Interdisciplinary Minor in Integrated Design, Architecture and Sustainability

The interdisciplinary Minor in Integrated design, Architecture and Sustainability (IDEAS) responds to a need to further reinforce the integration of sustainable architecture questions within the Master Cycle in Architecture, Civil and Environmental Engineering. It focuses on issues of energy consumption and the use of natural resources within the global framework of integrated design. The objective is also to strengthen exchanges and synergies between the three institutes of ENAC. Moreover, it creates a new orientation to prepare second cycle students more explicitly for a doctoral work in this field within the Doctoral Program Architecture and Sciences of the City (EDAR).

The IDEAS Minor is fully in line with the restructuration process of the different research and teaching fields of the SAR, as well as with the interdisciplinary exchange possibilities within ENAC.

The central thread of this orientation is based on a in-depth approach of sustainable architecture and construction principles, which rely on the simultaneous integration of various parameters: efficient use of non-renewable resources, optimal user comfort mainly through passive means, bioclimatic specificities and, more generally, optimization of environmental, sociocultural and economic criteria.

Thus, the Minor aims at structuring this existing offer in a targeted orientation for the students, in order to make it transparent and explicit, and to guide them towards a richer and more coherent knowledge.

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Interdisciplinary Minor in Integrated Design, Architecture and Sustainability

Selection of courses

The Minor is built around a list of 22 classes spread over both semesters (13 in the autumn and 11 in the spring), totaling 71 credits ECTS. They are selected from the existing course offering. This selection offers a combination of theory classes – focusing on comfort, energy, environment and infrastructures – and project-oriented classes. In order to obtain the Minor, 30 credits ECTS have to be validated from this list of courses throughout the duration of the Master.

In order to ensure the fully interdisciplinary character of the Minor, the list of 22 classes is separated in two groups (“Core courses” and “Theory courses”). 14 credits ECTS must be obtained in each group (for a total of 30 credits ECTS). Moreover, the student must obtain at least 10 credits ECTS (out of the total of 30) in a section outside that in which he is registered.

Core Courses

«Core Courses» form a group of courses considered to be fundamental for the basic understanding of sustainability in the built environment («Fundamental courses») as well as a selection of project-oriented courses which allow the application of a theoretical concept to a concrete case study («Project-oriented courses»).

- The «Fundamental classes» explore three complementary perspectives: energy issues (GC Section), occupant comfort (AR Section) and environmental footprint (SIE Section).
- The «Project-oriented classes» include ENAC semester projects and/or SGC optional transdisciplinary projects, as well as three SAR Master Teaching units. In general, they combine analysis and design work, which represents a particularly relevant exercise within the Minor.

In order to meet the general requirements of the Minor, 14 ECTS must be obtained among the 9 courses offered for this first group.

Theory courses

«Theory courses» offer a larger, but targeted, selection of theoretical classes according to three predefined themes, in relation with a variety of sections (including non-ENAC). Initially, four classes are offered for each theme, but this number could change if new courses are added or if existing courses are suppressed due to retirement for instance. These potential modifications will be previously validated by the direction of the Minor.

In order to meet the general requirements of the Minor, 14 ECTS must be obtained among the 13 courses offered for this first group.

### Core Courses

**Fundamental Classes**

- Energy within buildings: Gnansounou (3 ECTS; Autumn)
- Comfort and architecture: sustainable strategies: Andersen/Munari-Probst/Zurbriggen (3 ECTS; Autumn)
- Life cycle analysis and ecobalance: Payet (3 ECTS; Autumn)
- Theories and techniques of the project of sauvegarde: Graf/Marino (3 ECTS; Autumn)

**Project-oriented Classes**

- UE F: Architecture and rehabilitation: Odet/Méa/Buildwelle/Geneve/Paule (4 ECTS; Autumn)
- UE M: Space and light: the lighting project: Andersen/Paule (4 ECTS; Spring)
- UE K: Architecture and sustainability: performance studies: Andersen/Rey/Bolomey/Russell/Lufkin (4 ECTS; Autumn)
- ENAC project: Various prof (4 ECTS; Autumn/Spring)
- Optional transdisciplinary project: Various prof (3 ECTS; Autumn/Spring)

### Theory Courses

**Energy**

- Renewable energy: Van Herle (4 ECTS; Spring)
- Energy conversion: Manchot (3 ECTS; Spring)
- Integrated planning of energy infrastructures: Gnansounou (3 ECTS; Spring)

**Environment**

- Systems of environmental management: Baracchini (2 ECTS; Autumn)
- Water resources management: Davalle/Droz (2 ECTS; Spring)
- Impact studies: Schmidt (3 ECTS; Autumn)
- Air pollution and climate change: Vacat/Takahama (5 ECTS; Spring)
- Recycling of materials: Letenier (2 ECTS; Spring)
- Modelling of energy systems: Gnansounou (3 ECTS; Autumn)
- Material flow analysis: Corbière/Nizard (3 ECTS; Autumn)
- Urban hydrology: Rossi (4 ECTS; Spring)
- City and mobility: Kaufmann/Louvet/Ravalet (3 ECTS; Spring)
- Urban habitat and development: Bolio/Chenal/Pedrazzini (3 ECTS; Autumn)

Credits obtained for ENAC projects with themes related to IDEAS programme can be validated as credits obtained in an «outside» section, as long as the director of the ENAC project is clearly attached to another section and discipline as that of the student.