EDUCATIONAL PLAN

Valid from the academic year 2026-2027

Faculty:	Physics and Mathematics
The cycle of university studies:	Master
Name of the master's degree program:	Metode avansate de cercetare în fizică/Advanced Research Methods in Physics
Type of program[1]:	Research
Name of the qualification[2] acquired after graduating from the study program:	Specialist in Physics
Level of qualification (CNC/CEC):	Level 7
Title awarded:	Master's in physics
Duration of studies (in years):	2 years
Number of credits (ECTS):	120
Form of education:	Full-time Education
Language of instruction:	English
Geographical location of studies:	Timișoara
The framing of the study program in science fields	
Fundamental field:	Mathematics and Natural Sciences
Science Branch:	Physics
The field of university master's studies:	Physics
Name of the broad field of study (according to DL-ISCED F-2013):	Natural Sciences, Mathematics and Statistics
Name of the restricted field of studies (according to DR-ISCED F-2013):	Physical Sciences
Name of the detailed field of study (according to DDS-ISCED F-2013):	Physics

[1] Professional / Research / Teaching

[2] A qualification is the formal outcome of an assessment and validation process, obtained when a competent body or authority determines that an individual has achieved learning outcomes that meet predetermined standards. The qualifications acquired by graduates of higher education programs are attested by diplomas, certificates, and other academic documents issued exclusively by accredited higher education institutions.

GENERAL PRESENTATION OF THE PROGRAM OF UNIVERSITY STUDIES

1. The mission of the study program[3]

The mission of the master's studies in **"Advanced research methods in physics"** is to prepare qualified personnel for higher education and researchers in a field - closely related to condensed matter physics and theoretical physics. The master's program is open to students with a background in physics who are eager to expand their knowledge and experience in a modern physics research environment. Thanks to the experimental and theoretical skills acquired during the study, students will also have the ability to respond to the needs of the industrial community in areas such as materials technology, automotive industry, chemical engineering, IT and others.

Within the master's specialization two tracks could be chosen by students:

1. Theoretical physics: we will convey to students the current view (Standard Model) about the fundamental building blocks of Matter, about the elementary forces, about cosmic objects, about the future and the past of the Universe. As is known, the

[3] The mission and objectives of the study program must be consistent with the mission of the West University of Timișoara and with the needs identified in the labor market.

According to the University Charter (Article 5), the general mission of UVT is to provide education and conduct advanced research, generating, transferring, and certifying knowledge to society through:

a) undergraduate and graduate-level education and continuing education, aimed at the professional and personal development of students, doctoral candidates, and trainees, as well as at facilitating graduates' entry into the labor market and meeting the socio-economic sector's need for skilled professionals;

b) scientific research, development, innovation, and technology transfer, through individual and collective creation, relevant to the advancement of knowledge and the socio-economic environment;

c) community engagement, through the conduct of joint activities for the benefit of the university and the social, economic, and cultural environment.

UVT has taken on the mission of serving as a catalyst for the development of Romanian society by creating an innovative and participatory environment for scientific research, learning, cultural and artistic creation, and athletic performance, transferring skills and knowledge to the community through the educational, research, and consulting services it offers to partners in the economic and socio-cultural spheres, as well as by fostering and promoting democratic values, the rule of law, and fundamental rights and freedoms, thereby preparing active and engaged citizens.

The fulfillment of UVT's mission is set forth in (Article 6 of the UVT Charter):

- promoting scientific research, development and innovation, technology transfer, literary and artistic creation, and athletic achievement;
- providing initial and continuing education for qualified and highly qualified human resources;
- developing critical thinking and the creative potential of members of the university community;
- creating, preserving, and disseminating the values of human culture and civilization;
- promoting multicultural, multilingual, and interfaith dialogue;
- affirming Romanian culture and science within the global sphere of values;
- developing Romanian society within a free and democratic state governed by the rule of law;
- joining European university alliances.

main research center in fundamental physics, CERN, is the largest civilian consumer of computing power in the world. We will talk about the modern technologies involved in these activities at the frontiers of Science.

2. Physics of advanced materials: a basic training is provided in the field of theoretical and experimental physics, the physics of crystallization processes, nanosystems, physical methods for characterizing materials, transport phenomena, technologies for obtaining advanced materials, and numerical modeling and simulation methods. Also, special attention is paid to current trends in scientific research and demand both nationally and internationally, such as obtaining new materials with improved properties, relaxation processes, nanosystems in electromagnetic fields, obtaining crystals with laser potential, control of the flow of a melt with the help of magnetic and electric fields.

2. Competencies and expected learning outcomes formed within the study program

A. COMPETENCIES[4]

Key-Competences[5]:

1. multilingual competences;
2. competences in the field of science, technology, engineering and mathematics;
3. digital competences;
4. personal, social and learning competences.

