

# Diploma supplement

## Master of Science MSc in Computer Science

**Section:**

### Computer Science

This Diploma Supplement model was developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international «transparency» and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

#### 1. Information concerning the holder of the diploma

- |                                 |                          |
|---------------------------------|--------------------------|
| 1.1 Family name(s)              | <b>Volodin</b>           |
| 1.2 First name                  | <b>Sergei</b>            |
| 1.3 Date of birth               | <b>October 3rd, 1994</b> |
| 1.4 Federal registration number | <b>17816018</b>          |

#### 2. Information concerning the diploma

##### 2.1 Type of qualification and title conferred with official abbreviation (in original language)

Qualification	<b>Master of Science MSc</b>
MSc Title	<b>Master of Science MSc in Computer Science</b>
Swiss Professional title	<b>Ingénieur informaticien (ing. info. dipl. EPF)</b>

##### 2.2 Main fields of study covered by the qualification

The Master programme comprises the conceptual aspects and mastery of computer systems at all levels, offering such transdisciplinary opportunities as specialisations in embedded systems, industrial computing or biocomputing. Thanks to the understanding of concepts acquired, this training can be continually adapted to technological development and take advantage of constantly emerging new computing tools. The EPFL computer engineer designs and develops new innovative products and services. S/He is capable of working in an international context, in either a company or an academic environment.

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## 2.3 Name and status of the awarding institution (in original language)

**École polytechnique fédérale de Lausanne, Suisse (EPFL)****EPFL - Foundation and Development**

Created in 1853 as the École Spéciale de Lausanne, the institution became the Swiss Federal Institute of Technology Lausanne in 1969. EPFL has kept evolving, restructuring its programs and creating new curricula, thus anticipating the scientific and technological developments. Today, EPFL is among the world's top technological universities and a strategic center of innovation in Switzerland.

At a national level, EPFL is expanding by establishing specialized research centers, including outposts in Neuchâtel (Microcity), Sion (Energypolis), Geneva (Campus Biotech), and Fribourg (Smart Living Lab). Each of these research centers is active in a field that is of particular importance to the region where it is located.

EPFL has positioned itself as a research-intensive university of technology, where science and engineering come together to benefit education as well as fundamental and applied research.

**EPFL Facts - 2020**

- 11'813 students, including 2'282 doctoral students, representing over 120 nationalities
- 6'369 employees, including 349 faculty members and 3'780 scientific collaborators
- 1'084 Master and 390 Doctorate degrees were delivered in 2020
- 375 laboratories
- 119 Start-ups, 26 Corporate companies, 8 SME and 17 Service providers representing a total of 2'663 employees at EPFL Innovation Park
- 500'000 visitors to the Library, collections with 26'000 volumes; campus-wide online access to 40 databases, over 21'000 scientific journals and over 130'000 ebooks
- a total budget in excess of CHF 1 billion

**Study Programs**

- Architecture; Civil Engineering; Environmental Sciences & Engineering
- Electrical & Electronics Engineering; Mechanical Engineering; Materials Science & Engineering; Microengineering; Robotics; Energy Science and Technology
- Computer Science; Communication Systems; Data Science; Cyber Security
- Physics; Applied Physics, Mathematics; Applied mathematics; Molecular and biological chemistry ; Chemical Engineering & Biotechnology, Computational Science & Engineering; Nuclear Engineering
- Life Sciences Engineering
- Management, Technology & Entrepreneurship; Financial Engineering
- Digital Humanities

The EPFL programs are certified by the Center of Accreditation and Quality Assurance of the Swiss Universities (OAQ), and those in engineering have also been certified by the French Commission des Titres d'Ingénieur (CTI). Thanks to this double certification, EPFL degrees receive the label EUR-ACE and are recognized throughout Europe.

**Technology transfer**

EPFL acts as a start-up incubator to assure the technology transfer from academic results into industrial development. During the last decade, EPFL scientists have created an average of one new business every month. The EPFL Innovation Park hosts 170 companies including 25 large international groups and over 140 start-ups, SME and service companies.

**International Relations**

While preserving the coherence of rigorous scientific training, EPFL offers its students exchange possibilities thanks to agreements with more than 200 carefully selected partner universities worldwide. EPFL is also a member of several academic networks, such as EuroTech, RESCIF, CLUSTER and CESAER, which promote scientific collaborations as well as student and faculty mobility.

**2.4 Name and status of institution (if different from 2.3) administering studies**

Some courses in complementary fields can be chosen at the University of Lausanne

**2.5 Languages of instruction/examination**

English only

**3. Information concerning the level of qualification****3.1 Level of qualification**

Master: Academic degree obtained after the second cycle of studies.

