TASK O1/A3. BIMEPD Course Curriculum based on BIM technologies and ecological challenges for adult learning

CONTENT

1. INTRODUCTION

This report corresponding to the task "O1.A3. BIMEPD Course Curriculum based on BIM technologies and ecological challenges for adult learning" has been carried out taking into account what has been established in the two previous subtasks.

Once the first 2 subtasks have been carried out, the skills, competences and knowledge necessary to develop the activities of the profession of architect in equal conditions and with the necessary means to achieve the maximum level of effectiveness in labour inclusion have been defined. All these skills, competences and knowledge have been included in this report.

This Curriculum will be a common tool at European level for architects, teachers and employers, unemployed and further education workers in each partner country, with special attention to necessities and adaptation for professionals over 45 years old or senior professionals who requires retraining about BIM and EPD (Environmental Product Declaration) knowledge.

Furthermore, it can be applied by training organisations in which architecture-related specialities are taught, and by professional and business associations in further education courses.

2. COURSE DATA

Name	Curriculum based on BIM technologies and ecological challenges.
Module	Challenges for adult learning in Eco-efficient Construction and Sustainable Development.
Qualification in which it is taught	*
Other qualifications that could be offered *	Vocational Training. Occupational Professional Training. Dual Vocational Training. Continuing Education.
Centre	*
Character	OPTIONAL
Term	Short course
Course	*
Language	Official Language*
Overall workload (hours)	25
Theory class schedule	*
Classroom	*
Practice class schedule	*
Place	*

(*) All the fields marked with an asterisk are subject to completion with the specific information for each educational centre which will use this curriculum in future.

3. TEACHERS DATA

Teacher responsible	*
Department	*
Area of knowledge	*
Teacher's office location	*
Phone	*
E-mail	*
URL / WEB	WWW.BIMEPD.EU
~~Tutorial timetables~~	*
~~Tutorial location~~	*
Teaching and research profile	*

(*) All the fields marked with an asterisk are subject to completion with the specific information for each educational centre which will use this curriculum in future.

4. DESCRIPTION OF THE COURSE

4.1. Short description of the contents

- Construction and Sustainable development.
- Environmental regulation and sustainability in construction sector.
- Innovative construction methodologies.
- Information technologies applied to construction sector.
- Methodologies for calculating environmental impact (LCA, CO2 emissions…).
- The use of BIMEPD methodology.

4.2. General description of the course

The term sustainable means that it can stand on its own, without depleting natural resources. A world driven by natural resources requires good natural resource management to achieve what is known as sustainable development or meeting the needs of present generations without compromising the possibilities of the future. Sustainable development encompasses three factors: society, economy and the environment. To achieve the objective of sustainable development, societies need to develop a series of tools that are undoubtedly the product of research, development and human adaptation to the environment.

In this course sustainable processes in the construction industry are known and studied, understood as those that consume less raw materials, energy and produce less waste, thus producing less impact on the environment and preserving economic resources.

To this end, the following methodologies will be analysed within the reference regulatory framework for the study of a methodology for the placement of eco-efficient construction materials based on the use of new technologies.

1. **Life Cycle Assessment (LCA)** is a process that allows us to evaluate the environmental burdens associated with a product, process or activity, identifying and quantifying both the use of matter and energy as waste and emissions to the environment, to determine the impact of that use of resources and to evaluate and implement environmental improvement strategies. It includes the complete cycle of the product, process or activity, taking into account the stages of extraction and processing of raw materials, production, transport and distribution, use, reuse and maintenance, recycling and landfill disposal at the end of its useful life.

2. BIM (Building Information Modelling) is a methodology of collaborative work, which is technologically revolutionising the production chain and management of the building today. This tool, besides facilitating a more efficient construction, allows professionals of the sector to work in cooperation.

The use of tools is an attractive part of the analysis of environmental problems arising from construction industry, which require specific techniques. Often, it is necessary to use them in order to obtain the information required to solve an analysis problem. The objective of this course is to teach the different laying methodologies and their link with environmental challenges and new technologies.

4.3. Objectives of the course

1. Adequate knowledge of new technologies and their link to the construction industry.

2. Training of professionals in the construction sector in order to increase the quality of the final work, ensuring environmental sustainability.