Professional Competencies[6]:

Theoretical physics track:

1. analyse telescope images - examine images taken by telescopes in order to study phenomena and objects outside Earth's atmosphere;
2. operate telescopes - set up and adjust telescopes in order to look at phenomena and objects outside Earth's atmosphere;
3. design scientific equipment - design new equipment or adapt existing equipment to aid scientists in gathering and analysing data and samples;

[4] Competence refers to the demonstrated ability to select, combine, and appropriately apply personal, social, and/or methodological knowledge, skills, and abilities, as well as other acquired elements such as values and attitudes, to successfully resolve a specific category of work or learning situations, as well as for professional or personal development in an effective and efficient manner.

[5] Key competencies for lifelong learning are the skills that all citizens need for personal fulfillment and development, employment, social inclusion, and active citizenship; they are developed within the framework of lifelong learning, beginning in early childhood and continuing throughout adulthood, through formal, non-formal, and informal learning.v

[6] Professional competencies refer to the ability to perform the tasks required in the workplace to the standard of quality specified in the occupational standard. These are acquired through formal education, specifically by completing a program organized by an accredited institution.

4. carry out scientific research in observatory - perform research in a building equipped for the observation of natural phenomena, especially in relation to celestial bodies;
5. observe celestial objects - study the relative positions and movements of stars and planets, by using and interpreting data provided by specialised software and publications such as ephemeris;
6. define celestial bodies - analyse data and images to calculate the size, shape, brightness, and motion of celestial bodies;

Physics of advanced materials track:

7. analyse experimental laboratory data - analyse experimental data and interpret results to write reports and summaries of findings;
8. apply scientific methods - apply scientific methods and techniques to investigate phenomena, by acquiring new knowledge or correcting and integrating previous knowledge;
9. apply statistical analysis techniques - use models (descriptive or inferential statistics) and techniques (data mining or machine learning) for statistical analysis and ICT tools to analyse data, uncover correlations and forecast trends;
10. gather experimental data - collect data resulting from the application of scientific methods such as test methods, experimental design or measurements;
11. perform laboratory tests - carry out tests in a laboratory to produce reliable and precise data to support scientific research and product testing;
12. operate scientific measuring equipment - operate devices, machinery, and equipment designed for scientific measurement. Scientific equipment consists of specialised measuring instruments refined to facilitate the acquisition of data;
13. use measurement instruments - use different measurement instruments depending on the property to be measured. Utilise various instruments to measure length, area, volume, speed, energy, force, and others;
14. analyse scientific data - collect and analyse scientific data resulting from research. Interpret these data according to certain standards and viewpoints in order to comment on it;
15. execute analytical mathematical calculations - apply mathematical methods and make use of calculation technologies in order to perform analyses and devise solutions to specific problems;
16. operate open source software - operate Open Source software, knowing the main Open Source models, licensing schemes, and the coding practices commonly adopted in the production of Open Source software;

Transversal Competencies[7]:

17. interact professionally in research and professional environments - show consideration to others as well as collegiality. Listen, give and receive feedback and respond perceptively to others, also involving staff supervision and leadership in a professional setting;
18. apply research ethics and scientific integrity principles in research activities - Apply fundamental ethical principles and legislation to scientific research, including issues of research integrity. Perform, review, or report research avoiding misconducts such as fabrication, falsification, and plagiarism;
19. communicate with a non-scientific audience - communicate about scientific findings to a non-scientific audience, including the general public. Tailor the communication of scientific concepts, debates, findings to the audience, using a variety of methods for different target groups, including visual presentations;
20. communicate mathematical information - use mathematical symbols, language and tools to present information, ideas and processes;
21. conduct research across disciplines - work and use research findings and data across disciplinary and/or functional boundaries;
22. develop professional network with researchers and scientists - develop alliances, contacts or partnerships, and exchange information with others. Foster integrated and open collaborations where different stakeholders co-create shared value research and innovations. Develop your personal profile or brand and make yourself visible and available in face-to-face and online networking environments;
23. disseminate results to the scientific community - publicly disclose scientific results by any appropriate means, including conferences, workshops, colloquia and scientific publications;
24. demonstrate disciplinary expertise - demonstrate deep knowledge and complex understanding of a specific research area, including responsible research, research ethics and scientific integrity principles, privacy and GDPR requirements, related to research activities within a specific discipline;
25. perform scientific research - gain, correct or improve knowledge about phenomena by using scientific methods and techniques, based on empirical or measurable observations;
26. evaluate research activities - review proposals, progress, impact and outcomes of peer researchers, including through open peer review;
27. increase the impact of science on policy and society - influence evidence-informed policy and decision making by providing scientific input to and maintaining professional relationships with policymakers and other stakeholders;

[7]Transversal competencies are the values and attitudes acquired that extend beyond a specific field or program of study and are expressed through the following descriptors: responsibility and autonomy, social interaction, and personal and professional development.

