MODULE HANDBOOK

EP BA 6B01502 – Physics (IP)

Aktobe, 2025

EP BA 6B01502 – Physics (IP)

Content

Module Identification	**10. Module 1 – General education module** ООД KRYa 1102 Russian language. Theme plan: Module 1 Russian language in the modern world. Module 2 Lifestyle. Module 3 State and religious holidays in the Republic of Kazakhstan. Module 4 The history of the city. Module 5 Health problems. Module 6 The problem of population urbanization. Generalization. **Module 1 – Language Module.** ООД KRYa 1106 Russian language. Theme plan: Module 1 Languages and education Module 2 Education, profession Module 3 Written communication Module 4 Verbal communication. Terminology of science. Module 5 Language of the specialty. Module 6 Culture of professional speech
Semester(s) in which the module is taught	2
Responsible teacher	Tuleusheva Salima Diasovna
Language of instruction	Kazakh/ Russian
Connection to the curriculum	University component
Forms of education	Practical exercises, SSWT, SSW.
Study load (including contact hours, SIW)	Total working load:150 hours Contact hours: 45 hours of practical training Self-study, including exam preparation, in hours: 25 hours SSWT, 80 hours SSW
ECTS	5
Mandatory and recommended prerequisites for studying the module	Participation in all types of activities requires prior preparation and activity. To master this module, you need the knowledge, skills and abilities acquired during the study of the following courses: Russian language. Practical Russian language.
Module objectives/expected learning outcomes	Purpose of the training is to form students' knowledge and practical skills in the field of modern Russian in accordance with the established philological tradition and the modern scientific paradigm. Training results (TR11): 1. Has a command of the main language being studied in its literary form, basic methods and techniques of various types of oral and written communication in the field of the Russian language. 2. Is able to formulate arguments and solve professional problems in the process of learning the Russian language. 3. Gives a description of the linguistic situation in Kazakhstan, identifying the problems of national identity of language and culture, ethnic and cultural conditionality of the worldview. 4. Explains the studied rules of spelling, orthoepy and punctuation. 5. Is able to communicate in Russian, taking into account the spelling and punctuation norms of the Russian language.
Contents	Discipline is aimed at developing the language personality of the student, who is able to carry out cognitive and communicative activities in Russian and in the fields of communication in the context of the implementation of state programs of trilingualism and the spiritual modernization of national consciousness. It involves the development of competencies based on national consciousness and the cultural code of qualities of internationalism, a tolerant attitude towards world cultures and languages, advanced modern technologies that can ensure the modernization of the country and the personal career growth of future specialists. The following methods will be used in the teaching process: seminar, mixed learning methods: inverted classroom, "face-to-face", "change of work areas", "individual rotational model"; exercise, brainstorming, educational dispute-dialogue, case method.
Exam form	Format of the exam is an oral answer based on tickets.

Training and examination requirements	Everyone is required to attend classes and arrive on time. All tasks of practical training, SSW/ SSWT, boundary, intermediate control must be completed on time. Untimely submitted tasks will not be accepted. It is forbidden to use a mobile phone in the classroom, during the current, boundary and final control (except when working on the instructions of the teacher).
References	**Educational literature in printed format:** 1. Zhanalina, L.K., Musatayeva, M.S. Practical course of the Russian language : Textbook. Almaty: PrintS, 2005. 529 p. 2. Rosenthal, D.E. Russian language : Collection of rules and exercises / D. E. Rosenthal. Moscow : Eksmo, 2018. 464 p. 3. Chekina E.B. Professionally oriented Russian : a textbook / E. B. Chekina, S. K. Sansyzbayeva, Zh.S. Abayeva. - Almaty : "Kazakh University", 2017. 272 p. 4. Ippolitova N. A. Russian language and culture of speech in questions and answers : a textbook / N.A. Ippolitova, O.Y. Knyazeva, M.R. Savova. Moscow : Prospekt Publ., 2016. 344 p. 5. Vol. M. Fundamentals of test theory and testing practice (in the aspect of Russian as a foreign language) : textbook / T.M. Balykhina. Moscow : MGUA Publ., 2003. 242 p. **in electronic publications:** 1. Zhanalina, L.K., Musatayeva, M.S. Practical course of the Russian language : Textbook. Almaty: PrintS, 2005. 529 p. Republican Interuniversity Electronic Library https://rmebrk.kz **Educational and methodical literature in printed format:** 1. Aikenova, R. Russian for foreign students : an educational and methodological complex / R. Aikenova, S. I. Elgina. Almaty : Evero, 2015. 256 p. 2. Grekov V.F. A manual for teaching Russian in high school/ V.F.Grekov, V.V.Chizhov. Moscow:Onyx Publishing House, World and Education Publishing House, 2008. 512 p. 3. Khavaidarova, M. M. Russian language [Text] : a textbook / M. M. Khavaidarova. Almaty : Aknur, 2018. 186 p. 4. Bespayeva K. A. Russian language for students of the educational program [Text] : textbook / K. A. Bespayeva, A. B. Tazhinina. - [B. M.] : med, 2020. 102 p. 5. Baitenova R. M. Practical stylistics of the Russian language [For students of non-linguistic specialties] : Collection of exercises / R. M. Baitenova. Karaganda : Medet Group, 2020. 121 p. **in electronic publications:** 1. Igenbay, T.E. et al. Practical course of the Russian language : A textbook. / T.E. Igenbai, G.E. Zhandykeeva, Z.S. Egizbayeva. - Almaty: "Kyzdar universitetsi" baspasy, 2016. - 121 p. Republican Interuniversity Electronic Library https://rmebrk.kz 2. Karavanova, N.B. Matryoshka: An elementary practical course of the Russian language : Courses. Moscow: Russian Language, 2015. 336 p. Republican Interuniversity Electronic Library https://rmebrk.kz 3. Iskakova, A.G., Rumyantseva, E.V. Intensive practical course of the Russian language : A textbook. Almaty: Publishing house "Kizdar universitetsi", 2015. 260 p. Republican Interuniversity Electronic Library https://rmebrk.kz 4. Sarsenova Sh.A., Shuzheeva Zh.L., Imanbekova Zh.B. Russian language. - Almaty, 2017 Aktobe Regional University named after K.Zhubanov http://neb.arsu 5. Kovyneva I.A. & Rubtsova E.V. & Chirkova V.M. Russian language. Educational and methodical manual on Russian as a foreign language for 2nd - 3rd year students of the International Faculty. 2016 Aktobe Regional University named after K.Zhubanov http://neb.arsu **Scientific literature in printed format:** 1. Kurmanova B.Zh. New approaches in teaching philological disciplines/monograph by B.J.Kurmanova, N.R. Kalimullina, V.Zh. Islamgalieva - Aktobe Letter A2021 LLP. - 226 p. **in electronic publications:** 1. Ungarbayeva G. Teaching Russian as a non-native/foreign language for special purposes : theory and practice:a collective monograph.

	2018. Aktobe Regional University named after K.Zhubanov http://neb.arsu 2. Idrissova Ye. Actual problems of modern philology.2019. Aktobe Regional University named after K.Zhubanov http://neb.arsu 3. Innovative technologies in trilingual education: proceedings of the scientific school of Professor M.R. Kondubaeva [Text] : monograph / ... – Almaty, 2015. - 218 p. Kazakhstan National Electronic Library http://kazneb.kz

Module identification	Module 1. Linguistic IYa 1101 Foreign language
Semester(s) in which the module is taught	2
Responsible teacher	
Language of learning	English
Connection to the curriculum	GED
Forms of education	Practical classes, SIWT/SIW
Teaching load (including contact hours, SIW)	Total workload:150 hours Contact hours: 45 hours (practice classes), independent study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	This module requires the knowledge, skills and abilities acquired during the study of English at the level A1 ‘minimal-sufficient’ (pre-threshold level of foreign language proficiency according to the Common European Framework of Reference for Languages).
Module objectives/expected learning outcomes	**Learning objective:** The aim is to form students' intercultural-communicative competence in the process of foreign language education at a sufficient level (A2 Common European Competence) **Learning Outcomes:** 1. To identify the topic of a text, dialogue and recognise grammatical structures; ask and be able to answer simple questions about the material covered; 2. To reproduce the essence of the read/listened text, divide or reconstruct in the correct logical order the parts of the text (dialogue), support a conversation and discussion on a familiar topic in a concrete situation, simulate a situation of everyday life; 3. To analyse grammatical structures and compare their application in a given context, break a text into logical parts and identify its main idea, transform and paraphrase sentences, interpret the content of a text in simple words; 4. To compose a dialogue (simulation), summarize the studied material, describe a situation from everyday life; 5. To evaluate the logic of text construction, form an opinion on the text (dialogue), maintain a conversation on the studied material, give recommendations in everyday life.
Contents	English language teaching in higher education is an independent and complete course. It is designed to provide students with training in the discipline ‘Foreign Language’ as one of the compulsory disciplines of the general education cycle. This discipline includes the study of topics of socio-domestic and socio-cultural spheres of communication and is aimed at the formation of intercultural-communicative competence at the level of basic standardization. You will learn and understand the most common English words and phrases: the most basic information about a person and his/her family, shopping, work, location. This is the level at which the learner will be able to speak intelligibly on the simplest topics. Vocabulary: about 1500-2500 words. Foreign Language at A2 level aims to develop the basic language skills and abilities needed to communicate in simple and everyday situations. Students learn to understand and use frequently occurring expressions and phrases, as well as to read and write simple texts.
Exam form	oral

Learning and examination requirements	Mandatory attendance at practical classes, active participation in the discussion of issues, preliminary preparation for practical classes, qualitative and timely fulfilment of assignments, participation in all types of control. The final assessment takes place in the format of an oral examination (on tickets). The examination is conducted in accordance with the academic integrity policy of the university and the rules of examinations. Examination questions are compiled according to Bloom's taxonomy.
References	Educational literature: 1. Davies P.A., Falla T.– SOLUTIONS *Elementary* Student's book. Third Edition/ Oxford University Press, 2018 – 164 pages. https://rmebrk.kz/search/?search=SOLUTIONS+Pre+-Intermediate 2. Romanovskaya, N. V. English professional requirements : teaching aids / Chernyaeva Ye.V., Zelenkova. S.K. - M. : MSTU GA, 2014 3. Qazaq Oxford Dictionary: study of discipline / Kazakh-English dictionary. Project manager: R. Kenzhehanuli. - Almaty : National Translation Bureau, 65 2023 copies. 4. Chazal, E.Oxford EAP. A course in English for Academic Purposes. Intermediate/B1+ : teacher6s Handbook / E. Chazal, L. Rogers. - China : Oxcford University Press, 2013 30 copies. 5. 5. Professionally oriented foreign language (English): Training manual / Compiled by A.H. Amerkhanova, M.K. Karimbergenova, B.M. Yesengeldin; S. Toraigyrov Pavlodar State University. - Pavlodar: Toraighyrov University, 2019. – 68 p. -ISBN 978-601 -238-936-4 .https://rmebrk.kz/ Educational and methodical literature: 1. Batinova, A. S. Practical English course: in all special and training areas / A.S. Barinova, G.N. Turzhanova. Aktobe : RIO ASU named after K. Zhubanov, 2008 2. Nakesheva S.T. Methodological guidelines for practical classes in the discipline "English" for students of I-II courses of full-time education. Edition: Aktobe 2014 http://neb.arsu.kz/view?rid=5239&fid=5222 3. Baizhanova, A. A. Collection of tests with assignments in English: towards the study of discipline / A. A. Baizhanova, A. S. Musralina. Aktobe : Scientific Research Center of ARGU named after K. Zhubanov, 2015 4. Berstenova A.B. Handbook of English grammar with training tasks. Edition: Aktobe 2014 http://neb.arsu.kz/view?rid=5236&fid=5220 5. Berstenova A. B. collection of exercises of the grammar Handbook of the English language. Publ: Aktobe 2015. http://neb.arsu.kz/view?rid=5237&fid=5221 Scientific literature: 1. Shevyakova , V. E. Modern English: word order, actual division, intonation / V.E. Shevyakova. Moscow : Nauka Publ., 1980. 2. Sabitova, Leylya Seitzhaparovna The pair-type system of the Russian verb and ways of its transformation into Kazakh and English: Abstract of the dissertation for the academic degree of Doctor of Philosophy (PhD) (10.00.00). / Eurasian National University. L.N. Gumilyov University. - Astana, 2010. - 28 p. 3. Masalimova A.S. Handbook of English grammar with training tasks edited by Masalimova A.S./ Publishing Center of ARSU named after K.Zhubanov, 2014-77 p.http://neb.arsu.kz/view?rid=5236&fid=5220 **Electronic resources:** 1.Free printable worksheets. https://busyteacher.org/classroom_activities 2.Vocabulary Activities. https://www.teachingenglish.org.uk 3.English Grammar. https://learningapps.org/index.php?category=3&subcategory 4. Interactive English language simulator of varying degrees of difficulty. https://catchenglish.ru/dialogi/dialogi-srednej-slozhnosti/at-the-pub.html

Module Identification	IKT 1108 – Information and communication technologies (in English)

EP BA 6B01502 – Physics (IP)

Semester(s) in which the module is taught	1
Responsible teacher	Shangytbayeva Gulmira Asaugalikyzy
Language of learning	English
Connection to the curriculum	General education discipline
Forms of education	Lectures, practical and laboratory classes, SIW, SIWT.
Teaching load (including contact hours, SIW)	Total workload: 150 hours. Contact hours: 45 hours (15 hours of lectures, 15 hours of practical classes, 15 hours of laboratory classes) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW.
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, you need the knowledge, skills and abilities acquired while studying science subjects in secondary school.
Module objectives/expected learning outcomes	Purpose of the course is to train highly qualified specialists capable of applying modern information technologies in the professional field, developing the ability to critically evaluate and analyze processes, methods of searching, storing and processing information, ways of collecting and transmitting information through digital technologies. 1. Knows and understands the basic methods and means of processing, storing, transmitting and accumulating information, the basic concepts of automated information processing, the goals and principles of using system and application software, the main components and principles of functioning of information and telecommunication networks. 2. Uses information resources, mobile, cloud services, Internet resources and an automated workflow to search and store information, apply methods and means of information protection. 3. Is able to manage and analyze data in various fields using digital technologies based on information security tools, e-learning methods and basic software methods. 4. Is able to create algorithms and flowcharts, develop programs and perform testing and configuration of hardware and software, create and complete devices, evaluate the reliability of software and hardware. 5. Uses automated systems in office management and specialized programs to solve the problems of the relevant industry, masters the ability to understand the purpose and essence of information in the development of modern society, basic information security, including preserving state interest and value; masters the skills of using modern technology, information technology in the field of professional activity, develops various forms of e-learning for expansion of professional knowledge. 6. Develops programs for individual computer work, masters the necessary conditions for the use of information synthesis methods, analyzes the necessary information via the Internet, abstract journals, electronic libraries. 7. He is able to assess the significance of the course material, the stages of analyzing the results obtained during practice and the correspondence of conclusions. 8. Knows how to work individually and in a team, combine personal interest with a common goal; the ability to analyze and sort information obtained from any options. 9. Is able to evaluate the formation of project activities in the specialty using modern ICT. 10. Is able to evaluate the stages of analysis of the results obtained during practice and the conformity of conclusions; to evaluate the formation of project activities in the specialty using modern ICT.
Contents	Information and communication technologies are one of the fundamental branches of scientific knowledge, forming a system–information approach to the analysis of the surrounding world about the ways and means of studying, receiving, transmitting, storing and using information technology information. The course "Information and Communication Technologies" is aimed at studying the updated content of the general education discipline, forms the ability to critically understand the role and importance of modern information and communication technologies in the era of digital

	globalization, forms new "digital" thinking, acquisition of knowledge and skills using modern information and communication technologies in various activities.
Exam form	Computer test
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW assignments, participation in all types of control.
References	1. Alshanov A.K. Information Communication Technologies : Educational–methodical manual / A. K. Alshanov, G. M. Abildinova, D. A. Ramazanova. – Almaty : CyberSmith, 2017. – 176 c. 2. Urmashev B.A. Information and communication technology: Textbook / B.A. Urmashev. – Almaty, 2016. – 410 p., ISBN 978–601–7940–02–7 (A textbook in English with the stamp of the Ministry of Education and Science of the Republic of Kazakhstan) 3. Bidaybekov Y.Y. Mathematikal modeling and numerial methods: textbook.–Almaty,2016. – 416c. 4. Jomartova Sh.A. IT infrastructure: textbook. – Almaty, 2016. – 308 c. 5. Kisselyova E.A. Theoretical foundations of computer science: textbook. – Almaty, 2016. – 265c. 6. Tokhmetov A.T. A course of lectures on computer science: Textbook / A. T. Tokhmetov, L. A. Tanchenko. Almaty: Technoerudit, 2018. 440 p. 7. Balapanov Ye.K. new information technologies: 30 Lessons in computer science: textbook. - 6 editions, updated and updated. - Almaty: CyberSmith, 2017. 8. Balapanov Ye.K. New information technologies: 30 lessons in computer science: textbook. – 6th ed., supplement – Almaty: CyberSmith, 2017. 340 p.. 9. Aman K. P. Computer Science : methodological guide to practical classes / Aman K. P., Ilyasova T. Zh. - Aktobe: K. Zhubanov. ASU, 2015. - 109 pages. 10. Mukhambetzhanova, S. T. Informatics [text] : textbook for 6th grade / S. T. Mukhambetzhanova. - Almaty : Atameken, 2018. 192 p. 11. Salgarayeva, G. I. Informatics: a textbook for 6th grade students / G. I. Salgarayeva. Astana : Arman-PV, 2018. 176 p. 12. Information and Communication Technologies: a textbook for Grade 4. - Zh. U. Kobdikova,G. A. Kopeeva,A. A. Kaptagaeva, A. G. Yusupova. - Nursultan: Arman – PV, 2019. - 144 pages. 13. Information and communication technologies: textbook for 4th grade. – Zh.U. Kobdikova, G.A.Kopeyeva, A.A.Kaptagayeva, A.G.Yusupova. – Nur–Sultan: Arman–PV, 2019. 14. Kopeeva G. A. information and communication technologies: textbook for the 3rd grade / Kopeeva G. A. - Astana: Arman-PV, 2018. - 128 pages. 15. Kopeyeva G.A. Informatics : a textbook for 5th grade general education schools / G. I. Salgaraeva. Astana : Arman–PV, 2018. 192 p 16. Salgarayeva G. I. Computer Science: textbook for the 6th– 10th grade / Salgaraeva G. I. - Nur-Sultan: Arman-PV, 2019. - 176 pages. 17. English–Russian–Kazakh dictionary of computer and Internet terms: towards the study of discipline / D.B.Alibiev, E.V.Nesterik, A.T.Zhumasheva et al. – Almaty: Evero, 2018. 264 p.

