UCLouvain

# lbarc1260

*2019*

# Building physics

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

| 3 credits | 30.0 h | Q1 |
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| Teacher(s) | Bodart Magali ; |
| Language : | French |
| Place of the course | Bruxelles |
| Prerequisites | *The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.* |
| Main themes | This teaching unit cover the basic concepts of the physics of walls, hygrothermal comfort and air quality. In particular, it is designed to make students familiar with the notions of mechanical and thermal energy, interior thermal comfort and heat and steam transfer through ventilation and within the walls of a building. |
| Aims | This teaching unit focuses particularly on two dimensions of the profile of a Bachelor level graduate in Architecture: developing a technical dimension and making use of other disciplines.<br>**Specific learning outcomes:**<br>By the end of this course, students will be able to<br>• describe the methods of thermal transfer in material.<br>• clarify the parameters of hygrothermal comfort and air quality and determine, in a static situation, how to achieve this comfort.<br>• establish the main dimensions linked to the thermal qualities of buildings : thermal transmission coefficient of walls, nominal thermal loss in buildings during winter, power and quantity of energy used for heating, rate of air circulation etc.<br>• calculate the change in temperature and the transfer of steam within an opaque or glazed wall, in a static situation.<br>1<br>• detect and estimate the risks of superficial and internal condensation of a wall, for a given climatic situation, both internally and externally.<br>• specify the thermal bridges and assess their impact.<br>**Contribution to the learning outcome reference framework:**<br>**Make use of other subjects**<br>• Seek out other approaches, exchanges of views and ways of enhancing thinking about architecture<br>• Interpret the knowledge of other subjects<br>**Use the technical dimension**<br>• Be familiar with and describe the main technical principles of building<br>• Be able to apply the various basic technical principles in a producing a work of architecture<br>- - - -<br>*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".* |
| Evaluation methods | **Due to the COVID-19 crisis, the information in this section is particularly likely to change.**<br>The evaluation is a written exam based on applications of theory to cases ranging from simple to more elaborated, as practiced during the term. |
| Teaching methods | **Due to the COVID-19 crisis, the information in this section is particularly likely to change.**<br>The course is taught in auditorium.<br>All theory notions reviewed are very extensively illustrated by real cases, from the simplest to the most elaborated, for which the relevant physical phenomenon are quantified. |
| Content | The course starts with the quantification of energy involved during the shifting of a load and the heating of some material. The emphasis is put on the differentiation of the notions of energy and power, taking the units into account for each quantification. |

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| | The different heat propagation modes and the parameters of thermal comfort are then accurately described before tackling the chapter regarding heat exchanges through building walls.<br>The notion of thermal bridge is then introduced. Their influence on energy losses in buildings are then quantified. This allows to switch from the scale of a wall to the building, in order to calculate the energy requirements of the building in static mode.<br>The final chapter addresses the water vapor transmission in a wall.<br>For that purpose, the moist air diagram is very accurately studied. The students are then taught how to draw the curve of vapor pressure within a wall and how to accurately assess when the risks of internal condensation are present and to determine the protection methods to prevent this condensation.<br>The chapter ends with the surface condensation phenomenon. |
| Bibliography | Matériel d'enseignement<br>• Syllabus<br>• Copies des présentations powerpoint |
| Faculty or entity in charge | LOCI |

| Programmes containing this learning unit (UE) | | | | |
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| Program title | Acronym | Credits | Prerequisite | Aims |
| Bachelor in Architecture (Bruxelles) | ARCB1BA | 3 | LBARC1143 AND LBARC1144 | 🔍 |