28. manage findable accessible interoperable and reusable data - produce, describe, store, preserve and (re) use scientific data based on FAIR (Findable, Accessible, Interoperable, and Reusable) principles, making data as open as possible, and as closed as necessary;
29. manage research data - produce and analyse scientific data originating from qualitative and quantitative research methods. Store and maintain the data in research databases. Support the re-use of scientific data and be familiar with open data management principles;
30. manage personal professional development - take responsibility for lifelong learning and continuous professional development. Engage in learning to support and update professional competence. Identify priority areas for professional development based on reflection about own practice and through contact with peers and stakeholders. Pursue a cycle of self-improvement and develop credible career plans;
31. manage intellectual property rights - deal with the private legal rights that protect the products of the intellect from unlawful infringement;
32. manage open publications - be familiar with Open Publication strategies, with the use of information technology to support research, and with the development and management of CRIS (current research information systems) and institutional repositories. Provide licensing and copyright advice, use bibliometric indicators, and measure and report research impact;
33. promote the participation of citizens in scientific and research activities - engage citizens in scientific and research activities and promote their contribution in terms of knowledge, time or resources invested;
34. promote open innovation in research - apply techniques, models, methods and strategies which contribute to the promotion of steps towards innovation through collaboration with people and organizations outside the organisation;
35. promote the transfer of knowledge - deploy broad awareness of processes of knowledge valorisation aimed to maximise the two–way flow of technology, intellectual property, expertise and capability between the research base and industry or the public sector;
36. publish academic research - conduct academic research, in universities and research institutions, or on a personal account, publish it in books or academic journals with the aim of contributing to a field of expertise and achieving personal academic accreditation;
37. draft scientific or academic papers and technical documentation - draft and edit scientific, academic or technical texts on different subjects;
38. write scientific publications - present the hypothesis, findings, and conclusions of your scientific research in your field of expertise in a professional publication;
39. write work-related reports - compose work-related reports that support effective relationship management and a high standard of documentation and record

keeping. Write and present results and conclusions in a clear and intelligible way so they are comprehensible to a non-expert audience;

40. synthesise information - critically read, interpret, and summarise new and complex information from diverse sources;
41. apply for research funding - identify key relevant funding sources and prepare research grant application in order to obtain funds and grants. Write research proposals;
42. speak different languages - master foreign languages to be able to communicate in one or more foreign languages;
43. mentor individuals - mentor individuals by providing emotional support, sharing experiences and giving advice to the individual to help them in their personal development, as well as adapting the support to the specific needs of the individual and heeding their requests and expectations;
44. think abstractly - demonstrate the ability to use concepts in order to make and understand generalisations, and relate or connect them to other items, events, or experiences;
45. integrate gender dimension in research - take into account in the whole research process the biological characteristics and the evolving social and cultural features of women and men (gender);
46. perform project management - manage and plan various resources, such as human resources, budget, deadline, results, and quality necessary for a specific project, and monitor the project's progress in order to achieve a specific goal within a set time and budget;

EXPECTED LEARNING OUTCOMES [8]

a) Knowledge[9] - According to the European Qualifications Framework (EQF), the learning outcomes related to qualification level 7, corresponding to university master's studies, require highly specialized knowledge and their critical awareness, some of them being at the vanguard of the level of knowledge from a field of work or study, as a basis for original thinking and/or research:

1. know the advanced notions in the field of Physics, which involves a critical understanding of theories and principles;
2. know the working formulas for calculations with physical quantities using properly the principles and laws of physics;

[8] Learning outcomes are statements that describe what a learner knows, understands, and is able to do upon completing a learning process, and are defined in terms of knowledge, skills, responsibility, and autonomy.

[9] Knowledge refers to the result of assimilating information through learning. Knowledge represents the body of facts, principles, theories, and practices related to a specific field of work or study. Knowledge is described as theoretical and/or factual. Knowledge is expressed through the following descriptors: knowledge, understanding, and use of specific language, explanation, and interpretation.

3. know the language specific to the field;
4. know physical phenomena and interpret them by formulating hypotheses and operationalizing key concepts and the appropriate use of laboratory equipment;
5. know the constructive and operating principles of the equipment for obtaining and characterizing materials and to explain how to use it;
6. define essential concepts;
7. identify domain-specific terminology;
8. interpret analytical results expressed in different units of measurement;
9. justify the need for a given technique;
10. compare types of results;
11. demonstrate selected obtained results;
12. report selected results;
13. summarize selected results;
14. identify specific analysis protocols;
15. illustrate properties of substances or materials;
16. define advanced physical concepts, theories, and methods;
17. demonstrate and interpret concepts;
18. match appropriate models to the situation;
19. exemplify suitable analytical methods in concrete situations;
20. identify optimal analytical alternatives to obtain relevant information in the field;
21. understand laboratory-specific issues;
22. be familiar with the main types of analyses and techniques used;
23. apply the main types of analyses and techniques used;
24. understand how certain types of analyses are used;
25. identify automated analysis systems;
26. develop algorithms for acquiring datasets required by a project through appropriately chosen instrumental measurements;
27. evaluate options regarding the stages of an investigative process;
28. compare results obtained using multiple techniques and methods;
29. prepare reports;
30. explain the operating principle of an instrument;
31. understand the algorithm employed by a measuring instrument;
32. be familiar with the analytical method used in analytical-control activities;
33. identify the procedures underlying the methods employed;
34. understand the concepts and phenomena underpinning specific methods and the instrumental methods of analysis and measurement specific to physics;
35. explain and interpret experimental results obtained from a physics-specific case study;
36. identify and set out scientific information and the legislative/regulatory framework specific to physics;

