<table>
<tr><td>Course code</td><td></td></tr>
<tr><td>Type and description</td><td>EC</td></tr>
<tr><td>ECTS credit</td><td>1</td></tr>
<tr><td>Course name</td><td>Physics for mathematicians</td></tr>
<tr><td>Course name in Polish</td><td>Fizyka dla matematyków</td></tr>
<tr><td>Language of instruction</td><td>English</td></tr>
<tr><td>Course level</td><td>8 PRK</td></tr>
<tr><td>Course coordinator</td><td>Wojciech Kryszewski</td></tr>
<tr><td>Course instructors</td><td>Wojciech Kryszewski</td></tr>
<tr><td>Delivery methods and course duration</td><td>
<table>
<tr><th></th><th>Lecture</th><th>Tutorials</th><th>Laboratory</th><th>Project</th><th>Seminar</th><th>Other</th><th>Total of teaching hours during semester</th></tr>
<tr><td>Contact hours</td><td>0</td><td>0</td><td>0</td><td>15</td><td>0</td><td>0</td><td>15</td></tr>
<tr><td>E-learning</td><td>No</td><td>No</td><td>No</td><td>No</td><td>No</td><td>No</td><td></td></tr>
<tr><td>Assessment criteria (weightage)</td><td>0,00</td><td></td><td></td><td></td><td></td><td>0,00</td><td></td></tr>
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<tr><td>Course objective</td><td>1. Acquisition of knowledge on basics of time-space physics and classical mechanics in the language of modern mathematics.<br><br>2. Acquisition of knowledge on mathematical consequences of basic postulates and laws of Newtonian mechanics.<br><br>3. Gaining knowledge of mathematical aspects of the Lagrangian and Hamiltonian mechanics.<br><br>4. Acquisition of knowledge of basic quantum mechanics and its mathematical description by the theory of Hilbert spaces</td></tr>
<tr><td>Learning outcomes</td><td>After the course a PhD student is able to:<br><br>1. understands and applies the Basic notions of physics and mechanics, understand problems of physics and knows which mathematical techniques are applied in mechanics – effects W4, U4, K1<br><br>2. knows the notion of Lagrangian and Hamiltonian formalism of mechanics in description of kinematic and dynamic phenomena – effects W4, U4, K1<br><br>3. is able to Apple the acquired knowledge to study of concrete of mathematical models in physics: effects W4, U4, K1</td></tr>
<tr><td>Assessment methods</td><td>Effects W4, U4, K1</td></tr>
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| | – oral examination and presentation<br><br>The final evaluation is based on:<br><br>Exam - 80%<br><br>Presentation - 20% |
| **Prerequisites** | Master degree course in analysis and topology |
| **Course content with delivery methods** | Lecture<br><br>Module<br><br>1 Galilean and Newtonian mechanics; time-space, Galilean principle of relativity and inertial systems; fundamental laws of dynamics and their consequences; configuration space.<br>1. Lagrange mechanics, holonomic constraint; the Maupertuis-Hamilton principle of the least action<br>2. Dual approach of the Hamilton formalism; the Noether Thorem; the Legendre transform I thermodynamics.<br>Moduł 2<br>3. Hilbert space methods in the quantum mechanics formalism; the theory of unbounded operators; transformations and their symmetries.<br>4. The invariance principle in quantum mechanics<br>5. Harmonic oscillator and the theory of hydrogen atom.<br><br>PROJECT<br><br>2 Presentation of a solution to a mechanical model in the language of mathematics.<br>3 Paradigms of special and general theory of relativity. |
| **Basic reference materials** | 1. V. I. Arnold, Mathematical methods of classical mechanics, PWN 1986<br><br>2. M. Reed, B. Simon, Methods of modern mathematical physics, Academic Press 1980. |
| **Other reference materials** | |
| **Average student workload outside classroom** | 10 h |
| **Comments** | |
| **Last update** | 11.05.2023 |