Module Identification	Module 4. Make logical deductions and language training IYa 2205 Foreign language B1
Semester(s) in which the module is taught	3
Responsible teacher	Turmagambetova G.N.
Language of learning	English
Connection to the curriculum	Basic discipline, university component
Forms of education	Practical clases SSWT, SSW.
Teaching load (including contact hours, SIW)	Total workload:90 hours Contact hours: 30 hours (30 hours of practical classes)

	Independent study, including exam preparation: 15 hours of SSWT, 45 hours of SSW
ECTS	3
Mandatory and recommended prerequisites for studying the module	Process of mastering is aimed at the comprehensive development of students' intercultural competencies. The course involves working on further improvement of language skills and speech skills. The student has the skills to understand concrete and abstract messages, as well as to discuss terms in the foreign language field.
Module objectives/expected learning outcomes	The purpose of the discipline is to develop the student's ability to communicate in a foreign language at an intercultural level, to deepen and expand the language material 1. participate in meetings in his area of expertise; 2. produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options; 3. talk about mental processes and how can he use them to improve his effectiveness on the job; 4. explain his education, experience, strength and weaknesses, and discuss his career path; talk about what he likes to read and make recommendations about good things to read; 5. discuss common political situations.
Contents	Knowledge of a foreign language is an integral part of the professional training of all specialists at the University. The course provides practical classes, SSW and SSWT. The process of studying the discipline "Foreign language" (level B1) is aimed at the comprehensive development of students' communicative, cognitive, socio-cultural and linguistic-cultural competencies.
Exam form	Oral exam
Learning and examination requirements	At this level, the student is able to understand the main ideas of clear messages on familiar topics that regularly arise in work, study, or leisure. They can handle most situations that may occur while traveling in a region where the language is spoken. They can produce simple, coherent text on familiar or personal topics. They are able to describe events, dreams, hopes, goals, and briefly explain reasons and justifications for opinions and plans.
Required resources	1. Davies P.A., Falla T.– SOLUTIONS Intermediate. Student's book. Third Edition/ Oxford University Press, 2017 – 165 pages. https://rmebrk.kz/search/?search=SOLUTIONS+Pre+-Intermediate 2. Kulmagambetova Zh.K., Baiganova A.M.Information and Communication Technologies.Ақтөбе 2019 г. https://neb.arsu.kz/ru 3. Qazaq Oxford Dictionary: study of discipline / Kazakh-English dictionary. Project manager: R. Kenzhehanuli. – Almaty : National Translation Bureau, 2023 65 copies 4. Chazal, E.Oxford EAP. A course in English for Academic Purposes. Intermediate/B1+ : teacher6s Handbook / E. Chazal, L. Rogers. - China : Oxcford University Press, 2013 30 экз. 5. Ashirbekov A.N. Information and Communication Technologies Shymkent 2018 гhttps://rmebrk.kz/ 6. Jussupbekova G.T. Information and Communication Technologies Almaty 2021 г. https://neb.arsu.kz/ru 7. Educational and methodical literature: 8. Batinova, A. S. Practical English course: in all special and training areas / A.S. Batinova, G.N. Turzhanov. Aktobe : RIO ASU named after K. Zhubanov, 2008 9. Nakesheva S.T. Methodological guidelines for practical classes in the discipline "English" for students of I-II courses of full-time education. Edition: Aktobe 2014 http://neb.arsu.kz/view?rid=5239&fid=5222

	10. Baizhanova, A. A. Collection of tests with assignments in English: towards the study of discipline / A. A. Baizhanova, A. S. Musralina. Aktobe : Scientific Research Center of ARGU named after K. Zhubanov, 2015 11. Berstenova A.B. Handbook of English grammar with training tasks. Edition: Aktobe 2014 http://neb.arsu.kz/view?rid=5236&fid=5220 12. 12. Berstenova A. B. collection of exercises of the grammar Handbook of the English language. Publ: Aktobe 2015. http://neb.arsu.kz/view?rid=5237&fid=5221 13. Scientific literature: 14. Shevyakova, V. E. Modern English: word order, actual division, intonation / V.E. Shevyakova. Moscow : Nauka Publ., 1980. 15. Sabitova, Leylya Seitzhaparovna The pair-type system of the Russian verb and ways of its transformation into Kazakh and English: Abstract of the dissertation for the academic degree of Doctor of Philosophy (PhD) (10.00.00). / Eurasian National University. L.N. Gumilyov University. - Astana, 2010. – 28 p. 16. Masalimova A.S. Handbook of English grammar with training tasks edited by Masalimova A.S./ Publishing Center of ARSU named after K.Zhubanov, 2014.-77p. http://neb.arsu.kz/view?rid=5236&fid=5220

Module Identification	**10. Module - professionally methodical FK "Physical Education" 1105 OOD OK**
Semester(s) in which the module is taught	1-2-3-4
Responsible teacher	Mukhtarov Seitkery Malikovich, Yerzhanov Gabit Kuangalievich
Language of learning	Kazakh/ Russian
Connection to the curriculum	Basic discipline
Forms of education	Practical trainings
Teaching load (including contact hours, SIW)	Total workload: 240 hours Contact hours: 45 hours (60 hours of practical training)
ECTS	8
Mandatory and recommended prerequisites for studying the module	Memorize and possess vital skills (walking, running, skiing, swimming, etc.); Possess physical culture tools for the development of individual physical qualities. Memorize the skill of conducting independent physical exercises. Understanding the basics of physical culture and sports, physical education, self-education and self-education, physical development, physical and functional fitness, psychophysical fitness, professional orientation of physical education; Application of knowledge and features of the functioning of the human body and its individual systems under the influence of physical exercise and sports in various environmental conditions; Analysis of the scientific, biological and practical foundations of physical culture, and the foundations of a healthy lifestyle; Synthesis of mastering a system of practical skills that ensure the preservation and strengthening of health, mental well-being, development and improvement of psychophysical abilities, qualities and personality traits, self-determination in physical culture; Evaluation. Properly assess your physical condition. Possess the skills of self-assessment of working capacity, fatigue, fatigue and the use of physical culture tools for correction;
Module objectives/expected learning outcomes	Purpose of the academic discipline "Physical education" at the university is the formation of social and personal competencies of

	students, ensuring the targeted use of appropriate means of physical culture and sports for the preservation, promotion of health and preparation for professional activity.
Contents	"Physical education" is included in the section of the curriculum for students of all forms of education, fields of study, and is a mandatory section of the humanitarian component of education and is aimed at shaping the physical culture of the student's personality, preparing for social and professional activities, maintaining and strengthening health, which contributes to the expansion and in-depth study of knowledge and skills in physiology, pedagogy, and psychology, which makes it possible to increase the level of professional competence of a future specialist. The training methods used are: the circular training method, the repeated method, the frontal method, the competitive method.
Exam form	Practice
Training and examination requirements	Compulsory attendance of classes, active participation in lessons, preliminary preparation for practical exercises, high-quality and timely completion of homework, participation in all types of control.
References	1. Aizakov A.D. Monitoring the physical health and healthy lifestyle of children, adolescents and youth at the regional level: a textbook. - [B. M.], 2012. - 120 P. 2. Yevseev Yu. I. Physical culture: a textbook. - 6th ed. - [B. M.]: Phoenix, 2010. - 444 p.: fig. - (Higher education) 3. Barchukova, G. V. table tennis in higher education: a textbook for students of non-physical education universities/G. V. Barchukova, A. N.Mizin. Moscow: SportAkademPress, 2002. 132S. 4. Melnikov, V.S. 5. Physical education at the university: A textbook. Orenburg: OSU, 2002. 114c. https://rmebrk.kz/ 6. Grishina, Yu.I. Student's physical education: studies - Rostov n/a: Phoenix, 2019. – 283 p. - (Higher education). -ISBN 978-5-222-31286-5. https://rmebrk.kz/ 7. Yevseev Yu. I. Physical education:a manual. - 6th edition. - [b.m.]: Phoenix, 2010. - 444 PP.: ill. - (Higher education) 8. Barchukova, G. V. table tennis in higher education: a manual for students of non-physical education universities/G. V. Barchukova, A. N. Mizin. - M.: Sportakadempress, 2002. – 132 p. 9. Kulanova, K. K. theory and methodology of National Sports at school : manual / K. 7. Kulanova K., Marchibayeva U. S., Akhmetov A. K. - Almaty : New book, 2021 10. Uanbayev, E. K. methods of teaching physical culture and sports : a manual. / 4th edition. Ed. full - Ust-Kamenogorsk: publishing house "Berel" EKSU named after S. Amanzholov, 2014. - 360 P. - https://rmebrk.kz/ 11. 11. Uanbayev, E. K., Uanbaeva, F. zh.theoretical methodology of Physical Culture and sports : a manual. - Ust-Kamenogorsk: EKSU publishing house, 2006. - 267 P. - ISBN 9965-687-86-2..

Module Identification	Module 2. – Social-political, historical knowledge, informatization of knowledge and physical education. OOD OK IK 1103 History of Kazakhstan
Semester(s) in which the module is taught	1,2
Responsible teacher	Abdullayev Nurtaza

EP BA 6B01502 – Physics (IP)

Language of learning	Russian, Kazakh
Connection to the curriculum	General education discipline, the main component
Forms of education	Lectures, practical exercises, SIW, SIWT.
Teaching load (including contact hours, SIW)	Total workload: 150 hours Contact hours: 45 hours (30 hours of lectures, 15 hours of practical exercises) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, knowledge, skills and abilities acquired during the study of school courses are required: "History of Kazakhstan", "World History", "Man. Society. Right."
Module objectives/expected learning outcomes	Purpose of studying this discipline is to provide objective knowledge about the main stages of the development of the history of Kazakhstan from ancient times to the present. Study results: Study results: (PO-1) Demonstrates knowledge and understanding of world history and the history of Kazakhstan, masters the system of theoretical knowledge on fundamental issues of scientific fields of history, reflects the place and role of Kazakhstan in world history and cultural processes. 1. To demonstrate knowledge of the history of Kazakhstan from antiquity to the present day in the unity of general, special and singular, concrete facts and a holistic picture of world development. 2. To analyze the phenomena of Kazakhstan's past and present from the perspective of historicism, dialectical understanding of the multidimensionality and inconsistency of historical processes; 3. To have the ability to comprehensively and critically analyze information from various historical and modern sources, independently and creatively comprehend the problems of social development in the past and in the present. 4. To have a respectful attitude towards national and world history and culture, the desire to preserve and enhance the wealth of the material and spiritual culture of mankind. 5. To evaluate the importance of the identity of the development of modern Kazakhstan. Critically comprehends historical processes, knows how to show solutions to current social problems.
Contents	Program of the "History of Kazakhstan" discipline consists of 5 thematic blocks: Ancient people and the formation of a nomadic civilization, the Turkic civilization and the Great Steppe, Kazakhstan in the new era (XVIII – early XX centuries), Kazakhstan in the Soviet period, Independent Kazakhstan. "History of Kazakhstan" discipline is a mandatory discipline for all educational programs. Teaching methods and technologies used in the teaching of the discipline: interactive and digital technologies; project-based teaching methods; technology of problem-based learning; "jigsaw", "insert", "problem lecture", "working with historical documents", "fishbone", and others.
Exam form	Computer test
Training and examination requirements	Compulsory attendance of classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SSW tasks, participation in all types of control. Students who have mastered the course material and scored at least 50% of the overall rating based on the results of the 1st and 2nd intermediate controls are allowed to take the state exam.
References	1. Abuseitova M.H. Kazakhstan and Central Asia in the XV-XVII centuries: history, politics, diplomacy. Almaty: Dyke Press, 1998. 592 p. 2.Abylkhozhin Zh.B. The post-Stalin period in the history of Soviet Kazakhstan: a series of doomed reforms and failed declarations (1953-1991). Almaty, KBTU, 2019. 465 p. 3. Abylkhozhin Zh.B. A country in the heart of Eurasia: Stories about the history of Kazakhstan. Almaty: Kazakh University, 1998. 280 p.

	4. Abdurakhmanov N.A. Modern history of Kazakhstan: a textbook.-Karaganda: IP "AKNUR", 2017-346 p. AKNURPRESS 5. Abdullaev, N. A.The history of independent Kazakhstan (1900-2018) textbook / - Astana : Turan, 2019. - 315 p. 6. Abdullaev, N. A. Modern history of Kazakhstan(1900-2017): textbook - Aktobe : [B. I.], 2017. - 428 p. 7. Berdenova R.K. The history of Kazakhstan: A textbook.Almaty: Medet Group LLP,2019.296 p.AKNURPRESS 8. History of Kazakhstan. Documents and materials (1917-2012) [Text] : a textbook. Almaty : Shanyrak Media LLP, 2017. 320 p. 9. Nazarbayev N.A. Era of independence.-Astana, 2017.-508 p. 10. Khafizova K.S. Steppe rulers and their diplomacy in the XVIII-XIX centuries. - Nur-Sultan: KISI under the President of the Republic of Kazakhstan, 2019. - 480 p. 11. Grivennaya L.A. New history of Kazakhstan (Collection of tests) : An educational and methodical manual for specialty 050114 "History". Petropavlovsk: IPO SKSU named after M. Kozybaev, 2012. 100 p. http://rmebrk.kz 12. Pishchulina K. A. Essays on the history of the Kazakh Khanate. Collection of articles. Almaty: Ch.Ch. Valikhanov Institute of History and Ethnology, 2016. 350c. ISBN 978-601-7342-14-2 https://djvu.online/file/Q5IG53yDUwRAo 13. History of independent Kazakhstan [Text] : [monograph] / [Abzhanov Kh. M. et al.] ; Ministry of Education and Science of the Republic of Kazakhstan. Kazakhstan, Institute of History and Ethnology named after Ch. Ch. Valikhanov. Almaty : Kazakh Encyclopedia, 2011. 399 p. : portr., table : 25 cm.; ISBN https://rusneb.ru/catalog/000199_000009_005379944/ 14. Yerofeyeva I.V. Symbols of the Kazakh statehood (late Middle Ages and modern times). Almaty: Dyke Press, 2001. 256 p. 15.Yerofeyeva I.V. Khan Abulkhair: commander, ruler, politician. Almaty: Dyke Press, 2007. 456 b. 16. Ismagulov O., Ismagulova A. Origin of the Kazakh people. According to physical anthropology. Almaty, 2017. 196 b. 17. Kumekov B.E. The Kimak state in the IX-XI centuries. Alma–Ata, Nauka, 1972. 695 p. 18. Klyashtorny S. G., Sultanov T. I. States and peoples of the Eurasian steppes. Antiquity and the Middle Ages. St. Petersburg: Petersburg Oriental Studies, 2004. – 368 p 19. Koigeldiev M.K. Stalinism and repression in Kazakhstan in the 1920s – 1940s. – Almaty, 2009. – 448 p. 20. Masanov N.E. The nomadic civilization of the Kazakhs: the foundations of a nomadic society. Almaty: Horizon, 1995. 320 p. 21. Sultanov T.I. Raised on a white felt. Khans of the Kazakh steppes. Astana: Astana Damu, 2006. 256 b.

Module Identification	**10. Module -** Professional and methodical Philosophy
Semester(s) in which the module is taught	2
Responsible teacher	Senior lecturer Yeshniazova Ainur Chapaevna
Language of learning	Kazakh
Connection to the curriculum	Core discipline, university component
Forms of education	Lectures, practical exercises, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total workload: 150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	No special training is required to successfully master a philosophy course, but it is useful to have some basic knowledge and skills. Skills of reading and understanding texts, critical thinking, the ability to analyze arguments, identify logical errors and formulate one's own point of view, literacy and the ability to express thoughts, interest in

	the "why" and "what for" questions. Philosophy begins with wonder and the desire to understand the deep causes of phenomena, the meaning of life, justice, truth, etc.
Module objectives/expected learning outcomes	Purpose of the philosophy course is to develop students' ability for critical thinking, in depth analysis and understanding of fundamental issues of existence, knowledge, morality, consciousness and society. Philosophy course is aimed at: ✔ Formation of argumentation and logical thinking skills — ability to build, analyze and evaluate arguments. ✔ Developing the ability to think independently — understanding different points of view and forming your own position. ✔ Familiarization with key philosophical traditions and concepts such as genesis, epistemology, ethics, philosophy of consciousness, etc.. ✔ Understanding the historical context of the development of philosophical thought — from antiquity to modern philosophy.
Contents	Material of the basic philosophy course is presented in the form of a short course of lectures, which nevertheless covers a wide range of the most important philosophical topics provided for by the state educational standard. The textbook includes exactly the questions that are usually asked to students on the exam to test their understanding and depth of assimilation of the course. Philosophical problems are analyzed in close connection with humanism, legal consciousness, and other forms of spiritual and value development of reality. The course will help you develop your own philosophical position based on the knowledge of philosophical material, and independently understand complex vital problems.
Exam form	Computer test
Training and examination requirements	Study requirements (during the semester): attendance of classes, regular participation in lectures and seminars is mandatory, activity at seminars, study of philosophical texts, mandatory reading of primary sources, preparation for discussion of key ideas at seminars, writing written papers, essays, abstracts or analytical notes on course topics, participation in all types of control.
References	1. Khasanov M.S. "Philosophy" (sign language translation) is a textbook recommended by the al—Farabi Kazakh National University, which corresponds to the standard program of the Ministry of Education and Science of the Republic of Kazakhstan. 2. Abisheva A.K. "Philosophy" — a textbook for students, undergraduates and PhD students of higher educational institutions, edited by Z.K. Shaukenova. 3. Nurysheva G.Zh. "Philosophy" is a textbook published in Almaty in 2013. 4. Petrova V.F., Khasanov M.S. "Philosophy" is a textbook published in Almaty in 2014. 5. Barlybayeva G.G. "The evolution of ethical ideas in Kazakh philosophy" — a study published in Almaty in 2011. 6. Segizbayev O.A. "Kazakh philosophiyasyn tarikhy" is a book translated by G.Zh. Nurysheva and M.Sabit, published in 2017. 7. Begalinova K.K., Alzhanova U.K. "Philosophy" (Parts 1 and 2) is a textbook published in Almaty in 2014. 8. Masalimova A.R., Altaev Zh.A., Kasabek A.K. "Kazakh philosophy" is a textbook published in Almaty in 2018. 9. Hess R. "25 key books on philosophy" is a book published in 1999. 10. Johnston D. "A Brief History of Philosophy" — 2010 edition. 11. Johnston D.«A Brief History of Philosophy: From Socrates to Derrida». –A&C Black, 2006. – 211 p. (ДжонстонДи. «Э бриф хистори оф философи: Фром Сокрэйтес ту Дэррида».- Эй энд Си Блэк, 2006. - 211 с.) 12. Kenny A.«New History of Western Philosophy». Volume 1-4. –Oxford University Press, 2006 - 2010. (Кэнни Эй. «Нью

	хистори оф Вестерн философи». Волум 1-4 – Оксфорд юниверсити пресс, 2006-2010) 13. Humphreys P. «The Oxford Handbook of Philosophy of Science». – Oxford University Press, 2016. (Хамфрейс Пи. «Зе Оксфорд хэндбук оф философи оф ссайнс». – Оксфорд юниверсити пресс, 2016) 14. Estlund D.«The Oxford Handbook of Political Philosophy». –Oxford University Press, 2017. (Эстланд Ди. «Зе Оксфорд хэндбук офпалитикал философи». - Оксфорд юниверсити пресс, 2016) 15. Cappelen H., Gendler T., Hawthorne J. The Oxford Handbook of Philosophical Methodology. – Oxford University Press, 2016. (Кэппелен Эйч., Гендлер Т., Хоторн Дж. Оксфордский справочник по философской методологии. – Издательство Оксфордского университета, 2016.

