ETH zürich

MSc in Cyber Security

Tuesday, 5 November 2024

Online, 13:30

ETH zürich

Department of
Computer Science

Information:
Joint Degree Master's programme
Cyber Security ETH Zurich / EPFL

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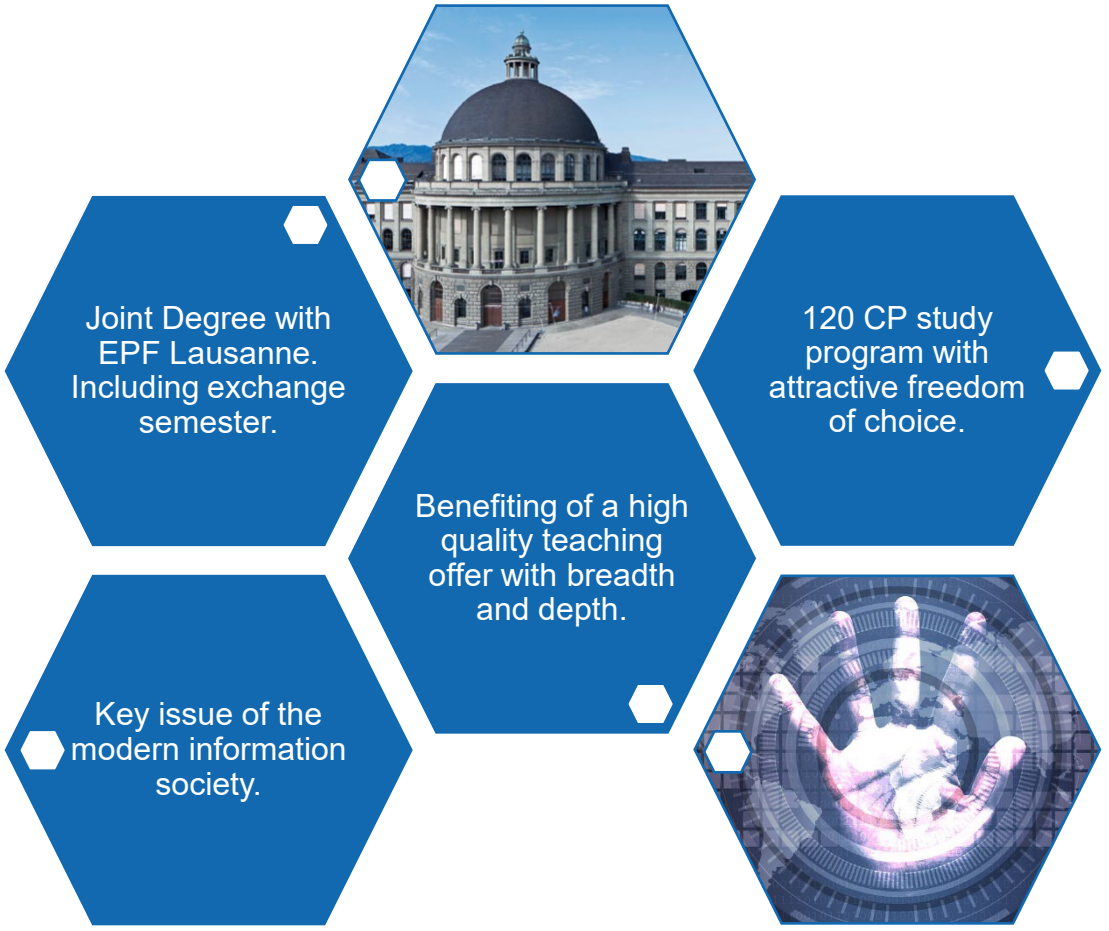
Why Cyber Security



www.inf.ethz.ch/master-cybsec

Agenda

- Design Principles
- Structure Master’s Programme Cyber Security
- Course Catalogue
- Semester in Lausanne
- Eligibility

Design Principles

- Solid and sound knowledge in
  - Information Security
  - System Security
  - Network Security
  - Cryptography
- Knowledge of the theories and the formal methods
- Competence of applying knowledge and skills in practical projects
- Analytical thinking, self-organziation, scientific working

