Last update: 04-11-2015

250440 - ENGCOMPREX - Computational Engineering for Design and Operation

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 (PROFESSIONAL TRACK) (Syllabus 2012). (Teaching unit Optional)
MASTER'S DEGREE IN CIVIL ENGINEERING (RESEARCH TRACK) (Syllabus 2009). (Teaching unit Optional)

ECTS credits: 5 Teaching languages: English

Teaching staff

Coordinator: IRENE ARIAS VICENTE

Others: IRENE ARIAS VICENTE, CARLOS SABORIDO AMATE

Teaching methodology

Taught module delivery: thirteen weeks of teaching, coursework and self-study. Apart from the 3 hours per week in the classroom, self-study must last an average of 4.5 hours per week.

At least a half of the classroom hours are devoted to work in small groups (computer laboratory, evaluations, etc.)

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.

Tutored weekly class where case studies and practical examples are reproduced by the students. Topics in computational engineering are reviewed and worked in depth using commercial software

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: 7h 11m

Theory classes: 2h
Laboratory classes: 1h
Self study : 4h 11m

Description:
Basic steps in computer modeling
Modeling exercise with pdetools. Error measures, convergence.

Governing physics

Learning time: 7h 11m

Theory classes: 2h
Laboratory classes: 1h
Self study : 4h 11m

Description:
Balance equations: solids, fluids. Thermal balance. Transport equation

Exercise on heat transfer.

Discretization methods

Learning time: 7h 11m

Theory classes: 2h
Laboratory classes: 1h
Self study : 4h 11m

Description:
Finite elements
Abaqus. SAP. Other commercial software.

Linear Elasticity

Learning time: 21h 36m

Theory classes: 1h
Laboratory classes: 8h
Self study : 12h 36m

Description:
Bulk and structural elements.
Introduction to SAP
Exercise with SAP

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Dynamics

Learning time: 12h

Theory classes: 2h
Laboratory classes: 3h
Self study : 7h

Description:
Modal and direct time-integration algorithms, explicit, implicit, stability.
Introduction to Abaqus

Evaluation

Learning time: 16h 48m

Laboratory classes: 7h
Self study : 9h 48m

Non-linearities

Learning time: 14h 23m

Theory classes: 1h
Laboratory classes: 5h
Self study : 8h 23m

Description:
Non-linear elasticity. Plasticity. Viscoelasticity. Damage.
Exercise with Abaqus

Buckling

Learning time: 7h 11m

Theory classes: 1h
Laboratory classes: 2h
Self study : 4h 11m

Description:
Linear and non-linear Buckling
Exercise

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Qualification system

The mark of the course is obtained as follows:

Mark = Q*0.2 + A*0.3 + P*0.5

where
Q is the mark of the in-class written exam
A is the average of the marks of the three assignments
P is the mark of the final project

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.

Bibliography

Basic:

Zienkiewicz, O.C.; Morgan, K. Finite elements and approximation. New York: John Wiley and Sons, 1983. ISBN 0471982407.