**3.2 Official duration of studies**

The Master comprises two stages:

- a. Master cycle of 2 semesters = 60 ECTS credits or 3 semesters = 90 ECTS credits
- b. Master project of 1 semester = 30 ECTS credits

1 credit = 25-30 hours of workload

**3.3 Admission requirements**

Bachelor's Degree in the corresponding field of studies awarded by a Swiss University or an École Polytechnique Fédérale (EPF) or according to qualifications, for other diplomas considered equivalent.

**4. Information concerning programme content and results gained****4.1 Mode of study**

Full-time

**4.2 Programme requirements**

The Master project is carried out after the 60 ECTS credits have been obtained in the Master programme or the 90 ECTS credits in the Master programme if a minor or a specialization is chosen (see art. 6.1).

An engineering internship in industry of a minimum length of 8 weeks is an integral part of the Master. However, depending on the study programme, if the Master project is of 25 weeks in length in industry, this 8 week internship can be dispensed with.

**4.3 Programme details and individual grades/marks/credits obtained**

The marks and the credits obtained appear in the grade sheet.

## 4.4 Grading system and if available information concerning allocation of grades

## Marking system EPFL

Excellent	6.0
Very good	5.5
Good	5.0
Satisfactory	4.5
Pass	4.0
Fail	3.5
Poor	3.0
Poor to very poor	2.5
Very poor	2.0
Not measurable	1.0

## 4.5 Overall classification of the qualification

**Final Master grade: 5.76 / 6****5. Information concerning the function of the qualification**

## 5.1 Acces to further studies

Allows application for specialised Master and other higher education programmes, in particular Doctoral programmes.

## 5.2 Professional status

There are no specific regulations bound to this profession

**6. Additional information**

## 6.1 Additional details on the individual course of the studies:

Engineering Internship:

Google Brain Software Engineering intern, Google,  
Mountain view, California, US, from 11 November 2019 to  
31 January 2020

Title of the Master project in the original language:

CauseOccam: Learning Interpretable Abstract  
Representations in Reinforcement Learning  
Environments via Model Sparsity from 23 November 2020  
to 26 March 2021

## 6.2 Others sources of information

**Computer Science Section**

EPFL Faculté IC  
Bâtiment IN  
Station 14  
CH-1015 Lausanne  
Tel: + 41 (0)21 6935637  
Web: <http://sin.epfl.ch/>  
E-mail: [sin@epfl.ch](mailto:sin@epfl.ch)

**Registrar's office**

EPFL AVP-E SAC  
Bâtiment polyvalent (BP)  
Station 16  
CH-1015 Lausanne  
Tél: + 41 (0)21 693 43 45  
Web: <https://www.epfl.ch/education/studies/>  
E-mail: [student.services@epfl.ch](mailto:student.services@epfl.ch)

Naric network: <http://www.crus.ch>  
Swissuniversity: <http://www.swissuniversity.ch>

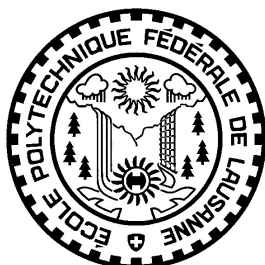
**7. Endorsement of the Diploma Supplement**

