Name of the module (English): Integrated Project 1					
Module code (UP): M15 (provisional)		**Name of the module (Portuguese):** Projeto Integrado 1			
Module code (THM): IMTM (provisional)		**Name of the module (German):** Integriertes Projekt 1			
Module code (UC): M15 (provisional)		**Name of the module (Spanish):** Proyecto Integrado 1			
Credits: 6 ECTS	**Module status:** Obligatory	**Duration:** 1 semester	**Semester:** 2	**Year:** 1	**Frequency:** Every year
Type of tuition: Classroom-based		**Workload:** 180 h	**Attendance time:** 60 h	**Self-study time:** 120 h	
Usability: Master (Degree in Sustainable Design, Construction and Management of the Built Environment)			**Classification:** Engineering / Architecture	**Teaching language:** English	
Module responsibility: Jorge Manuel Fachana Moreira da Costa (FEUP)		**Lecturers:** Bárbara Rangel Carvalho (FEUP) Hipólito José Campos de Sousa (FEUP) Maria Helena Póvoas Corvacho (FEUP) José Manuel Marques Amorim de Araújo Faria (FEUP) João Pedro da Silva Poças Martins (FEUP) Nuno Manuel Monteiro Ramos (FEUP)			

Description / Observations:

Application-oriented, life-oriented and self-directed learning, whereby the integrated project implies the active participation as well as application of the knowledge provided in the other modules and seminars. With the content learned in the different modules theoretical and practical knowledge is given. Students should now be able to define and understand the problems.

This module is planned to demonstrate how the development of an Integrated Design is reflected in the process of design optimization itself and in the construction process, as a result of a coordinated approach to the involved disciplines, from architecture to the several engineering expertise.

With applied work in multidisciplinary groups, students will be able to test and internalize that "common language" which should be adopted throughout their professional life. To do so, different methodologies and tools available will be presented so that they can be applied in the simulated-design that will be developed.

With the support of the other modules, the tools will be used and knowledge will be added in the practical application in real-world examples, integrating the scientific and technological components addressed in the course, with a depth that takes into account their constraints, simulating the effort and objectives that should be the outcome of a multidisciplinary design team.

Recommended Requirements

Basic knowledge about sustainable concepts in design, construction and managements of buildings and infrastructures.

Basic competences:

- Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context.
- Students are able to apply their acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
- Students are able to integrate knowledge and deal with the complexity of making judgments based on information that is incomplete or limited, including reflections on the social and ethical responsibilities associated with applying their knowledge and judgments.
- Students are able to communicate their findings and the ultimate knowledge and reasons behind them to specialist and non-specialist audiences in a clear and unambiguous manner.
- Students possess the learning skills to enable them to continue studying in a largely self-directed or autonomous manner.

Transverse competences:
This module will provide the student with a fundamental technical and scientific training in construction systems applied to the development of several designs involved in building construction, whether from architecture or engineering.
Articulating the tasks, criteria and requirements of the different expertise involved in the construction of a building the student will have the ability to compare and evaluate the design options that can be adopted.
The practical application of such knowledge in a specific project design, under the approach of Project Based Learning (PBL) methodology, will allow the student to obtain a real understanding of professional framework.
In this way the integrated project design development will be understood not as a simple sum of the designs from the different areas, but as a single integrator design of the different requirements, and a complex system, as a building is, as an integrated system.
This module has 4 h teaching schedule. In each week a theoretical lecture of a theme will be made, to be applied in the practical exercise of integrated design, which will be supervised by two teachers.
To support the development of designs, 2-4 seminars delivered by engineers and/or architects will be offered during the semester. These sessions may be of special-interest themes for support for the development of the design or conferences delivered by design teams using the integrated design approach in their practices. It is intended that, at the end of each session, the guests can make a review of the work of the students.

Specific competences:
Be able to apply BIM methodology in the different life cycle stages in a project and assess the level of detail necessary in each one of them.

