

5.0 credits	50.0 h	1q
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Teacher(s) :	Trachte Sophie ; Bodart Magali ; Van Moeseke Geoffrey ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	<p>All the Teaching Unit's documents are available on Moodle. A syllabus exists for the parts "Bioclimatics and HVAC" and "Electricity and lighting".</p> <p>The one addressing "Bioclimatics and HVAC" is available as a PDF document on Moodle and in print at the SICI. It should be considered as a reference document, with a scope larger than the Teaching Unit. This part also largely refers to the on-line encyclopaedia [www.energieplus-lesite.be].</p> <p>For the "Electricity and Lighting" part, the syllabus is available as a PDF document on Moodle and in print at the SICI. The copies of all PowerPoint pages are also available in the "documents" section.</p>
Aims :	<i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i>
Evaluation methods :	<p>The course is evaluated based on group works. The groups of students (maximum 3) will each produce a technical report, both textual and graphic, presenting an integration project of ventilation, heating, electricity, electric lighting, water conveyance and draining techniques for a house. This report will be handed in during the term and orally defended by the group in front of the teachers.</p> <p>The report presents :</p> <ul style="list-style-type: none"> -- the selection made of the systems and equipment -- the justification of the choices from a comfort, energy performance, dimensioning and architectural integration point of view -- the associated calculation/simulation elements -- the graphical documents of architectural integration. <p>The groups of students have at their disposal, from the beginning of the term, a documentation of case studies delivered by the corresponding teachers at an 'urbanistic project' state of progress, on which base they will develop their proposal.</p>
Teaching methods :	<p>The activities are organised as follows :</p> <ul style="list-style-type: none"> -- An ongoing practical exercise of design/dimensioning/integration of the technical installations of a housing project is the thread of the tuition unit and the basis of evaluation. <p>This exercise is sustained by :</p> <ul style="list-style-type: none"> -- support sessions (6), in the form of table sitting or workshops, animated by one of the teachers -- lecturing sessions (16) of theoretical concept presentations, of the targeted technical systems, aiming at a generalisation -- the provision of reference documents (syllabus, professional documentation, calculation tools) -- documentation/objectification exercises of existing situations with benchmarking purpose -- calculation and modelling exercises.
Content :	<p>The general objective of this Teaching Unit is to learn to determine and calculate the setup of the main technical installations of a building, in particular ventilation, heating, air-conditioning, water conveyance and draining, people transfers, day-and electric lighting.</p> <p>The emphasis is set on the aspects of energetic efficiency and comfort, with a bioclimatic approach and architectural integration.</p> <p>Given its multidisciplinary nature, the course is given by several teachers.</p> <p>The Teaching Unit is divided in four parts : bioclimatics and HVAC, artificial lighting, electricity, architectural integration.</p> <p>Bioclimatics and HVAC part</p> <p>Debates, activities and lectures introduce the working principles of the different current HVAC and hydraulic technologies and their integration in the buildings. They address as well the housing as the current tertiary functionalities.</p>

The lectures focus on the systemic dimension of these technologies more than on their individual behaviours. The objective is to familiarize the student with the complexity of these techniques, which is more related to their interweaving than to the complexity of each introduced system.

This part aims primarily at training for the pertinent selection of the HVAC systems according to the physical properties and use of the building rather than for their optimisation.

More concretely, the addressed contents are :

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- climatic sizes and bioclimatic architecture
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- reminders of the thermic comfort theory, the heat transfers and the moist air physics
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- heat production and exchange technologies
-
- air and hydraulic networks technologies
-
- HVAC systems dimensioning norms
-
- energy performance norms and standards.

Electricity part

This part starts with a reminder of the notions of electricity as viewed in the Physics 1 Teaching Unit, together with the basic laws for direct and alternative currents. Then comes the presentation of the miscellaneous electricity production techniques.

Then, the risks linked to the use of electricity in the building are studied in details, together with the protection systems. This part about electricity is then finalised with the study of the electrical control systems, with a particular emphasis on the lighting control.

More concretely, the addressed contents are :

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- definitions (static electricity, electric current, current direction)
-
- production of electricity
-
- direct and alternative electric current
-
- electric security and protection systems
-
- lighting control systems.

Electric Lighting part

The chapter about lighting starts with an accurate study of visual comfort, related with the human eye physiognomy. Then come the technical characteristics of the lamps, luminaires and auxiliary elements, as well as the impact of their selection on the quality of a lighting installation. The miscellaneous light production techniques are studied in details. The current European regulations about lighting is then addressed. Then, based on the acquired knowledge and developed competences, the students have to establish a survey of the lighting in their home, criticize this installation and suggest changes to improve comfort and lower its environmental impact. Therefore, they are divided in two groups and have the possibility of using the measurement equipment of the research team "Architecture & mp; Climat". In the frame of this exercise, they are prompted to explore techniques which may not have been approached during the course, but which are mentioned in numerous bibliographical sources given by the teacher.

More concretely, the addressed contents are :

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- visual comfort and vision
-
- the lamps
-
- luminaires and auxiliary elements
-
- regulations and norms
-
- practical work of survey, critics and renovation of a domestic lighting installation

Architectural integration part

This part aims at the understanding of the technical equipment and systems of a building and their impact on the architectural project design. It is based on a practical work aiming at developing :

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- the understanding of the issues of a specific project
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- the ability to select systems and equipment suited to a specific project (from an architectural and technical point of view)
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- the ability to design a system of technical equipment for a specific project: heating, ventilation, sanitary and electrical appliances
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- the ability to pre-dimension these appliances
-
- the ability to establish the different technical plans of a specific project.


Bibliography :

Guide d'aide à l'utilisation de l'éclairage artificiel en complément à l'éclairage naturel. M. Bodart et A. De Herde, Ministère de la Région Wallonne. Ce livre est disponible à la bibliothèque d'Architecture (bâtiment VINCI)

L'éclairage efficace des logements - guide pratique à destination des particuliers, Deltour J., Bodart M., Deneyer A., Service public de Wallonie, 35 pages, 2011

Guide pratique et technique de l'éclairage résidentiel. Deneyer A., D'Herdt P., Deroisy B., Roisin B., Bodart M., Deltour J., monographie CSTC, BEL, 2011/06/00, n°28, 60 pages, 2011

Faculty or entity in charge:	LOCI
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Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Master [120] in Architecture and Engineering	ARCH2M	5	-	
Master [120] in Civil Engineering	GCE2M	5	-	