EMECIS ECTS definition and grading system

An ECTS corresponds to a total student work (homework included) of about 25 hours. Two homework hours are supposed necessary for each hour with the professor. **Thus 1 ECTS corresponds to 7-8 hours with professor.** Each module will be validated by using each institution local grading system. The grading system conversion agreed between UNIGE - UTC/ECTS is in the following table:

UTC/ECTS Local grade	A	B	C	D	E	F/FX
UNIGE Local grade	30 lode	30	29-27	26-25	24-18	fail

Information on modules available is summarized in the next pages, where MiSj refers to the modules available at year i of semester j (e.g. M1S1 are the courses of the first year in the first semester).
More information is available at:

- https://corsi.unige.it/8733
- https://www.utc.fr/en/courses-and-training/the-french-masters-degree/complex-system-engineering-msci.html

EMECIS first year modules

The aim of the first year is to provide the students with a solid interdisciplinary background across the main areas of computer and systems engineering. This year consists of two semesters S1 (from September till the end of February) and S2 (from March till the end of June).

A1.1 M1S1 and M1S2 at UNIGE:

For alla specializations. Core Modules (36 ECTS)	ECTS	M1S
OPERATIONS RESEARCH	9	1
COMPUTER SECURITY	9	1
SOFTWARE ENGINEERING	9	2
METHODS AND TOOLS FOR INDUSTRIAL AUTOMATION	9	2

Area of specialization:

ARTIFICIAL INTELLIGENCE AND HUMAN-CENTERED COMPUTING Modules (24 ECTS)	ECTS	M1S
DATA ANALYSIS AND DATA MINING	6	1
HUMAN COMPUTER INTERACTION	6	2
ARTIFICIAL INTELLIGENCE	6	2
1 module among : ADVANCED DATA MANAGEMENT (6) M1S1; COMPUTATIONAL VISION (6) M1S1; DATA VISUALIZATION (6) M1S2	6	

SOFTWARE AND COMPUTING PLATFORMS Modules (24 ECTS)	ECTS	M1S
DATA ANALYSIS AND DATA MINING	6	1
DATA PROTECTION & PRIVACY	6	1
SOFTWARE PLATFORMS	6	1
1 module among : REAL-TIME OPERATING SYSTEMS (6) M1S1; ARTIFICIAL INTELLIGENCE (6) M1S2; TRANSACTIONAL SYSTEMS & DATA WAREHOUSE (6) M1S2	6	

LOGISTICS AND PRODUCTION Modules 24 ECTS)	ECTS	M1S
SYSTEM IDENTIFICATION	6	1
SOFTWARE PLATFORMS	6	1
TRANSACTIONAL SYSTEMS & DATA WAREHOUSE	6	2
CONTROL OF CYBER-PHYSICAL SYSTEMS	6	2

NETWORKED CONTROL SYSTEMS Modules (24 ECTS)	ECTS	M1S
SYSTEM IDENTIFICATION	6	1
REAL-TIME OPERATING SYSTEMS	6	1
TRANSACTIONAL SYSTEMS & DATA WAREHOUSE	6	2
CONTROL OF CYBER-PHYSICAL SYSTEMS	6	2

A1.2 M1S1 and M1S2 at UTC:

For M1S1 the student will select 30 ECTS from the following:

Analysis of experimental data	6
Introduction to stochastic programming	3
Tools used in scientific computation	3
Methodology in control synthesis	3
Operational safety prediction	3
Introduction to discrete event system modelling	6
Algorithmics and data structures	6
Mastering IT systems	6
IT networking	6
Artificial Intelligence (AI)	6
Management, economics and setting up a business concern	4
Foreign language studies	4

For M1S2 the student will select 30 ECTS from the following:

Introduction to systems engineering	6
Experimental protocols, instrumentation and information processing	6
System energy flows and transduction	5
Graph Theory and Combinatorial Optimization	6
Operational systems (OS)	6
Object-oriented programming	6
Multi-agent systems	6
Real-time programming and computing	6
Controlling observation of dynamic and merging systems	6
Management, economics and setting up a business concern	4
Foreign language studies	4

EMECIS second year modules

The aim of the second year is to provide the students with advanced competence on the main areas of cyber-physical systems, data analysis and distributed systems.

