<table>
<thead>
<tr>
<th>Course Title</th>
<th>GENERAL PHYSICS I: MECHANICS, WAVES, THERMODYNAMICS</th>
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<tbody>
<tr>
<td>Course Code</td>
<td>PHY 131</td>
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<tr>
<td>Course Type</td>
<td>Compulsory</td>
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<tr>
<td>Level</td>
<td>Introductory</td>
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<tr>
<td>Year / Semester</td>
<td>1\textsuperscript{st} year / 1\textsuperscript{st} semester</td>
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<tr>
<td>Teacher's Name</td>
<td>Faculty of the Physics Department</td>
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<tr>
<td>ECTS</td>
<td>6</td>
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<tr>
<td>Lectures / week</td>
<td>3 (1.5+1.5+1 hours)</td>
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<tr>
<td>Laboratories / week</td>
<td>1 (1 hour tutorial)</td>
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| Course Purpose and Objectives    | To deepen the students understanding and application of concepts of Newtonian Mechanics such as energy, linear momentum and angular momentum  
                                  | To familiarize students with problem solving using differential and integral calculus basic principles  
                                  | To present the students with the basic principles/concepts of waves  
                                  | To introduce students to basic principles/concepts of Thermodynamics  
                                  | To develop students' basic intuition in scientific methodology in Mechanics, Waves and Thermodynamics and to create the basis for the next advanced courses of their degree |
| Learning Outcomes                | It is expected that the students of the course will be able to:  
                                  | To thoroughly comprehend and apply basic principles of kinematics and dynamics using appropriate mathematical tools  
                                  | To understand in depth the concepts of motion, kinetic and dynamic energy, linear and angular momentum and to use them to explain natural phenomena  
                                  | To become familiar with the definition and application of new concepts and physical quantities of Newtonian Mechanics such as relative velocity, center of mass and the principle of angular momentum conservation  
                                  | To obtain experience in understanding and solving problems of rotational dynamics of rigid bodies  
                                  | To understand the mathematical description of oscillations and mechanical waves  
                                  | To become familiar with basic concepts of thermodynamics such as heat, internal energy, heat capacity, etc., and gain experience in solving simple thermodynamic problems  
                                  | To understand the zero and first thermodynamic laws and become |
familiar with simple applications and problem solving using the two laws
- To be introduced into introductory concepts of kinetic gas theory

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<tr>
<th>Prerequisites</th>
<th>Officially None</th>
<th>Required</th>
<th>Officially None</th>
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| Course Content | Kinematics: Instant and Average Speed-Acceleration, Examples of Motion in 2 Dimensions  
                | Newton's Laws and Applications, Friction and Fluid Resistance, Circular Relative Motion  
                | Kinetic/Potential Energy, Work, Conservative and Non-Conservative Forces, Energy Conservation Principle  
                | Linear Momentum and Principle of Conservation, Elastic and Inelastic Collisions, Center of Mass  
                | Rotation of Rigid Bodies: Angular Speed-Acceleration, Torque, Moment of Inertia, Rolling without Slipping, Rotational Energy, Angular Momentum and Principle of Conservation  
                | Periodic Motion: Simple Harmonic Oscillator: Equations and Energy, Simple and Physical Pendulum  
                | Mechanical Waves: Mathematical Wave Description, Speed-Acceleration-Wave Energy  
                | Introduction to Thermodynamics: Temperature, Calorimetry, Thermal Equilibrium, Thermal Expansion, Heat and Heat Conduction Mechanism  
                | Ideal Gases: Kinetic Gas Theory, the Ideal Gas Equation, Internal Energy, First Thermodynamic Law, Heat Capacity, Thermodynamic Processes, Diagrams P-V-T |

| Teaching Methodology | 1. 1.5-hour and 1-hour lectures containing:  
                      | - Brief review of previous lecture  
                      | - Basic theory  
                      | - Examples of practical applications of the theory  
                      | - Discussion on the lecture, student questions  
                      | - Problem solving by the lecturer  
                      | 2. Every week a set of (5-8) exercises are given to students as homework (not graded). The solutions are uploaded and selected exercises are solved in the lectures with the participation of the students  
                      | 3. Additional exercises are solved in tutorial hours by a teaching assistant  
                      | 4. Discussion on questions about theory/exercises at office hours or other hours upon consultation with the lecturer |

| Bibliography | Main textbook:  
<pre><code>          | University Physics with Modern Physics, Volume A: |
</code></pre>
<table>
<thead>
<tr>
<th>Mechanics-Thermodynamics, H.D. Young, Παπαζήση, (Greek Translation)</th>
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<tbody>
<tr>
<td>Additional Bibliography:</td>
</tr>
<tr>
<td>- Physics, Volume A, Mechanics-Waves-Thermodynamics Haliday-Resnick-Walker, Gutenberg, (Greek Translation)</td>
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<tr>
<td>- Physics for Scientists and Engineers, Serway-Jewett, Κλειδάριθμος, (Greek Translation)</td>
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<tr>
<td>Assessment</td>
</tr>
<tr>
<td>- 1st Midterm Exam (1/3 of the course content), 25% of the final grade</td>
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<tr>
<td>- 2nd Midterm Exam, (1/3 of the course content), 25% of the final grade</td>
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<tr>
<td>- Final Exam, (all course content), 50% of the final grade</td>
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<tr>
<td>Language</td>
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<tr>
<td>Greek</td>
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