37. draft and present a scientific/professional report in compliance with applicable legislation and current standards;
38. understand quality-management requirements in the physics laboratory;
39. understand the legislation in the field;
40. understand procedures used in materials physics;
41. design investigation methodologies;
42. integrate all results obtained across analyses;
43. propose investigation methods;
44. identify an experiment that could provide additional data;
45. devise a method for obtaining and characterizing a material;
46. carry out a case study specific to materials physics;
47. defend and debate results;
48. identify errors;
49. verify calculations and interpret them;
50. compare erroneous results;
51. exemplify the benefits of certain methods or techniques;
52. argue effectively for an experimental methodology;
53. interpret differing values;
54. reorganize experiments if improved results can be achieved;
55. answer questions within the studied disciplines;
56. interpret results presented in diagrams/plots;
57. cross-check results against the properties of materials or substances;
58. elaborate concise answers in case studies;
59. restate in their own words certain properties of materials;
60. explain situations within the field of study;
61. substantiate information with concrete examples;
62. justify decisions taken in casework;
63. interpret a case or situation in the field;
64. report plausible conclusions;
65. reconstruct events by associating multiple sources of information;
66. verify results;
67. compare formulas or results;
68. substantiate results;
69. explain situations;
70. select, in an informed manner, a methodology using a minimal number of methods to achieve the best outcome;

b) Skills[10] - According to the European Qualifications Framework (EQF), the learning outcomes related to qualification level 7, corresponding to university master's

[10] A skill is the ability to apply and use knowledge to perform tasks and solve problems. Skills are described as either cognitive (involving the use of logical, intuitive, and creative thinking) or practical (involving

studies, assume specialized skills for solving research and/or innovation problems, for the development of new knowledge and procedures and for the integration of knowledge from different fields:

1. compare the theoretical results provided by the specialized literature with those of an experiment carried out within a professional project;
2. deduce the working formulas for calculations with physical quantities, using appropriately the principles and laws of physics;
3. describe physical systems using specific theories and tools (experimental and theoretical models, algorithms, schemes, etc.);
4. apply the principles and laws of physics in solving theoretical or practical problems, under conditions of qualified assistance;
5. use the computer and calculation programs for the numerical simulation of the physical processes.
6. describe and explain the fundamental principles of physics, including those of: Relativity and Quantum Mechanics, Standard Model, Quantum fields and particles, Cosmology.
7. use high-level mathematical skills to solve conceptual and quantitative problems in physics.
8. describe critical experiments in the history of physics and explain how they led to revisions of our theoretical descriptions of nature.
9. analyse physical systems and provide order-of-magnitude estimates of quantities. This includes a knowledge of basic physical constants and key equations.
10. use the computer to control some experiments or processes and to acquire data;
11. characterize the specific properties of some materials taking into account the field in which they are used;
12. use experimental techniques for obtaining and characterizing materials through optical and spectroscopic methods;
13. identify the most appropriate methods to develop new materials with well-defined properties.
14. apply the full conceptual and methodological apparatus to solve complex problems under conditions of incomplete information;
15. interpret results obtained in forensic analysis;
16. articulate advanced chemical concepts;
17. specify relevant experimental processes and procedures;
18. critically analyze advanced methods of forensic analysis;
19. implement advanced chemical analysis techniques;
20. critically appraise a specialized article/report of high difficulty;

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manual dexterity and the use of methods, materials, tools, and instruments). Skills are expressed through the following descriptors: application, transfer and problem-solving, critical and constructive reflection, creativity, and innovation.

