University of Gdańsk

Subject card

Subject name and code	Master Diploma Lab, PG_00182346						
Field of study	Physics						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
Education level	Master's studies		Subject group	Obligatory subject group in the field of study			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	Polish			
Semester of study	4		ECTS credits	12.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Michał Studziński				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	150.0	0.0	0.0	150
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	150		0.0		150.0	300
Subject objectives	Preparing the student to carry out a masters thesis and introducing them to the use of research methods, tools, and procedures applied in the development and presentation of scientific results.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[FIZMU2_U11] is able to determine the directions of further improvement of knowledge and skills (including self-education) in the field of the selected specialization and beyond it	The student is able to: – plan and carry out advanced experiments necessary for the completion of a master's thesis, – perform critical analysis of measurement, observational, and theoretical–computational results, including an assessment of their accuracy, – locate essential information in professional literature, both in databases and other sources, – reconstruct the reasoning or the course of an experiment described in the literature, taking into account the stated assumptions and approximations, – apply methods and concepts from various areas of physics as well as from other exact and natural sciences, – recognize that seemingly "distant" phenomena are often described by similar models, – adapt the knowledge and methodology of physics—including experimental and theoretical techniques—to related scientific disciplines.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU5] implementation of a problem task
	[FIZMU2_K03] is aware of the responsibility for jointly performed tasks	The student understands / is aware of / is able to: – formulate questions with precision, – recognize the need for continuing their own education and for supporting the education of others, – apply the scientific method to the acquisition of knowledge, – work both independently and as part of a team, – acknowledge responsibility for tasks performed within a team, – understand the importance of intellectual honesty in their own work and in the work of others, – identify ethical issues in the context of research integrity, – formulate well-reasoned opinions on professional matters and on selected issues of public interest, – think and act in an entrepreneurial manner, – popularize knowledge in the field of physics, – assess the risks of obtaining information from unverified sources, including from the Internet.	[SK1] oral statement/conversation/ discussion [SK2] presentation/project/paper/ report [SK5] implementation of a problem task

Course outcome	Subject outcome	Method of verification
[FIZMU2_U03] is able to make a critical analysis of the results of measurements, observations or theoretical calculations along with the assessment of the accuracy of the results	The student is able to: – plan and conduct advanced experiments necessary for the completion of a master's thesis, – perform critical analysis of measurement, observational, and theoretical–computational results, including an assessment of their accuracy, – locate essential information in professional literature, both in databases and in other sources, – reconstruct the reasoning or the course of an experiment described in the literature, taking into account the stated assumptions and approximations, – apply methods and concepts from various areas of physics as well as from other exact and natural sciences, – recognize that seemingly "distant" phenomena are often described by similar models, – adapt the knowledge and methodology of physics—including experimental and theoretical techniques—to related scientific disciplines.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU5] implementation of a problem task
[FIZMU2_U02] has the ability to plan and carry out basic and advanced experiments or observations in specific areas of physics or its applications	The student is able to: – plan and conduct advanced experiments necessary for completing a master's thesis, – perform critical analysis of measurement, observational, and theoretical–computational results, including an assessment of their accuracy, – locate essential information in professional literature, both in databases and other sources, – reconstruct the reasoning or the course of an experiment described in the literature, taking into account the stated assumptions and approximations, – apply methods and concepts from various areas of physics as well as from other exact and natural sciences, – recognize that seemingly "distant" phenomena are often described by similar models, – adapt the knowledge and methodology of physics—including experimental and theoretical techniques—to related scientific disciplines.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU5] implementation of a problem task

Course outcome	Subject outcome	Method of verification
[FIZMU2_W03] knows experimental, observational and numerical techniques to plan and perform a complex physics experiment or computer simulation	The student knows: – advanced experimental, observational, and numerical techniques that enable the planning and execution of a complex physical experiment or computer simulation required for completing a master's thesis, – the operating principles of measurement systems and research apparatus, as well as advanced theoretical and mathematical physics methods used in carrying out a master's thesis, – current trends in the development of physics within the chosen specialization, – health and safety regulations at a level that allows independent work in the area of the chosen specialization, – the basic legal and ethical requirements connected with scientific research, – the fundamental concepts and principles of industrial property protection and copyright law, – the rules for using patent-information resources.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW5] implementation of a problem task
[FIZMU2_W04] knows the principle of operation of measuring systems and research equipment specific to the area of physics related to the selected specialization or knows advanced methods of theoretical and mathematical physics	The student knows: – advanced experimental, observational, and numerical techniques that enable the planning and execution of complex physical experiments or computer simulations necessary for completing a master's thesis, – the operating principles of measurement systems and research apparatus, as well as advanced theoretical and mathematical physics methods used in carrying out a master's thesis, – current directions of development in physics within the chosen specialization, – health and safety regulations at a level that permits independent work in the area of the chosen specialization, – the basic legal and ethical requirements related to scientific research, – the fundamental concepts and principles of industrial property protection and copyright law, – the rules for using patent-information resources.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW5] implementation of a problem task

