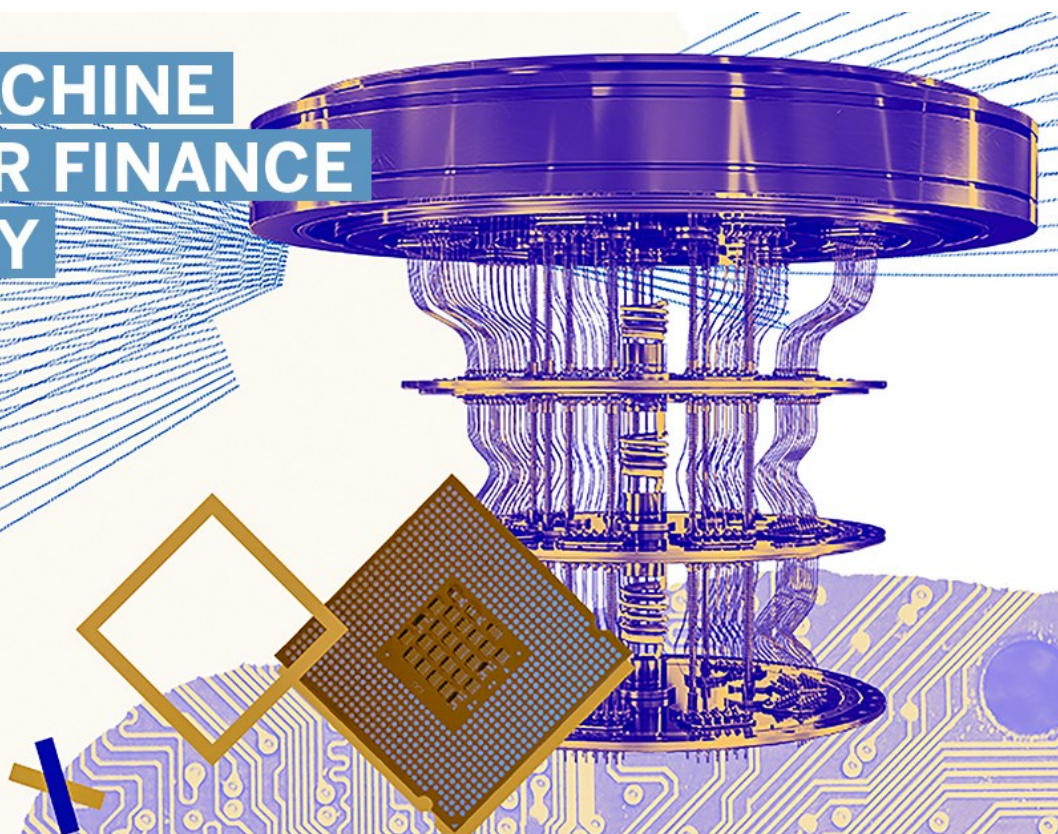


# QUANTUM MACHINE LEARNING FOR FINANCE AND INDUSTRY 1<sup>ST</sup> LEVEL



**MASTER'S DEGREE**  
III EDITION A.Y. 2025 – 2026

## PRESENTATION

The Executive Master in Quantum Machine Learning for Finance and Industry explores and examines the themes of Quantum Computing. This is a recent approach to computing based on the principles of quantum mechanics. Unlike traditional computing, which encodes and processes information in terms of bits (zeros or ones), Quantum Computing takes advantage of the properties of quantum physics, such as the superposition of quantum states and entanglement. The advantage of this type of computing is its ability to easily solve problems that otherwise prove difficult for traditional computing in terms of both the hardware resources and calculation times required. Equally innovative are Machine Learning in its various forms and Artificial Intelligence broadly defined. These are a set of quantitative methods that are inspired by the way that advanced living beings and Nature “produce” intelligent processes. The main capacity of these methods is that they can develop problem-solving capabilities autonomously.

Combining these two disciplinary areas is giving life to a new paradigm in the field of computing for automatic learning: Quantum Machine Learning. The possibilities it offers for enabling smart systems to learn “easily” how to solve problems – even extremely complex problems – will have a disruptive impact on many industries and fields of research, such as financial trading, industrial simulations and design, and complex system forecasting.

