COURSE SYLLABUS

1.	Course: Trends in Modern Theoretical Physics A	
2.	Scientific discipline: physical sciences	
3.	Teaching language: English	
4.	University department: Faculty of Physics and Astronomy	
5.	Course/module type – mandatory (compulsory) or elective (optional): mandatory	
6.	University subject (programme/major): physics, specialty Master's Study of Theoretical Physics	
7.	Study level (I or II): II	
8.	Year: 1	
9.	Semester (autumn/spring) autumn	
10.	Form of tuition and number of hours: lectures – 10, classes - 10	
11.	Initial requirements (knowledge, skills, social competences) regarding the course/module: • Quantum Mechanics • Analytical Mechanics	
12.	Learning objectives for the subject: • General concept of path integrals in Quantum Mechanics • Schroedinger equation from the path integral approach • Bosonic and fermionic harmonic oscillators • Generating functional • Perturbation theory in Quantum Mechanics • Application to Quantum Statistical Physics	
13.	Course content: Introduction into selected areas of modern theoretical physics. Making students familiar with the research currently going on at the Institute of Theoretical Physics of the University of Wrocław, in order to help them choose the subject of their M.Sc. thesis. Introduction to Feynman path integrals in non-relativistic physics: Schroedinger's equation, propagator, partition function, perturbation theory in path integral formulation.	
14.	Learning outcomes: • Knowledge of the concept of Feynman's pah integral alternative to the canonical quantization method. • Mathematical techniques to describe physics systems in the presence/absence of interactions and to compute various observables to be measured in experiments. • General knowledge of Quantum Theory and Statistical Physics. • Students will become familiar with the standard terminology in functional method and will become	Learning outcomes for the course: F2_W01, F2_W02, F2_W05, F2_U01, F2_U05, F2_U08, F2_U10, F2_U11, F2_K01,

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<tr><td></td><td>capable in learning advanced quantum theory using the major textbooks and literature.
• Students will become capable for working out the standard tasks in functional method unaided and for challenging advanced problems.
• Students will have a logical feeling and intuition for complex systems.</td><td>F2_K03,
F2_K06</td></tr>
<tr><td>15.</td><td colspan="2">Obligatory literature:
• Feynman, Hibbs: Quantum mechanics and path integral

Recommended literature:
• Zinn-Justin: Path Integrals in Quantum Mechanics</td></tr>
<tr><td>16.</td><td colspan="2">Methods for verifying the assumed learning outcomes:
- active participation
- writting a final test</td></tr>
<tr><td>17.</td><td colspan="2">Conditions and forms of passing individual components of the subject (leave the appropriate ones):
- constant monitoring of attendance and progress in the scope of classes
- writting a final test</td></tr>
<tr><td>18.</td><td colspan="2">Student’s workload
<table><tr><td>The form of carrying out classes by the student (leave appropriate)</td><td>Number of hours allocated to carry out a given type of classes</td></tr><tr><td>classes (according to the study plan) with the instructor:
- lecture:
- conversation classes:</td><td>

10
10</td></tr><tr><td>student's own work (including participation in group work):
- preparation for classes:
- reading the indicated literature:
- preparation for tests:</td><td>

15
5
10</td></tr><tr><td>Total number of hours</td><td>50</td></tr><tr><td>Number of ECTS</td><td>2</td></tr></table></td></tr>
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