MATRIX of existing Master course (Polytechnic Institute of Leiria)

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| Name of compulsory courses | Year | Semes-ter | | Number of ECTS | | Number of elective chairs | List of available elective courses | short description | relation between the contents and RETHINK’s theme |
| Master in Building Construction | | | | | | | | | |
| Dynamic Analysis and Earthquake Engineering | 1st year | | 1s semester | | 7 | - |  | This course provides training in the analysis, design and assessment of structures under seismic actions and other extreme loading conditions. The syllabus covers a comprehensive set of topics related to structural dynamics, single and multiple degree freedom systems, earthquake engineering, and advanced numerical techniques | This course is concerned with the study of how earthquake-induced ground motions affect building structures, the design of such structures to resist earthquake loading, and the control of structures by using sustainable and innovative materials to improve their dynamic response to earthquake loads. |
| Road Pavement Construction and Management | 1st year | | 1s semester | | 6 | - |  | This course is designed to get a better understanding of the principles underlying pavement design, taking into account the physical and mechanical characteristics of materials and the performance in pavement layers, the manufacturing techniques and on-site pavement construction. It also considers the techniques for pavement maintenance and recycling, how pavements deteriorate and and its life cycle performance. | From the production of the paving material, to the placement of the pavement on the road, to rehabilitation, through recycling, asphalt pavements minimize impact on the environment. Low consumption of energy for production and construction, low emission of greenhouse gases, and conservation of natural resources through recycling. |
| Urban Hydraulics | 1st year | | 1s semester | | 6 | - |  | This course is designed to provide knowledge on the management, operation and maintenance of water supply and sewerage; as well the solid waste management. Optimization problems in the field of urban hydraulics are complex by nature and difficult, so training is important to develop mathematical models for hydraulic simulation. | Producing environmentally safe fluid waste stream (or treated effluent), and a solid waste (or treated sludge) suitable for disposal or reuse, are vital to keep a clean environment. |
| Coatings and Finishings | 1st year | | 1s semester | | 6 | - |  | Students are introduced on the functional requirements of coatings and finishes in buildings, as well on the solutions currently used, its scope and application process. Training students to choose the best coating and finishing options on the market when designing a project, and to control quality in coatings and finishing applications on the construction site. Knowledge on *s*upervision and audit of construction works are also provided to students. | It aims to lead the sustainability effort and positively impact on the environment through the use of more environmentally sustainable coatings and finishes in buildings |
| Sustainable Construction | 1st  year | | 1s semester | | 5 | - |  | Understanding and obtaining knowledge on basic methods and tools s to enhance sustainability in buildings, through a comprehensive selection of materials, processes and methods, promoting recycling and reuse whenever possible, taking into account environmental, social and economic considerations | Contributing to the development of critical thinking skills, encouraging a more ecological and sustainable approach. Stimulate intellectual curiosity, innovation openness and experimentation on sustainable construction and related areas. |
| Safety and Quality in Construction and Projects | 1st  year | | 2 semester | | 6 |  |  | This course aims at promoting quality design, health and safety in the built environment. Provide students with knowledge and understanding on quality management systems, to evaluate project quality ensuring the project's success. Capacitate students to design preventive measures to avoid accidents and implement construction project safety and health. | Aims at training highly competent professionals to develop a safe, high quality and sustainable built environment |
| Wood and Masonry Structures | 1st year | | 2 semester | | 6 |  |  | The aim of this module is to introduce students to the design of structures in timber and masonry. The overall objective is to enable students to develop an understanding of the fundamental concepts and design philosophies related to timber and masonry elements and to apply this knowledge to the design of conventional building structures. Students are introduced to European design guidelines (Eurocode 5 and Eurocode 6). | In terms of sustainability, timber is arenewable resource in the construction sector**,** and **t**he rehabilitation of historic buildings usually involves the strengthening of wood and masonry structures |
| Modelling and Evaluation of Structures | 1st year | | 2 semester | | 5 |  |  | Computational methods in structural analysis are of prime importance in the construction industry as tools to assess the efficiency and performance of structures.  A good understanding of the finite element method (FEM) to efficiently model a real life engineering problem is crucial to predict its future behaviour, similarly to the importance of verifying and validating these computational models. | This course aims at improving structural reliability and safety |
