

## REGISTRATION

To register, please use the web page  
<http://congress.cimne.com/shmcourse09>

For administrative information or enquires, email to  
[shmcourse09@cimne.upc.edu](mailto:shmcourse09@cimne.upc.edu)

**Registration Fee:**

**Industry:** 800 Euros  
**Faculty and Students:** 400 Euros

Registration includes course presentation folder and supplementary data, plus lunches and refreshments.

## COURSE VENUE AND CONTACT

School of Civil Engineering  
Technical University of Catalunya – UPC  
Barcelona  
Campus Nord, building C2  
Conference Room C2-212 (second floor)



Escola Tècnica Superior d'Enginyers  
de Camins, Canals i Ports de Barcelona

UNIVERSITAT POLITÈCNICA DE CATALUNYA

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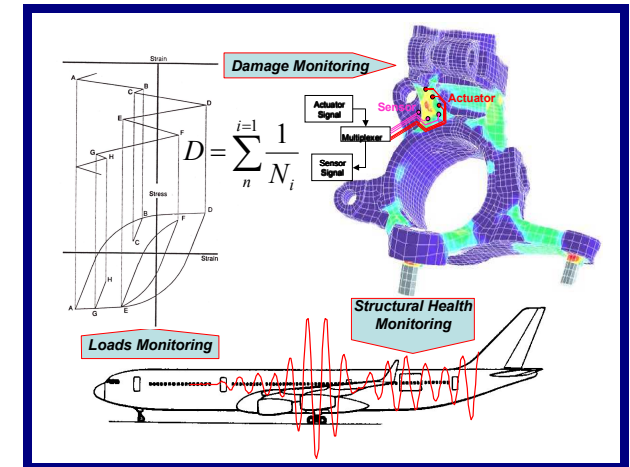
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## ADVANCED COURSE

# Structural Health Monitoring

December 1-4, 2009



Department of Applied Mathematics III  
Technical University of Catalunya  
Control, Dynamics and Applications  
Barcelona  
Spain

Lectures material developed with the support of the European Commission Project ASA6-CT-2006-044636

## COURSE PROGRAM

### TUESDAY – December 1

**09:00 – 10:00 Boller (U. Saarland)**

Why SHM in Aerospace? An introduction

**Coffee Break**

**10:30 – 11:30 Ostachowicz (IFFM)**

FTT based spectral element method

**11:30 – 12:30 Boller (U. Saarland)**

Loads and overloads: characterization, load monitoring and damage tolerance

**LUNCH**

**14:00 – 15:00 Rodellar (U. P. Catalunya)**

Statistical PCA based SHM method

**15:00 – 16:00 Boller (U. Saarland)**

Predictive maintenance, system reliability

**Coffee Break**

**16:30 – 17:30 Ostachowicz (IFFM)**

Lamb waves, propagation in composite structures, experimental validation

**17:30 – 18:30 Guemes (U. P. Madrid)**

Classification of fiber-optic sensors

### WEDNESDAY – December 2

**09:00 – 10:00 Guemes (U. P. Madrid)**

FBGs as damage sensors for composites

**Coffee Break**

**10:30 – 11:30 Ostachowicz (IFFM)**

Optimal sensor network

**11:30 – 12:30 Guemes (U. P. Madrid)**

Embedding FBGs in composites; examples

**LUNCH**

**14:00 – 15:00 Laboratory (U. P. Madrid)**

Application: Fiber optic sensors

**15:00 – 16:00 Suleman (U. Lisbon)**

Vibration based SHM methods

**Coffee Break**

**16:30 – 17:30 Fassois (U. Patras)**

Why statistical time series based SHM methods?

**17:30 – 18:30 Suleman (U. Lisbon)**

Lamb waves, piezo-networks, phased arrays

## COURSE PROGRAM

### THURSDAY – December 3

**09:00 – 10:00 Suleman (U. Lisbon)**

Applications: EU projects and Aircraft structures

**Coffee Break**

**10:30 – 11:30 Fassois (U. Patras)**

Statistical models and non-parametric methods

**11:30 – 12:30 Fassois (U. Patras)**

Statistical models and parametric methods applications

**LUNCH**

**14:00 – 15:00 Laboratory Mújica (U.P. Catalunya)**

Application: active piezoelectric systems

**15:00 – 16:00 Fritzen (U. Siegen)**

Structural health management: local and global methods

**Coffee Break**

**16:30 – 17:30 McGugan (RISO)**

Industry perspective on SHM

**17:30 – 18:30 Fritzen (U. Siegen)**

Experimental modal analysis, data processing / analysis

### FRIDAY – December 4

**09:00 – 10:00 McGugan (RISO)**

Remote condition monitoring of offshore wind farms

**Coffee Break**

**10:30 – 11:30 McGugan (RISO)**

Hardware validation, wind turbine data access tools

**11:30 – 12:30 Fritzen (U. Siegen)**

Model updating methods, optimisation and damage identification

## COURSE OBJECTIVES

Structural Health Monitoring (SHM) is an emerging technology, dealing with the development and implementation of techniques and systems where monitoring, inspection and damage detection become an integral part of structures and thus a matter of automation. It further merges with a variety of techniques related to diagnostics and prognostics.

SHM emerged from the field of smart structures and laterally encompasses disciplines such as structural dynamics, materials and structures, fatigue and fracture, non-destructive testing and evaluation, sensors and actuators, microelectronics, signal processing and much more. To be effective in the development of SHM systems, a multidisciplinary approach is therefore necessary. Without this global view it will be difficult for engineers to holistically manage the operation of an engineering structure through its life cycle in the future and to generate new breakthroughs in structural engineering.

The objective of this Course is to get the experts prepared for the European and other industries to be able to design and manage structural health of engineering structures in the future. A matching network of experts from European universities and research institutions, selected by their technical competence and teaching experience, has prepared an intensive Lectures Series, covering all theory and techniques relevant to the understanding and handling of SHM. Laboratory and demonstration activities will also be included such that participants gain hands-on experience in the main techniques addressed.