



COURSE: Dynamics of Structures

ACADEMIC YEAR: 2016-2017

TYPE OF EDUCATIONAL ACTIVITY:

TEACHER: Maria Anna De Rosa

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mobile (optional):

Language: Italian

ECTS: 6

n. of hours:54

Campus: Potenza
Dept./School: School of
Engineering

Semester: Annual

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

In this Course the basilar theories of the dynamic analysis of rigid and deformable solid continua is illustrated. Basically, the static analysis of solids and structures, as illustrated in Strength of Materials, is generalized in order to take into account the inertia forces due to dynamic effects.

The mathematic foundation is laid out, and subsequently the theory is applied to beams and frames, and finally to three-dimensional continua, by means of the Finite Discretization approach.

The student will be able to:

- a) identify a simplified discrete model of a real structure
- b) choice the most useful analytical model to study the resulting model
- c) evaluate the dynamic behaviour of the model
- d) apply the Finite Element method to beams and two-dimensional frames, in order to obtain frequencies and vibration modes
- e) use the symbolic package Mathematica

Hopefully, the student should also be able to use these skills in other subsequent courses

PRE-REQUIREMENTS

Strength of materials

SYLLABUS

1. Fundamentals of dynamics for a continuous body
2. Hamilton principle and Lagrange equations
3. One-degree-of-freedom systems
4. N-degree-of-freedom systems.
5. Euler-Bernoulli and Timoshenko beams
6. Pin-jointed trusses: finite element analysis, mass matrix and stiffness analysis
- 7 Two-dimensional frames: finite element analysis, mass matrix and stiffness analysis

TEACHING METHODS

Theoretical lessons and Classroom tutorials

EVALUATION METHODS

The student will be asked to discuss the dynamic analysis of a truss or a frames. Moreover, he should master the theoretical framework of the analysis, and he should be able to deduce the fundamental equations of the problem

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TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Detailed materials given by the teacher

Meirovitch "Fundamentals of vibrations" McGRAW-HILL

Bottega "Engineering vibrations" Taylor and Francis

INTERACTION WITH STUDENTS

- Monday 8.30-9.30

- Wednesday 11.30-12.30

E-mails are obviously very well welcomed for every kind of questions

EXAMINATION DATES¹

I Session: 11/1/2017 -1/02/2017-15/03/2017-

II Session 26/04/2017 - 17/05/2017- 7/06/2017 - 2/08/2017

III Session 27/09/2017 – 18/10/2017 – 15/11/2017 – 6/12/2017

EVALUATION BOARD

SEMINARS BY EXTERNAL EXPERTS YES NO X

FURTHER INFORMATION