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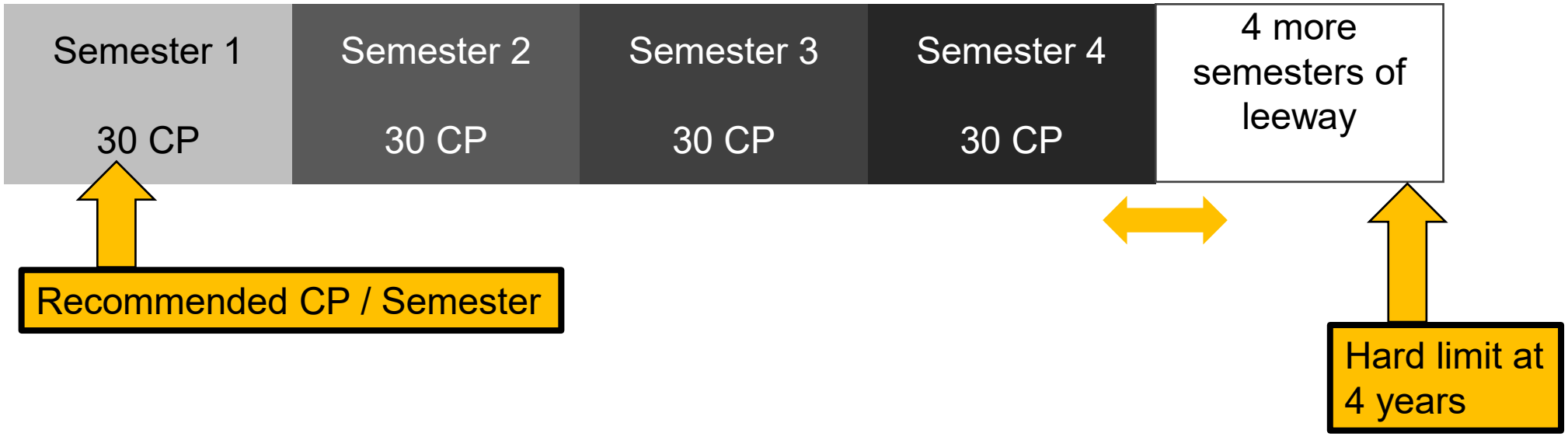
Programme

Master ETHZ – EPFL in Computer Science Major in Cyber Security	**120**
Core Courses and Electives in Cyber Security	28
Core Courses	16
Core Electives	
Seminar	2
Core Courses and Electives in a Minor	18
Core Courses	8
Core Electives	
Inter Focus Courses	16
Semester Project	12
Free Electives	
Science in Perspective	2
Master's Thesis	30

120 Credit Points

The Master's programme is designed to be completed within 4 semesters. The overall study duration must not exceed 8 semesters. The last semester focuses completely on the Master's thesis.

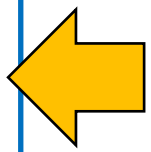


Programme Structure

Master ETHZ – EPFL in Computer Science Major in Cyber Security 120

Programme Structure

Master ETHZ – EPFL in Computer Science Major in Cyber Security	120
Core Courses and Electives in Cyber Security	28



Minimum required credit points

Programme Structure

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Core Courses and Electives in Cyber Security

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Core Courses	16
Core Electives	
Seminar	2

- High level of competence
- Provide essential knowledge in Cyber Security

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Minor

Core Courses and Electives in a Minor	18
Core Courses Core Electives	8

The Minor is mandatory and has to be chosen from one of the following specialization tracks:

- Data Management Systems
- Machine Intelligence
- Visual and Interactive Computing
- Theoretical Computer Science

See https://inf.ethz.ch/studies/master/master-cs-2020.html

for each of above (not allowed to pick Secure and Reliable Systems)

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Inter Focus Courses

- Cover all topis in computer science
- Teach algorithmic reasoning
- Methods of advanced system design

Interfocus Courses

Two out of four have to be taken:

