| **General information** | | |
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| Academic subject | **Physics** | |
| Degree course | Agricultural Science and Technology (STA) | |
| Academic Year | I | |
| European Credit Transfer and Accumulation System (ECTS) | | 6 |
| Language | Italian | |
| Academic calendar (starting and ending date) | I term (from the 9th of October 2023 to the 26th of January 2023) | |
| Attendance | Optional attendance although strongly recommended. | |

| **Professor/ Lecturer** | |
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| Name and Surname | Francesco Santoro |
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| Telephone | 0805442474 |
| Department and address | Department of Agricultural and Environmental Science (DiSAAT)<br>Agricultural mechanics<br>Via Amendola 165/a - Bari |
| Virtual headquarters | Microsoft Teams<br>Internal code: ts22vjh<br>Guests link: https://teams.microsoft.com/l/meetup-join/19:406949729ac44573968b7a0a2ae69e70@thread.tacv2/1631962675248?context=%7B%22Tid%22:%22c6328dc3-afdf-40ce-846d-326eead86d49%22,%22Oid%22:%2266518d06-abd0-44e4-b7bb-466cfbad1c69%22%7D |
| Tutoring (time and day) | Every day from 09:30 to 11:30 in the teacher's room by appointment agreed by e-mail. |

| **Syllabus** | |
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| **Learning Objectives** | The course deals with theoretical models of physics and the hypotheses on which these models are founded with particular regard to the principles of mechanics of solids and liquids, of hydrostatic and fluid dynamics, of thermodynamics, of electrostatics and electrical circuits. |
| **Course prerequisites** | Knowledge of basic mathematics: I and II grade equations, equation systems, geometric properties of flat figures and regular solids and basic trigonometry notions. |
| **Contents** | **Lectures and group activities**<br>*Generality*<br>Physical dimensions and measurement. Dimensions, Measurement systems. Scalar and vectoral dimensions. Geometrical and cartesian representation of vectors. Calculation on vectors: addition, difference, product with a scalar, scalar product, vectoral product.<br>*Kinematics*<br>Definition of mass point. Frames of reference. Average and instantaneous speed. Average and instantaneous acceleration. Cartesian representation. Space-time laws. Straight line motions. Motion of falling objects. Planar motion: motion, velocity and acceleration. Bullet motion. Uniform circular motion.<br>*Dynamics*<br>Forces and mass. The three Newton's laws. Weight. Friction (static and kinetic). Hooke's law forces. Dynamics of uniform circular motion: inward force. Force work: the case of a constant and a varying force. Kinetic energy. Work and |

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| | energy theorem. Conservative forces and potential energy. Conservation of mechanical energy. Power. Momentum of a force and elements of rigid body dynamics. Statics: conditions of equilibrium and leverages.<br>*Calorimetry and thermodynamics*<br>Temperature and heat. Ideal gas and state equations: thermodynamic transf. Thermodynamics laws, thermal machine.<br>*Fluid statics and dynamics*<br>Fluid. Pressure, density, unit weight. Stevino's law, Pascal's law, Archimede's law. Mercury barometer and open-tube manometer. Steady motion of ideal fluid. Fluid flow and the continuity equation. Bernoulli's theorem and applications (Torricelli's theorem, hydrodynamic paradox, venturi meter, carrying capacity).<br>*Electrostatic and electric circuits*<br>Coulomb's law. Electric field. Potential difference. Capacitors. Electric current. Ohm's law. Joule effect. Resistors.<br>**Practice**<br>Solving exercises related to acquired theoretical concepts. |
| **Books and bibliography** | o D. Halliday, R. Resnick, J. Walker, "Fondamenti di Fisica", Casa Editrice Ambrosiana, 2015 |
| **Additional materials** | Lessons notes integrate the contents of the reference texts. |

| **Work schedule** | | | |
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| Total | Lectures | Hands on (Laboratory, working groups, seminars, field trips) | Out-of-class study hours/ Self-study hours |
| **Hours** | | | |
| 150 | 32 | 28 | 90 |
| **ECTS** | | | |
| 6 | 1,28 | 1,12 | 3,60 |

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| **Teaching strategy** | |
| | Lecture – Practical<br>The course topics will be treated with the help of Power Point presentations and case study analyses with students' participation. |
| **Expected learning outcomes** | |
| **Knowledge and understanding on:** | o Knowledge of the main theoretical models of physics and the hypotheses on which these models are founded. Acquisition of the principles of mechanics of solids and liquids, of hydrostatic and fluid dynamics, of thermodynamics, of electrostatics and electrical circuits. |
| **Applying knowledge and understanding on:** | o Development of the ability to apply what has been learned to real world cases. |
| **Soft skills** | *Making informed judgements and choices*<br>o Ability to divert from pure notions in order to independently manage the solution of non-standard problems.<br>*Communicating knowledge and understanding*<br>o Ability to express oneself through clear and scientifically rigorous language.<br>*Capacities to continue learning*<br>o Learning of basics and consolidation of logical and scientific aptitudes useful in following studies. |

| **Assessment and feedback** | |
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| Methods of assessment | The exam consists of an oral test on the topics developed during the lectures and practice as reported in the Didactic Regulations of the Degree Course.<br>The exam for foreign students can be done in English. |
| Evaluation criteria | • Knowledge and understanding<br>o The student must demonstrate knowledge of the main theoretical models of physics in relation to the subjects dealt with during the lessons.<br>• Applying knowledge and understanding<br>o The student must be able to set up a safety management system by referring to simple real cases.<br>• Autonomy of judgment<br>o The student must demonstrate that he is able to follow alternative explanatory paths to standardized models.<br>• Communicating knowledge and understanding<br>o The student must be able to explain in a clear way all the topics related to physics.<br>• Communication skills<br>o The student must demonstrate sufficient knowledge of the reference scientific terminology.<br>• Capacities to continue learning<br>o o The student will be able to independently examine and deepen problems in which the use of the laws of physics is required. |
| Criteria for assessment and attribution of the final mark | The final mark is awarded out of thirty. The exam is passed when the mark is greater than or equal to 18/30<br>The evaluation of the student's preparation takes place on the basis of pre-established criteria, as detailed in the Didactic Regulations of the Degree Course.<br>In particular, for the oral exam all the topics of the program contribute equally to the formulation of the final mark and for the written exoneration test, the evaluation of each question administered contributes equally to the formulation of the exoneration mark.<br>For students who have taken the exoneration test, the final mark of the exam is expressed as the average between the mark related to the exoneration and the one related to oral exam. |
| **Additional information** | |
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