Course outcome	Subject outcome	Method of verification
[FIZMU2_K07] is aware of the responsibility for jointly (team) research tasks	The student understands / is aware of / is able to: – formulate questions precisely, – recognize the need for continuing their own education and supporting the education of others, – apply the scientific method to the acquisition of knowledge, – work both independently and as part of a team, – acknowledge responsibility for tasks carried out within a team, – understand the importance of intellectual honesty in their own work and in the work of others, – identify ethical issues in the context of research integrity, – formulate well-reasoned opinions on professional matters and on selected issues of public interest, – think and act in an entrepreneurial manner, – popularize knowledge in the field of physics, – assess the risks of obtaining information from unverified sources, including the Internet.	[SK1] oral statement/conversation/ discussion [SK2] presentation/project/paper/ report [SK5] implementation of a problem task
[FIZMU2_U04] can find the necessary information in professional literature, both in databases and in other sources; can reconstruct the reasoning or the course of an experiment described in the literature, taking into account the assumptions and approximations made	The student is able to: – plan and conduct advanced experiments necessary for the completion of a master's thesis, – perform critical analysis of measurement, observational, and theoretical–computational results, including an assessment of their accuracy, – locate essential information in professional literature, both in databases and other sources, – reconstruct the reasoning or the course of an experiment described in the literature, taking into account the stated assumptions and approximations, – apply methods and ideas from various areas of physics as well as from other exact and natural sciences, – recognize that seemingly "distant" phenomena are often described by similar models, – adapt the knowledge and methodology of physics—including experimental and theoretical techniques—to related scientific disciplines.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU5] implementation of a problem task

Course outcome	Subject outcome	Method of verification
[FIZMU2_W07] knows the principles of occupational health and safety to the extent that allows for independent work in the area corresponding to the discipline	The student knows: – advanced experimental, observational, and numerical techniques that make it possible to plan and carry out a complex physical experiment or computer simulation necessary for completing a master's thesis, – the operating principles of measurement systems and research apparatus, as well as advanced methods of theoretical and mathematical physics used in the preparation of a master's thesis, – current trends in the development of physics within the chosen specialization, – health and safety regulations at a level that allows independent work in the area of the chosen specialization, – the basic legal and ethical requirements related to scientific activity, – the fundamental concepts and principles of industrial property protection and copyright law, – the rules for using patent-information resources.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW5] implementation of a problem task
[FIZMU2_U08] can effectively communicate with both specialists and non-specialists in the area of study related to physics and to organize and lead discussions and debates on the subject	The student is able to: – plan and carry out advanced experiments required for the completion of a master's thesis, – perform critical analysis of measurement, observational, and theoretical–computational results, including an assessment of their accuracy, – locate essential information in professional literature, both in databases and in other sources, – reconstruct the reasoning or the course of an experiment described in the literature, taking into account the stated assumptions and approximations, – apply methods and ideas from various areas of physics as well as from other exact and natural sciences, – recognize that seemingly "distant" phenomena are often described by similar models, – adapt the knowledge and methodology of physics—including experimental and theoretical techniques—to related scientific disciplines.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU5] implementation of a problem task

Course outcome	Subject outcome	Method of verification
[FIZMU2_W08] knows and understands the legal and ethical conditions related to scientific and didactic activities	The student knows: – advanced experimental, observational, and numerical techniques that enable the planning and execution of a complex physical experiment or computer simulation required for completing a master's thesis, – the operating principles of measurement systems and research apparatus, as well as advanced theoretical and mathematical physics methods used in the preparation of a master's thesis, – current directions of development in physics within the chosen specialization, – health and safety regulations at a level that allows independent work in the area of the chosen specialization, – the basic legal and ethical requirements associated with scientific research, – the fundamental concepts and principles of industrial property protection and copyright law, – the rules for using patent-information resources.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW5] implementation of a problem task
[FIZMU2_U09] can work independently or in a team	The student is able to: – plan and conduct advanced experiments required for the completion of a master's thesis, – perform critical analysis of measurement, observational, and theoretical–computational results, including an assessment of their accuracy, – locate essential information in professional literature, both in databases and other sources, – reconstruct the reasoning or the course of an experiment described in the literature, taking into account the stated assumptions and approximations, – apply methods and ideas from various areas of physics as well as from other exact and natural sciences, – recognize that seemingly "distant" phenomena are often described by similar models, – adapt the knowledge and methodology of physics—including experimental and theoretical techniques—to related scientific disciplines.	[SU2] presentation/project/paper/ report [SU5] implementation of a problem task [SU6] demonstration of practical skills

Subject contents	Depending on the nature of the masters thesis (experimental or theoretical), the student: gains in-depth familiarity with the current state of knowledge in the field relevant to the masters thesis, becomes acquainted with the conditions, organization, and health and safety regulations of an experimental laboratory equipped with advanced scientific research apparatus and/or computers, becomes familiar with the instruments, measurement equipment, and/or available software, learns to use advanced devices, measurement apparatus, and scientific software, prepares and calibrates measurement equipment and/or develops numerical codes necessary for the execution of the masters thesis, performs measurements and/or numerical calculations, processes and analyses measurement results.
Prerequisites and co-requisites	**Formal requirements:** Completion of courses thematically related to the masters thesis at the undergraduate (bachelors) level. **Prerequisites:** Knowledge of mechanics, thermodynamics, atomic and molecular physics, electromagnetism, optics, nuclear physics, condensed matter physics, and quantum mechanics at the undergraduate level.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>not applicable</td><td>51.0%</td><td>60.0%</td></tr>
<tr><td>not applicable</td><td>51.0%</td><td>40.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Appropriate to the topic of the masters thesis. A supplementary reading list should be proposed by the thesis supervisor in consultation with the instructor of the masters laboratory</td></tr>
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<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">-Reporting on the current progress of the masters thesis and/or associated research.

-Review of the current state of research in a selected field of physics (e.g., quantum information, condensedmatter, quantum optics).

-Advanced measurement methods and research apparatus related to the topic of the masters thesis.
-Which factors limit the accuracy of measurements in your experiment, and how can they be minimized?
-What are the main assumptions adopted in your theoretical model, and what consequences might they have?
-Calibration of a spectrometer/optical setup and verification of the proper functioning of the apparatus.
-Implementation of a computational model described in the literature and comparison of the results with experimental data.
-Preparation of a seminar presenting the progress of the research work.
-Development of the review chapter of the masters thesis based on the literature.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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