April 22nd, 2021

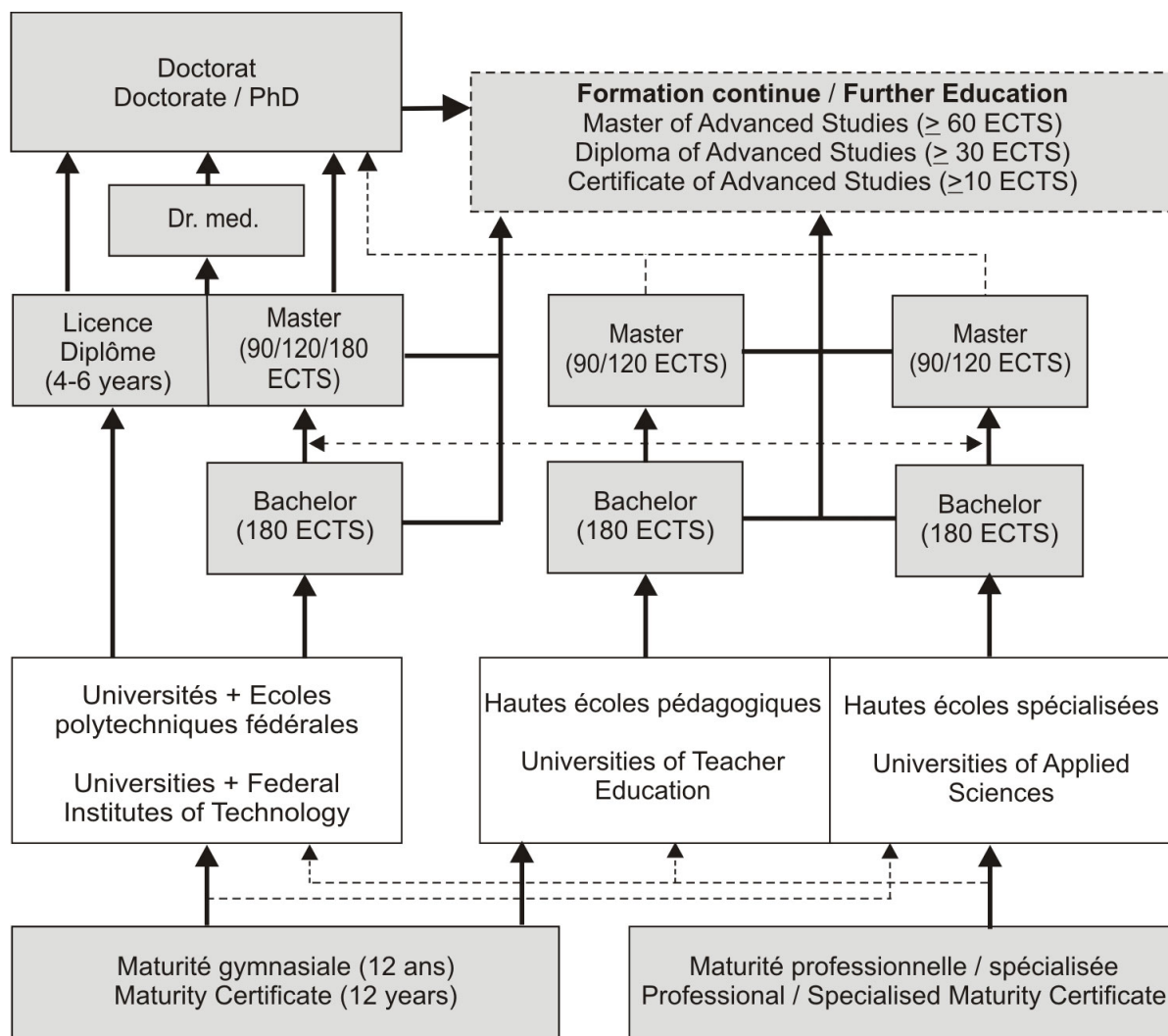
Associate Vice President for Education



Professor Pierre Dillenbourg



**8. Information on the Swiss education system**



**9. Description of courses attended****BIO-465 Biological modeling of neural networks**

ECTS Credits : 4.

Lecturers : Gerstner Wulfram. Semester : 2017-2018 Master semester 2

In this course we study mathematical models of neurons and neuronal networks in the context of biology and establish links to models of cognition.

**BIO-483 Neuroscience III: behavior & cognition**

ECTS Credits : 5.

Lecturers : Blanke Olaf, Herzog Michael, Sandi Perez Maria del Carmen. Semester : 2018-2019 Master semester 2

The goal is to guide students into the essential topics of Behavioral and Cognitive Neuroscience. The challenge for the student in this course is to integrate the diverse knowledge acquired from those levels of analysis into a more or less coherent understanding of brain structure and function.

**BIOENG-486 Sensorimotor neuroprosthetics**

ECTS Credits : 4.

Lecturers : Courtine Grégoire, Micera Silvestro. Semester : 2018-2019 Master semester 3

Teaching objectives: history, neural control of movement, computational motor control, neurorehabilitation after CNS disorders, upper limb and hand neuroprostheses, lower limb neuroprostheses, student project.

**BIOENG-490 Project in computational neurosciences**

ECTS Credits : 8.

Lecturers : Brea Johanni Michael. Semester : 2019-2020 Master semester 4

The student will engage in a laboratory-based project in the field of computational neuroscience in one of the research labs of the EPFL working in this field.

**COM-512 Networks out of control**

ECTS Credits : 4.

Lecturers : Celis Laura Elisa, Thiran Patrick. Semester : 2017-2018 Master semester 2

The goal of this class is to acquire mathematical tools and engineering insight about networks whose structure is random, as well as decentralized processes that take place on these networks.

**CS-433 Machine learning**

ECTS Credits : 7.

Lecturers : Jaggi Martin, Urbanke Rüdiger. Semester : 2017-2018 Master semester 1

Machine learning and data analysis are becoming increasingly central in many sciences and applications. In this course, fundamental principles and methods of machine learning will be introduced, analyzed and practically implemented.