Module Identification	Psi 2104 Psychology
Semester(s) in which the module is taught	1
Responsible teacher	Sautenkova M.Yu.
Language of learning	Russian
Connection to the curriculum	University component in the cycle of basic disciplines
Forms of education	Lectures, practical exercises, SSW, SSWT.
Teaching load (including contact hours, SIW)	Total working load: 90 hours Contact hours: 30 hours (15 hours of lectures, 15 hours of practical exercises) Self-study, including exam preparation, in hours: 30 hours SSWT, 30 hours SSW
ECTS	3
Mandatory and recommended prerequisites for studying the module	General psychology, age psychology, psychodiagnostics
Module objectives/expected learning outcomes	Purpose of studying this discipline is to consider the problems of the applied direction of Psychological Science, the mandatory study and solution of the problems of managerial activity based on psychological knowledge and theories. Studying the discipline helps students to master the psychology and culture of business communication, management activities as future specialists in the educational environment. In the process of mastering the discipline, special attention is paid to the development of leadership, managerial, reflective qualities of graduates in the field of Educational Management, direct involvement in scientific activities, the development of leadership skills, professional competencies, the development of management methods: A) to get the essence and psychological characteristics of management functions; B) to be able to independently search, critically analyze, systematize and generalize scientific and psychological information; C) to be abile to manage the team and tolerant perception of socio-psychological differences; D) to be able to design, implement and evaluate the educational process, educational environment of the University in the training of psychological personnel; E) to assess of the importance of self-development, self-realization in the use of creative potential
Contents	Discipline studies the laws, principles and methods of the construction and functioning of the organization; the laws and principles underlying the activities of senior employees in the management of the organization; the very activity of managers in the management of the organization; personal (physiological, psychological and social) requirements that the manager must meet.
Exam form	Written (essay)

References	**Basic literature** 1. Konovalenko V.A. Psychology of personnel management: a textbook for academic baccalaureate / V. A. Konovalenko, M. Yu. Konovalenko, A. A. Solomatin. Moscow : Yurayt Publishing House, 2015. 477 p. (Series : Bachelor. Academic course). 2. Mambetalina A.S. HR-personnel management. Nur-Sultan, L. Gumilyov ENU, 2021, 145 p. 3. Maltseva Yu. A., Yatsenko O. Y. Psychology of management. Yekaterinburg : Ural Publishing House. University, 2016.— 92 p 4. Alieva M. B., Magomedova E. E., Radjabova R. V., Umarieva S.Z., Tsakhaeva A. A. Psychology of management. Training manual. Kiev, 2017. 5. Fundamentals of management: textbook / V. R. Vesnin. Moscow: Prospekt Publ., 2010. 97 p. 6. Psychology of management: Textbook / E.V. Ostrovsky; All-Russian Correspondence Financial and Economic Institute. - M.: University textbook: INFRA-M, 2011. - 249 p. http://znanium.com/bookread.php?book=313827 7. Psychology of Personnel management: textbook and practical course for academic baccalaureate book. Author: Bazarov T.Yu., 2015; Moscow, Publisher: Yurait. - 381 p. 8. Volkogonova O. D., Zubov A. T., Managerial psychology. Moscow Publishing house "FORUM" - INFRA-M., 2009. **Additional literature** 9. Avdeyev V. V., Personnel management. Optimization of teamwork: Re-engineering technology: A practical guide / V.V. Avdeev. Moscow: FiS, 2008. 256 p . 10. Morozyuk S.N. Psychology of personality. Psychology of character: a textbook for universities / S. N. Morozyuk. Moscow: Yurait Publishing House, 2024. 217 p. (Higher education). - ISBN 978-5-534-06609-8.// Yurayt educational platform [website]. - URL: https://urait.ru/bcode/540621 11.Ivanova V.S. Psychology of management. The training manual. Publishing house of Tomsk Polytechnic University.2011. **Electronic resources:** 1.https://www.inter-nauka.com/uploads/public/15058901949362.pdf3. 2. Electronic Library of dissertations of the Russian State Library of Economics: http://diss.rsl.ru/. 3. LitRes Electronic Library: http://biblio.litres.ru.

Module Identification	IFN ASBM-1107 Social-political knowledge module
Semester(s) in which the module is taught	1
Responsible teacher	Sarsembin U.K.
Language of learning	Kazakh
Connection to the curriculum	University component in the cycle of basic disciplines
Forms of education	Lectures, practical exercises, SSW, SSWT.
Teaching load (including contact hours, SIW)	Total working load: 120 hours Contact hours: 40 hours (15 hours of lectures, 25 hours of practical exercises) Self-study, including exam preparation, in hours: 20 hours SIWT, 60 hours SIW
ECTS	3
Mandatory and recommended prerequisites for studying the module	To study the module of "social-political disciplines", the student must have knowledge of history, society and culture, law, social and humanitarian orientation.
Module objectives/expected learning outcomes	To promote the formation of students as future specialists, citizens of the state. In this direction, the explanation of the nature of society, the patterns of development, the internal structure, and the activities of social institutions in society. The formation of professional

	qualifications with a high political culture, capable of deeply studying current politics in the world and the state, and contributing to its development.
Contents	Concept of society, the social structure of society, patterns of development of society. The place of sociology and political science in the study of the social-economic and political development of modern society. The main categories of sociology and political science, sociological research, types and activities of social institutions, the role of the institution of the family in society, the state, political consciousness, political culture, political ideology, the role of the political elite in the spiritual and political life of the state, the activities of political parties, etc.
Exam form	Computer test
Training and examination requirements	Complete mastery of the topics in the course, study of literature during the course, understanding the specifics and relevance of each topic, in-depth knowledge of the social structure of society and the activities of political institutions, methods and techniques of social sciences and humanities.
References	**Basic literature:** 1. Brinkerhof D. fundamentals of sociology : textbook / D. Brinkerhof. - D. Wates, S. Ortega. - Almaty: National Translation Bureau, 2018. - pp. 215-221. 2. Ritzer D. theory of sociology : textbook / D. Ritzer. - D. Stepnitsky. - Almaty: National Translation Bureau, 2018. - 856 p. 3. Gabdullina, K.Sociology: textbook. - Almaty: Nur-press, 2019. - 210 c. - ISBN 978-9965-830-86-0 : 3000.00. 4. Sociological and analytical research on the issues of language policy in the Republic of Kazakhstan : Social Research. - pod Ed.The committee for the development of languages of the Ministry of culture and sports of the Republic of Kazakhstan. - Astana: Sana LLP, 2018. - 145 p. 5. Nazarbayev N. future orientation: modernization of public consciousness : looking into the future: modernization of public consciousness / N. Nazarbayev. - Astana: Regis-St polygraph, 2017. - 55 p. 6. Sarsenbekov N. Zh. Political Science (in Tabular Form) : textbook / Sarsenbekov N. Zh. - Almaty: SSK, 2017. – 84 p. 7. Sydykov U. Political Science. Almaty, 2012. - 53-62B. 8. Rakhimbayeva A. Political Science (collection of lectures). Astana, 2012. - 67-81B. 137-141bb. 9. Absattarov R. fundamentals of Political Science. Volume 1. : manual / R. Absattarov. - Almaty: Karasay, 2018. - 472 p. 10. Absattarov R. fundamentals of Political Science.Volume 2. : manual / R. Absattarov. - Almaty: Karasai, 2018. - 460 p.

EP	6B01512 – Physics IP
Module name	**Political Science**
Semester	4 semester
Module Responsible	
Work language	Russian, Kazakh languages
Correlation with the curriculum	University Required Component
Teaching methods	Lectures and interactive seminars Group presentations and sociological surveys Portfolio of analytical essays and reflections Case analysis of political regimes and ideologies Use of political science texts, comparative tables, and video materials
Study load / Labor intensity	Contact Hours: 30 (15 hours lectures, 15 hours practical sessions) Independent Study: 30 hours (10 hours IWST / IGIW, 20 hours IWS / SDL)
Credits/credits	2

Conditions for admission to study within the module	Basic knowledge of history, social studies, and civic education (secondary school level)
Module objectives/intended learning outcomes	**Module objective:** This course introduces students to the foundations of political science, including key theories, institutions, ideologies, and contemporary political processes. It equips students with analytical tools to interpret political systems, power relations, and civic structures in national and global contexts. Upon successful completion of the module, students will: **LO1:** Explain the fundamental concepts, paradigms, and methods of political science. **LO2:** Analyse the structure and functioning of political institutions, regimes, and systems. **LO3:** Interpret political ideologies and their influence on governance and society. **LO4:** Evaluate political development, modernization, and civil society in Kazakhstan and abroad. **LO5:** Demonstrate critical thinking and informed citizenship through presentations, debates, and project work
Contents	**Key Topics:** Political science as an academic discipline: subject, structure, methods Historical development of political thought (Plato, Aristotle, Al-Farabi, Hobbes, Rousseau, Marx) Political ideologies: liberalism, conservatism, socialism, nationalism Power and authority: theories of power, legitimacy, and political leadership Political systems and regimes: democracy, authoritarianism, totalitarianism Political institutions and state structures The concept of civil society and the rule of law Political modernization and national policy (Kazakhstan case) Political culture and participation
Exam form	Traditional (ticket)
References	**Main literature:** 1. Mukhayev R.T. *Political Science* (Prospekt, 2010) 2. Radugin A.A. *Political Science: Lecture Notes* (Center, 1999) 3. Kortets I.D. *100 Exam Answers on Political Science* (Phoenix, 2000) 4. Chebotarev A.E. *Political Thought of Sovereign Kazakhstan* (IMEP, 2018) 5. Kazakhstani Political Encyclopedia (Almaty, 1998) 6. Videos: https://youtu.be/zonVIAzTmG, https://youtu.be/D8gujolA-7I, etc.

Module Identification	**10. Module -**Professional**-methodical** **OOD OK 1104** – Cultural studies
Semester(s) in which the module is taught	2
Responsible teacher	Bolysbaeva Ainura Kanapievna
Language of learning	Kazakh
Connection to the curriculum	OOD, university component
Forms of education	Lectures, practical exercises, SIW, SIWT.
Teaching load (including contact hours, SIW)	Total working load: 60 hours Contact hours: 20 hours (10 hours of lectures, 10 hours of practical exercises) Self-study, including exam preparation, in hours: 10 hours SIW, 30 hours SIWT
ECTS	2
Mandatory and recommended prerequisites for studying the module	To successfully master the course, it is necessary to become familiar with the disciplines preceding the study of this course, such as "Sociology", "Religious Studies", "History of Kazakhstan", etc.
Module objectives/expected learning outcomes	Purpose of mastering the discipline "Cultural Studies" is to form students' concepts about the essence of the phenomenon of culture, its structure, typology and dynamics, about the main trends in the

	development of world and national culture; the formation of interest in creative and scientific activities, the need for constant self-education; social, ethical and aesthetic guidelines necessary for the formation of a healthy personality. **Training results:** A. Ability to interpret and present in a clear form the content and specific features of the cultural complex from a teaching perspective B. Formation of critical thinking skills and the ability to apply it in practice. C. Disclosure of personal self-development based on theoretical knowledge and practical experience in the field of cultural studies and social studies. D. Ability to carry out research activities as part of research teams, work which affects cultural issues; E. Ability to use basic knowledge in the field of cultural studies in the process of teaching in general education organizations. F. Ability to identify the main features of the main socio-cultural terms, to reveal the socio-cultural conditionality of the modern world.
Contents	Course is aimed at studying various aspects of the cultural sphere of society, analyzing cultural forms, and studying the values of Turkic and Kazakh cultures. The content focuses on developing positive communication and introspection skills. Culture is considered as a complex social phenomenon that plays a major role in human life. Experience gained by mankind in the course of its socio-cultural history provides invaluable assistance in solving cultural problems at the present stage of the transformation of our society based on the principles of humanism and democracy in the context of scientific and technological progress.
Exam form	Computer test
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	**Basic literature** 1. Gabitov T.H. History of Kazakh culture: textbook –Almaty: TechSmith? 2018. – 308 p. http://neb.arsu.kz/ru/view?rid=6977&fid=6961 2. Solovyov V.M. Cultural studies: a textbook for universities. 2nd ed.- Moscow; Berlin: Direct – Media, 2019. -616 p. http://neb.arsu.kz/ru/view?rid=7922&fid=7905 3. Dosmurzin Ye.D. Cultural studies: a course of lectures. –Almaty, 2017. - 336 p. http://neb.arsu.kz/ru/view?rid=8035&fid=8016 4. Gabitov T.H. Cultural studies: A textbook for university and college students.- Almaty: Rarity, 2008. - 424 p. http://neb.arsu.kz/ru/view?rid=6975&fid=6959 5. Kairova B.E. Axiology of culture: A textbook. Aktobe: 2014. -93 p. http://neb.arsu.kz/ru/view?rid=55&fid=55 6. Sarsenova Zh.N. Cultural studies: a textbook. Almaty: Nur-print, 2013. 300 p. http://neb.arsu.kz/ru/view?rid=6887&fid=6871 **Additional literature:** 7. Gabitov T.H., Abdigalieva G.K., Ismagambetova Z.N. "Philosophy of culture": Textbook for university and college students. Almaty: Evero, 2013. 8. Gabitov T.H. "Kazakhs: The experience of cultural analysis". – Saarbrücken: Germany Academic Publishing GmbH & Co. CD lap lambert. - Heinrich-Böcking-Str. 6-8, 66121. - KG LAP LAMBERT, Germany, 2012. 9. Zholdubaeva A.K. "Cultural studies: a practical course". Almaty: Al-Farabi Kazakh National University, 2014.

	10. History of Cultural Studies, ed. Ogurtsova A.P. - M., Gardariki, 2006. 11. Kairzhanova A. Palaeoturcica. "The world of the ancient Turks". – Almaty, 1999. 12. Kondybaev S. An introduction to Kazakh mythology. – Almaty. 1999. 13. Kurmangalieva G.K., Nysanbaev A.N., Solovyova G.G., Seitakhmetova L.N. "The legacy of al-Farabi and the modern philosophy of mutual understanding". – Almaty. 2011. 14. Malov S.E. "Monuments of ancient Turkic writing". Moscow, 1951. 15. Masalimova A.R. "Culture and civilization". – A., 2005. 16. Mahmud al-Kashgari "Diwani Lugat at-Turk" / M. Auezova. Almaty, 2005. 17. Mirzabekova A.S. "The problem of cultural identity in social philosophy". Karaganda: Bolashak-Baspa Publ., 2006. 18. "Al-Farabi's World of Values and the axiology of the 21st century." Book.2. Almaty, 2006 19. "The legacy of al-Farabi and the formation of a new integral worldview.a collective monograph."/ under the general editorship of Z.K. Shaukenov. – Almaty: 2012. 20. Nikonov A.Yu. "Alutun bilig. Tengrianism". – Almaty. 2000. 21. Nurzhanov B.G., Yerzhanova A.M. "Cultural studies". - Almaty, 2011. 22. Nurzhanov B.G. "Modern. Postmodernity. Culture". Almaty, 2012. 23. Starr S.F. "The Lost Enlightenment: The Golden Age of Central Asia from the Arab Conquest to the time of Tamerlane." Moscow:, 2017. 24. Dzhaambayeva B.A. / under the general editorship of G.M. Mutanov. "Al-Farabi and modernity": textbook - Almaty: Kazak University, 2014. 223 p. 25. Orynbekov M.S. "The pre-philosophy of the protocols". Alma Ata, 1994. 26. Oteniyaz Samat "Atilla". Almaty, 2000. 27. Rayevsky D.S. "The model of the world of Scythian culture." Moscow, 1985. 28. Razlogov K.E. "World cinema. The History of screen Art. Moscow: EKSMO, 2011. 29. Huntington S. "Clash of Civilizations". // Geopolitics: Anthology, Moscow, 2006.

Modules of the specialty/educational program

Module Identification	S EP Abai 1206 Abay studies 5.3. Module. Module for the formation of interdisciplinary competencies
Semester(s) in which the module is taught	2
Responsible teacher	Sultangalieva O. K.
Language of learning	Kazakh
Connection to the curriculum	University component
Forms of education	Lectures, practical exercises, SIW, SIWT
Teaching load (including contact hours, SIW)	Total working load: 60 hours Contact hours: 30 hours (10 hours of lectures, 10 hours of practical exercises) Self-study, including exam preparation, in hours: 10 hours SIWT, 30 hours SIW
ECTS	2
Mandatory and recommended prerequisites for studying the module	For the successful implementation of the course, it is necessary to know the disciplines, the predecessors of this course, such as "Abay studies", "National spirituality" and other.