The Master's degree program is, therefore, necessarily and deliberately multidisciplinary, involving four departments at Ca' Foscari University of Venice (specifically, the Department of Economics, the Department of Management, the Department of Environmental Sciences, Computer Science and Statistics and the Department of Molecular Sciences and Nanosystems). It presents and refines the knowledge needed to be able to understand and be an active part of this transitional phase from its earlier stages. In particular, knowledge will be dispensed regarding competencies in Quantum Computing, Machine Learning, mathematics, statistics, physics, computer science, economics, and finance.

The initial part of the Master's degree programme will be dedicated to reviewing the main mathematical and statistical foundations needed to be able to access the subsequent content effectively. In particular, after the initial overview, the following blocks of knowledge and skills will be developed:

- Machine and Deep Learning;
- Quantum Computation;
- Quantum Machine and Deep Learning;
- Applications in the FinTech and industrial sectors.

## OBJECTIVES

The graduates of the Master's degree programme can go on to work at private firms in the following sectors: finance, financial, insurance, and actuarial sectors; in the management of industrial Big Data; in Cybersecurity for information protection; in the production of public services for the management of smart cities and territorial Internet of Things; and in freelance professions as Quantum Machine Learning (QML) Developers and QML Data Analysts.

## SYLLABUS

### **MATHEMATICAL, STATISTICAL, PROGRAMMING, AND REGULATORY PRELIMINARIES**

*Objective:* To provide preliminary references in linear algebra, optimization, statistics, coding, and regulatory rules.

*Course hours:* 24

### **INTRODUCTION TO QUANTUM MECHANICS**

*Objective:* To provide knowledge and skills on the introductory aspects of Quantum Physics.

*Course hours:* 24

### **QUANTUM INFORMATION AND COMPUTATION**

*Objective:* To provide knowledge and skills on the formalism of quantum mechanics.

*Course hours:* 24

### **QUANTUM ANNEALING**

*Objective:* To provide knowledge and skills on quantum computing.

*Course hours:* 12

## **MACHINE/DEEP LEARNING**

*Objective:* To provide knowledge and skills on the basic elements of Machine Learning, with practice in the Python environment.

*Course hours:* 36

## **QUANTUM MACHINE/DEEP LEARNING – GATE MODEL**

*Objective:* to provide knowledge and skills on quantum algorithms for linear algebra and optimization; on quantum hybrid computing; on variational quantum algorithms; on quantum machine learning methods.

*Course hours:* 32

## **QUANTUM MACHINE/DEEP LEARNING – ANNEALING**

*Objective:* to provide knowledge and skills on quantum graph computation; on applications of quantum methods for machine learning; on feature selection.

*Course hours:* 30

## **QUANTUM APPLICATIONS**

*Objective:* to provide knowledge and skills on the main quantum algorithms.

*Course hours:* 12

## **DATA PROTECTION REGULATION**

*Objective:* to provide knowledge and skills on introductory aspects of data protection.

*Course hour:* 8

## **INTRODUCTION TO FINANCE & FINTECH**

*Objective:* to provide knowledge and skills on metaheuristic methods for optimization; on quantitative finance; and on models for the selection and management of financial portfolios.

*Course hours:* 50

## **LABS**

*Objective:* Provide opportunities to apply the knowledge and skills gained in previous modules.

*Course hours:* 48

## **DURATION AND ACADEMIC CREDITS (CFUs)**

The Master's has a duration of one year and consists of::

- **300 hours** of blended coursework
- **250 hours of internship** (participants already working in the sector can replace the internship with project work focusing on activities of interest)
- **1500 total hours of study**, including individual study and preparation of a final thesis
- **60 CFUs** awarded

## QUALIFICATION ISSUED

Students who have attended the didactic activities, completed the internship activities and passed any mid-term and final tests will be awarded with the qualification of 1st Level **Master's Degree in Quantum Machine Learning for Finance and Industry.**

## COURSE PERIOD

MARCH 2026 – JANUARY 2027

## COURSE CALENDAR

Friday from 9.00 AM to 12.00 PM and from 2.00 to 5.00 PM  
 Saturday from 9.00 AM to 12.00 PM and from 2.00 to 5.00 PM  
 Online lessons + two weeks in person at the end of the course at the Ca' Foscari Challenge School headquarters.  
*\* The teaching calendar will be defined in detail well in advance of the start of teaching activities and will be available for consultation on the Master's official website.*

## TEACHING METHOD

Blended

## LANGUAGE

The course will be taught in English.

