AI:** The most relevant interpretability methods and strategies to build trust in machine learning-powered services, ensuring their responsible use. This includes navigating the regulatory

landscape that governs the design, deployment, and maintenance of AI technologies.

- **Effective Innovation:** The typical phases of an innovation process within a corporate or fintech environment.

«We unite leading experts in machine learning, data science, and emerging technologies to equip professionals with the tools to drive innovation in finance and insurance. Our focus is on translating cutting edge research into real-world impact»

Bastian Bergmann, Executive Director ETH FinsureTech Hub

How the Programme works

Structured learning for professional growth.

March

Block I: Introduction to Machine Learning

Format: Lectures with exercises

Workload: 8 Fridays 6h in class, 4-6h preparation time per week

About: You will gain a solid foundation in the fundamentals of machine learning, including key concepts, models, algorithms and practical applications to develop the skills required to train and evaluate machine learning models for different real-world tasks.

- **Key Concepts:** Mathematical background for machine learning, the theory of statistical learning, machine learning methods, including supervised and unsupervised modeling and deep learning.
- **Skills-Building-Activities:** To deepen your understanding, you will work on in-class exercises and explore additional materials through self-paced learning. Continuous feedback from ETH faculty will guide and support you throughout your learning journey.
- **Assessment:** You will undertake two projects that apply machine learning techniques to address practical challenges in finance and insurance. In each project, you will articulate the theoretical foundations, demonstrate their application to real-world scenarios, and develop code to implement the solutions.

April

+ Additional 2-Day Bootcamp on «Fundamentals of Generative AI»

About: This workshop offers an in-depth exploration of the theory and fundamentals of generative AI, equipping you with a strong foundation in the algorithms, models, and key concepts behind this advanced technology. You will learn about the mathematical principles underlying generative models and participate in hands-on coding sessions to build and experiment with generative AI systems.

Deliverable: Active Participation & Hand in 2 Group Exercises (graded)

May

June

Block II: Ethics in the Age of AI

Format: Full-Day Workshop with Lectures, Case Work and Guest Speakers
Workload: 3 Days in May/June, 6-8h preparation time

About: You will gain a multidisciplinary understanding of AI ethics, which guides the responsible design of AI systems in society. You will engage in dynamic discussions on key ethical questions, the complexities of AI-assisted decision-making, and explore critical issues like machine learning fairness, transparency, and explainability through hands-on coding exercises. Finally, you will dive into how regulations, including the EU AI Act, address the design, development, and maintenance of AI systems, equipping you with insights into the evolving landscape of AI governance

Deliverable: Active Participation & Case Work in Class

Block III: Cases in Machine Learning in Finance and Insurance

Format: Full-Day Workshops, Case Work, Guest Speakers & Company Visits
Workload: 5 x 2 Days in June/July/September, each with 4-6h preparation time

About: You will get exposure to real-world case studies and projects in finance and insurance where ML techniques are tested and successfully applied. Gain insights and understanding of the overall system landscape and pipeline in which a machine learning model is embedded.

- Cases in Machine Learning in Finance I
- Cases in Machine Learning in Finance II
- Cases in Machine Learning in Insurance I
- Cases in Machine Learning in Insurance II
- Cases in Fintech and Startups

Deliverable: Active Participation & Case Work in Class

July

Sep

Block IV: Your Innovation Project

Format: Individual Project Work over 4-6 weeks
Workload: Overall 30h

Innovation Workshop: One-Day Workshop on Innovation, Ideation, Growth

About: Spurred on by the learnings achieved through Blocks I-III, Block IV will allow you to advance your machine learning skills through an individual project over 4-6 weeks. Whether you focus on machine learning modeling, the risks of ML-powered services, or the design of innovative applications in finance and insurance, your project will be tailored to your interests and career goals. This capstone project enables you to apply your knowledge to real-world challenges, showcasing your ability to drive innovation in your field.

Deliverable: Project Presentation & Report (graded)

Oct

Nov

Graduation Event

Degree: Certificate of Advanced Studies ETH in Machine Learning in Finance and Insurance

Total Credits: 15 ECTS

Tuition Fee: CHF 13 000

Programme Start: 1 March

Duration: 9 month

Application Window: 1. Nov to 31. Jan

Foster Intellectual Leadership

Fuel your curiosity, empower your AI journey!

