

**EMESB Agreement, Annex 2,
Study Programme**

I – SUBJECT

This document deals with the Study Programme of the EMESB agreement, academic years 2024-2025 to 2026-2027 included. Present version was approved in February 2025.

II – STUDENT MOBILITY AND ECTS REQUIREMENTS

Students must acquire at least 22 (twenty-two) ECTS credits of taught modules at the Home University to submit an application for the Double Degree EMESB. Deadline for the fulfillment of the 22 credits is 15th June of student's first academic year.

Student mobility is in the second academic year of the Home University, during the first (Fall) semester.

Students must acquire 50 (fifty) ECTS credits in the Home University before they move to the Hosting University.

The Master Theses will be written and defended in English language; each student will be jointly supervised by two advisors, one by USMB and one by UNIGE. In any case a representative of the Hosting University will be part (in person or as video phone call) of the Master Thesis audience at the Home University where the thesis will be defended.

III – CREDIT SYSTEM AND GRADE CONVERSION

Each semester of the EMESB mobility consists of teaching modules for corresponding 25 to 30 ECTS credits.

ECTS credits correspond to a total student work which includes lectures (frontal lessons), assisted learning (tutorials), laboratory activities and homework. One ECTS corresponds to about 25-30 hours of student workload.

Each module is validated during the exam (written, oral or both) according to the local regulations and according to each University local grading system.

The grading system conversion agreed between USMB and UNIGE is provided in the following Table.

| | | | | | | | | | |
|------------------|---------|------|----|----|----|----|----|----|-------------|
| USMB Local mark | 20 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | M<10 Failed |
| UNIGE Local mark | 30 Lode | 30 e | 29 | 28 | 27 | 25 | 22 | 18 | M<18 Failed |

UNIGE - EN2 ORGANIZATION

The En2 MSc course at UNIGE is organized according to the following teaching modules, as also described in the MSc course website (<https://corsi.unige.it/en/corsi/11917>)

| FIRST YEAR – 1st (Fall) SEMESTER | ECTS | SECOND YEAR- 1st (Fall) SEMESTER | ECTS |
|---------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------|-------------|
| Heat Transfer (66382) | 6 | Models and Methods for Energy Engineering (86662) | 5 |
| Mathematical Modeling for Energy Systems (86630) | 5 | Energy and Buildings (86655) | 6 |
| Chemical Processes and Technologies (86631) | 5 | Fuel Cells and Distributed Generation Systems (86660) | 6 |
| Industrial Fluid-dynamics (86641) | 6 | Solar and Geothermal Energy (80043) | 6 |
| Combustion Processes and Emissions (80054) | 6 | Elective course (86667) Other Activities (Italiano, Academic Writing/Soft Skills) | 5 3 |
| FIRST YEAR – 2nd (Spring) SEMESTER | | SECOND YEAR – 2nd (Spring) SEMESTER | |
| Power Systems Modeling and Control (65887) | 6 | Hydro, Wind and Micro-gas Turbines (86661) | 6 |
| Power Systems Management (86638) | 6 | Energy Laboratory (80081) | 6 |
| Power Plants for Energy Conversion (80053) | 6 | Master thesis project (86663) Technologies and Fuels for Propulsion systems Decarbonization (86665) | 15 |
| Industrial Plants for Energy (86644) | 5 | Elective courses | 6 5-10 |
| ELECTIVE COURSES, SECOND YEAR (student choice, 2 out of 4 among the ones here below) | | | |
| Remote Sensing (80048, 2nd semester) | | | |
| Chemical and Biochemical Processes and Plants for Energy (72562, 2nd semester) | | | |
| Project Management for Energy Production (86666, 2nd semester) | | | |
| Power Systems Simulation and Optimization (86667, 1st semester) | | | |

Total ECTS=51**Total ECTS=69**

USMB-EMESB student will attend courses at Unige which refer to En2 fall semester, second year (31ECTS), including the Other Activities (3ECTS) module at En2 fall semester 2nd year, according to the teaching modules in the list here above and he/she will acquire the corresponding 31 ECTS by passing examinations.

