



**UNIMORE**

UNIVERSITÀ DEGLI STUDI DI  
MODENA E REGGIO EMILIA

Dipartimento di Scienze e Metodi  
dell'Ingegneria

**Overview of the Course**

# **Multibody Simulation and Experimental Modal Analysis**

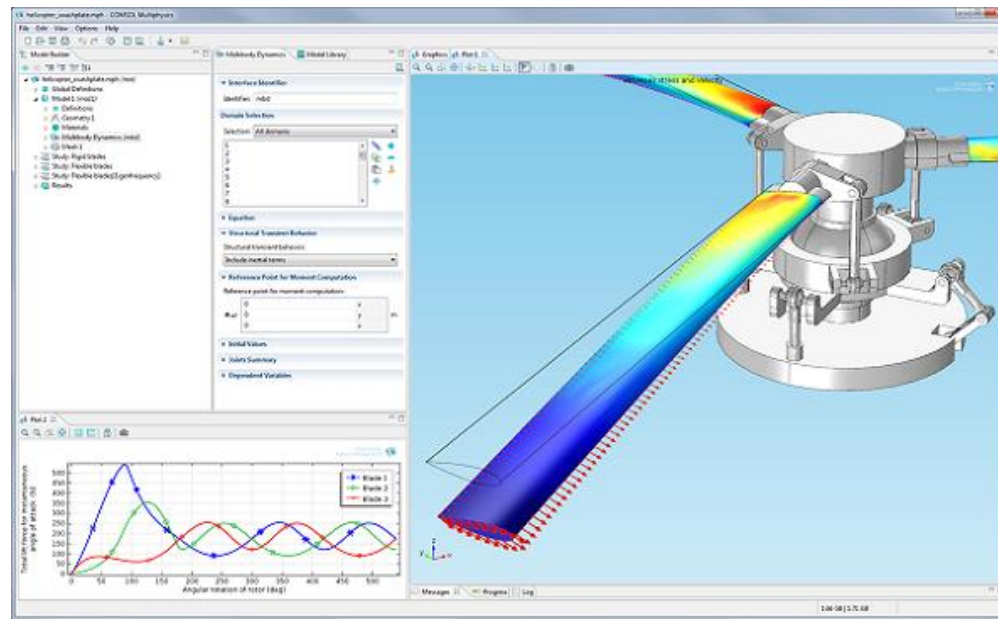
**Prof. Marco Cocconcelli**

**Prof. Matteo Strozzi**

**Digital Automation Engineering**

# Aim of the Course

Provide advanced knowledge of **mechanics** for both **numerical** and **experimental modelling** of **complex mechanical systems**.



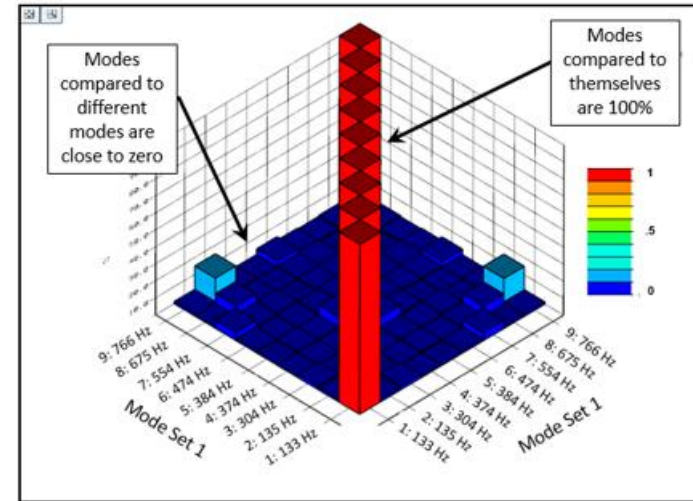
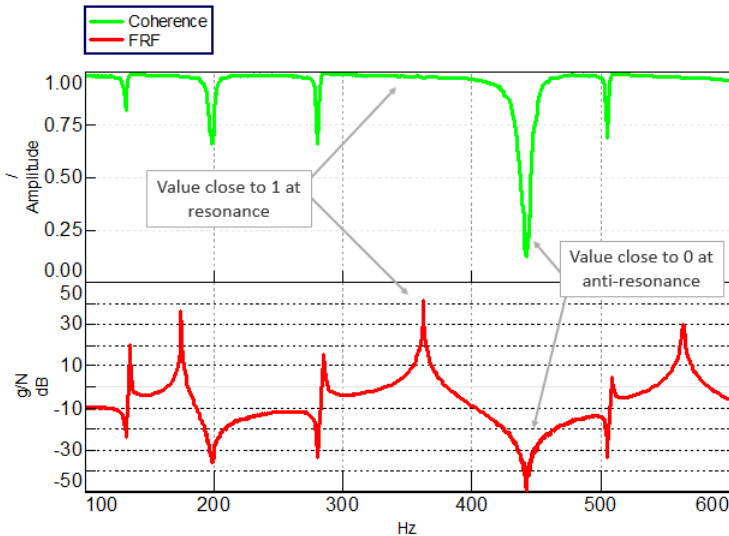
# Expected learning outcomes

