



Course guide

250723 - 250723 - Using Construction Waste

Last modified: 21/06/2024

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| Unit in charge: | Barcelona School of Civil Engineering | |
| Teaching unit: | 751 - DECA - Department of Civil and Environmental Engineering. | |
| Degree: | MASTER'S DEGREE IN STRUCTURAL AND CONSTRUCTION ENGINEERING (Syllabus 2015). (Optional subject). | |
| Academic year: 2024 | ECTS Credits: 5.0 | Languages: Spanish |

LECTURER

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| Coordinating lecturer: | MARILDA BARRA BIZINOTTO |
| Others: | DIEGO FERNANDO APONTE HERNÁNDEZ, MARILDA BARRA BIZINOTTO, ADRIANA HAYDEE MARTINEZ REGUERO, SUSANA VALLS DEL BARRIO |

TEACHING METHODOLOGY

The course consists of 2,3 hours per week of classroom activity (large size group) and 0,3 hours weekly with half the students (medium size group).

The 2,3 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 0,3 hours in the medium size groups is devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

The rest of weekly hours devoted to laboratory practice.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and references.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

LEARNING OBJECTIVES OF THE SUBJECT

Course to introduce the student to the recycling of construction and demolition waste and other industrial waste.

Capacity to assess the environmental impact of construction waste recycling techniques.

Identify primary and secondary materials.

Understand the basic notions of sustainability, recycling and chain management.

Analyze construction and demolition processes. Identify and assess construction and demolition waste. Know the processing and production of recycled aggregates. Characterize recycled aggregates. Learn about the applications of recycled aggregates in civil construction for the production of recycled concrete and how granular material in layers of firm.

Environmental impact by Leaching. Protection of soils and aquifers.

Learn about the properties of combustion waste. Urban solid waste. Incineration and recycling of incineration slags. incineration plants. Emission strategies.

Learn properties of steel aggregates. Applications on roads. Fly ash. Applications. Environmental problems. K factor.

Inertization and immobilization. Treatments with binders. Mining waste and industrial waste.

Alkaline activation as a technique for waste recovery.

STUDY LOAD

| Type | Hours | Percentage |
|--------------------|-------|------------|
| Hours small group | 9,8 | 7.83 |
| Self study | 80,0 | 63.95 |
| Hours large group | 25,5 | 20.38 |
| Hours medium group | 9,8 | 7.83 |

Total learning time: 125.1 h

CONTENTS

Sustainability - Waste - Recycling

Description:

Conceptual discussion: Sustainability - Waste - Recycling. Recycling in construction - Life Cycle Materials - Sustainability and Energy Efficiency - Carbon footprint

Specific objectives:

Enter the cycle of sustainable construction. Distinguish between primary and secondary materials

Full-or-part-time: 2h 24m

Theory classes: 1h

Self study : 1h 24m

Construction and demolition waste

Description:

Processing. Situation in Spain and the world linked and unlinked applications of recycled aggregates in road. Tests and experiences.

Properties of recycled aggregate. Dosage recycled concrete. Recycled concrete properties in fresh and hardened state. Durability RCD fines. Technical considerations and environmental quality

Exercise dosing

Specific objectives:

Learn landslides processing construction and demolition waste, fixed and mobile plants, recycled aggregates. become acquainted roads with recycled aggregates from Spain

Full-or-part-time: 31h 12m

Theory classes: 10h

Practical classes: 2h

Laboratory classes: 1h

Self study : 18h 12m

Soil and water protection. Leaching

Description:

Protection of soil and water. Toxicity of organic and inorganic content. Leaching: General concepts. Essays and legislation.

Tendencies

leaching practice

Full-or-part-time: 9h 36m

Theory classes: 2h

Laboratory classes: 2h

Self study : 5h 36m



Fly ash from thermal power plants

Description:

Production. Classification. Properties. Additions. Alkali activation

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

Inerting for implementation

Description:

Inerting for implementation

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

Steel slag

Description:

Using waste from other industries: Blast furnace slag and steel slag

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

Used tires

Description:

Used tires. Use in concrete and asphalt mix

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m

Municipal solid waste

Description:

Municipal solid waste

Full-or-part-time: 7h 11m

Theory classes: 3h

Self study : 4h 11m



Other usable waste

Description:

Glass, shell of rice, vegetable fibers
Practice other recoverable waste
Recycling of asphalt

Full-or-part-time: 21h 36m

Theory classes: 6h
Laboratory classes: 3h
Self study : 12h 36m

Classroom assessment

Full-or-part-time: 7h 11m

Laboratory classes: 3h
Self study : 4h 11m

GRADING SYSTEM

Continuous assessment: written questions on the subject of the class that must be delivered on paper at the beginning of the next class will be formulated.

All deliveries will be qualified and skilled absence with a zero.

The subject will be adopted with the average from continuing evaluations, representing 25% of the mark, a test representing 40% of the mark and a final paper that represent 35% of the mark. The work will be delivered on paper and will be presented orally in class (20 minutes).

EXAMINATION RULES.

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

BIBLIOGRAPHY

Basic:

- Vázquez, E. (ed.). Progress of recycling in the built environment: fina report of the RILEM Technical Committee 217-PRE [on line]. Dordrecht: Springer, 2013 [Consultation: 28/04/2020]. Available on: <http://dx.doi.org/10.1007/978-94-007-4908-5>. ISBN 9789400749078.