## ATTENDANCE

Attendance is compulsory for 70% of total hours and will be monitored by the master's staff. Award of the degree is conditional on completion of activities, including any intermediate examinations, internship/project work and final examination. Students who work in a sector relevant to the Master's degree may apply to have their work counted in lieu of the internship.

## COURSE LOCATION

Ca' Foscari Challenge School, via della Libertà 12, 30175 Venezia (Vega Park) – Online platform.

## ADMISSION REQUIREMENTS

FIRST LEVEL  
 / Old system bachelor's degree/diploma in STEM discipline or equivalent foreign qualification  
 / Three-year bachelor's degree in STEM discipline or equivalent foreign qualification  
 / Equivalent foreign university qualification, subject to approval from the Teachers' Board  
 / At the discretion of the Master's Programme's Teachers' Board, candidates holding undergraduate degrees in economics, finance or other social sciences with a significant quantitative component to their studies may also be admitted.

## ADMISSION APPLICATION

To submit your application you must complete the online admission application, the details of which are defined in the art. 3 of the University's single Call. Only applications accompanied by all the required documentation will be considered. The notice and related attachments are present and downloadable on the Master's web page.  
 To compete for the award of any scholarships provided by the Master, please refer to the Master's web page

## SELECTION PROCEDURE

A specially appointed commission will evaluate the applications through analysis of the CV and qualifications presented and the motivational letter. As part of the selection, the evaluation criteria will be: the qualification, the professional experiences, knowledge inherent to the topics of the master's degree and the motivation.

## GRADUATE ELIGIBILITY

Students about to graduate may also be admitted to the course, provided they qualify within one month from the start of the course. In this case, the enrolment in the Master's may only be finalised after the valid qualification for admission has been awarded.

If there are available places not covered by regular enrollment, students without undergraduate degrees may audit the courses and will be awarded an attendance certificate.

## AVAILABLE PLACES

Maximum number of available places: **20**.

*\* The Master will only be activated when the minimum number of participants is reached envisaged by the organizational structure.*

## COURSE FEES:

**€ 5.000**

/ 1° instalment within **15/02/2026**: € 2.516 (inclusive of duty stamp of € 16)\*

/ 2° instalment within **05/05/2026**: € 2.500

*\* The cost of the revenue stamp is not refundable.*

## SELECTION FEES:

**€ 36** (inclusive of duty stamp of € 16)

Not refundable, to be paid by **February 5th 2026** when submitting the application for admission, via the PagoPA system.

Failure to pay the selection fee will result in exclusion from the selection process and from admission to the Master's Programme.

## STUDY SUPPORT

Information on possible scholarships to cover totally or partially the enrolment fee, if given, are updated on the Master's Programme web page on the website.

Loans are available from the University's partner banks (for more information: <http://www.unive.it/pag/8560/>).

## ENROLLMENT

ADMISSION APPLICATION SUBMISSION (online procedure, Call for Applications, art. 3): **within 05/02/2026**

SELECTION RESULT ANNOUNCEMENT: **within 10/02/2026**

ENROLMENT COMPLETION (online procedure, Call for Applications, art. 6): **within 15/02/2026**

Start of didactic programme: **March 2026**

## DIRECTOR

Prof. Marco Corazza

## INFORMATIONS

For general information concerning the Master's Programme, enrollment procedures, access methods and internships, please contact the Administration Office.

Ca' Foscari Challenge School - Administration Office



Università  
Ca' Foscari  
Venezia



Ca' Foscari  
**Challenge  
School**

# Innovation-Technology

from 9.00 AM to 1.00 PM

tel.0039 041 234 6853

e-mail [master.challengeschool@unive.it](mailto:master.challengeschool@unive.it)