Course Unit Descriptor

**Study Programme:** Civil Engineering

**Course Unit Title:** Civil Engineering Physics

**Course Unit Code:** GG06

**Name of Lecturer(s):** Full Professor Milica Vučinić Vasić

**Type and Level of Studies:** Undergraduate Academic Studies

**Course Status (compulsory/elective):** Compulsory

**Semester (winter/summer):** Summer

**Language of instruction:** English, Serbian

**Mode of course unit delivery (face-to-face/distance learning):** Face-to-face

**Number of ECTS Allocated:** 5

**Prerequisites:** None

**Course Aims:**

The primary aim of this course is to develop a conceptual understanding of physical principles relevant for buildings and civil engineering because the physical aspects need to be considered in the early stage of planning. The main physical aspects of interest are: energy, moisture, acoustic and light. The pedagogical issues are to introduce students with physical quantities of importance and its units, as well as with physical principles and interrelations between them.

**Learning Outcomes:**

After completed the course the student will be able to apply simple quantitative methods in order to analyze a certain problem of building physics and to understand a current practice in solving the problems.

**Syllabus:**

*Theory*

SI units. Scalars and vectors. The gravitational force – weight. Introduction in thermodynamics. Internal energy. Heat. Temperature and thermometers. Heat capacity and specific heat capacity. State of aggregation. Phase transitions. Ideal and real gas lows. Laws of thermodynamics, heat and work. Thermal processes for an ideal gas. Thermal pumps. Heat transfer: convection and conduction. Vapor and saturated vapor. Humidity. Vapor diffusion in walls. Wetting and drying of walls. Elasticity. Hooke's law. Thermal expansion and thermal stresses. Fluids. Viscosity. Surface tension. Capillarity. Oscillations: harmonic, forced and damped. Waves – wave equation. Sound. Sound intensity. Reflection and absorption of sound. Reverberation time. Standing waves. Acoustic protection and barriers. Geometrical optics. Photometry. Thermal radiation. Black body radiation and Planck's law. Photoelectric effect. Basics in electrostatics. Piezoelectric effect. Direct current. Ohm’s law. Series and parallel wiring. Wheatstone bridge.

*Practical work*

*Tutorials* Calculation exercises in solving problems.

*Laboratory exercises* Density. Viscosity. Surface tension – capillarity. Hooke's law. Thermal processes for an ideal gas. Acoustic resonance. Specific heat capacity. Heat conduction. Direct current.

**Required Reading:**

1. Introduction to Building Physics, Carl-Eric Hagentoft, Chalmers University of Technology, ISBN: 91-44-01896-7, 2001.
2. Building physics, Hugo Hens, 2nd edition, Ernst&Sohn, 2012

| | | |
|---|---|---|
| **Weekly Contact Hours:** 4 | **Lectures:** 2 | **Practical work:** 2 |

| | | | |
|---|---|---|---|
| **Teaching Methods:**<br>Lectures, laboratory practice, computing practice | | | |
| **Knowledge Assessment (maximum of 100 points): 100** | | | |
| **Pre-exam obligations** | points | **Final exam** | points |
| Active class participation | 10 | written (oral) exam | 35 |
| Laboratory exercise defense | 20 | | |
| Preliminary exam(s) | 35 | ……. | |
| | | | |
| The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc. | | | |