**CS-434 Unsupervised & reinforcement learning in neural networks**

ECTS Credits : 4.

Lecturers : Gewaltig Marc-Oliver. Semester : 2017-2018 Master semester 2

Learning is observable in animal and human behavior, but learning is also a topic of computer science. This course links algorithms from machine learning with biological phenomena of synaptic plasticity. The course covers unsupervised and reinforcement learning, but not supervised learning.

**CS-439 Optimization for machine learning**

ECTS Credits : 4.

Lecturers : Jaggi Martin. Semester : 2018-2019 Master semester 2

This course teaches an overview of modern optimization methods, for applications in machine learning and data science. In particular, scalability of algorithms to large datasets will be discussed in theory and in implementation.

**CS-442 Computer vision**

ECTS Credits : 4.

Lecturers : Fua Pascal. Semester : 2019-2020 Master semester 4

Computer Vision aims at modeling the world from digital images acquired using video or infrared cameras, and other imaging sensors. We will focus on images acquired using digital cameras. We will introduce basic processing techniques and discuss their field of applicability.

**CS-448 Sublinear algorithms for big data analysis**

ECTS Credits : 4.

Lecturers : Kapralov Mikhail. Semester : 2017-2018 Master semester 2

In this course we will define rigorous mathematical models for computing on large datasets, cover main algorithmic techniques that have been developed for sublinear (e.g. faster than linear time) data processing. We will also discuss limitations inherent to computing with constrained resources.

**CS-450 Advanced algorithms**

ECTS Credits : 7.

Lecturers : Svensson Ola Nils Anders. Semester : 2018-2019 Master semester 2

A first graduate course in algorithms, this course assumes minimal background, but moves rapidly. The objective is to learn the main techniques of algorithm analysis and design, while building a repertory of basic algorithmic solutions to problems in many domains.

**CS-451 Distributed algorithms**

ECTS Credits : 6.

Lecturers : Guerraoui Rachid. Semester : 2018-2019 Master semester 3

Computing is often distributed over several machines, in a local IP-like network, a cloud or in a P2P network. Failures are common and computations need to proceed despite partial failures of machines or communication links. The foundations of reliable distributed computing will be studied.

**CS-498 Project in computer science II**

ECTS Credits : 12.

Lecturers : Guerraoui Rachid. Semester : 2018-2019 Master semester 3

Individual research during the semester under the guidance of a professor or an assistant.

**CS-524 Computational complexity**

ECTS Credits : 4.

Lecturers : Svensson Ola Nils Anders. Semester : 2018-2019 Master semester 3

In computational complexity we study the computational resources needed to solve problems and understand the relation between different types of computation. This course advances the students knowledge of computational complexity, and develop an understanding of fundamental open questions.

**CS-526 Learning theory**

ECTS Credits : 4.

Lecturers : Macris Nicolas, Urbanke Rüdiger. Semester : 2018-2019 Master semester 2

Machine learning and data analysis are becoming increasingly central in many sciences and applications. This course concentrates on the theoretical underpinnings of machine learning.

**CS-595 Internship credited with Master Project (master in Computer Science)**

ECTS Credits : 0.

Lecturers : . Semester : 2019-2020 Master semester 4

The engineering internship is part of the curriculum for master's students. They join companies in Switzerland or abroad for an internship or a master's thesis project which takes place in a field of activity where the skills of the future engineer are highlighted.

**EE-618 Theory and Methods for Reinforcement Learning**

ECTS Credits : 3.

Lecturers : Cevher Volkan. Semester : 2018-2019 Master semester 2

This course describes theory and methods for decision making under uncertainty under partial feedback.

**HUM-429(a) Philosophy of life sciences I**

ECTS Credits : 3.

Lecturers : Arminjon Mathieu. Semester : 2017-2018 Master semester 1

Understand and discuss central issues in the philosophy of life sciences, for instance that of reductionism. Transpose problems and arguments from one debate to another. Evaluate the impact of the scientific worldview to the proper understanding of our human nature.

**HUM-429(b) Philosophy of life sciences II**

ECTS Credits : 3.

Lecturers : Sachse Christian. Semester : 2017-2018 Master semester 2

Evaluate the main positions in a chosen philosophical debate. Develop, possibly in a group, a solid approach to one or more philosophical problems of that debate. Defend your analysis and conclusions.

**MATH-318 Set theory**



ECTS Credits : 5.

Lecturers : Duparc Jacques. Semester : 2017-2018 Master semester 1

Set Theory as a foundational system for mathematics. Relative consistency of the Axiom of Choice and the Continuum Hypothesis.