21. design innovative research projects using advanced chemical methods;
22. use advanced forensic analysis techniques in a coordinated/integrated manner;
23. prepare professional/research reports specific to forensic chemistry;
24. properly operate measuring instrumentation to carry out the investigations required for a concrete application;
25. develop a work/activity plan for applying appropriate chemical analysis techniques;
26. complete specific investigations by producing reports or conclusions in accordance with current regulations in forensic chemistry;
27. deliver results with a high degree of confidence following forensic analyses;
28. develop the most appropriate investigative method;
29. integrate learned rules into concrete cases;
30. apply the studied principles;
31. construct algorithms for concrete cases;
32. develop solutions in the event of accidents/incidents;
33. employ techniques applicable to the resolution of casework;
34. adapt the experimental plan to the specific situation;
35. solve problems in specific situations;
36. plan an experimental protocol for concrete cases;
37. adapt the analysis to the specific situation;
38. integrate results into a final report or a study;
39. plan a case study;
40. produce a synthesis (concise) report;
41. lead a case study;
42. improve specific experimental protocols in concrete cases;
43. compute results in well-defined situations;
44. handle chemical substances;
45. operate physico-chemical analytical instrumentation;
46. convert results into other units of measurement;
47. outline experimental protocols;
48. develop experimental protocols;
49. develop new experimental protocols for different situations;
50. apply (practice) knowledge in new situations;
51. develop new protocols;
52. lead work/project teams;
53. initiate working protocols;
54. select the best investigative techniques in new situations.
55. Collect samples according to their physicochemical characteristics using appropriate protocols.
56. Apply personal protection procedures in specifical situations.

57. Operate and appropriately use protective equipment specific to laboratory and field activities.
58. Use domain-specific terminology accurately in professional and scientific contexts.
59. Communicate using discipline-specific scientific language in oral and written form.
60. Justify and select appropriate sample preparation procedures for specific instrumental techniques.
61. Critically evaluate and revise scientific conclusions based on experimental evidence.
62. Apply analytical techniques and methodologies while preserving the integrity of evidence.
63. Translate and interpret scientific and technical documents written in widely used english language.
64. Correlate analytical results with international legislation and standards relevant to the field.
65. Prepare and write scientific articles according to academic publishing standards.
66. Disseminate scientific results through presentations at conferences and specialized symposia.

c) Responsibility and autonomy[11] - According to the European Qualifications Framework (EQF), the learning outcomes related to qualification level 7, corresponding to university master's studies, involve the management and transformation of work or study situations that are complex, unpredictable and require new strategic approaches, by taking responsibility to contribute to professional knowledge and practices and/or to review the strategic performance of teams:

1. assume responsibility for managing professional development;
2. participate in some concrete physics experiments;
3. to present scientific seminars and to popularize some notions of physics;
4. to critically analyze a specialized report, scientific communication with a medium degree of difficulty in the field of physics;
5. to be autonomous in the context of handling laboratory equipment, including in situations requiring an interdisciplinary approach;
6. to autonomously use information sources and resources for communication and assisted professional training (Internet portals, specialized software applications, databases, online courses, etc.) both in Romanian and in a language of international circulation;

[11] Responsibility and autonomy refer to the learner's ability to apply their knowledge and skills independently and responsibly.

7. to carry out research internships in various production/research units in order to become familiar with and operate modern equipment, obtain interesting results and prepare reports on the activity carried out.
8. Plans comparative analyses of theoretical models, physical formulas, and experimental results in advanced physics research.
9. Argues experimental and numerical results using scientific evidence from condensed matter physics and theoretical physics.
10. Explains and debates physical phenomena related to quantum mechanics, spectroscopy, transport phenomena, and advanced materials.
11. Decides and manages the selection of experimental or computational methodologies for advanced physics investigations.
12. Examines and interprets experimental datasets obtained from spectroscopic, X-ray, rheological, or transport measurements.
13. Verifies correlations between physical properties and the structural characteristics of materials.
14. Practices the responsible use of laboratory techniques employed in crystal growth, optical spectroscopy, and materials characterization.
15. Monitors and evaluates the consequences of experimental procedures on material properties and measurement accuracy.
16. Studies and identifies common and distinct characteristics of crystalline, nano-, and micromaterials.
17. Formulates scientific conclusions based on experimental and computational investigations in physics.
18. Applies and exemplifies advanced theoretical concepts from solid-state physics, quantum mechanics, and cosmology.
19. Examines thermal and transport effects associated with phase transitions, crystallization, and material processing.
20. Initiates and develops algorithmic and numerical approaches for solving advanced physics problems.
21. Decides and justifies the most appropriate experimental or computational solutions for materials and theoretical physics applications.
22. Solves advanced research problems using analytical, numerical, and experimental methods.
23. Applies and follows occupational health and safety regulations during advanced laboratory investigations.
24. Manages compliance with quality and safety standards in physics research laboratories.
25. Plans and coordinates responses to laboratory incidents and experimental risks in materials research activities.
26. Correlates theoretical models with real physical systems investigated experimentally.