Learning outcomes:
This course aims to provide students with a greater operational capability of design development, coordinated with the several expertise involved in building construction. In a structured way, students will be able to coordinate the decisions of all subject areas to support the conceptual and technological options in every moment of design development.
The development of an Integrated Project Design will allow the student to identify the requirements that will determine the architectural and constructive criteria, not only to optimize the whole process, but also to enhance the balance between the architectural language and the efficiency in the use of the building. After assimilating this design approach, the student will not only be able to justify the technological options, but also to understand the importance of each in the performance of the building as a unique and whole system.
The specifics derived from the integration of sustainable design options in the development of the construction process will be addressed at all stages of the syllabus, both at the level of the processes used for the motivation and engagement of stakeholder, as well as the way that the corresponding technical and technological options of innovative profile may be adopted, namely the strategies to be followed to cope with the resistance to change in comparison to the traditional work models.

Content:
1. Introduction and Framework
   - Fundamental concepts of Integrated Project Design (IPD)
   - Project Management/IPD
   - Integrated Design/Optimization of the Construction Process
   - The building as an Integrated System
2. Project work in groups
   - Identify the objectives and goals of a Project
   - Assign group tasks that encourage involvement
   - Recognize and design collaborative work in multiple forms
   - Exploring basic rules for group efficient interaction
   - Responding and dealing with unpredictable circumstances
3. Integration of different aspect of typical tasks a construction process
   - Integrated Design (Integration of all project design disciplines)
   - Possibility of performance measurement and functional objectives (performance measurement for quality of the building in order to reduce operations costs and improve maintenance)
   - Implementing an agile project management
   - Specifics of integrating approaches with a focus on sustainability
   - Indicators for the characteristics of sustainable materials and techniques. Selection and decision processes.
4. Practical application of Current methodologies of the Integrated Project Design approach
   - Architect Handbook RIBA
   - Integrated Project Delivery AIA
   - Integrated Project Design Methodology FEUP/BR

5. Requirements as criteria for design decisions in an Integrated Project Design
   - Criteria Design
   - Definition of criteria in each stage of design
   - Harmonisation of Concept/Design/Requirements/Technological Options
6. Practical applications
   - Integrated Design examples
   - Development of Integrated Design in its different stages.

Teaching methodology:

Practical exercises of different complexities applying the concepts of integrated design The exercises will have two approaches: small applications, relating to limited scientific/technological issues and based on actual building designs; a larger group work, carried out by multidisciplinary teams of students, connecting several of the topics and based on a summary to be then developed and specified in the design document. This work will be presented to a panel of module teachers and, where possible, external experts.
The evaluation will be done, mainly concentrated among the group work, with an intermediate evaluation. In the mid-term evaluation, the panel will be invited to evaluate the concepts developed for the design in order to continue with the expected confidence. The final presentation will include a public presentation of the work not only to the panel mentioned above but also to the entire academic community.

Training activities:

	Number of hours	% Attendance
Theory	20	100
Classroom practice	40	100
Tutorials	5	100
Evaluation	5	100
Group work	60	0
Self-directed work	20	0

Assessment method:

	Minimum weighting	Maximum weight
Continuous classroom evaluation	10%	20%
Final written work	40%	60%
Oral presentation	10%	20%
Practical exercises	0%	30%

Grading system:

U.PORTO	20	19	18	17	16	15	14	13	12	11	10	9	...	0
Portugal	Very Good with distinction			Good with distinction		Good		Sufficient				Fail		
U.CANTABRIA	10.0	9.9	9.0	8.9	...		7.0	6.9	...		5.0	4.9	...	0.0
Spain	Sobresaliente			Notable				Aprobado				Suspenso		
THM	100	...	88	87	73	72	58	57	...		50	49	...	0
Germany	Excellent			Good with distinction		Satisfactory		Sufficient				Fail		

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