610072-EPP-1-2019-1-LV-EPPKA2-CBHE-JP
"Development of a flexible, innovative and practical framework for Work-based Learning in higher education of Armenia and Russia" (FlexWBL)

Development of Integrated Curricula

Components	**Definition**	PSU curriculum
1. Placement of the Programme	Information needed: Code, title, qualification, duration, number of students, internal & external students, aim of WBL	**28.04.01 Nanotechnologies and microsystems technologies** Master programme 2 years of full-time study or 120 ECTS credits. Total workload of the program is 120 credits – over 60% is devoted to independent study, internships take 30 credits 10 students 1st year —5 students 2nd year —5 students The goal is to prepare specialists who understand physical and chemical processes at atomic and molecular level. The specialists should be able to conduct experiments and theoretic research into physics of condensed matter, solve applied scientific and technical tasks in photonics
2. Qualification for Access	Degrees, entrance tests, accreditation of prior learning (practical/theoretical), Define the personal learning paths	Certificate of Bachelor's Degree; entrance examinations
3. Leading Principles	Define the leading principles for the programme.	Partnership between students, HEI and employers to improve the quality of education and promote the career growth of students and graduates; The combination of work and training in a real work environment; Active use of ICT and distance learning technologies; Network learning based on active involvement in the educational process of the resources of

		other universities and external educational platforms; Support for reflective practices and introspection, innovative pedagogical theories and practice Innovation in training through the active involvement of employers and innovations in production; Active support of the student by the employer; The special role of the tutor as the person responsible for supporting the student during the implementation of his/her individual learning path; The need for university teachers to constantly improve their skills in new pedagogical theories and practice, especially using ICT; WBL enhances the scientific research to be more economy-based, as well as the topics, spheres, and outcomes of the research to be more applicable.
4. University Courses Accompanying WBL	Define the titles, credits and workload of the accompanying university courses. Define possibilities for distance-learning courses	The curriculum contains general disciplines such as history, philosophy; general professional disciplines (mechanics, optics) and professional disciplines (physical and chemical basics of micro- and nanotechnological processes)
5. Contents/Syllabus of University Courses	Define the contents/syllabus of the accompanying university courses.	Compulsory disciplines Academic and professional communication in the English language – 4 credits Relevant issues of modern nanotechnologies – 3 credits History and methodology of science and technology in the field of nanotechnologies – 3 credits Academic and professional communication – 3 credits Computer technologies in research – 6 credits Methods of mathematical modelling – 4 credits Micro- and nanosystems in technics and technologies – 4 credits Principles of organisation of high-tech production – 3 credits Variable part of the curriculum Automatic systems of construction of micro- and nanosystems elements – 4 credits Infrared spectroscopy and

		combinatorial scattering spectroscopy – 3 credits Quantum and semiconductor electronics – 4 credits Cultural diversity and dialogue of cultures – 3 credits Matrix optics – 4 credits Methods of photonic integrated circuits modelling – 4 credits Plasma and chemical technologies of production of micro- and nanosystems elements – 4 credits Materials performance under extreme physical conditions – 3 credits Project management – 3 credits Professional and personal self-development – 3 credits Systematic problem solving – 3 credits Theory of abnormal diffusion – 3 credits Elements of photonic integrated circuits – 4 credits Elective disciplines (modules) Fundamentals of negotiating process – 3 credits Oral communication in a foreign language in academic and professional activity – 3 credits Written communication in a foreign language in academic and professional activity – 3 credits Conflict management in professional activity – 3 credits Internships Research internship – 24 credits Research internship (fundamentals of research work) – 3 credits Pre-degree internship – 3 credits Final state attestation – 9 credits State examination – 3 credits Graduate qualification work (Master thesis) – 6 credits Elective discipline – 3 credits

6.	Learning Outcomes of University Courses	Define the learning outcomes considering the types, depth and fields of knowledge. Define competences students will gain through the courses.	The fields of professional activity are defined as project and technological work, and research work. During the course students will gain universal, general professional and professional competences. The universal competences include critical thinking, analysis, project management, team work, foreign language skills and self-development. The general professional competences cover problem solving in engineering and technological processes, product management in the field of nanotechnologies and microsystems technologies, ability to use applied software for modelling and elaborating objects and processes, sustainable development and drafting specific engineering documentation. The professional competences consider conducting a research, ability to develop methodology and consolidate results obtained; elaborating technological projects in the field of nanotechnologies and microsystems technologies regarding the peculiarities of the technological process.
7.	Contents of Workplace Learning	Define the contents/syllabus of the WP learning.	The major industrial partner is Perm Scientific-Industrial Instrument Making Company (PNPPK PJSC) that employs PSU graduates. Part of the classes is conducted at PNPPK and as laboratory workshops
8.	Assessment and Recognition	Define appropriate forms of assessment for the university courses and WP learning. Define an appropriate overarching assessment for the WBL programme.	State examination, defense of graduate qualification work (Master thesis) are possible ways to evaluate the results of educational programme
9.	Else that can be Considered?	Define the terms of approval Define the guidelines from external persons/organisations/stakeholders concerning the curriculum Define the margin of development within the existing curriculum Define the possibility/margin of flexible study timetable	A head of a department, deputy dean for academic affairs and dean are engaged in the process of curriculum development. The head of the department for academic process provision develops the main part of the study programme that covers disciplines, internships, final attestation and assessment systems

