DISCIPLINE: PHYSICS

Specialization ENVIRONMENT ENGINEERING, 1th Year of study, 1th Semester

Credit value (ECTS): 4

Course category: mandatory

Course holder:
PhD. Ilie BODALE, Assistant professor

Discipline objectives (course and practical works)

The aim of the course is to acquiring the theoretical and practical notions of physics to understand the mechanisms of functioning of living organisms and the environment.

- developing an independent and efficient study method by using appropriate bibliographic resources;
- developing the practical abilities to work in laboratory.

Contents (syllabus)

Course (chapters/subchapters)
1. Vectors and scalars. Reference system. Rigid-body dynamics. The material point.
2. **Kinematics**: speed and acceleration. The movement of bodies in the gravitational field.
3. **The laws of dynam**ics. Impulse and preservation of impulse. Kinetic moment and preservation of kinetic moment. Applications.
4. Mechanical work and mechanical power. Law of mechanical energy conservation.
5. **Oscillations and mechanical waves**. Harmonic oscillations. Damped oscillations. Forced oscillations. Resonance. Applications.
6. **The dynamics of liquids**. Surface tension, capillarity, viscosity, diffusion, osmosis. Applications.
7. **Electrostatics:** intensity of electric field, electric potential, capacitors, voltage sources. Gauss's law.
8. **Electrokinetics:** continuous electric current. Laws of DC through conductors and circuits. Alternative electric current. AC circuits.
9. **Methods of electricity generation:** Electric induction. Electricity generators. The Steebeck effect. Electric battery.

Practical works
The presentation of the laboratory goals and work methodology. Operations with vectors and applications.
Physical quantities and units of measure. Errors calculation and data processing.
Determination of the elastic constant of a spring.
Determination of surface tension coefficient of liquids by using Traube stalagmometer.
Determination of viscosity of liquids by using Ostwald viscometer.
Determination of viscosity coefficient by using Stoke's law
Measurement of the electrical resistance and conductivity of liquids by using Kohrlausch bridge

Bibliography

- D. Luca, C. Stan, "Physical mechanics – I: The mechanics of the material point", Tehnopres Publishing House, Iasi, 2004.
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- C. Papusoi, A. Stancu, "Treatise on electricity and magnetism", University Book Publishing House, 2006.
- Feynman R., "Modern Physics", vol, I and II, Technical Publishing House, Bucharest, 1970.
- Luca E., Zet Gh., Et al., "General Physics", Didactic and Pedagogical Publishing House, Bucharest, 1981.
- Oancea Servilia, "Elementary Physics", PIM Publishing House, Iasi, 2005.
- Bodale Ilie, "References for the practical works of physics", 2019.
- Oancea Servilia, "Practical works of physics and biophysics", PIM Publishing, Iasi, 2009.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Course activity	10%
	Written exam	70%
Practical works	Laboratory activity evaluation	10%
	Projects	10%

Contact

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DISCIPLINE: PHYSICS

Specialization ENVIRONMENT ENGINEERING, 1th Year of study, 2nd Semester

Credit value (ECTS): 2

Course category: mandatory

Course holder:
PhD Ilie BODALE, Assistant professor

Discipline objectives (course and practical works)

The aim of the course is to acquiring the theoretical and practical notions of physics to understand the mechanisms of functioning of living organisms and the environment.

- developing an independent and efficient study method by using appropriate bibliographic resources;
- enhancing the practical abilities to work in laboratory.

Contents (syllabus)

Course (chapters/subchapters)
1. Geometrical optics 1.1. Reflection. The laws of refraction. Applications. 1.2. Light refraction. Total reflection. The laws of reflection. Applications.
2. Optical instrument 2.1. Lenses, mirrors, microscope, refractometer, human eye. 2.2. Image construction through optical instrument. Applications.
3. Wave Optics 3.1. Dispersion. Applications. 3.2. Light interference. Young's device, interference in thin blades, Newton's rings, interferometers. Applications. 3.3. Diffraction of light. Diffraction network. Applications. 3.4. Polarized light. Applications.
4. Photonics 4.1. Wave–particle duality of electromagnetic radiation. 4.2. Laws of thermal radiation. Kirchhoff's law. Stefan-Boltzmann's law. Applications. 4.3. Photoelectric effect. Applications. 4.4. LASER. Applications. 4.5. Light absorption, emission and transmission through biological environments and atmosphere. Applications.
5. Spectral analysis methods 5.1. Spectroscope 5.2. Spectrophotometer.

Practical works
Study the formation of images in lenses.
Measuring the length of convergent thin lens.
Determination of the refractive index of a thin blade with the microscope.
Determination of fruit sugar concentration based on the refractive index of the juice measured by using Abbe refractometer.
Determination of the thickness of the thin wires with the goniometer.
Polarized light. Measuring the concentration of optical active solutions.
Determination of chlorophyll content in leaves using spectroscope.

Bibliography

- V. Pop, "The bases of optics", Polygraphic Enterprise Publishing house, Iasi, 1988.
- Feynman R., "Modern Physics", vol, I and III, Tehnica Publishing house, Bucharest, 1970.
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- Oancea Servilia, "Elementary Physics", PIM Publishing House, Iasi, 2005.
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- Rusu F., Pricop T., Matei V, Cojocaru N., "Physics and Agrometeorology. Practical works" Inst. Agronomic, "Ion Ionescu from Brad" Publishing house Iasi, 1991.
- Oancea Servilia, "Practical works of physics and biophysics", PIM Publishing house, Iasi, 2009.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Course activity	10%
	Written exam	70%
Practical works	Laboratory activity evaluation	10%
	Projects	10%

Contact

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