3. Knowledge of the mechanisms that favour the recovery, reuse and recycling of construction materials.

4. Knowledge and ability to design solutions that minimises the waste generated in the placing processes.

5. Train the student over 45 years old (senior) to acquire a critical and scientific way of thinking, to be able to apply the offered technologies to their constructive solution, to respond to the demands of citizens regarding sustainability and to protect the environment during the placing process.

6. Teach the basic operation of the BIMEPD Application, as a professional instrument to evaluate the environmental impacts of products, processes and services.

7. Acquire the necessary basic knowledge of LCA and analyse the databases and impact assessment methodologies available to perform an LCA.

8. Make practical cases that support learning.

9. Present the foundations and the environmental regulations that pertain to construction sector development.

10. Teach the operation of the OER platform, as an open educational resource for self-learning in placing methodologies for sustainable development in construction industry.

4.4. Contribution of the course to professional practice

This course aims to define the skills, competences and knowledge necessary for the installation of construction products, as well as the means

necessary to reach the maximum level of efficiency: scaffolding, machines, tools, cranes, etc., considering aspects related to sustainable construction.

It also aims to make future professionals aware of the need to adequately foresee the negative consequences that human actions may have on the environment during the development of a specific project.

In it, students will have the necessary knowledge to develop and apply tools for analysis, decision making, prevention, correction, mitigation, etc., of the negative effects that a particular construction project can cause.

Currently, with the legislative changes that have taken place in recent years, some preventive tools have been included in other environmental permits or authorisations, although they play a fundamental role in minimising environmental problems.

On the other hand, it is worth highlighting the set of measures that allow us to correctly manage the different environmental aspects of a specific activity, which will allow us to comply with current environmental legislation, as well as achieve levels of environmental excellence.

4.5. Recommendations

(*) Completion subject to the criteria of the educational centre.

4.6. Special measures provided

(*) Specific regulations of the educational centre with respect to the establishment of special adaptations in the methodology and the development of teachings for students who suffer some type of disability or limitation.

5. COMPETENCIES AND LEARNING OUTCOMES

5.1. Basic competences

BC1. Students know how to communicate their conclusions and the knowledge and ultimate reasons that sustain them to specialised and non-specialised audiences in a clear and unambiguous way.

BC2. Students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.

BC3. Students have the ability to gather and interpret relevant data to make judgments that include a reflection on relevant issues of a social, scientific or ethical nature.

BC4. 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.

BC5. Students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.

5.2. General competences

GC1. Be able to take responsibility for their own professional development and their specialization in one or more fields in the field of construction product placing.

GC2. Be able to foster, in professional contexts, the technological, social or cultural advancement within a society based on knowledge.

GC3. Be able to take responsibility for their own professional development and their specialisation in one or more fields of study.

GC4. Students have demonstrated a detailed and well-founded understanding of the theoretical and practical aspects and the methodology of work in the field of construction product placing and Sustainable placing Processes.

GC5. Students are able to predict and control the evolution of complex situations through the development of new and innovative work methodologies adapted to the field of Environmental Engineering and Sustainable Processes.

5.3. Specific competences

SC1. Knowledge of the impact of the construction sector in the achievement of sustainable development and, especially, deepening knowledge of the regulations on the life-cycle analysis of the construction products.

SC2. Intensification of the quality of the evaluation techniques in the construction processes, of the sustainability of the sector and its relationship with the BIM methodology.

SC3. Know the different digital tools and methodologies available to increase the efficiency in placement techniques.

SC4. Plan the implementation of techniques that integrate traditional methodologies, consideration of potential environmental impact and collaborative tools.

SC5. Know the principles of sustainable development applied to methodologies of construction product placing, and the rules that affect the environment.

SC6. Know the procedures related to BIM methodology with LCA and EPD.

5.4. Transversal competences

TC1. Aptitude for teamwork, interdisciplinary, that combines interpersonal skills while maintaining respect for diversity, such as coexistence with other cultures.

TC2. Ability to acquire criteria of continuous training, adaptability to social transformations, motivation for quality from creativity.

TC3. Ability to reconcile environmental requirements with the conditions of development.

TC4. Ability to apply ethical criteria and sustainability in decision making.

TC5. Aptitude for the written and oral communication, as well as for the analysis, organisation, planning and synthesis that provides sufficiency or suitability in the critical reasoning.

TC6. Ability to manage computer tools that allow data management, problem solving and help decision making.