Module objectives/expected learning outcomes	Students' learning of the life and literary heritage of the great Abai and related research and scientific discoveries. **Training results:** 2- LO: Collecting and interpreting information for the formation of knowledge, taking into account social, ethical and scientific considerations, critically evaluating their values, views, ethical principles and teaching methods, setting new goals for their own pedagogical development. 6-LO: holistic and objective coverage of the main stages of the history, evolution of statehood and civilized forms of the Kazakh people, knowledge of scientific research methods and academic writing, understanding the importance of principles and culture of academic integrity.
Contents	"Abai studies" discipline is designated in the curriculum as a separate discipline. This discipline is aimed at a comprehensive study of the creative heritage of Abai, who is the spiritual leader of our nation, to understand the image of time and man in the environment in which he lived, to get acquainted with the work of representatives of the poetic school formed by Abai, to study the poet's philosophy, worldview, the vitality of his works and the works of scientists who contributed to the study of Hakim Abai.
Exam form	Oral
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	**Basic literature** 1. Abai. Complete works in two volumes. Volume one. - Almaty, ”Writer", 1995. 2. Auezov M. collected works in 20 volumes. Studies of Abai. Vol. 18-19-Almaty, "writer", 1985. 3. Auezov M. Abai Kunanbaev. Monographic research. - Almaty:” Sanat", 1995. 4. Two (Auezov M., Aimauytov Zh.). The life and work of Abai. "Abai", No. 1-2, 1995. 5. Zhubanov K. Abai is a classic of Kazakh literature. // Lessons of Abaya. - Almaty: “The writer”, 1986. 6. Silchenko M. S. Creative biography of Abai. Publishing House of the Academy of Sciences of the Kazakh SSR. - A-A, 1957. 7. Myrzakhmetov M. The history of Abai studies. - Almaty: “native language", 1994. 8. Myrzakhmetov M. “Mukhtar Auezov and the problems of Abai studies". - Almaty: "Science", 1982. 9. Lessons of Abai. Literary and critical articles and research. - Almaty:”Writer", 1986. 10. Myrzakhmetov M. moral ideals of Abai. - Almaty: "Rauan", 1993. 11. Yerembekov B. Abai studies. - Astana: "Foliant", 2012. - 432 p. 12. Abai and modernity (new facets of life and literary heritage). Almaty, Nauka Publ., 1994. **Additional literature:** 1. Abai. Encyclopedia. - Almaty:” Atamura", 1995. 2. Mukhtar Auezov. Encyclopedia. Almaty: Atamura, 2011. 3. Auezov M. Unpublished materials of Abai studies. - Almaty: Nauka, 1988. 4. Bukeikhanov A. Abai (Ibrahim) Kunanbaev (Obituary). (1905) "Abai" journal, No. 2, 1992. 5. Baitursynov A. The main Kazakh poet. Essays. Almaty: ”Writer", 1989. 6. Dulatov M. Ibrahim ibn Kunanbayev. Fearless. Essays. Almaty: ”Writer", 1991. 7. Myrzakhmetov M. Abaiology. (Bibliographic index). - Almaty: Nauka, 1988. 8. Abishevich C. "Abai term" (7 poems by Abai, The words of edification "the first"). Orenburg, 1916.

	9. Mashanov A. al-Farabi and Abai. - Kazakhstan, 1994. 10. Mukhamedkhanov K. the textology of Abai's works. Almaty: ”Writer", 1959. 11. Zhurbai T. "You're burning your heart... You love!” - Almaty: "Sanat", 2001. 12. Yanushkevich A. Diary and letters from a trip to the Kazakh steppe. Berlin, 1861. - Almaty, 1966 (in Russian), 1986 (in Kazakh). 13. Saparaly B. Kunanbai kazhi. Almaty: Er-Daulet, 1995.

Module Identification	**Module 5.1** – Panoramic interdisciplinary educational module OOD VK, MOM 1107, 1105 Panoramic interdisciplinary educational module (Fundamentals of Financial Literacy and Entrepreneurship, Fundamentals of Law and Anti-corruption Culture, Ecology and Life Safety)
Semester(s) in which the module is taught	2
Responsible teacher	Nurmanov Aslan Orynbasarovich
Language of learning	Kazakh/ Russian
Connection to the curriculum	Core discipline, university component
Forms of education	Lectures, practical exercises, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total workload: Contact hours: 9 a.m.
ECTS	1
Mandatory and recommended prerequisites for studying the module	To master this discipline "Fundamentals of Financial Literacy", the module requires knowledge, skills acquired during the study of the following courses: fundamentals of entrepreneurship, natural sciences.
Module objectives/expected learning outcomes	Purpose of the "Fundamentals of Financial Literacy" course is to study the conceptual provisions of finance and financial literacy, the formation of investment thinking and basic skills for effective personal finance management. Training results: 1. To know and understand the basics and patterns of financial literacy; 2. To make informed and effective decisions in various areas of personal finance management; 3. To be able to plan your personal financial flows competently and effectively invest your money in order to achieve your goals. As a result of studying the discipline, students should acquire knowledge and skills in financial literacy and security in order to reduce the likelihood of problems when consuming financial products.
Contents	The course is aimed at preparing students for their future professional activity - teaching mathematics in schools of various profiles. Mastering the discipline is also the basis for successful teaching practice. Ability to solve financial problems is one of the most important components of a future teacher's mathematical training. This skill is developed only if, throughout the entire period of study at the university, the student solves problems of varying difficulty and different content, and also considers various ways to solve them. In classes on the basics of financial literacy, methodological issues related to solving financial and mathematical problems are considered, and in the classes of this course, methodological skills for solving them are developed.
Exam form	Computer test
Training and examination requirements	Compulsory attendance of classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	1. Money. Credit. Banks. Textbook edited by Iskakov U. M., Honored Worker of the Republic of Kazakhstan, Doctor of Economics, Professor. – Almaty: - Fortune Polygraph Publishing House LLP. - 2022 – 344 p. 2. Modern financial markets. (Master's degree). Textbook. / Krinichansky K.V. (ed.), Rubtsov B.B. (ed.), Tsyganov A.A. (ed.),

	Adamova K.R., Annenskaya N.E., Buturlin I.V., Kulikova E.I., Larionova I.V., Panova S.A., Sakharov A.A., Shaker I.E. - Moscow: KnoRus, 2021. - 602 p. 3. Financial markets: digital transformation. (Master's degree). The monograph. / - Moscow: Rusains, 2021. - 184 p. 4. Digitalization of financial markets: new competencies. (Bachelor's degree, Master's degree). The monograph. / - Moscow: Rusains, 2021. - 128 p. 5. Modern payment systems and technologies. (Bachelor's degree). Textbook. / Krivoruchko S.V. (ed.), Lopatin V.A., Tamarov P.A., Dostov V.L., Kakabadze T.M., Revenkov P.V., Berdyugin A.A., Shamraev A.V., Shust P.M. - Moscow: KnoRus, 2021. - 248 p. 6. V.Y. Apryshchenko, P.E. Kiryukhov, E.A. Grigoriev, G.S. Denisova, S.V. Brovchak, E.V. Shandulin, I.A. Kidyaev, R.A. Kokorev, A.V. Paranich, E.A. Abrosimova, A.Y. Bodungen. Fundamentals of financial literacy and methods of teaching it in the system of general, secondary vocational and additional education Textbook for university students of pedagogical training areas fifth edition. Moscow Rostov-on-Don 2020 7. Pimonova T.K. Textbook A short course of lectures on the academic subject "Fundamentals of financial literacy" (part 1). Magnitogorsk, 2022. 8. I. V. Blokhin. A financial literacy workshop. Glazov ggpi 2021 9. Under the general editorship of Fatima Ramazanovna Tkhagova. Project activity as a basis for the implementation of a project to improve the level of financial literacy of the population. Maykop, 2019 10. T. V. Alexandrova, G. G. Modern financial literacy. Perm 2022 11. A. Gerasimov: Financial diary. How to put money in order: Moscow: Eksmo Publishing House, 2017 160 p. 12. S. Lucas.: Personal wealth: Increase, protect, dispose. Moscow: Alpina Publishing House, 2007 320 p. 13. Textbook on financial literacy. The textbook was created by the Faculty of Economics of Lomonosov Moscow State University as part of a joint project of the Ministry of Finance of the Russian Federation and the World Bank "Assistance to improving the level of financial literacy of the population and the development of financial education in the Russian Federation." 2023 14. Sembieva L. M., Makysh S. B., Zhagyparova A. O., Temirkhanov Zh.T. introduction to finance. Study guide, volume II, 2020 //https://elib.kz/ru/search/read_book/6881/ 15. Sembieva L. M., Makysh S. B., Zhagyparova A. O., Temirkhanov Zh.T. introduction to finance. Study guide, volume I, 2021 //http://neb.arsu.kz/ru/view?rid=7384&fid=7367 16. Musirov G. M. et al. Money, credit, banks, 2021 // http://neb.arsu.kz/ru/view?rid=9359&fid=9341 17. E. Thomas Garman, Raymond Forge personal funds, 2020 / / https://openu.kz/kz/books/79

Module Identification	Module 3. Instrumental and communicative module PIYaI 3206 Advanced Foreign Language
Semester(s) in which the module is taught	6
Responsible teacher	Baizhanova A.A.
Language of learning	English
Connection to the curriculum	Basic discipline, university component
Forms of education	Practical clases SSWT, SSW.
Teaching load (including contact hours, SIW)	Total workload:120 hours Contact hours: 40 hours (40 hours of practical classes) Independent study, including exam preparation: 20 hours of SSW, 60 hours of SSWT
ECTS	4
Mandatory and recommended prerequisites for studying the module	Communicative competence as an interactive learning goal is presented in the content of the program as part of its following

	components: linguistic, intercultural, socio-cultural, cognitive and pragmatic competence. Professional competence is realized through the formation of a number of professionally significant skills, the work on which is carried out in practical language classes and corresponds to the goals and objectives of the course.
Module objectives/expected learning outcomes	The purpose of the training is the formation of students' communicative and professional competence full understanding of the partner's communicative intentions and the authors of texts at this level; 1. express your opinion spontaneously in conversations, discussions, debates, scientific conferences on topics of general cultural and professional block; 2. prepare a clearly detailed, well-structured message, report, convey the content of the book with the expression of your own impressions; 3. improve the skills of writing essays, articles, writing texts of speeches, reports, in accordance with the communicative task, essays with elements of reasoning, with a clear and reasoned explanation of their point of view; 4. listen to authentic monologue and dialogue of various functional styles of varying complexity in direct communication and sound recording: speeches of public and political figures, excerpts of prose, poetic, dramatic works, scientists, philologists, teachers, literary critics, TV shows and films (the speech rate is normal, the recording is original); 5. possess different reading strategies (introductory, study, search) based on the material of authentic socio-political, fiction, professional texts of a philological nature of different functional styles with the extraction of significant information that is adequate to the chosen reading strategy;.
Contents	Knowledge of a foreign language is an integral part of the professional training of all specialists at the University. The course provides practical classes, SSW and SSWT. The process of studying the discipline “Advanced Foreign Language” is aimed at the comprehensive development of students ' communicative, cognitive, socio-cultural and linguistic-cultural competencies
Exam form	Oral exam
Learning and examination requirements	At this level, the student includes the development of skills for fluent and accurate use of the language in complex academic and professional contexts, as well as the successful completion of listening, reading, writing, and speaking tasks that demonstrate an advanced level of proficiency.
References	1. Davies P.A., Falla T.– SOLUTIONS Advanced. Student’s book. Third Edition/ Oxford University Press, 2018 – 171 pages. https://rmebrk.kz/search/?search=SOLUTIONS+Pre+-Intermediate 2. Romanovskaya, N. V. Professional English : a textbook / Chernyaeva E.V., Zelenkova S.K. - Moscow : MGTU GA, 2014 Oxford Qazaq Dictionary : to study discipline / Kazakh-English and English-Kazakh dictionary. Project Manager: R. Kenzhekhanuly. - Almaty: National Translation Bureau, 2023 65 copies. 3. Chazal, E.Oxford EAP. A course in English for Academic Purposes. Intermediate/B1+ : teachers Handbook / E. Chazal, L. Rogers. - China : Oxcford University Press, 2013 30 экз. 4. Professionally oriented foreign language (English): A textbook. / Comp. A.H. Amerkhanova, M.K. Karimbergenova, B.M. Yesengeldin; S. Toraigyrov Pavlodar State University. - Pavlodar: Toraighyrov University, 2019. - 68c. -ISBN 978-601 -238-936-4. https://rmebrk.kz/ 5. Batinova, A. S. Practical English course: in all special and training areas / A.S. Batinova, G.N. Turzhanova. Aktobe : RIO ASU named after K. Zhubanov, 2008

	6. 6. Nakesheva S.T. Methodological guidelines for practical classes in the discipline "English" for students of I-II courses of full-time education. Edition: Aktobe 2014 http://neb.arsu.kz/view?rid=5239&fid=5222 7. Baizhanova, A. A. Collection of tests with assignments in English : towards the study of discipline / A. A. Baizhanova, A. S. Musralina. Aktobe : Scientific Research Center of ARGU named after K. Zhubanov, 2015 8. 8. Berstenova A.B. Handbook of English grammar with training tasks. Edition: Aktobe 2014 http://neb.arsu.kz/view?rid=5236&fid=5220 9. 9. Berstenova A. B. collection of exercises of the grammar Handbook of the English language. Publ.: Aktobe 2015. http://neb.arsu.kz/view?rid=5237&fid=5221 10. Shevyakova, V. E. Modern English: word order, actual division, intonation / V.E. Shevyakova. Moscow: Nauka Publ., 1980. 11. Sabitova, Leylya Seitzhaparovna The pair-species system of the Russian verb and ways of its transformation into Kazakh and English: Abstract of the dissertation for the academic degree of Doctor of Philosophy (PhD) (10.00). / Eurasian National University. L.N. Gumilyov University. -Astana, 2010. - 28 p. 12. Masalimova A.S. Handbook of English grammar with training tasks edited by Masalimova A.S./ Publishing Center of ARSU named after K.Zhubanov, 2014-77 p. http://neb.arsu.kz/view?rid=5236&fid=5220

EP	6B01512 – Physics IP
Module name	Physics of micro-objects
Semester	7 semester
Module Responsible	Istlyaup A.S., Master in Physics, Lecturer.
Work language	Russian, Kazakh languages
Correlation with the curriculum	Elective component
Teaching methods	Lecture-based teaching, Problem-solving sessions, Case studies, Collaborative learning, Blended learning, etc.
Study load / Labor intensity	Lectures – 30 hours, practical classes – 30 hours, , IWMT – 30 hours, IWM – 90 hours / 180 hours
Credits/credits	6
Conditions for admission to study within the module	Prerequisites: Mechanics, Molecular Physics, Electricity and Magnetism, Optics, Atomic and Nuclear Physics
Module objectives/intended learning outcomes	**Module objective:** To develop students' fundamental understanding of the physical properties and behavior of micro-objects — atoms, molecules, elementary particles, and nanostructures — based on modern advances in quantum and nuclear physics. To enhance their ability to apply this knowledge in pedagogical practice and scientific research within the framework of integrating physics with information technologies. **Learning outcomes:** ● Explain the fundamental principles and concepts of quantum, molecular, and nuclear physics related to micro-objects (atoms, molecules, nanostructures, and elementary particles); ● Analyze the physical properties of micro-objects based on modern models and theories; ● Solve problems using quantum mechanical approaches and methods; ● Interpret experimental data related to the micro-world and explain phenomena from the standpoint of modern physics; ● Apply knowledge of micro-object behavior in educational and research contexts; ● Integrate ICT and simulation tools into the study and teaching of micro-object physics..

Content	Formation of students' ideas about the quantum-mechanical laws underlying modern physics and its fundamental applications in the study of one of the fundamental sections of theoretical physics. The acquisition of theoretical knowledge and practical skills will allow students to independently solve specific physical problems in the physics of micro-objects
Exam forms	Oral exam
Training and exam requirements	Students who have successfully mastered the course material and achieved at least 50% of the total score from the 1st and 2nd midterm assessments are eligible to take the final exam.
Literature	1. **Prigogine I., Stengers I.** – *Order Out of Chaos: Man's New Dialogue with Nature*. Translated from English. Moscow, 1986. 2. **Zisman G.A., Todes O.M.** – *Course of General Physics. Volume 2*. Moscow, 1974. 3. **Vainshtein L.A., Sobelman I.I., Yukov E.A.** – *Excitation of Atoms and Broadening of Spectral Lines*. Moscow, 1979. 4. **Davydov A.S.** – *Theory of Solid State*. Publisher unknown, 2000. 5. **Gushchin V.S.** – *Physics: Elements of Atomic Physics, Solid-State Physics, Nuclear Physics, and Elementary Particle Physics*. Yekaterinburg, 2006. 6. **Soldatov A.V. et al.** – *Solid State Physics*. Rostov-on-Don, 2002.

Module Identification	Theoretical Physics-2
Semester(s) in which the module is taught	7
Teacher in charge	Ubaev Zhiger Kartbaevich, docent
Language of instruction	Kazakh
Relationship to the curriculum	Component of choice
Forms of training	Lectures, laboratory work, IWST (Instructor-guided self-study), SIW (Student independent work)
Teaching load (including contact hours, SIW)	Total workload: 180 hours - Contact hours: 60 hours - 30 hours lectures - 30 hours laboratory work - Independent work: - 30 hours IWST - 90 hours SIW
ECTS	6
Mandatory and recommended prerequisites for studying the module	Theoretical Physics-1
Module objectives / intended learning outcomes	Objective: During the course, future teachers will learn about the mathematical formulation of the laws of quantum and statistical phenomena observed experimentally. Intended Learning Outcomes: 1. Demonstrate strong academic and practical knowledge in the field of physics, operate with forms and methods of scientific knowledge, various ways of exploring the world around them, and understand the role of science in the development of society; 2. To carry out scientific research in the chosen field of experimental and (or) theoretical physical research using modern instrumentation and information technologies, taking into account domestic and foreign experience; 3. Apply modern methods of processing, analyzing and synthesizing physical information in their chosen field of physical research, operate with basic mathematical concepts and operations and are able to apply them in solving physical problems, implement analytical and technological solutions in the field of experimental and theoretical physics

Table of contents	Topics covered in this module include: They will also learn about theoretical physics as a unified science, the internal connections of which are established through analytical calculations or numerical calculations and comparison with experimental data. Future teachers study the description of fundamental physical laws in six research areas
Form of examination	Traditional (written/oral ticket-based exam)
Training and examination requirements	- Active participation in all types of training - Timely submission of IWST and SIW tasks - Mastery of theoretical material and lab skills - Academic integrity and individual work submission - Use of approved textbooks and digital tools
List of references	1. Ilyasov, N. I. introduction to quantum mechanics : textbook / N. I. Ilyasov. - Almaty: Lantar Trade, 2018. - 254 P. - ISBN 978-601-7975-05-02. 2. Konishi, Kenichi. Quantum mechanics. Zhana kozkaras : okulyk / K. Konishi. - Almaty : Polygraphcombinat ZHSHS-I.Vol. 1 / J. Paffuti. - 2013. - 448 b. - ISBN 978-601-7427-22-1. - ISBN 978-601-7427-21-4 3. Istyshov, K. K. Course of theoretical physics. Quantum mechanics : a textbook/K. K. Istyshov. - Almaty : KazNPU named after Abaya, 2011. - 372 p. - ISBN 978-601-232-573-7 4. Landau L.D., Lifshits E.M. Theoretical physics: in 10 volumes, textbook.Handbook.V :Statistical Physics/ edited by L.P. Pitaevsky.-M.Fizmatlit, 2013-620s.-ISBN 978-5--9221-1510-0 5. Statistical physics and thermodynamics: selected chapters/ E.P. Shevchuk et al.-Almaty: Technoerudit, 2019-312 p. ISBN 978-601-342-323-4

Module Identification	12.1 Interdisciplinary collaboration. Project approach in scientific education
Semester(s) in which the module is taught	7
Teacher in charge	Amantayeva Amangul Shalkarbaykyzy
Language of instruction	Kazakh/Russian
Relationship to the curriculum	Basic discipline, university component
Forms of training	Lecture, practical classes, laboratory classes, IWST, SIW.
Teaching load (including contact hours, SIW)	Teaching load (including contact hours, SIW) Total work load: 150 h Contact hours: 45 h (15 h lectures, 30 h practical classes) Independent study, including preparation for exams, in hours: 25 h IWST, 80 h SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	Education Science and Key Learning Theories, Pedagogical studies
Module objectives/ intended learning outcomes	**Learning objective:** formation of students' skills and competences necessary for effective application of the project approach in educational activities. This includes the development of critical thinking, creativity, teamwork and project management skills. **The intended learning outcomes are:** 1. Students will be able to explain the basic concepts and principles of the project approach in science education. 2. Ability to develop and plan educational projects, including the definition of goals, objectives, methods and evaluation criteria. 3. Develop skills for effective teamwork, including role assignment, conflict resolution, and shared decision making. 4. Students will learn to use a variety of methods and tools to conduct research as part of project activities. 5. Ability to analyse and evaluate the results of project activities and suggest improvements and recommendations.