USMB- ESBC ORGANIZATION

The ESBC MSc course at USMB is organized according to the following teaching modules, as also described in the USMB website

<https://www.univ-smb.fr/solaracademy/master-energy-for-solar-buildings-and-cities-esbc-program/>

FIRST YEAR – 1ST SEMESTER, FALL (S7) 30**UE701 Core Solar 4**

Solar Ressource, Radiation and Optics 3
Application to solar systems 1

UE702 Core Building 4

Energy needs and performance 1
Building energy: Envelope and HVAC 3

UE703 Physics and materials for solar systems and buildings 4

Thermodynamics and heat transfer 3
Materials for energy 1

UE704 Introduction to Economics 4

Introduction to economics 2
Public economics 2

UE 705 Sustainability for energy transition 8

International regulations 2
Seminars solar 1 2
Sustainability analysis 2
Foreign language (French or English) 2

UE706 Introduction to research 6

Literature review project 6
Library research tools and methods

FIRST YEAR – 2ND SEMESTER, SPRING (S8) 30**UE801 Power generation 6**

Solar power generation 2
Energy vectors & Energy storage 2
Energy grids 2

UE802 Advanced tools - experimental 4

Experimental methods 2
Application to solar systems 2

UE803 Modelling of transfers phenomena 4

Modelling of Energy Systems 2
Building performance simulation (BPS) 1
Radiation modeling in complex media 1

UE804 Introduction to management 2

Strategic management 2

UE805 Energy Environment and Society 6

European regulations 2
Seminars Solar 2 2
Foreign language (French or English) 2

| | | |
|---------------------------------------------------|-----------|----------|
| UE806 Innovation, creativity, research | 8 | 2025-275 |
| Creativity through biomimicry for solar cities | 2 | |
| Research project | 6 | |
| Optional Internship/Work placement | | |
| SECOND YEAR – 1ST SEMESTER, FALL (S9) | 30 | |
| UE901 Advanced Solar Systems | 6 | |
| Solar thermal systems | 2 | |
| Building integrated PV | 2 | |
| Solar power generation | 2 | |
| UE902 Tools for Solar Cities | 6 | |
| Urban Metabolism: Energies, anergy, geothermy... | 2 | |
| Solar cadastre, solar performance | 2 | |
| Environment and buildings and systems | 2 | |
| UE903 Advanced methods | 4 | |
| Artificial Intelligence | 2 | |
| Operational research for urban solar development | 2 | |
| UE904 Urban development | 6 | |
| Case study common project | 2 | |
| Urban planning and architectural integration | 1 | |
| Performance indicators and information processing | 1 | |
| Foreign language (French or English) | 2 | |
| UE905 Research and Innovation Project | 8 | |
| Research project | 6 | |
| Entrepreneurship, Innovation challenge | 2 | |
| SECOND YEAR – 2ND SEMESTER, SPRING (S10) | 30 | |
| UE001 Internship | 30 | |
| Total ECTS | 60 | |

UNIGE- -EMESB student mobility is in the first (fall) semester of their second year. They will attend courses at USMB corresponding to at least 22 ECTS common with ESBC S9 students. Additional 8 ECTS refer to S7 (semester 7) of ESBC, as stated hereafter. Additional credits from ESBC S9 can be chosen as elective courses.

| | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------|
| Second Year – 1st (fall) semester, for UNIGE EMESB students at USMB | | |
| UE701 Core Solar Solar Resource, Radiation and Optics Application to solar systems | 4 3 1 | <i>Mandatory</i> |
| UE702 Core Building Energy needs and performance Building energy: Envelope and HVAC | 4 1 3 | <i>Mandatory</i> |
| UE901 Advanced Solar Systems Solar thermal systems Building integrated PV Solar power generation | 6 2 2 2 | <i>Mandatory</i> |
| UE902 Tools for Solar Cities Urban Metabolism: Energies, anergy, geothermy... Solar cadastre, solar performance Environment and buildings and systems | 6 2 2 2 | <i>Mandatory</i> |
| UE903 Advanced methods Artificial Intelligence Operational research for urban solar development | 4 2 2 | <i>Mandatory</i> |
| UE905 Research and Innovation Project Research project | 6 6 | <i>Mandatory</i> |
| TOTAL ECTS | 30 | |

V – COURSE SYLLABI, PROFESSOR IN CHARGE AND OTHER INFORMATION RELATED SPECIFIC COURSE

The course syllabus, professors, exam organization, references, course schedules are information available at USMB and En2 web sites

<https://www.univ-smb.fr> and <https://formations.univ-smb.fr/fr/catalogue/master-XB/sciences-technologies-sante-STS/master-energie-solaire-solar-energy-KGYQG5E6/energy-for-solar-buildings-and-cities-energie-pour-batiments-et-villes-solaires-KGYT50QD.html>)

<https://corsi.unige.it/en/corsi/11917>

Article III: Amendments to Annex 3 – Teaching Team

Appendix 3 is amended as follows: