

ME-602

**Modelling, optimisation, design and analysis of integrated energy systems**

Maréchal François

| Cursus | Sem. | Type |
|--------|------|------|
| Energy |      | Opt. |

|                            |           |
|----------------------------|-----------|
| Language of teaching       | English   |
| Credits                    | 2         |
| Session                    |           |
| Exam                       | Multiple  |
| Workload                   | 60h       |
| <b>Hours</b>               | <b>28</b> |
| Courses                    | 14        |
| TP                         | 14        |
| <b>Number of positions</b> |           |

**Frequency**

Every year

**Remark**

Easter 2023

**Summary**

The student will learn advanced concepts in the field of process integration, process modeling and optimization for the design of integrated energy systems: Life cycle energy analysis.

**Content**

- Advanced process integration techniques based on mixed integer programming for site scale energy system integration.
- Integration of advanced energy conversion technologies including cogeneration, heat pumps and refrigeration systems in industrial processes and urban communities.
- Combined integration of heat and water for the design of integrated system.
- Process integration of batch and discontinuous processes.
- Definition of objective functions based on life cycle & energy analysis.
- Multi-objective optimization including energetic, environmental and economic parameters.
- Application to the design of integrated energy systems: zero emission plants, advanced cycles including combined cycles, thermal solar plants, hybrid solar combined cycles.

**Learning Prerequisites****Recommended courses**

Process integration (advanced energy systems), modeling and optimization of energy systems, thermodynamics, basic in optimization techniques

**Assessment methods**

Oral presentation and project report

**Resources****Moodle Link**

- <https://go.epfl.ch/ME-602>