| Environmental Comfort in Buildings | 1st year | | 2 semester | | 5 |  |  | Provide students with the technical, regulatory and regulations related to several areas of analysis of indoor environmental quality, as well the ability to integrate information on various aspects relevant to environmental quality (indoor air quality, thermal environment, noise, vibration, lighting), and perform diagnostics of the quality of the indoor environment and propose improvement measures.  Develop awareness of the need to harmonize the concerns on indoor environmental quality and the need to minimize energy usage. | This course aims to improve the environmental comfort in buildings, through the definition of the design conditions of indoor environments and its assessment in existing buildings |
| Pathology and Rehabilitation of Buildings | 1st year | | 2 semester | | 6 |  |  | Provide students with the concepts and basis to understand the intervention principles in existing constructions, promoting its conservation and rehabilitation. Train students to identify anomalies in the construction, to select and use non-destructive tests on site, to assess the condition of existing constructions and to define all tasks related to the conservation, repair, rehabilitation and strengthening of constructions made of concrete, steel, timber or masonry. . | This course aims at promoting the conservation and rehabilitation of existing buildings  . |
| Introduction to Research in Civil Engineering | 1st year | | 2 semester | | 2 |  |  | Capacity to integrate knowledge, to relate data and compare different methods, to develop solutions and produce judgments using limited or incomplete information. Stimulate reflections on findings and development of implications, enhances an understanding of ethical dilemmas and the responsibilities of researchers in applied science. | this course aims at raising standards of ethical practice and social responsibility within the built environment. Ethics and sustainability in construction are related to economic progress, social responsibility and environmental concerns in an integrated way. |
| Total |  | |  | | 60 |  |  |  |  |
| Pre-stressed Structures and Prefabrication | 2nd year | | semester | | 6 |  |  | Prefabricated concrete; design methods, tolerance, floor and roof systems, wall panels and construction joints. Prestressed concrete; basic principles, methods and systems of prestressing, partial loss of prestressing, analysis and design for flexural, shear, bond and bearing. Capacity to design systems with prestressing techniques and precast philosophy. | Prefabrication plays an important role in structural concrete construction and is evolving to cope with current society’s habits and needs related to the built environment. Industrialized construction may bring cost efficiency, good quality and environmentally friendly solutions, able to adapt to market demands.  . |
| Support Structure and Improvement of Soil | 2nd year | | semester | | 6 |  |  | Design of retaining and sheet-pile walls according to global and partial safety factors (Eurocode 7). Application of appropriate techniques for soil improvement and reinforcement. Ability to produce reports on improvement in soils and carry out expert inspection on retaining wall structures. Safety design of various types of retaining walls according to European Standards and selection of the most appropriate method to ground improvement in different soil conditions. | Soil is a fundamental and ultimately finite resource that fulfils a number of functions and services for society which are central to sustainability. Some of the most significant impacts on this resource occur as a result of activities associated with construction activity, and this course develops awareness and understanding of this need within the construction industry. |
| Mobility Planning and Management | 2nd year | | 2 semester | | 6 |  |  | Training students to analyze transportation systems and develop mobility management projects with a strong focus on urban systems. It provides students with the knowledge to understanding intelligent transportation systems and participate in the development of sustainable mobility plans by developing the capacity to integrate all the main aspects inherent to transportation planning | Traditional transport planning aims to improve mobility, reducing environmental and social impacts, and managing traffic congestion |
| Project | 2nd year | | annual | | 42 |  |  | Development of the project work with the elaboration of the final document. | Aim: Linking the objectives of sustainable development with "green building" |
| Dissertation | 2nd year | | annual | | 42 |  |  | Development of the dissertation work with the elaboration of a final document*.* . | Aim:Linking the objectives of sustainable development with "green building" |
| Training | 2nd year | | annual | | 42 |  |  | Realization of a supervised traineeship in a company that operates in the domains of this Master degree. Preparation of a final document to describe the work carried out during this traineeship and the results accomplished | Aim:Linking the objectives of sustainable development with "green building" |
| Total |  | |  | | 60 |  |  |  |  |
| Total - Master degree: | 2 years | | 4 semesters | | 120 |  |  | This Master degree is an interdisciplinary program.  The broad objective of this master degree is to develop awareness to create built environments that are livable, comfortable, safe, and productive, educating future professionals in the concepts of sustainable development. | It intends (i) to provide a holistic, systems perspective to the impact of human activity on the environment, including the role of engineering; (ii) to educate students in the concepts of sustainable development; (iii) to provide insight into sustainability tools such as life cycle analysis and ecological footprint; (iv) to show how engineering decisions, particularly design, can support sustainability goals, and (v) to develop awareness of the ethical, economic, social and political dimensions that influence sustainability |