27. Decides based on theoretical predictions, numerical simulations, and experimental evidence.
28. Formulates and presents scientific results using diagrams, plots, and graphical representations specific to physics research.
29. Examines critically the strengths and limitations of experimental and computational protocols.
30. Performs and argues SWOT analyses for advanced research methodologies in physics.
31. Correlates theoretical physics concepts with practical applications in materials science and modern technologies.
32. Defends and argues scientific conclusions derived from advanced spectroscopy, crystallography, and computational analyses.
33. Verifies the consistency of obtained data with the international scientific literature in physics and materials science.
34. Completes and drafts scientific reports according to academic and research standards in physics.
35. Verifies the correctness, reliability, and reproducibility of experimental and numerical results.
36. Studies and examines advanced methods for materials characterization and physical analysis.
37. Plans and prioritizes experimental and computational activities according to scientific relevance and project objectives.
38. Evaluates physical phenomena in relation to experimental evidence and theoretical models.
39. Tests and verifies the reproducibility of measurements performed using spectroscopic and analytical techniques.
40. Formulates recommendations consistent with advanced physical theories and experimental findings.
41. Tests and analyzes hypotheses related to material properties, transport phenomena, and quantum systems.
42. Debates scientific interpretations and conclusions resulting from advanced physics investigations.
43. Verifies preliminary hypotheses through systematic experimental measurements and simulations.
44. Fulfills self-assessment processes regarding scientific performance and research activities.
45. Provides and shares constructive feedback within multidisciplinary research teams.
46. Examines and appraises critically datasets obtained from optical, structural, and computational investigations.

47. Reformulates and adapts experimental protocols according to the characteristics of investigated materials and systems.
48. Identifies and justifies cost-effective solutions for advanced research activities and laboratory investigations.
49. Formulates and develops simplified methodologies for experimental and numerical physics studies.
50. Leads and coordinates advanced research projects in theoretical physics and materials physics.
51. Collaborates actively within multidisciplinary teams involved in experimental and computational physics research.
52. Justifies the use of research infrastructure, laboratory time, and experimental materials.
53. Completes and develops scientific deliverables specific to advanced physics research projects.
54. Argues and justifies research costs associated with instrumentation, simulations, and laboratory investigations.
55. Administers and plans research project budgets in compliance with institutional and research regulations.
56. Compiles and organizes scientific data to formulate valid conclusions regarding physical systems and materials.
57. Formulates professional viewpoints regarding scientific reports, publications, and experimental methodologies.
58. Coordinates and manages activities within advanced research and dissertation projects.
59. Participates, collaborates, and adheres to scientific and ethical standards within research teams.
60. Applies and follows ethical and legal principles in scientific research and data management.
61. Tests and verifies hypotheses grounded in advanced theoretical physics and materials science concepts.
62. Studies, verifies, and correlates information from the scientific literature relevant to advanced research topics in physics.
63. Manages and monitors the handling and preparation of samples in order to preserve material integrity and experimental accuracy.

3. Occupations that can be practiced on the labor market

- Physicist – code ESCO 2111.3
- Research Assistant in Physics – code COR 211103
- Research Assistant in Physics-Chemistry – code COR 211105
- Research Assistant in Technological Physics – code COR - 211107

4. Ensuring flexible learning paths within the study program

The flexibility of the study program is ensured through optional subjects, optional subjects and complementary subjects.

The disciplines of choice (optional) are proposed for semesters 1, 2, 3 and 4 and are grouped into optional packages, which complete the student's specialization path. The choice of the route is made by the student, before the start of each academic year.

The non-compulsory disciplines are proposed for semesters 1-4 by the Department of Physics or the Faculty of Physics, which manages the study program, but they can also be chosen from the packages offered by other faculties of UVT.

In accordance with the provisions of the Regulation on the development of education plans for the study programs at the University of West Timisoara, so that students can benefit from credits for volunteering activities based on the provisions of the National Education Law no. 1/2011, with subsequent amendments and additions (article 203, paragraph (9)), the Volunteering discipline is available every semester in the curricula of all bachelor's and master's degree programs, with optional subject status, with a number of 2 ECTS credits.

Furthermore, in accordance with the provisions of the Regulation on the initiation, development, monitoring, and periodic review of academic programs and fields of study at the West University of Timisoara and their corresponding curricula, every UVT student, both during their undergraduate studies and during their graduate studies, will be able to participate, on an optional basis, in short-term educational programs (e.g., “blended intensive programs,” thematic schools, etc.), organized in-person and/or in a hybrid format by UVT, by UVT partner higher education institutions within the European Higher Education Area (EHEA), or by other UVT partner entities, with students earning transferable academic credits upon successful completion of such a program. Successful completion of these educational programs, the credits earned, and the competencies/learning outcomes acquired by students (to the extent that these are mentioned in a supporting document issued by the program organizer) will be noted in the diploma supplement. To receive these credits, students must submit proof of successful completion of the program, issued by the organizer, to the Student InfoCenter within 10 business days of the program’s completion. The awarding of credits will be approved by a committee composed of representatives from the UVT General Secretariat, appointed by a decision of the UVT Rector at the beginning of each academic year.

5. Professional activity and student assessment

The rights, obligations and conditions of the professional activity of students at the West University of Timisoara are regulated by the Code of Student Rights and Obligations and the Regulation on the professional activity of students from the bachelor's and master's study cycles of WUT, approved by the WUT Senate.

