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250471 - PONTS - Bridges

Coordinating unit: 250 - ETSECCPB - Barcelona School of Civil Engineering

Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering

Academic year: 2015

Degree: MASTER'S DEGREE IN CIVIL ENGINEERING (RESEARCH TRACK) (Syllabus 2007). (Teaching unit Optional)
MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Teaching unit Optional)
MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Teaching unit Optional)
MASTER'S DEGREE IN GEOTECHNICAL AND EARTHQUAKE ENGINEERING (Syllabus 2009). (Teaching unit Optional)
MASTER'S DEGREE IN CIVIL ENGINEERING (RESEARCH TRACK) (Syllabus 2009). (Teaching unit Optional)
MASTER'S DEGREE IN STRUCTURAL AND CONSTRUCTION ENGINEERING (Syllabus 2009). (Teaching unit Optional)
MASTER'S DEGREE IN GEOTECHNICAL ENGINEERING (Syllabus 2015). (Teaching unit Optional)
MASTER'S DEGREE IN STRUCTURAL AND CONSTRUCTION ENGINEERING (Syllabus 2015). (Teaching unit Optional)

ECTS credits: 5 Teaching languages: Catalan, Spanish, English

Teaching staff

Coordinator: ANGEL CARLOS APARICIO BENGOECHEA

Others: ANGEL CARLOS APARICIO BENGOECHEA, JUAN RAMON CASAS RIUS

Opening hours

Timetable: The tutorial hours will be published at the beginning of the course

Degree competences to which the subject contributes

Specific:

8162. Knowledge of all kinds of structures and materials and the ability to design, execute and maintain structures and buildings for civil works.

8228. Knowledge of and competence in the application of advanced structural design and calculations for structural analysis, based on knowledge and understanding of forces and their application to civil engineering structures. The ability to assess structural integrity.

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Teaching methodology

The course consists of 1,8 hours per week of classroom activity (large size group) and 0,8 hours weekly with half the students (medium size group).

The 1,8 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 0,8 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 literature.

Learning objectives of the subject

Specialization subject in which knowledge on specific competences is intensified.

Knowledge and skills at specialization level that permit the development and application of techniques and methodologies at advanced level.

Contents of specialization at master level related to research or innovation in the field of engineering.

- Learn to design and build bridges of small and medium spans constructed by any method
- Started in the design and construction of long span bridges

Study load

Total learning time: 125h	Theory classes:	19h 30m	15.60%
	Practical classes:	9h 45m	7.80%
	Laboratory classes:	9h 45m	7.80%
	Guided activities:	6h	4.80%
	Self study:	80h	64.00%

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Content

Generals Themes

Learning time: 24h
Theory classes: 10h
Self study : 14h

Description:
Presentation of the Course. Specific language of Bridge Engineering. Historical approach
Actions on the bridges. Equipment of the superstructure
Structural Behavior of Beam Bridges, Portal Bridges and Arch Bridges
Structural behavior of cable-stayed bridges

Structural behaviour and Design criteria for deck cross sections

Learning time: 16h 48m
Theory classes: 7h
Self study : 9h 48m

Description:
Design of precast prestressed beam decks
Design of slabs decks
Design of box beam girder decks

Bridge Bearings, Piers and Abutments

Learning time: 12h
Theory classes: 5h
Self study : 7h

Description:
Design of Piers and Abutments
Bearing devices for bridges

Bridge Deck Structural Analysis by the Grillage method

Learning time: 7h 11m
Practical classes: 3h
Self study : 4h 11m

Description:
Structural analysis by plane grillage method of beam bridge decks, slab decks and box beam decks

Evaluations

Learning time: 14h 23m
Laboratory classes: 6h
Self study : 8h 23m

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Design and Construction of segmental prestressed concrete bridges	Learning time: 19h 12m Theory classes: 8h Self study : 11h 12m

Description:
Design and Construction of bridge decks "in situ" and with pecast beams
Design and construction of segmental bridges span by sapan
Design and construction of bride decks by incremental launching
Design and Construction of Bridges by the Cantilever method

Qualification system

- Continuous assesment consists in carrying out a practical work (40%) and a final exam (60%)

- The practical work conssists in en prelimenary design of a bridge according to a draft format of five partial works, P1 to P5, conducted in groups of two students

-Each partial practical work must be delivered on the dates indicated in ATENEA. Failure to timely delivery will be graded with 50% of the marks obtained at delivery.

- The grade obtained in each delivery (3 deliveries) will be affected by a multiplier, a value between 0 and 1, which is obtained through a write examination conducted the day of delivery of the practice. The review will assess the degree of authorship of each group member.

- These three evaluations are worth 40% of the total mark

- The final evaluation will be at week 13, is single, will last three hours and its value is 60% of the final mark

- According to academic guidelines, special evaluation exists only for those students who can support, in a documented way , they had been unable to attend to one or more partial evaluations. They can only recover the missing evaluation

Regulations for carrying out activities

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

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Bibliography

Basic:

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Arenas, J.J.; Aparicio, A.C. Estribos de puente de tramo recto : concepción, diseño, cálculo. Santander: Departamento de Tecnología de las Estructuras, Universidad de Santander, 1984.

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Menn, C. Prestressed Concrete Bridges. Brasel: Birkhaüser Verlag, 1990. ISBN 0817624147.

. E.CHambly. Bridge deck behaviour. 2nd ed. New York: Chapman and Hall, 1991. ISBN 0419172602.

Manterola, J. Puentes: apuntes para su diseño, cálculo y construcción. Madrid: Colegio de Ingenieros de Caminos,, 2006. ISBN 9788438003237.

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