# COURSE DETAILS

# "PHYSICS"

# SSD FIS/01

DEGREE PROGRAMME: FOOD TECHNOLOGY

ACADEMIC YEAR 2021-2022

## GENERAL INFORMATION – TEACHER REFERENCES

TEACHER: LUIGI CAPPIELLO
PHONE: 081676483
EMAIL: LUIGI.CAPPIELLO@UNINA.IT

## GENERAL INFORMATION ABOUT THE COURSE

INTEGRATED COURSE (IF APPLICABLE):
MODULE (IF APPLICABLE):
CHANNEL (IF APPLICABLE): **I-Z**
YEAR OF THE DEGREE PROGRAMME (I, II, III): **I**
SEMESTER (I, II): **II**
CFU: **6**

## REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE "ORDINAMENTO")

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## PREREQUISITES (IF APPLICABLE)

Admission test in Physics, Mathematics, Logics

## LEARNING GOALS

The aim of the course is two-folded. On one side it aims at providing students with notions related to the basic Physics (Mechanics, Fluids and Electricity). On the other side, through the practice with numerical exercises, train the students to solve problems of different kind, choosing the right mathematical model to approach them, solving algebraic equations and reasoning critically on the numerical results.

## EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

### Knowledge and understanding

The student needs to show ability to know and understand the basic principles of Mechanics of point particle and of rigid body, of Fluids at rest and in motion, and of Electricity. The student is not expected to learn by heart the notions, but he is required to develop a critical thinking connecting the different topics studied.

### Applying knowledge and understanding

The student needs to show ability to solve simple problems of Mechanics and Electricity. In particular, he/she needs to build a sketch of the problem, to set up a strategy for its resolution, to manipulate equations in order to derive the unknowns, to analyze the results and be able to discuss them.

## COURSE CONTENT/SYLLABUS

**MECHANICS**. Physical Quantities and Units. Kinematics of a Point Particle. One-Dimensional Motion.
**Dynamics of a Point Particle**. Work. Kinetic Energy and Work-Energy Theorem. Power. Definition of Conservative Force. Potential Energy. Conservation of Total Mechanical Energy. Non-Conservative Forces.
**Dynamics of Multiparticle Systems and Rigid Bodies**. Center of Mass of a System of Point Particles. Motion of the Center of Mass. Total Momentum. Isolated Systems and Total Momentum Conservation. Collisions in One-Dimensions. Torque. Rotational Kinetic Energy and Moment of inertia. Equilibrium of a Rigid Body. Center of gravity. Levers.

**FLUIDS**. Pressure and Density. Variation of the Pressure in a Liquid at Rest, Stevin's Law. Pascal's Principle. Archimedes' Principle. Measuring the Pressure. Ideal Fluid Motion. The Equation of Continuity. Bernoulli's Equation and its Applications. Remarks on Real Fluids.

**ELECTROMAGNETISM.** Electrostatics. Electric Charges. Conductors and Insulators, Coulomb's Law. Electric Field. Field Lines. Superposition Principle. Electrical Potential. Uniform field. Field of a Point Charge. Electric Dipole. Electric Currents. Ohm's Law. Resistors and Resistivity. Power: Joule Law.

## READINGS/BIBLIOGRAPHY

On the teacher Unina website (and on Microsoft Teams) there are a collection of exercises, lecture slides and additional material useful for exam preparation.

**Bibliography:**

D. Halliday, R. Resnick, J.Walker, Fondamenti di Fisica, Ambrosiana, Milano;
J. Serway, Principi di Fisica vol.I, Edises, Napoli.

## TEACHING METHODS

Teacher will use lectures for 60% of total hours and practical exercises for the remaining 40%. This proportion may change according to the students' requests. In addition, seminars on examples of real fluid motion are foreseen.

## EXAMINATION/EVALUATION CRITERIA

**a) Exam type:**

| Exam type | |
|---|---|
| **written and oral** | |
| **only written** | X |
| **only oral** | |
| **project discussion** | |
| **other** | |

| | | |
|---|---|---|
| **In case of a written exam, questions refer to: (*)** | **Multiple choice answers** | |
| | **Open answers** | X |
| | **Numerical exercises** | X |

(*) multiple options are possible

The exam consists of a written exam and an optional oral exam.
The written exam consists of an **intermediate exam** (mid course) on the Mechanics and of a **final exam** on Fluids and Electricity. In case the student failed one of the two written exams, he/she had to to take the **complete exam** (based on the full course).

**b) Evaluation pattern:**
The written exams (**intermediate exam**, **final exam**, **complete exam**) consist of theory questions and numerical exercises with open answers, where both the intermediate steps and the numerical results will be considered for the final mark. The exam is passed if a mark of at least 18/30 is obtained.

The **optional oral exam** consists of 3 questions on the course content and lasts for 20-30 minutes.

The **final mark** is the result of the written exam (and, in case, of the optional oral one too).

ADDITIONAL REMARKS:
During the written exams the use of calculators is allowed.
The students cannot take part in two exam sessions in the same month.