	6. Ability to effectively present project results using a variety of formats and communication tools.
Table of Contents	During the course, students are grouped together to solve learning tasks together. Working in a team on a project, they gain experience that is as close as possible to their future profession. Future teachers are implementing a project to solve and identify a genuine scientific problem. They will learn how to develop a similar project for secondary school students.
Form of examination	Project
Training and examination requirements	The final assessment is conducted in the format of project defence. The project defence is conducted in accordance with the university's academic integrity policy and examination rules. If plagiarism or copying is detected, the result will be automatically removed and the course will be retaken in the summer term. Project preparation requirements will be provided to prepare for the project defence.
References	1. Esekeshova M. Fundamentals of scientific and pedagogical research: training manual - Astana: Foliant, 2018. - 168 pp - ISBN 978-601-302-836-1 2. Mubarakov A. M., Baigozhanova D. S. Doing so may cause the device to become uncomfortable and may cause the device to become unstable.: training manual / - Karagandy : Aknur, 2018. – 138 pp. - ISBN 978-601-7879-40-2. 3. Dinaeva B. B. Theoretical and practical foundations of academic literacy: training manual - Nur-Sultan, 2020. - 200 pp. - ISBN 978-601-7538-27-9 4. Ernazarova G. I., Bazargalieva A. A., Anuarova L. E. Organisation of defence of schoolchildren's research works: methodological instructions: - Almaty : Kazak University, 2018. - 78 pp. - ISBN 978-601-04-3502-5

Module Identification	**(12.1) Module - Interdisciplinary integration** **Subject: Physics in STEM**
Semester(s) in which the module is taught	7
Teacher in charge	Kudaibergenova Kuralay Baytemirkyzy
Language of instruction	Kazakh/Russian
Relationship to the curriculum	PD
Forms of training	Lecture, practical classes, IWST.
Teaching load (including contact hours, SIW)	Teaching load (including contact hours, IWST) Total work load: 150 h Contact hours: 45 h (15 h lectures, 30 h hands on/ practical classes) Independent study, including preparation for exams, in hours: 25 h IWST
ECTS	5
Mandatory and recommended prerequisites for studying the module	Physics, Chemistry , Mathematics, Information and communications technology
Module objectives/ intended learning outcomes	**Learning objective:** By the end of this course, you will have acquired a foundational understanding of key principles in physics, with a focus on their application in mechanics and physical interactions. This course will introduce you to essential concepts in physics, chemistry, mathematics, and information and communications technology, aligned with the Next Generation Science Standards. You will explore topics such as the properties of matter, motion, energy, electricity, magnetism, and waves. Special emphasis will be placed on the Science and Engineering Practices and inquiry-based learning. The goal of this course is to enhance your understanding of fundamental concepts in physics, chemistry, mathematics, and information and communications technology, boosting your confidence in teaching these subjects through inquiry-driven approaches. **The intended learning outcomes are:**

	1. Understanding of Key Principles: Develop a solid grasp of fundamental concepts in physics, chemistry, mathematics, and information and communications technology. 2. Application of Knowledge: Gain the ability to apply scientific principles to real-world situations, with an emphasis on mechanics and physical interactions. 3. Inquiry-Based Learning: Strengthen skills in inquiry-based learning, promoting critical thinking and problem-solving through active engagement with scientific processes. 4. Teaching Confidence: Build confidence in teaching complex concepts in physics, chemistry, mathematics, and information and communications technology in an inquiry-driven, student-centered way. 5. Interdisciplinary Integration: Foster the integration of science, technology, engineering, and mathematics (STEM) disciplines, enabling a holistic approach to education.
Table of Contents	Properties of Matter, Physical and Chemical Changes/ Conservation of Matter, Properties of Water, Heat, Velocity/ Acceleration, Newton's Laws, Gravity/ Free Fall/ Weightlessness, Static Electricity, Current Electricity, Magnetism, Energy and Energy Conservation, Properties of Waves, Sound, Light (Refraction and Lenses), Light (Reflection and Color)
Form of examination	Mini-project
Training and examination requirements	To acquire high-quality knowledge; To follow the instructor's requirements as outlined in the syllabus; To complete all types of work independently (assignments, course papers, final projects, etc.) and submit them on time; To use reliable and credible sources of information; Not to allow others to copy one's work.
List of references	1. Lyublinskaya, I. (2014). STEM in school and the new standards of secondary science education in the USA. Biology at School, (8), 35–45. 2. Penprase, B. E. (2020). STEM Education for the 21st Century. Springer. https://doi.org/10.1007/978-3-030-41633-1 3. Ryoo, J., & Winkelmann, K. (Eds.). (2021). Innovative Learning Environments in STEM Higher Education: Opportunities, Challenges, and Looking Forward. Springer. https://doi.org/10.1007/978-3-030-58948-6 4. Conner, L. (2021). Integrating STEM in Higher Education: Addressing Global Issues. Routledge. https://doi.org/10.4324/9781003130734 5. Shernoff, D. J. (2023). Integrative STEM and STEAM Education for Real-Life Learning. Springer. https://doi.org/10.1007/978-3-031-69824-8 6. Ouyang, F., Jiao, P., McLaren, B. M., & Alavi, A. H. (Eds.). (2022). Artificial Intelligence in STEM Education: The Paradigmatic Shifts in Research, Education, and Technology. Routledge. https://doi.org/10.1201/9781003181187

EP	6B01512 – Physics IP
Module name	Robotics in education and mechatronics
Semester	8 semester
Module Responsible	Zhubayev Abzal Kantarbayevich, Ass. Prof.
Work language	Kazakh
Correlation with the curriculum	Elective component
Teaching methods	CER, MOOC, etc.
Study load / Labor intensity	Lectures – 15 hours, practical classes – 20 hours, laboratory classes-5, IWST – 20 hours, IWS – 60 hours (lecture, lesson, laboratory work, project, seminar, etc.).) / 120 hours

EP BA 6B01502 – Physics (IP)

Credits/credits	4
Conditions for admission to study within the module	Prerequisites: Mechanics, Information and communication technologies, Algebra and geometry, Mathematical analysis, Molecular physics and thermodynamics, Electricity and magnetism, Optics.
Module objectives/intended learning outcomes	The purpose of the discipline is to explain the methods, laws, models and basic laws of modern robotics and mechatronics, to develop students ' physical thinking. Learning outcomes: 1. knows and understands thebasic stages of the development of robotics; features of the mechanical component of mobile robot designs; principles of operation and operation of the control unit and electromechanical drives; functions and principles of operation of sensors in mobile robots, the basic principles of programming mobile robots. 2. uses the control unit and electromechanical drives, sensors in mobile robots, programming of mobile robots. 3. classifies electromechanical drives of robotics. 4. design of mobile robots; forms mathematical models of programming the movement of mobile robots. 5. evaluates the effectiveness of developed designs, algorithms and programs. 6. master the system of subject, psychological, pedagogical, methodological and socio-humanitarian knowledge, business and skills in the field of Mathematics and physics, carry out further professional development. 7. uses mathematical methods in the analysis and compilation of physical processes, data and phenomena. 8. uses various types of information and communication technologies in the personal service: internet resources, "cloud" and "mobile" services for searching, storing, processing and distributing information.
Content	The history of the development of robotics. Development of pre-robotics techniques. The emergence and development of modern robotics. Development of robotics in the CIS countries. Mechanical processes in robotics. Electrical processes in robotics. Magnetic processes in robotics. Optical processes in robotics. Human movement management. Construction of robots. Robot drives. Robot control systems. Dynamics of robots. Robotics systems design. Class division of technological complexes in which robots are used. The use of industrial robots in auxiliary operations. Robotics and Mechatronics Research Methodology. Arduino controllers. Arduino programming. Sensors and feeders. Working with Arduino platforms. Control of LEDs. LED indicator. Piezoelectric emitter. Temperature transferability.
Exam form	written
Training and exam requirements	Students who have mastered the course material and scored at least 50% of the overall rating based on the results of the 1st and 2nd intermediate tests are allowed to take the final exam
References	Main literature: 1. Advanced Mechanics in Robotic Systems. Ed. Nestor Eduardo Nava Rodríguez. Springer-Verlag London Limited 2011. 105 p. 2. Artificial Intelligence and Robotics. Eds. Huimin Lu and·Xing Xu. Springer International Publishing AG 2018. 326 p. 3. Dynamic Decoupling of Robot Manipulators. Ed. Vigen Arakelian. Springer International Publishing AG 2018. 118 p. 4. Handbook of Fundamentals and Challenges Collective Robotics. Ed. Serge Kernbach. Taylor & Francis Group, LLC, 2013. 914 p. 5. Humanoid Robotics: A Reference. Eds. Ambarish Goswami and Prahlad Vadakkepat. Springer Nature B.V. 2019. 2699 p.

	6. Merzouki R., Samantaray A.K., Pathak P.M., Bouamama B.O., Intelligent Mechatronic Systems: Modeling, Control and Diagnosis. Springer-Verlag London 2013. 943 p. 7. Machine Vision and Mechatronics in Practice. Eds. John Billingsley and Peter Brett. Springer-Verlag Berlin Heidelberg 2015. 350 p. 8. Bishop O. The desktop book of a robot developer. Moscow: MK–Press, St. Petersburg: KORONA-VEK, 2010. 400 p. (in Russian) 9. Tajibaeva B.T. Fundamentals of robotics: collection of lectures, 2021. (in Kazakh) 10. Tukushova A. E., Shoshak M., Temirbayev Sh.A. Robotics in education, 2019. (in Kazakh)

Module Identification	**Physics and Sustainable Development Education**
Semester(s) in which the module is taught	8
Teacher in charge	Amantayeva Amangul Shalkarbaykyzy
Language of instruction	Kazakh/Russian
Relationship to the curriculum	Basic discipline, elective component
Forms of training	Lecture, practical classes, laboratory classes, IWST, SIW.
Teaching load (including contact hours, SIW)	Teaching load (including contact hours, SIW) Total work load: 120 h Contact hours: 40 h (15 h lectures, 20 h practical classes, 5 h laboratory classes) Independent study, including preparation for exams, in hours: 20 h IWST, 60 h SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	Fundamentals of research in ecology and safe life, Project approach in scientific education
Module objectives/ intended learning outcomes	**Learning objective:** developing students' understanding of the relationship between physical processes and the principles of sustainable development, and in developing critical thinking and problem-solving skills in the context of environmental and social challenges. **The intended learning outcomes are:** 1. Students should demonstrate knowledge of basic physical laws and principles, such as the laws of thermodynamics, mechanics and electromagnetism, and their application to real-world situations. 2. Ability to analyse sustainable development issues in terms of physical processes, including energy use, resource intensity and environmental impacts. 3. Development of critical thinking skills to evaluate different approaches to sustainable development and their impact on the environment and society. 4. Understanding the importance of an interdisciplinary approach in addressing sustainable development issues, including the interaction of physics with ecology, economics and sociology. 5. Ability to apply physics concepts to develop and evaluate technologies and methods that promote sustainable development, such as renewable energy and energy efficient technologies. 6. Ability to effectively communicate ideas and solutions related to sustainable development, both written and verbal, and to work in teams to achieve common goals. 7. Awareness of the ethical and social aspects associated with physics and sustainable development, including the impact of technology on society and the environment.

EP BA 6B01502 – Physics (IP)

Table of Contents	This course is an interdisciplinary study of physics in conditions of unstable development. Natural resources and technologies in the field of ecology, the interaction between social laws and environmental problems, as well as the application of physical laws for sustainable development are considered. The focus is on the analysis of modern energy and environmental problems, the study of energy sources, the efficient use of resources and the development of technologies to reduce the negative impact on the environment.
Form of examination	Traditional (ticket)
Training and examination requirements	The final assessment is in the format of an examination. The examination is conducted in accordance with the university's academic integrity policy and examination regulations. If plagiarism or copying is detected, the exam results are automatically removed and the course is retaken in the summer term. The format of the exam is traditional (ticket). Questions are formed on the basis of B. Bloom's taxonomy. Bloom's Taxonomy. Bloom's Taxonomy. To prepare for the exam, you will be provided with questions for preliminary study of the course.
References	1. Aidarbekova, J.M. Electron and magnetism : Textbook. 2016. http://rmebrk.kz/book/1161804 2. B.T. Dosayeva, K.S. Dusebayeva, G. Nurbakyt, G.A. Usabaeva. Physics workshop: Educational and methodical manual. 2018. 3. Edited by Shauekenov Z.K. Ecology of culture in the formation of the modern picture of the world. Collective monograph. -Almaty. 2014 4. A.S. Musina. Ecology and sustainable development. Textbook. Almaty, 2015. http://rmebrk.kz/ 5. Karnauhova T.V. Ecology and sustainable development: Educational and methodological complex. - Kokshetau: Publishing house of KSU named after Sh. Ualikhanov, 2015 http://rmebrk.kz/

EP	6B01512 – Physics IP
Module name	Mechanics
Semester	1 semester
Module Responsible	Istlyaup Assel Sarbekovna, Master of Science
Work language	Russian, Kazakh languages
Correlation with the curriculum	Required component
Teaching methods	Problem-solving sessions, Laboratory work, Case studies, Collaborative learning, Blended learning, etc.
Study load / Labor intensity	Lectures – 30 hours, practical classes – 20 hours, labworks – 10, IWMT – 30 hours, IWM – 90 hours / 180 hours
Credits/credits	6
Conditions for admission to study within the module	Prerequisites: School physics course
Module objectives/intended learning outcomes	**Module objective:** The objective of this course is to enhance the following areas of subject-specific competencies: ● The area of competence related to the development of cognitive skills ● The area of competence aimed at improving practical and research skills ● The area of competence for fostering interdisciplinary collaboration **Learning outcomes:** ● Effective application of mathematical tools and laws to solve problems related to the trajectory of a solid body ● Dynamic method for describing mechanical systems in various reference frames ● Interpretation and critical analysis of graphs

	● Effective methods and laws for solving various practical problems related to mechanical oscillations ● Fundamentals of fluid and gas mechanics ● Evaluation of results in mechanics
Contents	The "Mechanics" course covers the following topics: Kinematics; Newton's laws; Work and energy; Motion under the influence of elastic forces; Motion under the influence of gravitational forces; Mechanics of special relativity; Angular momentum; Inertial forces; Rigid body mechanics; Mechanics of elastic forces; Hydrostatics and aerostatics; Hydrodynamics and aerodynamics; Natural oscillations of systems with multiple degrees of freedom; Waves; Acoustics.
Exam form	Oral exam
Training and exam requirements	Students who have successfully mastered the course material and achieved at least 50% of the total score from the 1st and 2nd midterm assessments are eligible to take the final exam.
References	**Main literature:** 1. Kulshykova A., Ibraeva G. *Mechanics: A Brief Lecture Collection*. – Aktobe: K. Zhubanov Aktobe Regional University, 2016. – 90 pages. 2. Akylbayev Zh., Gladkov V., Ilina L., Turmukhambetov A. *Mechanics: Textbook*. 2nd ed., revised. – Astana: Foliant, 2015. – 360 pages. 3. Irodov I.E. *Mechanics. Fundamental Laws*: Textbook / translated by N.A. Mazhenov, Yu.M. Smirnov, B.M. Kenzhin. – Almaty, 2016. – 276 pages. 4. Spabekova R.S. *Mechanics: Study Guide*. – Karaganda: Medet Group LLP, 2017. – 156 pages. 5. Koishybayev N. *Mechanics. Volume I. Textbook*. – Almaty: Ziyat Press, 2015. – 498 pages. 6. Aimagambetova Z.K., Serikbayeva G.D., Shunkeyev K.Sh. *Mechanics. Instructional Manual for Laboratory Work*. – Aktobe, 2010. – 93 pages. 7. Tleuberkenova G.A., Orazaliyev B.N., et al. *General Physics Course Practicum. Mechanics. Electricity*: Study Guide. – Almaty: Mektep, 1987. 8. Korazov T.A. *Physics. Mechanics with Sample Problem Solutions*: Study Guide. – Aktobe: RIO, 1999. 9. Frisch S.E., Timoreeva A.V. *General Physics Course. Part 1: Physical Foundations of Mechanics. Molecular Physics. Oscillations and Waves*. – Almaty: Mektep, 1971. 10. Isatayev S.I., et al. *General Physics Practicum. Mechanics. Molecular Physics*: Study Guide. – Almaty: Kazakh University, 2004. 11. Sakypova Sh.E. *Physics Practicum. Mechanics. Molecular Physics and Thermodynamics. Electromagnetism. Optics*: Study Guide. Parts 1–4. – Almaty: KazNAU, 2016. 12. Kaltaev A.Zh., Bekbauov B.E., Asylbekov B.K. *Problem Book on Fluid and Gas Mechanics*: Study Guide. – Almaty: Kazakh University, 2011. – 140 pages. 13. Savelev I.V. *General Physics Course. Vol. 1: Mechanics, Oscillations and Waves, Molecular Physics*. – Moscow: Nauka, 1970. **Supplementary literature:** 1. Aikeyeva A.A., Kubaeva U.S. *Measurement Errors of Physical Quantities*. Educational-methodical manual. – Almaty: SSK, 2018. – 100 pages. 2. Abylkalykova R.B. *Mechanics. Molecular Physics. Thermodynamics. Electricity. Magnetism*: Study guide. – 2019. 3. Odiyak B.P. *General Physics Course in Problems and Exercises*. Part 1: Fundamentals of Classical Mechanics, Molecular Physics, and Thermodynamics. – 2018.