- Algorithms Lab, AS
- Information Security Lab, AS
- Advanced Systems Lab, SS
- Computational Intelligence Lab, SS

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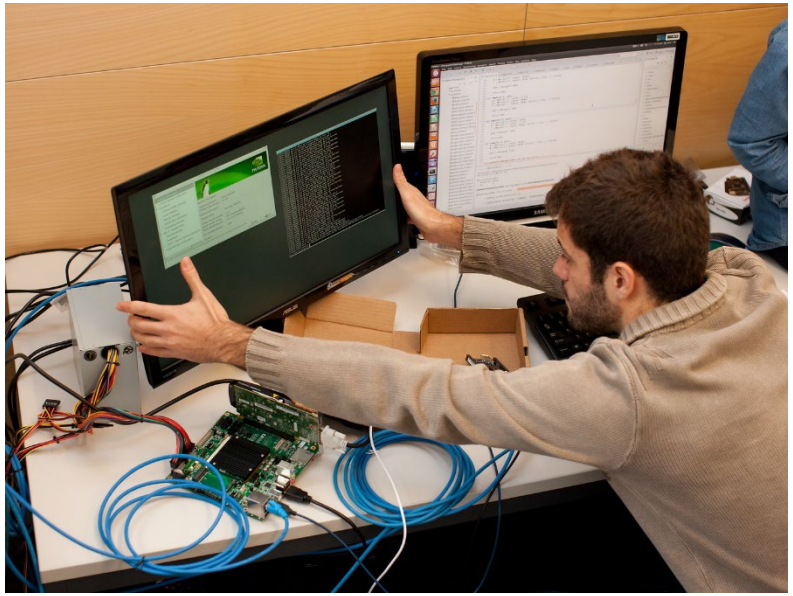
Semester Project	12

Semester Project

Semester Project 12



- Apply acquired knowledge and skills
- Solve independently a technical-scientific problem

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Free Electives	

Free Electives

Free Electives

- Courses offered by ETH, UZH, EPFL
- Master’s level
- In the area of computer science or a closely related field

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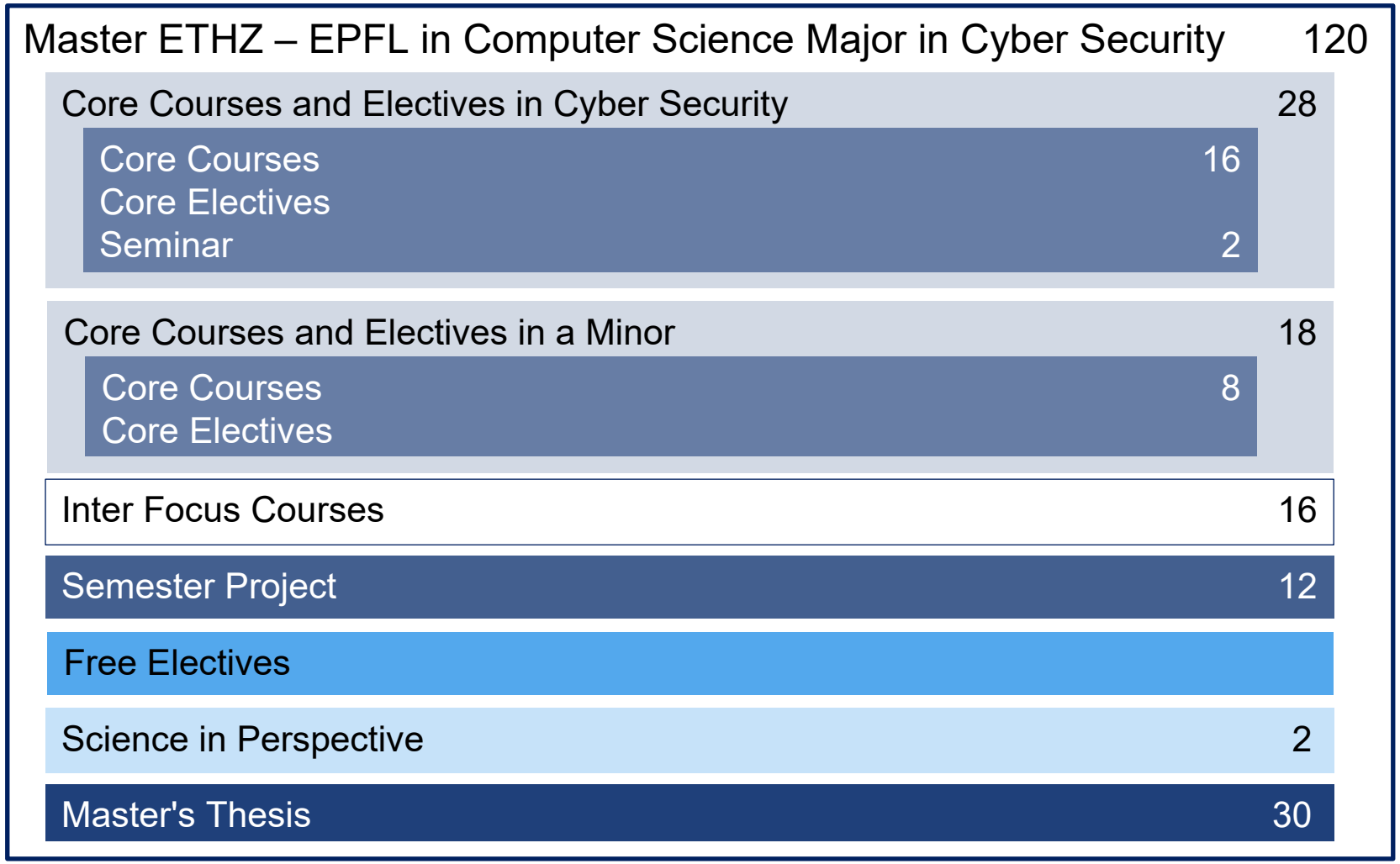
Science in Perspective	2