Collaborative Learning Environment

Step into a friendly and collaborative atmosphere where you will connect with like-minded peers, challenge your ideas, and expand your horizons. Through open discussions and group activities, you will sharpen your communication skills on cutting-edge tech topics, all while building valuable professional relationships that last.

Diverse Insights from Industry Leaders

Gain a comprehensive perspective on Machine Learning with insights from CEO-level strategies to the hands-on expertise of project managers and data architects. You will engage with all key stakeholders in the field, ensuring a well-rounded understanding of how Machine Learning is transforming organizations at every level.

Personalized Interaction with Industry Experts & Lecturers

Join a program designed for direct engagement with dedicated lecturers and top industry professionals. With small class sizes, you will enjoy intimate, meaningful discussions and the opportunity to ask questions that drive deeper understanding. Explore your interests in depth and get personalized attention to fuel your growth.

Check out the current list of external lecturers and speakers: [Link](#)

A Perfect Blend of Theory and Practical Application

Our program strikes the ideal balance between fundamental theories and real-world applications. Through engaging slides, interactive group work, reading materials, and hands-on coding exercises, you will solidify your understanding of the concepts. With self-paced mini exercises, you will have the freedom to learn at your own pace, while receiving individual consulting sessions to guide you through your personal learning journey.



About You

Getting ready to lead in the Age of AI.

Whether you are an executive making strategic decisions, a developer engineering AI-driven systems, or a manager driving innovation, this programme is designed to equip ambitious professionals in finance and insurance with the deep machine learning expertise needed to stay ahead in the age of AI.

Gaining a thorough understanding of machine learning is no longer optional – it is essential for maintaining a competitive edge. This programme offers both the theoretical knowledge and practical skills needed to implement AI solutions effectively, equipping you to confidently seize the opportunities ahead.

You bring:

- **A Strong Academic Background:** Demonstrated by a Master's degree acknowledged by ETH Zurich or an equivalent qualification, preferably in the natural sciences or engineering field as well as finance and economics.
- **Industry Experience:** At least two years of professional experience in finance, banking, or insurance.
- **Proficiency in English:** A solid command of English, as the program is conducted entirely in English.

Coding requirements:

Prior coding experience is welcome but not mandatory. During the course you are expected to follow basic coding examples as a basic requirement for the credits. In addition, you have the opportunity to deep dive into coding for a specific project guided by faculty and professionals.

Application Process for Cohort 2025:

Applications are submitted online through the ETH School for Continuing Education. Applications are reviewed on a rolling basis, typically within two to three weeks. With a maximum class size of 25 students, early submission is encouraged as the program may fill up before the application deadline. The application window opens on November 1, 2024, and closes on January 31, 2025.

Information Events

Join our information events to learn more about the program, meet faculty, and connect with current students and alumni of the CAS. We also offer individual consultations if you have specific questions or need guidance

Upcoming: CAS Information Event - [Link](#)



«I chose the CAS to both deepen my understanding of machine learning algorithms at a top university and to facilitate transition into a more data-centered role. During the programme I enjoyed to network and to learn from fellow students, industry leaders, and ETH lecturers.»

Tomasz Skorkowski
CAS Class 2024



Studying in the heart of Europe

ETH Zurich

ETH Zurich is not just a university; it is a catalyst for innovation and economic growth. Our commitment to knowledge exchange and transfer strengthens innovation and boosts prosperity in society.

Founded in 1855 and situated in the heart of Europe, ETH Zurich drives Swiss innovation, providing an ideal environment for independent thinking and award-winning research. Ranked 7th globally in the QS ranking 2025, ETH Zurich fosters a spirit of freedom, responsibility, and entrepreneurial excellence, connecting you to a global network while addressing the challenges of today and tomorrow.

ETH FinsureTech Hub

The Finsuretech Hub, emerging from the Department of Mathematics, is dedicated to bridging pioneering research with real-world expertise. By uniting cutting-edge knowledge in machine learning, cyber security, distributed ledger technology, digital currencies, and quantum computing, we aim to develop impactful insights and approaches that address the challenges of today and tomorrow. Our mission is to translate mathematical excellence into practical applications through integrative research and education at the master's and professional levels, driving value and impact across the financial and technology sectors.

Visit us at: www.finsuretech.ethz.ch.

FinsureTech < HUB >

ETH Zürich
ETH FinsureTech Hub
Department of Mathematics

www.finsuretech.ethz.ch

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