	4. Yegemkulov G.T., Medetov A.K., Ubakeyeva S.U. *Kinematics*. – Almaty: "Evero", 2009. – 56 pages. 5. *Course of Physics. Part 1. Mechanics*: Textbook for secondary school / A.V. Peryshkin, V.V. Krauklis. – Moscow: Prosveshchenie, 1969. 6. Balash V.A. *Physics Problems and Methods of Solving Them*: Guide for teachers. 4th ed., revised and expanded. – Moscow: Prosveshchenie, 1983. 7. Gershenzon E.M. *General Physics Course. Mechanics*: Study guide. 2nd ed. – Moscow: Prosveshchenie, 1987. 8. Gutman V.I., Moshchansky V.N. *Algorithms for Solving Mechanics Problems in Secondary School*: Teacher's book. – Moscow: Prosveshchenie, 1988. 9. Bishop R.E. *Oscillations*: Monograph. – Moscow: Nauka, 1968. 10. Abduramanov A. *Fluid Mechanics*: Study guide. 2nd edition. – Medet Group LLP, 2020. – 266 pages. 11. Zhukarev A.S., Matveev A.N., Peterson V.K.; ed. A.N. Matveev. *Advanced-Level Problems in General Physics Course*. – Moscow State University, 1985. 12. *Laboratory Works on Physics: Mechanics, Molecular Physics, Electricity and Magnetism* / Edited by E.L. Andronikashvili. – Moscow: FizMatLit, 1961. 13. *Lecture Demonstrations in Physics* / Edited by V.I. Iveronova. 2nd edition, revised and expanded. – Moscow: Nauka, 1972.

EP	6B01512 – Physics IP
Module name	Molecular Physics
Semester	2 semester
Module Responsible	Akhmetova Marzhan Senior Lecturer
Work language	Kazakh languages
Correlation with the curriculum	The course *Molecular Physics* is an integral part of the Physics IP educational program (6B01512) and corresponds to the fundamental training module in the natural sciences cycle. It contributes to the achievement of learning outcomes related to scientific literacy, critical thinking, and the ability to apply physical concepts in pedagogical practice. The course supports the development of core competencies in experimental methodology, data interpretation, and interdisciplinary integration with chemistry, biology, and mathematics. It directly correlates with the modules on Thermodynamics, Modern Teaching Methods, and Educational Physics Experiments.
Teaching methods	The course employs a variety of active and student-centered teaching methods to enhance conceptual understanding and practical skills. These include: - Interactive lectures with digital visualizations and PhET simulations; - Problem-solving sessions and guided practice in small groups; - Laboratory-based learning with real and virtual experiments; - Project-Based Learning (PBL) and flipped classroom techniques; - Case studies and inquiry-based learning scenarios; These methods aim to develop students' critical thinking, collaboration, scientific inquiry, and the ability to connect theoretical knowledge with practical application.

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Study load / Labor intensity	**Lecture sessions** – 30 hours, **Practical/laboratory sessions** – 30 hours, **Independent work (IWS)** – 90 hours, **Midterm and final assessments** – 30 hours
Credits/credits	6
Conditions for admission to study within the module	Basic knowledge of general physics and mathematics (algebra, calculus) is required. The module is typically taken in the second or third semester and is preceded by introductory courses in **Mechanics** and **Mathematical Analysis**.
Module objectives/intended learning outcomes	**Objectives:** The module aims to provide students with a fundamental understanding of the molecular and thermodynamic basis of physical processes. It develops their ability to explain macroscopic phenomena through microscopic models, conduct thermal experiments, and apply theoretical concepts in teaching and interdisciplinary contexts. **Intended Learning Outcomes:** Upon successful completion of the module, students will be able to: - Explain the basic principles of molecular-kinetic theory and thermodynamics; - Analyze and interpret physical phenomena such as pressure, temperature, internal energy, and heat transfer; - Apply thermodynamic laws to real-world systems and calculate relevant physical quantities; - Conduct and document laboratory experiments in molecular physics; - Integrate knowledge from mathematics, chemistry, and biology to explain heat-related processes; - Communicate scientific ideas clearly in oral and written forms, including teaching contexts.
Contents	Module is structured into four main thematic blocks: **Foundations of Molecular-Kinetic Theory** o Structure of matter: molecules, atoms, and their interactions o Ideal gas laws and their derivation o Maxwell–Boltzmann distribution and Brownian motion **Internal Energy and Heat Transfer** o Heat conduction, convection, and radiation o First law of thermodynamics and its applications o Calorimetry and specific heat capacity **Phase Transitions and Real Gases** o Evaporation, condensation, sublimation o Van der Waals equation and critical phenomena o Phase diagrams and latent heat **Thermodynamic Laws and Applications** o Second law of thermodynamics, entropy o Carnot cycle and heat engines o Thermodynamic efficiency and reversible processes Each topic integrates theoretical explanations, experimental tasks, problem-solving activities, and real-world examples to promote deep conceptual understanding and practical relevance.
Exam form	oral
Training and exam requirements	To successfully complete the *Molecular Physics* module, students must fulfill the following conditions: **Attendance**: Minimum 75% participation in lectures and practical/laboratory sessions; **Independent Work**: Timely submission of all self-directed tasks, including problem sets, lab reports, and reflective journals; **Laboratory Work**: Completion of all assigned experiments with documented results and conclusions; **Midterm Assessment**: Achieve a minimum of 50% on the midterm written exam; **Final Exam**: Obtain at least 50% on the comprehensive final assessment;

	Cumulative Grade: Combined coursework and exam score must be ≥ 60% for module credit. Academic integrity and adherence to safety protocols in laboratory work are strictly required throughout the module.
References	**Main literature:** 1. Sivukhin D.V. General Physics Course: Thermodynamics and Molecular Physics – Moscow: Fizmatlit, latest edition. 2. Landsberg G.S. Thermodynamics and Molecular Physics – Moscow: Nauka, 2000. 3. Busch L., Töpfer F. Molecular Physics and Thermodynamics – Moscow: Mir, 1981. 4. Halliday D., Resnick R., Walker J. Fundamentals of Physics – Wiley, 2018. 5. Reif F. Statistical Physics: Berkeley Physics Course, Vol. 5 – McGraw-Hill, 2009. 6. Online resources and simulations: https://phet.colorado.edu, https://openedu.ru

Additional modules
Optional modules

Module Identification	**Module 4.** **SUPPORT FOR STUDENTS AS INDIVIDUALS** BP/ZHOOK-4 VFORD 2204 Age and physiological features of children's development
Semester(s) in which the module is taught	2
Responsible teacher	Kazkeev E.T.
Language of learning	Kazakh
Connection to the curriculum	University component
Forms of education	Lectures, practical exercises, SIW, SIWT.
Teaching load (including contact hours, SIW)	Total working load: 90 hours Contact hours: 30 hours (15 hours of lectures, 15 hours of practical exercises) Self-study, including exam preparation, in hours: 30 hours SIWT, 30 hours SIW
ECTS	3
Mandatory and recommended prerequisites for studying the module	To successfully master the course, it is necessary to become familiar with the disciplines preceding the study of this course, such as "General Biology (school course)", etc.
Module objectives/expected learning outcomes	to familiarize teachers with the physiological features of the growth and development of children and adolescents. Teaching children quantitative and qualitative changes at different stages of growth, patterns of development of anatomical and physiological systems of students of different ages, age characteristics. **Training results:** A. Knows the features of the anatomical and physiological structure and the Basics of life safety and environmental protection of children and adolescents in the organization of the educational process; B. Understands the pedagogical, psychological, didactic principles and ways of organizing educational work in connection with the patterns of development, complex changes in the child's body in the organization of education and training in professional activities; C. Is able to analyze and apply pedagogical, psychological, and didactic principles in teaching, depending on the age of the child; D. Is able to analyze the acquired theoretical knowledge in the formation of skills to use them in practice; E. To check and evaluate the level of organization of hygiene requirements in the educational process and their compliance in the learning process
Contents	Future teachers will get acquainted with the formation of the psyche, its activities and patterns of development. Future teachers will be able to control the conflict of students and, accordingly, plan

	and implement educational processes in accordance with age characteristics and take into account the individual needs of students. Future teachers can act creatively and situationally in various situations and support the general education and well-being of students. Future teachers who possess the competencies are able: • to recognize the initial stages of each student, their learning potential, and specific support needs; • to consider the individual needs of their students in terms of specific support, guidance, learning, and assessment; explore various methodological solutions for inclusion and real-world support.
Exam form	Computer test
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	**Basic literature** 1. Babsky, E. B. Human physiology : textbook. Volume 1 / E.B.Babsky , N.E. Babskaya. - Almaty : Evero, 2018 2. Bezrukikh, M. M. et al. Age-related physiology (physiology of child development) : A textbook. / M.M. Bezrukikh, V.D. Sonkin, D.A. Farber. - 4th ed., stereotype. - M.: Academy, 2009 https://rmebrk.kz 3. Sarsekeeva, G. Zh. Age-related human physiology : an educational and methodological guide / G. Zh. Sarsekeeva- 2nd ed. - Almaty : Almanac, 2022. 4. Konurova-Idrisova, Z. K. Age-related physiology and school hygiene : An educational and methodological complex. . - Kokshetau: KSU named after Sh. Ualikhanov, 2012. https://rmebrk.kz 5. Fomin, I. S. Human physiology / I. S. Fomin. - M. : Prosveshchenie, 1982 6. Age-related physiology and preschool hygiene. Karaganda: KarSU Publishing House, 2012 https://rmebrk.kz/. 6. Amantaykyzy B., Erdenbayev A. Zh., Olzhabaev K. O., age physiology and school hygiene. Training manual .- Almaty: IP "Ntw bok", 2021. - 172B 7. A.M. Mausumbayeva., Physiological development of students: a manual for higher education institutions.- Almaty: CyberSmith, 2019-228 P 8. Utesinov Zh. U., Amanova B. M., physiology of young people and school hygiene: textbook – Almaty: Evero, 2019 -236 p. 9. Katasheva A. Ch. physiology and school hygiene of young people. Training manual (second edition) 2021 10. Zhaparkulova N. I. Murzakhmetova M. K. Seidakhmetova Z. zh.physiology of the development of students: a manual., "Lantar BOOKS", 2022. - 145 p. - ISBN 978-601-7607-43 **Additional literature:** 1. Arynova R.A., Sagnaeva Zh.B. Physiological mechanisms of body adaptation: monograph. Almaty: TechSmith, 2018. 168 p. ISBN 978-601-7816-58-2. 2. Arynova R.A. Physiology of the heart, respiration and adaptation of the body : monograph. Almaty: TechSmith, 2018. 144 p. ISBN 978-601-240-809-6.

Module Identification	**6. Module. Support of students as individuals** **BP ZhK NOOKTO 2209 Education Science and basic theories of teaching**
Semester(s) in which the module is taught	3
Responsible teacher	Tuyakova U.Zh., Meyrkhanova A.A.
Language of learning	Kazakh
Connection to the curriculum	University
Forms of education	Lectures, practical exercises, SIWT, SIW.

Teaching load (including contact hours, SIW)	Total working load: 120 hours Contact hours: 40 hours (15 hours of lectures, 25 hours of practical exercises) Self-study, including exam preparation, in hours: 20 hours SIWT, 60 hours SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	For the successful development of the course, it is necessary to know the disciplines, the predecessor of this course, such as "Abay studies", "features of age and physiological development of children" and other.
Module objectives/expected learning outcomes	Purpose of the course is to improve competencies in the field of pedagogy and didactics (1, 2), to master key learning theories, educational concepts, and modern learning technologies for the effective implementation of pedagogical activities in the secondary education system. **Training results:** A. To possess intercultural and communicative competence, apply skills for independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods to ensure the preservation and strengthening of health in professional activities; B. To collect and interpret information for the formation of knowledge, taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, and set new goals for their own pedagogical development; C. To apply modern methods of processing, analyzing and synthesizing physical information in their chosen field of physical research, operate with basic mathematical concepts and operations and apply them to solving physical problems, implement analytical and technological solutions in the field of experimental and theoretical physics; D. To distinguish between human concepts and their importance for understanding learning and designing the educational process; E) To distinguish between learning theories and their importance for understanding the learning process and designing the educational process; apply learning theories and pedagogical models suitable for different learning situations.
Contents	Future teachers study the fundamentals of pedagogical science, such as conceptual representations of a person, leading to various theories of learning and pedagogical models. Based on an understanding of theoretical concepts, future teachers can make appropriate pedagogical choices for various learning situations. This course is aimed at developing the future teacher's competencies in the field of pedagogy and didactics. As a result of studying the course, future teachers: - will have basic knowledge and understanding of learning, and are able to take into account the diversity of learners in the learning/teaching process, as well as are able to ethically support their psychological well-being, taking into account their life and learning context; - will be able to design, implement, evaluate, and develop learning and leadership processes in various types of educational environments in a pedagogically meaningful way, including the teacher's ability to use various digital resources in a way that supports learning.
Exam form	Blank test
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	**Basic literature** 1. Pedagogy. Almaty: Kemel kitap, 2024- 636 p. (Zhampeisova K.K., Khan N.N., Columbayeva Sh.Zh.) 2. Slastenin, V.A.

	Pedagogy: Textbook / V.A. Slastenin. Moscow: Academia, 2019. 400 p. **Additional literature:** 1. Savenkov A. I. Pedagogy. A research approach. Textbook and practical course for academic baccalaureate. In 2 parts. Part 2. Moscow: Yurait, 2019. 188 p. 2. Medium–term planning - structuring of constructivist learning: a methodological workshop / Author's comp. G.U. Nasyrova, T.A. Kucherova. Almaty: RIPKSO Publ., 2015. 86 p. 3. Starikova L.D. Methodology of pedagogical research: textbook: 2nd ed. amend. and add. - Moscow: Yurayt Publishing House.- 2023-282 p . 4. Bermus A. G. Practical pedagogy. Textbook. Moscow: Yurait, 2020. 128 p. 5. Bloom B.S., Kratvol D. Taxonomy of learning objectives. New York: Longman, 1956. 6. Modern pedagogical technologies: a textbook for undergraduate students studying in pedagogical fields and specialties / Compiled by O.I. Mezentseva; edited by E.V. Kuznetsova; Kuib. phil. Novosibirsk State Pedagogical University un-ta. Novosibirsk: Nemo Press LLC, 2018. 140 p. 7. Guidelines on criterion assessment for teachers of primary and general secondary schools: Educational method. Stipend. / Edited by O.I.Mozhaeva, A.S.Shilibekova, D.B.Ziedenova. – Astana: AOO "Nazarbayev Intellectual Schools", 2016. 56 p. 8. A teacher's guide to updating the educational content of the Republic of Kazakhstan. AOO "NICHE", 2016 9. "Lesson study" as a way to improve the practice of teaching. Methodical manual. – Astana: NAO named after I. Altynsarin, 2014. – 48 p.

Module Identification	**6. Module. Support of students as individuals** **BP ZhK PVKOI 2208 Psychology, interaction and communication in education**
Semester(s) in which the module is taught	3
Responsible teacher	Kuanzhanova K.T.
Language of learning	Kazakh
Connection to the curriculum	University component
Forms of education	Lectures, practical exercises, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total workload: 150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	For the successful development of the course, it is necessary to know the disciplines, the predecessor of this course, such as "Abay studies", "features of the age and physiological development of children" and other.
Module objectives/expected learning outcomes	Mastering modern psychological theories and models, personality functioning and personality traits. **Training results:** A. To possess intercultural and communicative competence, apply skills for independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods to ensure the preservation and strengthening of health in professional activities; B. To collect and interpret information for the formation of knowledge, taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, and set new goals for their own pedagogical development;

	C. To understand the psychological and pedagogical problems of teaching and educating students with disabilities in inclusive education, take into account the diverse abilities of students in the learning process, ethically support their psychological well-being in a life and educational context; D. To understand the basic concepts and terms of educational psychology, as well as the main practical applications of psychological knowledge, patterns, facts and phenomena of cognitive and personal development in the processes of education and upbringing; E. To understand the concept of lifelong learning as part of the process of cognitive and personal development of a person, apply an integrated approach to the design, implementation, evaluation and development of the educational environment; F. To apply basic concepts and theories of communication and interaction at the individual, social and interpersonal levels, choose methods of communication and interaction that are most suitable to facilitate learning in various forms (offline, online, mixed, hybrid); understand the characteristics of group behavior and act in such a way as to contribute to the development and well-being of the community.
Contents	Future teachers contribute to the beneficial development of students by facilitating dialogue, interaction and communication in the educational process. They are able to communicate, interact, and collaborate with students' families, as well as through various other types of partnerships, and create new relationships suitable for the development of their own teaching activities. The module highlights the importance of improving student well-being by creating and maintaining a psychologically safe learning environment. Future teachers can reflect on their values, attitudes, ethical principles, and experiences, as well as their ability to set new goals for their pedagogical development, cohesion, and professional well-being. Future teachers will use various information and communication technologies to help them learn from a variety of reliable sources and grow professionally capable of assimilating, searching and critically analyzing theoretical knowledge.
Exam form	Blank test
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	**Basic literature** 1. Boryakova, Natalia Yurievna. Stages of development. Early diagnosis and correction of mental retardation in children: An educational and methodological guide / N. Y. Boryakova, 2000. 64 p. 2. Practical psychology for teachers/by M. K. Tutushkina. Moscow: Inf.-ed. Filin's House, 1997. - 328 p. - ISBN 5-89569-003-8: 380 tg. - Text: Immediate. 3. Abramova, Galina Sergeevna. Age psychology: a textbook for higher educational institutions / Galina Sergeevna Abramova, 2000. - 624 p. 4. Psychological and pedagogical interventions of acute crisis states in adolescence: a textbook. Almaty: KazGUPU named after Abai, 2011. 150 p. ISBN 978-601-80219-1-6 : 375 tenge,] **Additional:** 1. Otepbergenova Z. D. pedagogical psychology: [Matin] : textbook /Utepbergenova Z. D. Almaty: Nur-print, 2015 – - 238 P 2. Shunk, Dale H. theory of science. Bilim berý kóqjiegi. Almaty: National Translation Bureau, 2019. - 608 P (Ruhani zhangyru. New humanitarian education. Qazaq tilindegi 100 jańa oqýlyq). 3. Garber, Alyona Ilyinichna. Pedagogical psychology: [Matin]: practicum / A.I. Garber, M.V. Demidenko, S.K. Berdibayeva. –

	Ónd., tolyqt., 2-shi bas. – Almaty: Kazakh University, 2016. – 200 p. 4. Age and pedagogical psychology: a textbook for higher educational institutions / B. A. Sosnovsky [and Dr.] ; edited by B. A. Sosnovsky. - M., 2021. — 359 p. — (Higher education). 5. Logvinov I. N., Sarychev S. V., Silakov A. S. Pedagogical psychology in higher education diagrams and comments: textbook for higher education institutions. - 2nd ed., ISPR. Moscow, 2021. — 171 p. — (Higher education).

