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250439 - MODNUMECE - Numerical Models in Civil and Structural Engineering

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

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

Academic year: 2019

Degree: 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 STRUCTURAL AND CONSTRUCTION ENGINEERING (Syllabus 2015). (Teaching unit Optional)

ECTS credits: 5 Teaching languages: Spanish, English

Teaching staff

Coordinator: MICHELE CHIUMENTI

Others: LUIS MIGUEL CERVERA RUIZ, MICHELE CHIUMENTI, JOSE FRANCISCO ZARATE ARAIZA

Degree competences to which the subject contributes

Specific:

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.

Transversal:

8559. ENTREPRENEURSHIP AND INNOVATION: Being aware of and understanding the mechanisms on which scientific research is based, as well as the mechanisms and instruments for transferring results among socio-economic agents involved in research, development and innovation processes.

8560. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

8561. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Learning objectives of the subject

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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

Introduction	Learning time: 2h 24m Theory classes: 1h Self study : 1h 24m
Brief review of Continuum Mechanics	Learning time: 12h Theory classes: 5h Self study : 7h
Geometric modeling and meshing	Learning time: 9h 36m Practical classes: 4h Self study : 5h 36m
Structural Analysis	Learning time: 19h 12m Theory classes: 2h Practical classes: 3h Laboratory classes: 3h Self study : 11h 12m
Transient Analysis	Learning time: 19h 12m Theory classes: 3h Practical classes: 2h Laboratory classes: 3h Self study : 11h 12m
Nonlinear analysis	Learning time: 31h 12m Theory classes: 7h Practical classes: 3h Laboratory classes: 3h Self study : 18h 12m

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Bibliography

Basic:

Fung, Y.C.. A First Course in Continuum Mechanics. Prentice-Hall, 1977.

Malvern, L.E.. Introduction to the Mechanics of a Continuous Medium,. Prentice-Hall, 1969.

Mase, G.T. & Mase, G.E.. Continuum Mechanics for Engineers, 2nd edition,. CRC Press, 1999.

1. Fung Y.C., Tong P.. Classical and Computational Solid Mechanics. 2001.

Bathe K.J.. Finite Element Procedures. Prentice Hall, 1996.

Zienkiewicz, O.C., Taylor, R.L., Zhu, J.Z.. The Finite Element Method: Its Basis and Fundamentals. Elsevier Butterworth-Heinemann, 2005.

Zienkiewicz, O.C., Taylor, R.L.. The Finite Element Method for Solid and Structural Mechanics. 2005.

Crisfield, M.A. Non-Linear Finite Element Analysis of Solids and Structures. John Wiley & Sons., 1991.

Complementary:

West, H.H. Fundamentals of structural analysis. 2nd ed. New York: Wiley, 2002. ISBN 0471355569.

Ghali, A., Neville, A.M. & Brown, T.G.. Structural Analysis: A Unified Classical and Matrix Approach. Spon Press., 2003.

Utku, S., Norris, C.H. & Wilbur, J.B.. Elementary Structural Analysis. McGraw-Hill., 1991.