Science in Perspective

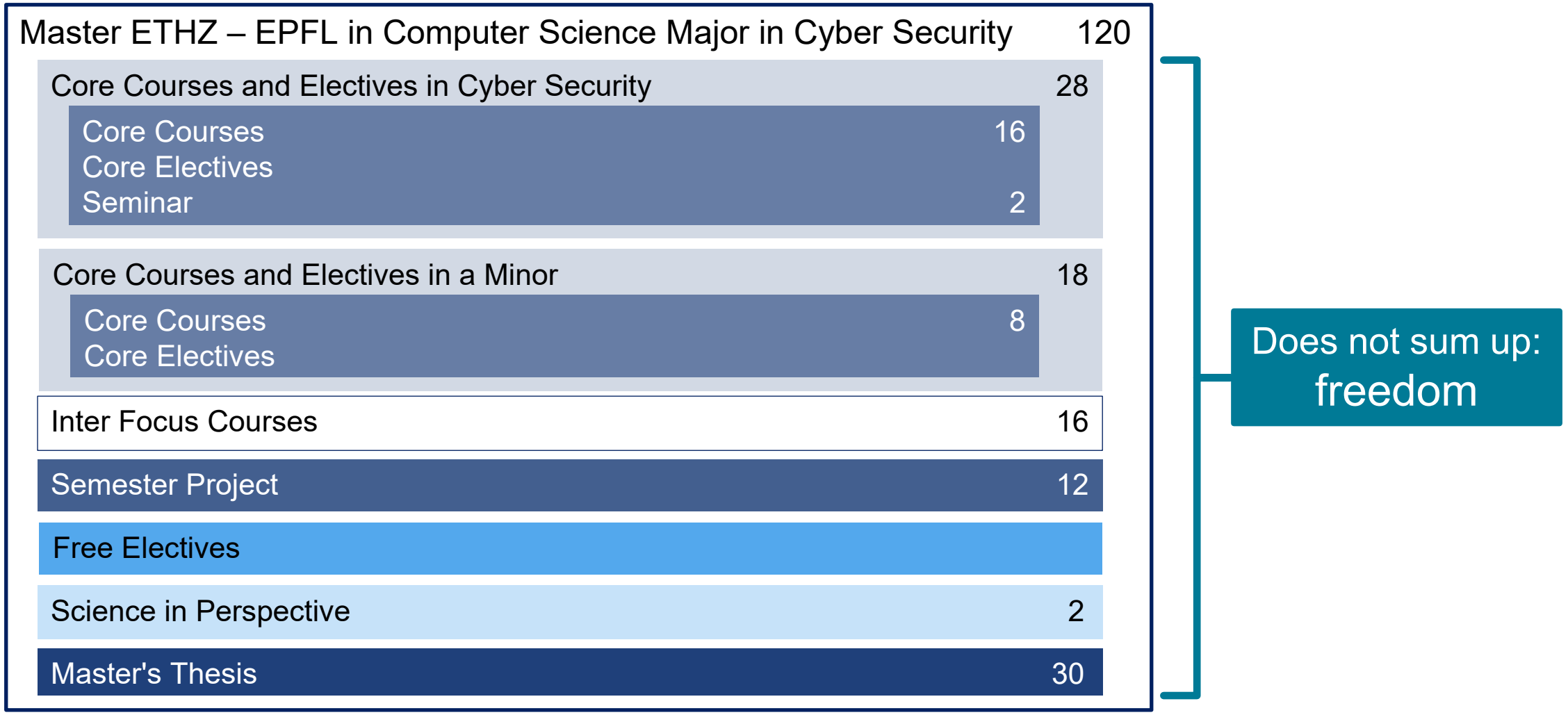
Science in Perspective	2

- Courses offered in the programme Science in Perspective (mostly by the department D-GESS)
- 851-xxxx-xx language courses (≤ 3 credits including ETH BSc)

Programme Structure



Programme Structure



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Core Courses and Electives Cyber Security

Tentative Course List

Major in Cyber Security

CORE COURSES			
252-0463-00L	Security Engineering	autumn	7
252-1414-00L	System Security	autumn	7
263-4640-00L	Network Security	autumn	8
263-4658-00L	Privacy Enhancing Technologies	autumn	7
263-4660-00L	Applied Cryptography	spring	8

CORE ELECTIVES			
227-0575-00L	Advanced Topics in Communication Networks	autumn	6
227-0579-00L	Hardware Security	autumn	8
252-0811-00L	Applied Security Laboratory *(not offered in AS 24)*	autumn	8
252-1411-00L	Security of Wireless Networks	autumn	6
263-4657-00L	Advanced Encryption Schemes *(not offered in AS 24)*	autumn	5
263-4665-00L	Zero-Knowledge Proofs	autumn	5
252-0408-00L	Cryptographic Protocols	spring	6
263-4600-00L	Formal Methods for Information Security	spring	5
263-4656-00L	Digital Signatures	spring	5

The Professorial Team