Module Identification	**9. Module. Modern education** **BD KV IO 3306 Inclusive education**
Semester(s) in which the module is taught	5
Responsible teacher	Turebaeva K.Zh.
Language of learning	Kazakh
Connection to the curriculum	University component
Forms of education	Lectures, practical exercises, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total workload: 150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully master the course, it is necessary to become familiar with the disciplines preceding the study of this course, such as "Pedagogy", etc.
Module objectives/expected learning outcomes	To familiarize students with the theoretical foundations of inclusive education and ways of its implementation in Kazakhstan, as well as to provide comprehensive knowledge of the basic rules of organization and management of inclusive processes in order to ensure equal access to education for all students. **Training results:** A) To know and understand the continuity of socialization, education and upbringing of children of early, preschool and school age with various developmental disabilities; B) To use methods to improve the cognitive functions of people with special educational needs in everyday life; C) To analyze methods for improving socially significant skills and cognitive functions in the daily lives of people with special educational needs; (D) To systematize socially relevant skills in the daily lives of persons with special educational needs; E) To assess the continuity of socialization, education and upbringing of children of early, preschool and school age with various developmental disabilities.
Contents	Purpose and subject of the course "Inclusive education", the concept of "inclusive education". The history of the development of inclusive education in the Republic of Kazakhstan and abroad. Values and principles of inclusive education. The inclusive education model. Regulatory and legal documents of inclusive education. The role of the teacher in inclusive education. Forms of interaction and coordination of the activities of teachers, parents and specialists. Psychological and pedagogical characteristics of children with hearing, vision, speech disorders, lesions, mental retardation, musculoskeletal disorders, behavioral and emotional disorders. Psychological and pedagogical characteristics of gifted and children with learning difficulties due to adverse environmental factors. Technologies for planning students' individual learning paths. Technologies for teaching children in an inclusive environment. Organization of the criterion assessment system in the context of inclusive education
Exam form	Blank test

Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	**Basic literature** 1. Likhodedova L. N. Theory and practice of Inclusive Education: A manual / Likhodedova L. I. - Karaganda: Medet Group, 2020. - 194 p. 2. Methodological recommendations for the training of teachers in the implementation of inclusive education: towards the study of discipline / Z.A.Movkebayeva, I.A.Denisova, I.A.Oralkanova, et al. - Almaty : IP Sagautdinova, 2014.- 165 p. 3. Galieva A. N. professional activity of a special teacher : monograph / A. N. Galieva. - Almaty: new book, 2021. – 212 p. 4. Movkebayeva Z.A. et al Methodological recommendations for the preparation of teachers for the integration of Inclusive Education. - 2nd edition-Almaty: IP "Sagatudinova", 2019. - 160 p. https://rmebrk.kz/book/1177495 5. Zhanibekova G. O. inclusive education: lecture collection. / Ministry of Education and science of the Republic of Kazakhstan; Mardan Saparbayev Institute. - Shymkent, 2020. - 98 p. https://rmebrk.kz/book/1177290 6. Ospanbayeva M. P. content and methodology of Inclusive Education: a manual. . - publ. - Almaty: Kazakh University, 2020. - 232 p. https://rmebrk.kz/book/1178826 7. Movkebayeva Z.A. Inclusive education: theory and practice. The monograph. Almaty, 2016. 8. Turebayeva K.Zh., Doszhanova S.E., Shestakova E.V. Socialization of children in inclusive education. The monograph. Aktobe, 2016. 344 p . 9. Training of special teachers in Kazakhstan. The monograph. – Edited by D.N.Bilyalov, Z.A.Movkebayeva. Almaty, 2023. – 358 p. **Additional literature:** 10. Bakhtiyarova, G. R., Kenshykova K. M. inclusive education: the essence and problems. - Aktobe, publishing house" Zhubanov University", 2019. - 160 p. 11. Kokkozeva K. Sh. special pedagogy. - Almaty, 2018.-244 P. 12. Zarkenova L. S., Omarova N. N., Ilyasova B. I. Special pedagogy. - Almaty, 2014 – - 180 p. 13. Abayeva G. A., Torebaeva K. Zh., Orazaeva G. S., Kartbayeva Zh. Zh. special pedagogy. - Almaty, 2018 – - 324 P. 14.Zhanatbekova N. zh. innovative technologies in the education system.- Almaty, 2019.-248 P. 15. Zholamanova T. M. new pedagogical technologies. - Karaganda, 2018.-208 P. 16. Narenova A. B. Yesengulova M. N. dimensional assessment technologies. - Aktobe, 2019. -240 P. 17. Urmashev B. A. technology of criterion-based assessment. - Almaty, 2017. -140 p.

Module Identification	**8. Module. Teacher as a reflective practitioner** **BP ZhK PIA 2219 Pedagogical research**
Semester(s) in which the module is taught	4
Responsible teacher	Kuanzhanova K.T.
Language of learning	Kazakh
Connection to the curriculum	University component
Forms of education	Lectures, practical exercises, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total workload: 150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	5

Mandatory and recommended prerequisites for studying the module	For the successful implementation of the course, it is necessary to know the disciplines, the predecessor of this course, as well as the "Basic theories of education and teaching" and other.
Module objectives/expected learning outcomes	This course is aimed at developing competencies for professional development (10). This course provides future teachers with the theoretical foundations of pedagogical research. **Training results:** A. To possess intercultural and communicative competence, apply skills for independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods to ensure the preservation and strengthening of health in professional activities; B. To collect and interpret information for the formation of knowledge, taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, and set new goals for their own pedagogical development; C. To understand the psychological and pedagogical problems of teaching and educating students with disabilities in inclusive education, take into account the diverse abilities of students in the learning process, ethically support their psychological well-being in a life and educational context; D. To know the nature of pedagogy and its basic terminology; E. To identify the main research areas in pedagogy and understands the difference between thinking and scientific knowledge in everyday life. F. Monitors changes in education and considers how they affect your work as a teacher.
Contents	Future teachers will be trained in the skills of searching and critically selecting theoretical knowledge from various reliable sources, using research results in the development of their pedagogical thinking and practice. They are willing to promote research-based learning and education, as well as their own continuous development and professional growth.
Exam form	Blank test
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	**Basic literature** 1. On education (2007). Law of the Republic of Kazakhstan; as amended from 27.12.2019. 2. Kozhukhar V.M. Fundamentals of scientific research, Moscow: Dashkov and Co., 2015.-216 p. 3. Boldin A.P., Maksimov V.A. Fundamentals of Scientific Research, Moscow: Akademiya, 2012, 336 p. 4. Kuznetsov I.N. Fundamentals of Scientific Research, Moscow, 2013, 284 p. 5. Cohen, L., Manion, L. & Morrison, K. (2011). Research methods in education (7th ed.). London and New York: Routledge. 6. Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. Theory into practice, 39(3), 124-130. https://doi.org/10.1207/s15430421tip3903_2 Creswell, J. W. (2009). 7. Research design: Qualitative, quantitative, and mixed methods approaches. Thousand Oaks, CA: SAGE Publications Inc. Gibbs, G. R. (2007). 8. Analyzing qualitative data. In U. Flick (Ed.), The Sage qualitative research kit. London: Sage. Kambatyrova, A., Orynbassarova D., Zhaksybay, M. (2017). 9. Graduate students' experiences in thesis writing in Kazakhstan: The case of Nazarbayev University. Assignment on the course "Advanced quantitative research methods". Kambatyrova, A. (2020) Parents' language ideologies in the context of trilingual

	education policy. (Unpublished doctoral thesis). Nazarbayev University Graduate School of Education, Nur-Sultan, Kazakhstan. Linneberg, M. S., & Korsgaard, S. (2019). 10. Coding qualitative data: A synthesis guiding the novice. Qualitative Research Journal. https://www.researchgate.net/deref/https%3A%2F%2Fdoi.org%2F10.1108%2 FQRJ-12-2018-0012 Muijs, D. (2011). Doing quantitative research in education with SPSS (2nd ed.). London, UK: SAGE Publications Inc. Pallant, J. (2011). **Additional:** 1. Survival manual. A step by step guide to data analysis using SPSS (4th ed.). Crows Nest: Allen & Unwin Thomas, G. (2013). How to do your research project. A guide for students in education and applied social sciences (2nd ed.). London, UK: SAGE Publications Inc. Yin, R. K. (2011). Applications of case study research. 2. Sage publications. Kambatyrova, A.S. (2016). New content of primary education in Kazakhstan: approbation and experience. KazNU Bulletin. Series "Pedagogical Sciences, 3(49), 21-32.

EP	6B01512 – Physics IP
Module name	**Assessment and Development**
Semester	5 semester
Module Responsible	Akhmetova Marzhan , Master of Science
Work language	Russian, Kazakh languages
Correlation with the curriculum	This module supports the pedagogical competencies outlined in the Master's program by focusing on modern assessment strategies, student-centered evaluation practices, and data-informed development of learning. It is tightly integrated with teaching methodology and educational psychology.
Teaching methods	Interactive lectures Seminar discussions and debates Peer-reviewed project design Micro-teaching with feedback
Study load / Labor intensity	Lectures: 15 hours Seminars and workshops: 15 hours Independent study and reading: 90 hours Project and presentation work: 30 hours
Credits/credits	5
Conditions for admission to study within the module	Students must complete coursework in general pedagogy, didactics, and curriculum theory prior to enrollment.
Module objectives/intended learning outcomes	**Module objective:** To explore contemporary theories and models of assessment in education. To equip future educators with practical tools for formative and summative assessment. To link assessment data to strategies for student learning development and differentiation.
Contents	1. Theories and purposes of assessment in education 2. Formative vs. summative assessment 3. Assessment of learning vs. assessment for learning 4. Assessment tools: rubrics, checklists, portfolios 5. Diagnostic assessment and feedback strategies 6. Differentiation based on assessment outcomes 7. Data-informed planning for student development 8. Assessment in inclusive education 9. Digital tools for monitoring progress (e.g., Kahoot, Quizizz, Google Forms) 10. Case studies and school-based assessment analysis
Exam form	Traditional (ticket)
References	**Main literature:** 1. Black, P. & Wiliam, D. (1998). *Inside the Black Box: Raising Standards Through Classroom Assessment*

	2. Earl, L. M. (2003). *Assessment as Learning: Using Classroom Assessment to Maximize Student Learning* 3. Sadler, D. R. (1989). *Formative assessment and the design of instructional systems* 4. Stiggins, R. (2005). *Student-Involved Assessment FOR Learning*

EP	6B01502 – Physics (IP)
Module name	**Analytical Geometry and Linear Algebra**
Semester	3 semester
Module Responsible	Akhmetova Marzhan , Master of Science
Work language	Russian, Kazakh languages
Correlation with the curriculum	Basic University Component
Teaching methods	Lectures and problem-solving sessions Instructor-guided independent work (IWST / IGIW) Self-directed learning (IWS / SDL) Discussion-based and application-driven classroom activities
Study load / Labor intensity	Contact Hours: 45 (15 hours lectures, 30 hours practical sessions) Independent Study: 105 hours (25 hours IWST / IGIW, 80 hours IWS / SDL)
Credits/credits	5
Conditions for admission to study within the module	Basic knowledge of school-level algebra, geometry, and introductory calculus .
Module objectives/intended learning outcomes	**Module objective:** This module aims to equip students with a solid foundation in linear algebra and analytical geometry. It focuses on developing students' abilities to apply mathematical structures and concepts in scientific and pedagogical contexts. Upon successful completion of the module, students will: **LO1:** Understand and apply fundamental concepts and methods in linear algebra and analytical geometry (e.g., vector spaces, linear mappings, conics, and surfaces). **LO2:** Use mathematical methods to solve problems related to professional and scientific tasks. **LO3:** Perform calculations involving matrices, determinants, and systems of linear equations using classical and computational tools. **LO4:** Interpret and manipulate geometric entities in both two- and three-dimensional spaces. **LO5:** Communicate mathematical reasoning effectively and demonstrate autonomous learning and problem-solving.
Contents	**Linear Algebra Topics:** Matrices and matrix operations, properties of determinants Systems of linear equations: Gaussian elimination, Cramer's rule, matrix equations Vector spaces, basis and dimension, linear mappings Algebraic structures: groups, orders, fields Linear operators and their matrix representations Complex numbers **Analytical Geometry Topics:** Coordinates and points on a line and plane Lines, angles, distances, and basic geometric transformations Conic sections and canonical forms of second-order curves Vectors in space, spatial point and plane relations Surfaces of the second order and their classification
Exam form	Traditional (ticket)
References	**Main literature:** 11. Badaev S.A. *Syziktyk algebra men analytikalyk geometriya*, Kazakh University, 2010. 12. Bayarystanov A.O. *Zhogary matematika*, Nur-Print, 2015. 13. Kochetkov P.A. *Kratkiy kurs vysshey matematiki*, M: MGIU, 2009. 14. Askanbayeva G.B., Berkinbay R.A. *Analitical Geometriya*, A. Baitursynov Kostanay State University, 2019. 15. Sagindikov B.Zh. *Analytical Geometry*, Lantar Trade, 2022. 16. Mikhailov A.A., Sabitov I.Kh. *Linear Algebra and Analytical Geometry*, Moscow: Akademiya, 2013

Module Identification	**12.1 Interdisciplinary interaction** ANT 1303, Algebra and Number Theory

EP BA 6B01502 – Physics (IP)

Semester(s) in which the module is taught	1
Responsible teacher	Omarova B.
Learning language	Kazakh/Russian
Connection with the curriculum	Basic discipline, university component
Forms of training	Lectures, practical classes, guided self-study (GSS), self-study (SS).
Academic workload (including contact hours, independent work)	Total workload: 150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical classes) Self-study, including exam preparation, in hours: 25 hours of guided self-study (GSS), 80 hours of self-study (SS)
ECTS	5
Mandatory and recommended prerequisites for studying the module	Mastering this module requires the knowledge, skills, and abilities acquired through the study of the following courses: Fundamentals of Algebra and Mathematical Analysis 1.
Module objectives/expected learning outcomes	The aim of the course is to provide foundational knowledge in number theory and polynomial theory, including divisibility, the Euclidean algorithm, prime numbers, modular comparisons, properties and factorization of polynomials, as well as the study of algebraic and transcendental numbers. **LO- 3, 4, 5:** A. Identify and describe fundamental algebraic structures, key concepts of polynomials, the Euclidean algorithm, irreducible polynomials, rational fractions, and their decomposition into partial fractions. B. Apply concepts such as the greatest common divisor (GCD), least common multiple (LCM), the Euclidean algorithm, irreducible polynomials, the fundamental theorem of algebra, and methods of decomposing rational fractions. Solve systems of linear equations. C. Analyze mathematical problems based on studied topics and select appropriate methods for their solution. D. Construct and justify mathematical arguments in a logically coherent and clear form, both orally and in writing. E. Evaluate personal learning needs and organize independent study of new areas in fundamental sciences.
Contents	The course is aimed at preparing students in the field of number theory and algebra, covering the following key topics: divisibility and the Euclidean algorithm, greatest common divisor (GCD) and least common multiple (LCM), prime numbers, modular comparisons and their applications, as well as the fundamental concepts of polynomial theory. Students will study irreducible polynomials, their factorization, Vieta's formulas, and solve problems related to polynomials of the third and fourth degrees, including rational and integer roots. The course will also address polynomials with multiple variables, symmetric polynomials, and their results. The course concludes with the study of algebraic and transcendental numbers and their properties.
Exam form	Traditional
Requirements for the course	Mandatory attendance at both online and in-person classes is required. Students must actively participate in discussions during lectures and practical sessions, as well as prepare in advance for lectures and practical sessions. Students are expected to complete self-study assignments (SRO) qualitatively and on time and participate in all forms of assessment, including tests, assignments, and other forms of performance evaluation.
References	1. Bukhshtab A. A. Theory of numbers. – 4th ed., ster. – St. Petersburg: Publishing house "Lan", 2015. – 384 p.

	2. Smolin Yu. N. Algebra and number theory. 4th ed., ster. - M.: FLINT, Nauka, 2012. - 464 p. 3. Avdoshin S.M., Nabebin A.A. Discrete mathematics. Modular algebra, cryptography, coding. Moscow: DMK Press, 2017. 352 p. 4. Deza E.I., Kotova L. V. Collection of problems in number theory. Moscow: LIBROCOM Book House, 2012. 224 p. 5. Sitnikov V.M. Theory of numbers. Chelyabinsk: Publishing House of the Chelyabinsk State Pedagogical University. University, 2014. – 116 p. 6. Veretennikov B. M., Mikhaleva M. M. Algebra and number theory. Part 1. Yekaterinburg: Ural Publishing House. University, 2014. – Part 1. – 52 p. 7. Cheremisina M. I. Selected issues of algebra and number theory. Orenburg: OGPU Publishing House, 2016. 28 p. 8. Gushchina O. A., Neeshpapa T.A. Comparisons in the ring of integers. Yuzhno-Sazalinsk: Sakhgu Publishing House, 2012– 96 p . 9. Vorobyov N. N., Vorobyov S. N., Naumik M.I. Algebra: theory of polynomials and elements of field theory.Vitebsk: Masherov Moscow State University, 2018.87 p. 10. Luzgarev A. Algebra and number theory. Lecture notes, 2016 [Electronic resource http://mahalex.net/151-153/algebra.pdf]. 11. Ermolaeva N.N., Kozynchenko V.A., Kurbatva G.I. Practical studies in algebra. Elements of set theory, number theory, and combinatorics. Algebraic structures. St. Petersburg: Lan Publishing House, 2014. 112 p. 12. Myrzabekov S. A., Omarova B. Zh., Mukash M. A. A workshop on solving problems in number theory. Aktobe, 2014. - 100 p.

