COURSE DESCRIPTION
FUNDAMENTALS OF SCIENCE OF CONSTRUCTIONS

SSD: SCIENZA DELLE COSTRUZIONI (ICAR/08)

DEGREE PROGRAMME: ARCHITETTURA (N14)
ACADEMIC YEAR 2022/2023

COURSE DESCRIPTION

TEACHER: BABILIO ENRICO
PHONE: 081-2538032
EMAIL: enrico.babilio@unina.it

GENERAL INFORMATION ABOUT THE COURSE

INTEGRATED COURSE: NOT APPLICABLE
MODULE: NOT APPLICABLE
CHANNEL: 03 Cognome A - Z
YEAR OF THE DEGREE PROGRAMME: II
PERIOD IN WHICH THE COURSE IS DELIVERED: SEMESTER I
CFU: 8

REQUIRED PRELIMINARY COURSES

You cannot be admitted taking the exam if you have not passed the Calculus /Geometry exam.

PREREQUISITES

No specific prerequisites are required for understanding the teaching content, but disciplinary knowledge acquired in the Calculus/Geometry course is still very useful.

LEARNING GOALS

The objective of the course is to introduce the subject of structural analysis. The course aims to provide students with the basic notions, which are necessary for understanding the courses in Continuum and Structural Mechanics and Building Technology, placed in later years.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

The student must show an understanding of basic concepts such as displacement and rotation, force and moment, know how to manipulate simple physical-mathematical relationships, and

understand their connection to reality.

Applying knowledge and understanding

The student must show that he or she is able to draw the "practical" consequences, in terms of simple applications, of the set of theoretical notions acquired; he or she must be able to solve simple structures.

COURSE CONTENT/SYLLABUS

Vector theory

1. Scalar and vector quantities
2. Vector algebra
3. Scalar product, vector product and mixed product
4. Vector basis

Kinematics of rigid bodies

1. Material point. Absolute and relative displacement.
2. Rigid material system
3. Infinitesimal displacements of a rigid body
4. Superposition of effects
5. Independent parameters of an infinitesimal rigid motion
6. Constraints and restraints
7. Beams and mechanical systems
8. Congruence
9. Distortions
10. Graphical solutions

Statics of rigid bodies

1. Laws of Mechanics
2. Equilibrium of a material point and a rigid body
3. The static behavior of constraints
4. Equations of equilibrium
5. Stress characteristics
6. Relationships between load, shear and moment
7. Graphical solution of equilibrium

Beam theory

1. The beam
2. Definitions of first and second moment of area
3. Definition of elastic modulus
4. Technical theory of the beam
5. Equation of the extensional and flexural elastic line
6. Mohr's analogy and corollaries

Virtual Works Theorem

1. The theorem of Virtual Works
2. Uses of the Virtual Works theorem.

Solution methods for statically indeterminate elastic structures

1. Force Method (direct writing of the Congruence Equations)
2. Method of Unitary Force Method (VFT)

READINGS/BIBLIOGRAPHY

A. Anselmi, Appunti di Statica, reperibile presso la copisteria Luda di Cirelli D. (SAS) in Via Sant'Anna dei Lombardi, 14 80134, Napoli

A. Anselmi, Appunti di Teoria delle Strutture, Luda

C. Ceraldi, L. Dodaro, M. Lippiello, Meccanica dei sistemi rigidi, Aracne editrice

C. Ceraldi, L. Dodaro, M. Lippiello, Esercizi di Meccanica dei sistemi rigidi, Luda

TEACHING METHODS OF THE COURSE (OR MODULE)

The course is taught with lectures that cover all topics included in the syllabus, from both theoretical and applied perspectives. Students may ask for further clarification during the office hours.

EXAMINATION/EVALUATION CRITERIA

a) Exam type

- [x] Written
- [x] Oral
- [ ] Project discussion
- [ ] Other

In case of a written exam, questions refer to

- [ ] Multiple choice answers
- [x] Open answers
- [x] Numerical exercises

b) Evaluation pattern

The result of the exam will depend on achieving a minimum passing mark (18/30) in both tests, written and oral, and the final score will be equal to their arithmetic mean.