

IDEAS | Integrated Design, Architecture & Sustainability

Interdisciplinary Minor in Integrated Design, Architecture and Sustainability

The axis Integrated Design, Architecture and Sustainability (IDEAS) is a joint initiative of both the Laboratory of Architecture and Sustainable Technologies (LAST) and the Laboratory of Integrated Performance in Design (LIPID), respectively directed by Prof. Emmanuel Rey and Prof. Marilyne Andersen. IDEAS aims to integrate sustainable architecture issues from a holistic, interdisciplinary and evaluative perspective within the School of Architecture, Civil and Environmental Engineering (ENAC) at EPFL.

The interdisciplinary Minor in Integrated design, Architecture and Sustainability (IDEAS) responds to a need to integrate 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 restructuring 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.

Coordination

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EPFL



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INTERDISCIPLINARY
MINOR IN
INTEGRATED DESIGN,
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Laboratory of Architecture and Sustainable
Technologies (LAST)
Laboratory of Integrated Performance in
Design (LIPID)
Structural Xploration Lab (SXL)
Building2050 Group

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Interdisciplinary Minor in Integrated Design, Architecture and Sustainability

Selection of courses

The Minor is built around a list of 23 classes spread over both semesters, totaling 78 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 23 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.

- «Energy classes» are a selection of fundamental to advanced classes (but not too specialized) that focus on energy (in particular – but not only – renewable) and on associated infrastructures (offered in engineering and basic sciences).

- «Environment classes» are a selection of classes focusing on ecological impact and environmental strategies (offered mainly in the SIE section).

- «Systems classes» are a selection of classes focusing on infrastructures, including at urban scale (social sciences, architecture and engineering courses)

- Students also have the possibility to validate one course outside EPFL (max. 5 ECTS), upon request and in agreement with the IDEAS Minor Committee.

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

Core Courses (Min. 14 ECTS)

| Fundamental classes | | Lecturer(s) | | ECTS |
|--------------------------|---|---|-----------|------|
| ENG-445 | Building energetics | Khovalyg/Licina | GC | 3 |
| ENV-461 | Sustainability assessment of urban systems | Binder/Merino-Saum + Merino-Saum | SIE | 3 |
| AR-442 | Comfort and architecture: sustainable strategies | Andersen/Karmann/Wienold + Karmann/Wienold | AR | 3 |
| AR-434 | Théories et techniques du projet de sauvegarde | Graf/Marino | AR | 3 |
| Project-oriented classes | | | | |
| PENS-494 | Projet ENAC pour mineur IDEAS* | Divers enseignants | AR/GC/SIE | 4 |
| CIVIL-493 | Projet interdisciplinaire à option* | Profs divers | GC | 4 |
| PENS-491 | Summer workshop** | Divers enseignants | AR/GC/SIE | 4 |
| AR-440 | UE K : Architecture et durabilité: études de performances | Andersen/Fivet/ Rey/Karmann/Fumeaux/Pastore | AR | 4 |
| AR-435 | UE R : Introduction au BIM | Cache/Hautecoeur | AR | 4 |

Theory Courses (Min. 14 ECTS)

| Energy classes | | Lecturer(s) | | ECTS |
|---|---|------------------------------|-----|--------|
| AR-449 | Architecture et énergie solaire | Munari Probst | AR | 3 |
| ME-454 | Modelling and optimization of energy systems | Maréchal | GM | 4 |
| Environment classes | | | | |
| ENV-409 | Air pollution | Takahama/Reimann | SIE | 5 |
| ENG-474 | Etudes d'impact | Schmidt F./Devanthery/Helfer | GC | 3 |
| MSE-463 | Recycling of materials | Leterrier | MX | 2 |
| ENV-469 | Systèmes de management environnementaux | Baracchini | SIE | 2 |
| CIVIL-450 | Thermodynamics of comfort in buildings | Khovalyg | GC | 3 |
| CIVIL-460 | Indoor air quality and ventilation | Licina | GC | 4 |
| Systems classes | | | | |
| AR-496 | Behind/Beyond future cities | Mauree/Coccolo | AR | 3 |
| AR-497 | Building design in the circular economy | Fivet | AR | 3 |
| ENV-470 | Development engineering | Schönenberger/Makohliso | SIE | 4 |
| AR-483 | Interactive conceptual design of structural forms | Fivet | AR | 3 |
| ENV-501 | Material and energy flow analysis | Moreau/Binder/Athanassiadis | SIE | 4 |
| AR-484 | Introduction au BIM | Hautecoeur | AR | 3 |
| Course outside EPFL (upon request, in agreement with IDEAS committee) | | Various prof. | | 5 max. |

Global ECTS offer : 78 Total min. 30

* Provided that the topic is relevant, to be validated with the IDEAS Minor steering committee.

** Course during 4 weeks in the summer.