- Learn **how to model physical systems**.
- Learn **how to set up a system of equations** for the kinematic and dynamic analysis of mechanical systems.
- Learn **how to perform an experimental modal analysis** test of a mechanical component.
- **Evaluate different techniques** for modelling complex systems, **interpreting and comparing** the different results.

# Experimental Modal Analysis

6 CFU – Prof. Matteo Strozzi

Pictures from [Simcenter Testlab](#)

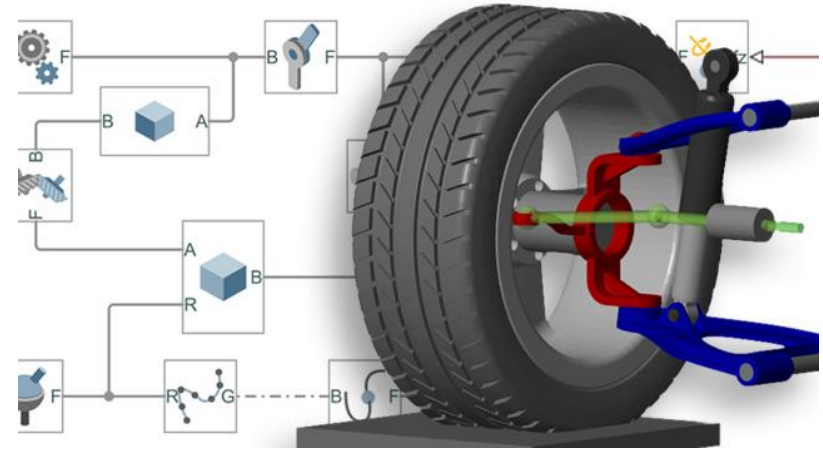
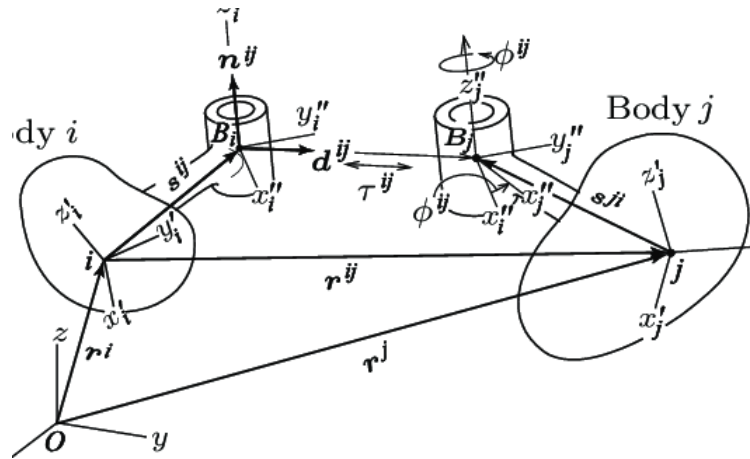


- In the Course, you will learn how to obtain the **frequency response function** of a continuous system and how to extract the **modal parameters**.
- The Course comprises experimental tests carried out by adopting **Siemens' LMS Test.Lab** software.

# Multibody Simulation

6 CFU – Prof. Marco Cocconcelli

Pictures from [Researchgate](#) and [Mathworks](#)



- In the Course, you will learn how to model a **system of inter-connected bodies** and how to write the equations to perform **dynamic analysis**.
- The Course comprises a simulation part using the **MathWorks' Simscape Multibody** software.

# Evaluation methods

12 CFU – 108 hours

- The exam is divided into **two parts**, one on the experimental modal analysis, the other on the multibody simulation.
- For each part, the test consists of **an oral exam** on the whole program covered in class.
- The estimated time for each of the two oral tests is 45 minutes, i.e., **90 minutes in total**.
- The final grade is given by **the arithmetic average** of the evaluations of the individual questions.

# Intermediate and full exam

- For the current students it is possible to take **an intermediate oral exam**, on the first part of the Course (Experimental Modal Analysis) and in the same way as described above (45 minutes).
- The exam is positive only if **both the parts** are sufficient.
- **Six exam dates** will be established during all the academic year. Students must register for the exam sessions through the ESSE3 platform.