Prof. Dr. David Basin | **Prof. Dr. Srdjan Capkun** | **Prof. Dr. Kenny Paterson** | **Prof. Dr. Adrian Perrig** | **Prof. Dr. Shweta Shinde** | **Prof. Dr. Florian Tramèr**

- 6 faculty members, 3 associated members (Ueli Maurer, Dennis Hofheinz, Kaveh Razavi). Other faculty members working in S&P: M. Vechev, L. Vanbever, O. Mutlu, …
- 70+ PhD/postdoctoral researchers
- ETH global ranking #5 in Computer Science (THE World University Rankings 2024)
- ZISC: Zurich Information Security Center
- **We pursue big challenges with the goal to positively affect the world.**

Previous Thesis Topics

- Adaptive Online Monitoring
- A System for Increasing Awareness of Price Discrimination
- Proximity Verification for Intel SGX using USB 3
- Privacy Mechanisms for Distributed Fingerprint-based Authentication
- Formal Verification of DoS-Resilient Protocols
- Design and Implementation of SCION's End-Entity PKI
- Constant-Time Implementation of NTS-KEM
- Contributions to the Theory of Probabilistic Discrete Systems
- …

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Semester in Lausanne

https://www.epfl.ch/schools/ic/

Semester in Lausanne

During the course of the programme, one semester has to be spent at EPF Lausanne.