Components	Definition	
1. Placement of the Programme	Information needed: Code, title, qualification, duration, number of students, internal & external students, aim of WBL	05.04.04 Hydrometeorology (major – Meteorology) Master programme 2 years of full-time study or 120 ECTS credits. 16 students All of the students combine work and study (7 directly connected to the major) The goal is to prepare a specialist who is able to perform professional activity and conduct research in the field of meteorology, climatology, ecology, weather forecast development and protection of the atmosphere
2. Qualification for Access	Degrees, entrance tests, accreditation of prior learning (practical/theoretical), Define the personal learning paths	Certificate of Bachelor's Degree; entrance examinations
3. Leading Principles	Define the leading principles for the programme.	Partnership between students, HEI and employers to improve the quality of education and promote the career growth of students and graduates; The combination of work and training in a real work environment; Active use of ICT and distance learning technologies; Network learning based on active involvement in the educational process of the resources of other universities and external educational platforms; Support for reflective practices and introspection, innovative pedagogical theories and practice Innovation in training through the active involvement of employers and innovations in production; Active support of the student by the employer; The special role of the tutor as the person responsible for supporting the student during the implementation of his/her individual learning path; The need for university teachers to constantly improve their skills in new pedagogical theories and practice, especially using ICT; WBL enhances the scientific research to be more economy-based, as well as the topics, spheres, and outcomes of the research to be more applicable.

4.	University Courses Accompanying WBL	Define the titles, credits and workload of the accompanying university courses. Define possibilities for distance-learning courses	120 credits; 4320 academic hours: 684 hours of theoretical and practical study and 3636 hours of independent study. Lectures and workshops are unevenly allocated to the terms. The average workload is 10 hours per week, 34% theoretical classes and 66% workshops. The curriculum contains 23 disciplines directly referring to the field of study
5.	Contents/Syllabus of University Courses	Define the contents/syllabus of the accompanying university courses.	Compulsory disciplines Academic and business writing – 3 credits History, theory and methodology of hydrometeorology - 3 credits Cultural diversity and dialogue of cultures - 3 credits Project management - 3 credits Professional and personal self-development - 3 credits Systematic problem solving - 3 credits Research workshop on forecast issues and atmospheric circulation – 5 credits Issues of correlation between atmosphere and hydrosphere – 3 credits Modern issues of hydrometeorology – 3 credits Theory of general atmospheric circulation – 3 credits Elective disciplines Fundamentals of negotiating process – 3 credits Oral communication in a foreign language in academic and professional activity – 3 credits Written communication in a foreign language in academic and professional activity – 3 credits Conflict management in professional activity – 3 credits Agrometeorological forecasting – 3 credits Regional weather forecasting – 3 credits Meteorological services for aviation – 3 credits Very-short-range weather forecast – 3 credits

		Academic and professional communication in the English language (basic level) – 4 credits Academic and professional communication in the English language (advanced level) – 4 credits Internships Introductory internship – 3 credits Internship on mathematical modelling of atmospheric pollution – 3 credits Internship on theory of climate – 3 credits Company internship – 30 credits Pre-degree internship – 3 credits Research internship – 21 credits
6. Learning Outcomes of University Courses	Define the learning outcomes considering the types, depth and fields of knowledge. Define competences students will gain through the courses.	Professional competences concern analysis, compilation and systematisation of data and results of hydrometeorological research with the help of modern computer technologies; usage of modern methods of data processing and interpretation; development of physical and mathematical models of atmospheric circulation and development of hydrometeorological forecasts. Professional competences also consider graduate's awareness of standards of organising and doing hydrometeorological activities; ability to use fundamental and applied knowledge of the studied disciplines. Apart from that, professional competences focus on graduate's ability to provide urgent hydrometeorological forecast; ability to use fundamental and applied knowledge of the studied disciplines
7. Contents of Workplace Learning	Define the contents/syllabus of the WP learning.	Students take internships at Roshydromet and Aviamettelecom of Roshydromet. These organizations provide services in the area of public service and air transport. Internships take 1080 hours (30 credits) and are undertaken in the 3th and 5th terms
8. Assessment and Recognition	Define appropriate forms of assessment for the university courses and WP learning. Define an appropriate overarching assessment for the WBL programme.	Examinations, essays, tests, oral presentations, reports, defense of graduate qualification work (Master thesis) are possible ways to evaluate the results of educational programme
9. Else that can be Considered?	Define the terms of approval Define the guidelines from external persons/organisations/stakeholders concerning the curriculum Define the margin of development within the existing curriculum	The program is elaborated by the staff of the department of meteorology and protection of the atmosphere as well as by representatives of industrial partners. In this program there are no hours devoted to students' work outside the university.

	Define the possibility/margin of flexible studytimetable	This kind of work is integrated into internships.