



Università  
degli Studi  
di Ferrara

DE Department of  
Engineering  
Ferrara

# Vibroacustica del veicolo Simulazione

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# Goal of the Course

- Provide advanced numerical methods for NVH (Noise Vibration and Harshness) and comfort issues in the automotive field.
- Knowledge of acoustic and vibration propagation inside materials in order to design noise and vibration abatements in vehicles.
- Provide numerical tools for taking into account the NVH issues within the vehicle design (design for NVH)

# Exam

- The exam consists in an oral test, to be done in one time.
- The oral exam, for testing the understanding and application of the course content and to be done in one session, consists of two parts: a 15-minute oral speech regarding the numerical simulation developed during the course, and an oral test regarding the course contents.
- The exam is passed if the score of each test is at least sufficient. The final mark is the arithmetic mean of the marks obtained in the two tests.

# Teachers

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# Text books

## For studying

- **Mechanical Vibrations (6th Edition), Singiresu S. Rao, ISBN-13: 978-0134361307.**

## For the personal deepening of contents:

- Vibration damping of structural elements, C. T. Sun, Y. P. Lu
- Passive vibration isolation, Eugene I. Rivin



# Agenda (30h) - vibrations

1. Advanced modeling of finite elements for dynamic analysis of automotive components such as car frames and critical components;
2. Vibration suppression (design and methods for experimental testing of vibration dampers);
3. Laboratory: computer simulation activities with FEM software with automotive applications

# Agenda (30h) - Acoustics

- Introduction to acoustic simulation methods
  - Modeling of multilayer trim components for noise control
  - Advanced acoustic modeling with FEM
  - Seminars on acoustical simulations in automotive
  - Laboratory: computer simulation activities with FEM software with automotive applications
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