The form and assessment/examination methods for each subject in the curriculum are established by the subject sheets.

6. Final studies exam

In accordance with the Regulation on the organization and conduct of the final exams for bachelor's and master's university studies at the West University of Timisoara, approved by the WUT Senate, the final exam for master's university studies in any master's university study program organized at WUT it consists of a sample of elaboration and support of the dissertation work, for which 10 credits are awarded.

The topic and the bibliography corresponding to the final exam tests are published on each faculty's own website and/or on the WUT website before the beginning of each academic year.

Enrolment in the graduation exam is conditional on the student choosing the theme of the graduation thesis within 60 days at most from the beginning of the academic year of the final year of study.

The submission of the final version of the thesis on the e-learning platform is done at least 5 working days before the date scheduled for the start of the exam.

Each thesis will be accompanied, at the time of submission, by the Similarity Report resulting from the verification of the originality of the thesis through a specialized software, on the WUT e-learning platform.

According to the structure of the academic year, at WUT the exams for completing university studies can be organized in 3 sessions, usually in the months of July, September and February.

7. Preparation for the teaching profession (if applicable)

Students who wish to opt for a teaching career in pre-university education must complete (in addition to this study program) and complete the Psychopedagogical Training Program in order to certify the skills for the teaching profession and obtain the Certificate of Completion of this program. In the West University of Timisoara, this program is organized through the Department for the Training of Teaching Staff (DPPD) and can be followed in parallel with university studies or as a postgraduate. For more information, visit the link: https://dppd.uvt.ro.

LIST OF DISCIPLINES STUDIED, GROUPED BY YEARS AND SEMESTER OF STUDY

Study year I

Academic year 2026-2027

Nr. crt.	Discipline	C1	C2	Discipline Code	Semester I					Semester II				
					Number of hours/week				Number of credits	Number of hours/week				Number of credits
					C	S	L	P		C	S	L	P	
1.	Complements of Theoretical Physics	DF	DOB	ARMP 1101	2	1	-	-	7	-	-	-	-	-
2.	Complements of Solid State Physics	DF	DOB	ARMP 1102	2	1	-	-	7	-	-	-	-	-
3.	Complements of Atom and Molecule Physics	DF	DOB	ARMP 1103	2	1	-	-	7	-	-	-	-	-
4.	Magnetic Materials	DS	DOP	ARMP 1104	2	1	-	-	7	-	-	-	-	-
	Symmetries in Physics			ARMP 1105										
	Complements of Biophysics with Applications in Medicine			ARMP 1106										
5.	Research Ethics	DC	DOB	ARMP 1107	1	1	-	-	2	-	-	-	-	-
6.	Crystal Growth Methods	DS	DOP	ARMP 1201	-	-	-	-	-	2	1	-	-	6
	Gravitation and Cosmology			ARMP 1202										
7.	Applications of Quantum Mechanics in Technology	DS	DOB	ARMP 1203	-	-	-	-	-	2	-	1	-	6
8.	Transport Phenomena	DS	DOP	ARMP 1204	-	-	-	-	-	2	2	-	-	7
	Quantum Fields			ARMP 1205										
9.	Standard Model	DS	DOB	ARMP 1206	-	-	-	-	-	2	2	-	-	7
10	Specialization Practice	DS	DOB	ARMP 1207	-	-	-	-	-	-	-	-	112*	4
Total					9	5	-	-	30	8	5	1	8	30
Total teaching hours per week					14					14 + 8				

**** The total number of hours (112) for the Specialization Practice corresponds to one semester.***

Noncompulsory Disciplines														
Nr. crt.	Disciplina	C1	C2	Discipline Code	Semester I					Semester II				
					Number of hours/ week				Number of credits	Number of hours/ week				Number of credits
					C	S	L	P		C	S	L	P	
1.	Design of Optical Devices	DS	DFA	ARMP1108	2	-	2	-	4	-	-	-	-	-
2.	Study of Complex Devices with ANSYS	DS	DFA	ARMP1109	2	-	2	-	4	-	-	-	-	-
3.	Volunteering activity 1*	DC	DFA	ARMP 1110	-	-	-	60 hours	2	-	-	-	-	-
4.	Volunteering activity 2*	DC	DFA	ARMP 1210	-	-	-	-	-	-	-	-	60 hours	2