- Students enrolled at ETHZ must start the Master's programme at ETHZ.
- Students must earn minimum 20 CP, maximum 35 CP at EPFL.
- Inter Focus Courses must be done at ETHZ.
- Master's thesis may be conducted externally (counts as ETHZ credits) – with a Cyber Security MSc faculty member's agreement.
- Students receive a scholarship for their exchange semester of 2'500.- CHF.
- Spring semester: support in searching accommodation by EPFL
- Eligible courses are published on the MSc Cyber Security website
- Study plan for the semester in Lausanne has to be approved by the Studies Administration
- During the exchange semester, students are enrolled at ETHZ **and** EPFL – but pay tuition fee only at ETHZ.

Semester in Lausanne

Study plan (= course list) and regulation (only in French) at EPFL:
https://www.epfl.ch/education/studies/en/rules-and-procedures/
https://edu.epfl.ch/studyplan/en/master/computer-science-cybersecurity/

Computer Science - Cybersecurity 2024-25

COURSES	LANGUAGE	MASTER 1 L	MASTER 1 E	MASTER 1 P	MASTER 2 L	MASTER 2 E	MASTER 2 P	SPECIALISATIONS/ORIENTATIONS	EXAM	CREDITS / COEFFICIENT
Advanced computer architecture CS-470 / Section IN Ienne	EN	-	-	-	3h	-	2h		**Summer session** Written	8
Advanced topics on privacy enhancing technologies CS-523 / Section IN Troncoso	EN	-	-	-	3h	1h	2h	▪ Depth requirement	**Summer session** Written	8
Algorithms II CS-450 / Section IN Kapralov, Svensson	EN	4h	3h	-	-	-	-		**Winter session** Written	8
Cryptography and security COM-401 / Section SC Vaudenay	EN	4h	2h	-	-	-	-	▪ Depth requirement	**Winter session** Written	8

Semester in Lausanne

Find information on the exchange semester at EPF Lausanne here:
https://inf.ethz.ch/studies/master/master-cybsec/semester_epfl.html

In particular, make sure you read the course transfer list with EPFL courses, showing the corresponding course category at ETH Zurich.

Group 1

Code	*Course*	*Semester*	*CP*	*Exam*	*Category ETHZ*	*Core/Core Elective*
CS-470	Advanced computer architecture	spring	8	written	DMS	Core Elective
CS-523	Advanced topics on privacy enhancing technologies	spring	8	written	CybSec	Core Elective
CS-450	Algorithms II	autumn	8	written	TI	Core
COM-401	Cryptography and security	autumn	8	written	CybSec	Core Elective
CS-438	Decentralized systems engineering	autumn	8	written	DMS	Core Elective
CS-451	Distributed algorithms	autumn	8	written	DMS	Core
CS-451	Distributed algorithms	autumn	8	written	TI	Core Elective
CS-452	Foundations of software	spring	8	written	CybSec	Core Elective

Eligibility

Consecutive

- Bachelor in Computer Science / Communication Systems
  from a Swiss university and as one-subject degree involving at least 180 credits

Qualifying degrees (eligible)

- Bachelor in Electrical Engineering and Information Technology
- Bachelor in Mechanical Engineering
- Bachelor in Mathematics
- Bachelor in Physics

Admission Principles

With Bachelor's degree from ETH: Admission without any additional requirements

The better the profile requirements are covered, the better the chances are to be admitted.

Gaps in the profile requirements are expected to be filled in self-study.

➡ Excellent track record

Information

Master in Cyber Security: www.inf.ethz.ch/master-cybsec

Forms and Documents: https://inf.ethz.ch/studies/forms-and-documents.html

- Study guide
- Tentative course list
- Regulations of studies (in German)
- ….

Admissions Office: https://ethz.ch/en/studies/master/application.html

Information

Studies administration:

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CAB H 36.1

brigitteregula.marti@inf.ethz.ch

Program coordination:

Dr. Ralf Sasse

ralf.sasse@inf.ethz.ch

Program director:

Prof. Dr. David Basin

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Thank you