This year consists of two semesters: S1 (from September till the end of February) dedicated to courses and S2 (from March till the end of June) dedicated to the work related the master thesis. **Master thesis may be defended starting July till the end of the academic year.**

A2.1 The third semester modules at UNIGE:

Area of specialization:

ARTIFICIAL INTELLIGENCE AND HUMAN-CENTERED COMPUTING **Modules (33 ECTS)**	**ECTS**	**M2S**
ENGLISH LANGUAGE 2	3	1
DISTRIBUTED SYSTEMS	6	1
VIRTUALIZATION AND CLOUD COMPUTING	6	1
1 module among : BINARY ANALYSIS AND SECURE CODING (6); TECHNOLOGIES FOR INDUSTRIAL AUTOMATION (6)	6	1
2 modules among: FORMAL LANGUAGES AND COMPILERS (6); CONCURRENT AND DISTRIBUTED PROGRAMMING (6); INTERNET INFRASTRUCTURE AND CLOUD PLATFORMS (6); EMBEDDED SYSTEMS (6)	12	1

SOFTWARE AND COMPUTING PLATFORMS **Modules (33 ECTS)**	**ECTS**	**M1S**
ENGLISH LANGUAGE 2	3	1
ADVANCED ARTIFICIAL INTELLIGENCE	6	1
MULTIMODAL SYSTEMS	6	1
1 module among : SEMANTIC WEB TECHNOLOGIES (6); KNOWLEDGE MANAGEMENT AND ENGINEERING (6)	6	1
2 modules among: VIRTUALIZATION AND CLOUD COMPUTING (6); MODELING AND VERIFICATION OF CYBER-PHYSICAL SYSTEMS (6); SOFTWARE ARCHITECTURES FOR ROBOTICS (6); EMBEDDED SYSTEMS (6)	12	1

LOGISTICS AND PRODUCTION **Modules (33 ECTS)**	**ECTS**	**M1S**
ENGLISH LANGUAGE 2	3	1
METHODS AND TOOLS FOR DECISION SUPPORT	6	1
PRODUCTION SYSTEMS	6	1
OPTIMISATION AND CONTROL OF LOGISTICS SYSTEMS	6	1
2 modules among: TECHNOLOGIES FOR WIRELESS NETWORKS (6); TECHNOLOGIES FOR INDUSTRIAL AUTOMATION (6); INTERNET INFRASTRUCTURE AND CLOUD PLATFORM (6)	12	1

NETWORKED CONTROL SYSTEMS **Modules (33 ECTS)**	**ECTS**	**M1S**
ENGLISH LANGUAGE 2	3	1
TECHNOLOGY FOR INDUSTRIAL AUTOMATION	6	1
COOPERATIVE ROBOTICS	6	1
SMART SYSTEMS CONTROL AND APPLICATIONS	6	1
2 modules among: DISTRIBUTED SYSTEMS (6); MODELLING AND VERIFICATION OF CYBER-PHYSICAL SYSTEMS (6); EMBEDDED SYSTEMS (6)	12	1

A2.2 The third semester M2S1 modules at UTC:

Specialization: Automation and Robotics in Intelligent Systems.

30 ECTS among the following courses:

Semester 3 – 1st quarter	
Optimization	3
Advanced systems engineering	3
Biomimetics in systems of systems (SOS)	3
Modelling, control and observation of dynamic systems	3
Representing and assessing mobile system movements	3
Advanced machine learning	3
Modelling uncertainty and its propagation	3
Foreign language studies	4

Semester 3 – 2nd quarter	
Robot vision	3
Technologies and algorithms for SoS communications	3
Estimating robotic navigation	3
Autonomous robotic systems	3
Deep learning	3
Foreign language studies	4

Specialization: Machine Learning and Optimization of Complex Systems.

30 ECTS among the following courses:

Semester 3 – 1st quarter	
Optimization	3
Advanced systems engineering	3
Modelling uncertainty and its propagation	3
Biomimetics in systems of systems (SOS)	3
Modelling, control and observation of dynamic systems	3
Representing and assessing mobile system movements	3
Advanced machine learning	3
Foreign language studies	4

Semester 3 – 2nd quarter	
Modelling and optimization in discrete systems	3
Introduction to optimization under uncertainty	3
Introduction to decision theory	3
Technologies and algorithms for communications in SoSs	3
Deep learning	3
Foreign language studies	4

A4 Joint fourth semester

The fourth semester is devoted the Master Thesis, valued for 30 ECTS credits. Each student will be jointly supervised by at least two advisors each from the two institutions (the principal advisor from the hosting institution). The research topic could be supervised and located either in university or in the R&D department of industry.

The research work is finalised by a written dissertation of the Masters Thesis, which must be done individually and must contain elements of original work. The dissertation must be defended in front of a committee of experts. The composition and the procedures related to theses commissions will comply with regulations of the two Universities.

The dissertation should demonstrate:

- A comprehensive understanding of techniques applicable to the chosen topic of research,
- Originality in the application of computer/systems engineering knowledge,
- The ability of the student to evaluate critically current research in the field of computer/systems engineering and, where appropriate, to propose new hypothessis and solutions.

Degrees will be awarded according to national assessment structures, namely:

- France based on the M1 and M2 result: Très Bien Bien, Assez bien, Passable et Echoué,

- Italy based on the M1 and M2 result in 110/110 (pass mark 66)

ECTS/UTC	A	B	C	D	E	F (Failed)
UNIGE	110 ≥ mark ≥ 99	99 > mark ≥ 88	88 > mark ≥ 77	77 > mark ≥ 70	70 > mark ≥ 66	66 > mark