**** The total number of hours (60) for the Volunteer activity course corresponds to one semester.***

Study year II

Academic year 2027-2028

Nr. crt.	Discipline	C1	C2	Discipline Code	Semester I					Semester II				
					Number of hours/ week				Number of credits	Number of hours/ week				Number of credits
					C	S	L	P		C	S	L	P	
1.	Advanced Methods in Optical Spectroscopy	DS	DOB	ARMP 2301	2	-	2	-	8	-	-	-	-	-
2.	Solar Energy Conversion	DS	DOB	ARMP 2302	2	2	-	-	8	-	-	-	-	-
3.	Rheological Characterization of Materials	DS	DOP	ARMP 2303	2	1	-	-	7	-	-	-	-	-
	Stellar Astrophysics			ARMP 2403										
4.	Synthesis and Characterization of Nano/Micromaterials	DS	DOP	ARMP 2305	2	1	-	-	7	-	-	-	-	-
	Fields in Interaction			ARMP 2306										
5	Microwaves and Applications	DS	DOB	ARMP 2401	-	-	-	-	-	2	-	1	-	7
6.	Defects in Crystal	DS	DOP	ARMP 2402	-	-	-	-	-	2	-	2	-	8
	Advanced Methods in Computational Physics			ARMP 2304										
7.	X-ray Characterization of Materials	DS	DOP	ARMP 2404	-	-	-	-	-	2	1	-	-	7
	Statistical Methods for Data Analyzing			ARMP 2405	-	-	-	-	-					
8	Relativistic Fluid Dynamics	DS	DOP	ARMP 2406	-	-	-	-	-	2	2	-	-	6
	Dielectrics			ARMP 2407										
9.	Elaboration of Dissertation	DS	DOB	ARMP 2408	-	-	-	-	-	-	1	-	42*	2
Total					8	4	2	-	30	8	4	3	3	30
Total teaching hours per week					14					14 + 4				

**** The total number of hours (42) for the Elaboration of Dissertation corresponds to one semester.***

Noncompulsory Disciplines														
Nr. crt.	Discipline	C1	C2	Discipline Code	Semester I					Semester II				
					Number of hours/ week				Number of credits	Number of hours/ week				Number of credits
					C	S	L	P		C	S	L	P	
1.	Volunteering Activity 3	DC	DFA	ARMP 2307	-	-	-	60 hours	2	-	-	-	-	-
2.	Volunteering Activity 4	DC	DFA	ARMP 2409	-	-	-	-	-	-	-	-	60 hours	2
3.	Effective Models in Quantum Chromodynamics	DS	DFA	ARMP 2410	-	-	-	-	-	2	2	-	-	6

Noncompulsory Disciplines														
Nr. crt.	Discipline	C1	C2	Discipline Code	Semester I					Semester II				
					Number of hours/ week				Number of credits	Number of hours/ week				Number of credits
					C	S	L	P		C	S	L	P	
4.	Numerical Relativity	DS	DFA	ARMP 2308	2	2	-	-	-	-	-	-	-	6

The total number of hours (60) for the Volunteer activity course corresponds to one semester.

Legend

C1	content criterion
C2	mandatory criterion
DF	fundamental disciplines
DS	specialization disciplines
DC	complementary disciplines
DOB	compulsory (imposed) disciplines
DOP	optional disciplines (of your choice)
DFA	noncompulsory disciplines
CP	professional competency
CT	transversal competence
C	course-type didactic activity
S	seminar-type didactic activity
L	didactic activity of practical laboratory type
P	didactic activity of the internship type

Discipline code: <faculty><department><no. discipline>

GENERAL ASSESSMENT I
(by content criterion)

No.	Discipline type	Total number of hours							
		First year		Second year		The entire study program			% of the total
		Curs	S/L/P	Curs	S/L/P	Curs	S/L/P	**Total**	
1.	Fundamental	84	42	-	-	84	42	126	13,24%
2.	Specialisation	140	210	224	224	364	434	798	83,82%
3.	Complementary	14	14	-	-	14	14	28	2,94%
TOTAL		**238**	**266**	**224**	**224**	**462**	**490**	**952**	100%

GENERAL ASSESSMENT II
(according to the mandatory criterion)

No.	Discipline type	Total number of hours							
		First year		Second year		The entire study program			% of the total
		Curs	S/L/P	Curs	S/L/P	Curs	S/L/P	**Total**	
1.	Compulsory	154	210	84	126	238	336	574	60,29%
2.	Optional	84	56	140	98	224	154	378	39,71%
TOTAL		**238**	**266**	**224**	**224**	**462**	**490**	**952**	100%
3	Facultative	56	116	56	176	112	292	404	***Not included in the total***
Raport total ore de aplicare practică (S/L/P) / ore de curs						1,06			

Responsabil program de studii,
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Rector,
Prof. univ. dr. Marilen Gabriel PIRTEA

CORELAREA DINTRE COMPETENȚE, REZULTATELE AȘTEPTATE ALE ÎNVĂȚĂRII ȘI DISCIPLINELE STUDIATE

Corelarea rezultatelor așteptate ale învățării cu disciplinele studiate

Corelarea rezultatelor așteptate ale învățării cu competențele-cheie, profesionale și transversale

https://docs.google.com/document/d/1lo8llGlWrhvSNUPwMlqvJJoR-__95pP4/edit?usp=drive_link&ouid=110689886080710962373&rtpof=true&sd=true