5.5. Learning outcomes

1. Be able to develop an efficient project, taking into account the design, new technologies, and its functionality.

2. Develop the capacity for environmental evaluation of construction projects, and the capacity for self-criticism.

3. Know the different European environmental specific regulations in the field of construction.

4. Know the different available methodologies for construction to be able to develop an optimized project.

5. Know the different tools of management, differentiating those of a mandatory nature from those of a voluntary nature.

6. Identify and assess the best techniques in a constructive process.

7. Know the different concepts of the field of sustainability.

8. Know the sustainable construction and the life cycle assessment.

9. Understand sustainability as a new green culture in the construction sector.

6. CONTENTS

6.1. Contents of the course

Placement methodologies available. Generation of alternatives. Environmental legislation and sustainability in construction. Construction and sustainable development. Identification and evaluation of impacts. Life cycle analysis of construction products. BIM methodologies and applications in the construction sector.

6.2. Theory programme

UNIT 1. Basic concepts and BIM (Building Information Modeling) technology applied to Life Cycle Analysis (LCA).

1.1 BIM methodology.

1.2 Introduction to LCA.

1.3 Basic concepts of BIM applied to LCA.

UNIT 2. BIM and LCA regulation.

2.1 BIM regulations.

2.2 Regulations for environmental management.

2.3 Reference standars on life cycle assessment.

2.4 Application to the natural sector.

2.5 LCA examples.

UNIT 3. Search and interpretation of DAP databases.

3.1 Ecolabels.

3.2 Environmental product declarations.

UNIT 4. Modeling of BIM objects with development level 600 (LOD600) for the integration of environmental impact data.

4.1 Levels of development.

4.2 Environmental impact categories.

4.3 LOD600.

UNIT 5. Modeling of sustainable buildings (new construction and renovation) based on Life Cycle Analysis.

5.1 Environmental certification of buildings

5.2 Reference systems for environmental certification

5.3 Softwares for LCA calculation.

5.4 BIMsoftware for sustainable building modelling.

UNIT 6. Environmental management and documentation of a BIM project.

6.1 Circular Economy in construction.

6.2 Environmental management.

6.3 BIM document management.

UNIT 7. Initiation and development of a project with BIM technology through a strategy of environmental impact reduction.

7.1 Eco-efficient application.

7.2 Connectivity model.

7.3 Workflow model.

UNIT 8. Methodologies for calculating environmental impact from BIM objects with LOD600 development level.

8.1 Calculation methodologies with software.

8.2 BIMclay.

8.3 BIMstone.

UNIT 9. Other methodologies of environmental impact calculation from open BIM formats.

9.1 BIMhealthy.

9.2 UrbanBIM.

9.3 CircularBIM.

UNIT 10. The Construction Manager: BIM Environmental Manager.

10.1 The environmental BIM manager.

10.2 Regulation of CDW in construction works.

10.3 CDW management planning.

6.3. Practices

Realisation of 1 exam test.

7. TEACHING METHODOLOGY

7.1. Teaching methodology

Activity	Teaching techniques	Student's work	Hours
Theoretical classes	Expositive classes of the theoretical contents. Resolution of doubts raised by students.	On-site or Non-on-site:	2
Practices in computer classroom	Search for information, management of databases and use of computer programmes.	On-site or Non-on-site:	2
Tutorship	Resolution of doubts.	On-site or Non-on-site:	2
Work / Individual study	Study of the course in the Online Platform.	Non-on-site:	18
Official exams	Preparation, correction and review of written tests.	Non-on-site:	1
			25

8. ASSESSMENT METHODOLOGY

8.1. Activities and assessment criteria

Activities	Systems and assessment criteria	Percentage weight (%)
Written test.	Theoretical-practical knowledge acquired by the student will be evaluated.	70
Work assessment in the online platform.	Following up the course in the platform will be evaluated.	20
Other assessment activities.	Attendance and participation to classes of the course will be evaluated.	10

8.2. Control and monitoring mechanism

The control and monitoring of student learning will be done through the following actions:

- Participation in the issues raised in class.
- Assistance in the classes.
- Participation in the Online Platform.
- Resolution of doubts in personal tutorship.
- Carrying out self-evaluation questionnaires.
- Assessment of the individual written test.

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marketing of construction products and repealing Council Directive 89/106/EEC.

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