Module Identification	MT 2314 Mathematical analysis
Semester(s) in which the module is taught	2
Responsible teacher	Mynbaeva S.T., PhD, Associate Professor
Language of learning	Kazakh
Connection to the curriculum	University component in the cycle of basic disciplines
Forms of education	Lectures, practical exercises, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total workload: 150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	Algebra and geometry
Module objectives/expected learning outcomes	Familiarization of students with the basic concepts and basic mathematical methods of mathematical analysis, which are encountered in the study of special disciplines in the educational process, arising from scientific research and mastering areas that require independent study. 1. To be aware of the basic definitions, theorems, rules and mathematical methods of the subject of mathematical analysis. 2. To be able to apply methods of basic problems of the discipline of mathematical analysis. 3. To study mathematical analysis problems. Comparison of the obtained results of solving mathematical analysis problems. 4. To be able to correctly choose the apparatus and method in the study of simple problems of Mathematical Analysis;

	use mathematical knowledge and skills in solving professional problems. 5. To be able to evaluate the results of solving mathematical analysis problems, express mathematical knowledge orally.
Contents	sets, operations on sets, circuit, function, function with one variable, limit of chain, limit of function, properties of limits, infinitesimal quantities, infinitesimal quantities, their properties and relationship, perfect limits, continuity, differentiation of a function with one variable, rules of differentiation, table of derivatives, geometric and mechanical meaning of the derivative, basic theorems of differentiation, Lopital's rule, Taylor's formula, study of a function using a derivative, graph construction, integral calculations of a function with one variable, indefinite integral and the first function, definitions, properties, table of integrals, basic methods of integration: direct, variable substitution method, fractional integration, integration of simple fractional-rational, trigonometric, irrational expressions, defined integral, definition, calculation methods, properties, applications, non-proprietary integrals, definitions, types, calculation methods.
Exam form	Blank test
Training and examination requirements	The final assessment takes place in the exam format. The exam is conducted in accordance with the academic integrity policy of the University and in accordance with the rules for conducting the exam. If plagiarism or copying is detected, the exam results are automatically canceled, and this subject is re-taught in the summer semester. The format of the exam is blank testing. The test questions are based on the taxonomy of B. Bloom. To prepare for the exam, you will be given questions on the course in advance.
References	**Basic literature** 1. Karataev Zh. mathematical analysis-1. textbook. Almaty: Technoerudit, 2018 – - 344 p. 2. Otarov H. T. mathematical analysis: textbook. - Almaty: Economics, 2012 – - 536 p. 3. Aubakir S. B. higher mathematics: textbook. Part 1. Almaty: epigraph, 2016. - 340 P. 4. Aubakir S. B. higher mathematics: textbook. Part 2. Almaty: epigraph, 2016. - 280 p. 4. Akhmetova A.U. Mathematical analysis. Training manual. Almaty: Evero Publ., 2020. 132 p. 5. Bayarystanov A. O. higher mathematics: textbook. Part 1. Almaty: Nur-print, 2015 – - 232 p. 6. Bayarystanov A. O. higher mathematics: textbook. Part 2. Almaty: Nur-print, 2015. - 218 p. 7. Bazarbekova A. A., Bazarbekov A. B. higher mathematics: a collection of problems. Almaty; CyberSmith, 2017. - 120 p. 8. Berikkhanova G. E. calculation workshop of Mathematical Analysis: Part 1. Training manual. Almaty: epigraph, 2016. - 216 p. 9. Zhautikov O. A. course of mathematical analysis: textbook. Almaty: Economics, 2014 – - 832 p. 10. Zholimbayev O. M., Berikkhanova G. E. Mathematics. Training manual. - Almaty: CyberSmith, 2019 – - 368 p. 11. Ibrashev H. I., Yerkegulov sh. t.course of mathematical analysis: textbook. 1 T. Almaty: Economics, 2014 – - 600 p.

12. Ibrashev H. I., Yerkegulov Sh. T. course of mathematical analysis: textbook. 2 Vol. Almaty: Economics, 2014. – 562 p.
13. Kenzhebaev K. K. course of mathematical analysis collection of problems: textbook. Aktobe: IP S. T. Zhanadilov, 2014. - 388 p.
14. Kasimov E. A., Kasimov K. A. higher mathematics course (mathematical analysis): textbook. Part 2. Almaty: Economics, 2014 – - 386 p.
15. Rakhimzhanova S.K. Educational and methodological complex of the discipline Mathematical analysis 1. Almaty: Evero, 2018. 184 p.
16. Hughes-Hallett, Gleason, McCallum and others. Mathematical analysis. Functions of one variable. 1 T. Almaty: Association of Universities of the Republic of Kazakhstan, 2017. - 563 p.

Additional literature

1. Bazarbayeva G. S. higher mathematics: a textbook. Almaty: Evero, 2014. - 201 p.
2. Balmagambetova R. E. mathematical analysis-1: glossary. Aktobe: K. Zhubanov. Apu, 2014. - 29 p.
3. Ilyin V. A. Vysshaya mathematics: Учебник. M.: prospect, 2014 – - 608 p.
4. Croft E., Davison R. fundamentals of Mathematics. The textbook. Part 1. Almaty, 2013 – - 392 p.
5. Croft E., Davison R. fundamentals of Mathematics. The textbook. Part 2. Almaty, 2014 – - 324 p.
6. Makhmedzhanov N. collection of tasks in higher mathematics: manual. Almaty: Kazakh University, 2014. - 122 p.
7. Makhmedzhanov N. M. collection of problems of higher mathematics: textbook. Almaty: era, 2008. - 392 p.
8. Tokbergenov Zh. B. higher mathematics: textbook. Almaty: Otan, 2015 – - 376 p.
9. Khanzharova B. S., Sydykov A. A., Iskakova A. K., etc. methodology for solving standard problems in Mathematics-2: textbook. Almaty: Otan, 2016 – - 141 p.

Electronic sources:

27. Electronic Library of K. Zhubanov AOU - neb.arsu.kz
28. "Epigraph" database - elib.kz
29. "Epigraph" multimedia textbook - mbook.kz
30. «Smart Kitap» - web.smart-kitap.kz
31. "RZHOAEC" information system – rmebrk.kz
32. Republican scientific and technical library – aktobe.rntb.kz
33. https://math.ru
34. http://kazneb.kz – National Academic Library of the Republic of Kazakhstan
35. http://library.arsu.kz – Scientific Library of K. Zhubanov AOU

Module Identification	**General modules** DMML 1304 Discrete mathematics and mathematical logic
Semester(s) in which the module is taught	2
Responsible teacher	Nugaeva Z.T.

EP BA 6B01502 – Physics (IP)

Language of learning	Kazakh/ Russian
Connection to the curriculum	Core discipline, university component
Forms of education	Lectures, practical exercises, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total working load:150 hours Contact hours: 45 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 hours SIWT, 60 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, you need the knowledge, skills and abilities acquired during the study of the following courses.Discrete mathematics and mathematical logic is a cycle of mathematical sciences that study the properties of finite sets. Course is designed to familiarize students with the basic concepts of the branches of mathematics traditionally combined within the framework of the Discrete Mathematics cycle: propositional algebra, discrete analysis, set theory, combinatorics, graph theory.
Module objectives/expected learning outcomes	Purpose of the course is the professional and methodological preparation of a future mathematics teacher to teach elements of probability theory and mathematical statistics at school. LO- 3, 4, 5: A. As a result of studying the discipline "Discrete Mathematics and Mathematical Logic", students should know the basic definitions and concepts of the studied sections of discrete mathematics. B. To be able to formulate and prove the main results of these sections. In the course of practical classes, students should acquire the skills to solve typical tasks based on the studied theoretical material. C. To acquire skills in using sets, functions, elements of combinatorics, graph theory, and algebraic structures; skills in solving typical course problems. D. To be able to logically correctly, argumentatively and clearly build oral and written speech. E. To have the ability to independently study new sections of fundamental sciences, be ready to work independently.
Contents	Course is aimed at preparing students for their future professional activities - teaching mathematics in schools of various profiles. Mastering the discipline is also the basis for successful teaching practice. Ability to solve problems is one of the most important components of a future teacher's mathematical training. This skill is developed only if, throughout the entire period of study at the university, the student solves problems of varying difficulty and different content, and also considers various ways to solve them. In the classes on the methodology of teaching mathematics, methodological issues related to solving mathematical problems are considered, and in the classes of this course, methodological skills for solving them are developed..
Exam form	Blank test
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely completion of tasks, participation in all types of control.
References	Basic literature 1. Baizhumanov A. A., Ibragimov O. A. Discrete Mathematics and mathematical logic, Almaty, 2021.

	2. Bimendina A.U. Discrete Mathematics and mathematical logic, Almaty, 2019. 3. Paliy, I. A. Discrete mathematics and mathematical logic : a textbook for universities / I. A. Paliy. — 3rd ed., ispr. and add. Moscow : Yurait Publishing House, 2020. 4. Levin O. Discrete Mathematics: An Open Introduction, 3rd Edition 2021. 5. Johnsonbaugh R. Discrete Mathematics, 8th Edition 2018. 6. Bavrin, I. I. Discrete mathematics. Textbook and task book: for universities — Moscow : Yurayt Publishing House, 2024. **Additional literature** 1. Gashkov, S. B. Discrete mathematics. Textbook for universities : textbook for universities / S. B. Gashkov. — Saint Petersburg : Lan, 2022. — 456 URL: https://e.lanbook.com/book/193306 2. Yablonsky S.V. Introduction to discrete mathematics : A textbook, 2018. 3. Gusmanova F. R., Berkimbayeva S. B., Turganbaeva A. R., elements of Discrete Mathematics: a manual / - Nur-Sultan: financial Academy, 2021 . – 127 p. 4. Novikov, F.A.Discrete Mathematics for Programmers : A Textbook, 2019 Russian Library of Economics 5. Yavorsky, V.V., Oleinikova, A.V.Discrete mathematics and mathematical logic : A training program, 2018. 6. Igoshin V.I. Mathematical logic and theory of algorithms. Moscow: Akademiya Publishing House, 2008.

Module Identification	**BP ZhK PPO 2220 Pedagogical and psychological assessment (2nd year, pedagogical practice)**
Semester(s) in which the module is taught	4
Responsible teacher	Tuyakova U.Zh.
Language of learning	Kazakh
Connection to the curriculum	University component
Forms of education	in isolation from theoretical studies (for full-time, full-time on the basis of an applied bachelor's degree); at least 6 hours of presence on the basis of practice daily during the academic week.
Teaching load (including contact hours, SIW)	Total workload: 60 hours of which: 30 hours SIWT, 30 hours SIW
ECTS	2
Mandatory and recommended prerequisites for studying the module	To successfully master the course, it is necessary to become familiar with the disciplines preceding the study of this course, such as "Pedagogical studies" and others.
Module objectives/expected learning outcomes	Purpose of this course (pedagogical practice) is to familiarize future teachers with the features of the holistic pedagogical process of an educational institution and the formation of analytical, reflective, research, design and other skills in the field of psychological and pedagogical support of the educational process. **Training results:** A. To understand the psychological and pedagogical foundations of learning strategies (critical thinking, functional literacy, collaborative learning, self-education, self-improvement, criterion-based learning); C. To apply methods of psychological and pedagogical diagnostics to assess the group of students and understand how the psychological support services of the educational organization function; D. establish an effective dialogue to strengthen the positive and responsible behavior of students in the learning process; E. cooperate with all stakeholders in the educational process; To analyze and develop the holistic pedagogical process in its various

	forms (lesson, seminar, round table, debate, etc.), to conduct various forms of extracurricular activities on the subject.
Contents	This course is aimed at developing the following areas of pedagogical competence: Competencies in the field of pedagogy and didactics, an area of competence for interaction, an area of competence for the working environment of teachers, an area of competence for professional development.
Exam form	Following the results of the internship, the student interns fill out: - Pedagogical diary – a detailed daily meaningful analysis of practice, with a description of each algorithm of the holistic pedagogical process for daily observation and diagnosis (reflexive report). - Electronic portfolio (digital content on a single educational platform (video tutorials; photo reports; development of innovative lessons; a set of didactic and methodological materials, etc.) - Characteristics of the student prepared by the head of the practice base (teacher-mentor, mentor). - Reflective report
Training and examination requirements	Compulsory attendance of classes, active participation in the discussion of issues, preliminary preparation, high-quality and timely completion of tasks, participation in all types of control.
References	**Basic literature** 1. The State Mandatory Standard of Higher Education (as amended by the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated January 19, 2023 No. 21); 2. Methodological recommendations on the organization and conduct of pedagogical practice for students in the field of education "Pedagogical Sciences" (Appendix to the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated March 27, 2023 No. 125); 3. Professional standard "Teacher" (Approved by the Order of the Acting Minister of Education of the Republic of Kazakhstan dated December 15, 2022 No. 500); 4. Rules for the organization of the educational process on credit technology of education in organizations of higher and (or) postgraduate education (as amended by the Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated 07/25/2023 № 334); 5. List of documents required for teachers of preschool education and training organizations, secondary, special, additional, technical and vocational, post-secondary education, and their forms (as amended by the Order of the Minister of Education of the Republic of Kazakhstan dated 08/07/2023 No. 248) **Additional literature:** 1. The State mandatory standard of preschool education and training (as amended by the Order of the Minister of Education of the Republic of Kazakhstan dated 04.10.2023 No. 303); 2. The State mandatory standard of primary education (as amended by the Order of the Minister of Education of the Republic of Kazakhstan dated 04.10.2023 No. 303); 3. The State mandatory standard of basic secondary education (as amended by the Order of the Minister of Education of the Republic of Kazakhstan dated 04.10.2023 No. 303); 4. The State mandatory standard of general secondary education (as amended by the Order of the Minister of Education of the Republic of Kazakhstan dated 04.10.2023 No. 303); 5. Standard curricula of preschool education and training in the Republic of Kazakhstan 6. (Order of the Minister of Education and Science of the Republic of Kazakhstan dated December 20, 2012 No. 557); 7. Standard curricula for primary, basic secondary, and general secondary education of the Republic of Kazakhstan (Order No. 412 of the Minister of Education of the Republic of Kazakhstan dated September 30, 2022);

	8. Standard curricula for general education subjects and elective courses at the levels of primary, basic secondary and general secondary education (Order of the Minister of Education of the Republic of Kazakhstan dated September 16, 2022 No. 399); 9. Standard curricula for preschool education and training (+ for Children with special educational needs: Appendices 2-7; as amended by the Order of the Minister of Education of the Republic of Kazakhstan dated 10/14/2022 No. 422); 10. Instructional and methodological letter "On the specifics of the educational process in secondary education organizations of the Republic of Kazakhstan" (for the current academic year); 11. Instructional and methodological letter on the organization of the educational process in preschool organizations and pre-school classes of the Republic of Kazakhstan (for the current academic year).

EP	6B01512 – Physics IP
Module name	Methods of teaching physics: private issues
Semester	5 semester
Module Responsible	Serikbayeva Gulbanu Duisenkyzy
Work language	Kazakh languages
Correlation with the curriculum	Required component
Teaching methods	TBL, elements of STEAM-learning, CLIL technology
Study load / Labor intensity	Lectures – 15 hours, practical classes – 30 hours, IWST – 25 hours, IWS – 80 hours (lecture, lesson, labworks, project, seminar etc.) / 150 hours
Credits/credits	5
Conditions for admission to study within the module	**Prerequisites:** Pedagogical science and major theories of learning, Methods and technologies of teaching physics, Mechanics, Molecular physics, Electricity and magnetism, Optics
Module objectives/intended learning outcomes	**Module objectives:** Provide information about the main objectives of physics teaching methodology. show the tasks and topical issues of physics teaching methodology at the present stage of the School's development.. **learning outcomes:** - to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering the physical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of physics; - 10 conduct integrated lessons with STEAM-learning elements, use CLIL technologies for subject-language teaching of natural subjects; - 12 understand the scientific principles and logic of developing a school physics course, apply various learning technologies in their diversity and to the place.
Content	During the course, future teachers learn to combine knowledge about the content of physics in the secondary school curriculum and knowledge about the forms, methods and technologies of teaching to develop physics lessons, teaching methods and evaluation, to conduct scientific and methodological analysis of topics and sections of the school physics course.
Exam forms	Oral (ticket)
Training and exam requirements	- obtaining quality knowledge; - fulfill the requirements of the teacher, as specified in the syllabus; - independently complete all types of work (SRSP assignments, term papers, graduation theses, etc.) and submit them to the teacher on time; - use reliable and trustworthy sources of information; - do not submit your work to be cheated by other students. - The examination will be administered in accordance with the University's academic integrity policy and examination regulations.

	- If plagiarism or copying is detected, the exam results will be automatically invalidated and the course will be retaken in the summer semester.
Literature	Primary Literature: Methods of teaching physics at secondary school: textbook. Part 1. Theoretical foundations / K. T. Namazbaev. - Almaty: Otan, 2016. - 245 c. - ISBN 978-601-216-148-9 (ed.). 2. Methods of teaching physics at secondary school: textbook. Part 2. Individual topics and chapters / K. T. Namazbaeva. - Almaty: Otan, 2016. - 334 c. - ISBN 978-601-7860-58-5 (ed.). 3. Physics: methodological manual / D.M. Kazakhbaeva, Sh.A. B. Nasokhova, J.J. Abzhalelova. - Almaty: Shkola, 2019. - 224 c. - ISBN 978-601-07-1247-8 4. Methods of teaching physics in higher education institutions: textbook / J. A. Abekova, A. B. Oralbaeva. - Almaty: New Book, 2021. - 220 c. - ISBN 978-601-352-500-6 (ed.) 5. Actual problems of methodology of teaching physics: textbook / S. K. Serkebaev. - Almaty: CyberSmith, 2021. - 252 c. - ISBN 978-9965-876-30-1 (ed.). 6. Methods of teaching physics at secondary school: textbook / M. Kudaykulov, K. Zhanabergenov. - Almaty: Rauan, 1998. - 310 c. - ISBN 5-625-03880-5 Additional literature: 1. Methods of teaching physics at secondary school: Theoretical foundations : textbook / A. I. Bugaev. - Moscow : Prosveshchenie, 1981. - 288 c. 2. Fundamentals of Teaching Physics at Secondary School, 1984, V.G. Razumovsky, A.I. Bugaev, Y.I. Dik, et al. 3. Business games at the lessons on the methodology of teaching physics: methodical development, 1988. Topical issues of methodology of teaching physics at the institute and school: Thematic collection, 1981, ed. by G. I. Bokov

Module Identification	(12.1) Module - Interdisciplinary integration Subject: Innovation and research in education
Semester(s) in which the module is taught	8
Teacher in charge	Kudaibergenova Kuralay Baytemirkyzy
Language of instruction	Kazakh/Russian
Relationship to the curriculum	BD
Forms of training	Practical classes
Teaching load (including contact hours, SIW)	Teaching load Total work load: 450 h Contact hours: 450 hands-on/practical classes
ECTS	15
Mandatory and recommended prerequisites for studying the module	Pedagogical studies, Methods of teaching physics: private issues
Module objectives/ intended learning outcomes	**Learning objective:** Objective: formation of research- and development-oriented thinking, the ability to develop, update and apply innovative approaches and learning technologies in the context of ongoing changes in society and the educational environment. **The intended learning outcomes are:** 1. Develop their own teaching skills through research-based approaches 2. Apply critical thinking when collecting and using data for software development 3. Participate in scientific research and/or develop cooperation between universities and stakeholders 4. Document your own research activities and present the results using various forms of communication

Table of Contents	For the course, the following teaching methods and planned learning activities are provided: Lectures and seminars: Conducting lectures to introduce students to educational research, the development of teacher education, and innovative practices in pedagogy. Seminars are held to discuss and deepen understanding of the studied material. Case analysis: Using real-life cases will enable students to perform in-depth analysis and provide critical evaluation when studying phenomena and real-world events. Project work: Designing and implementing a research project allows students to organize research and academic-pedagogical activities, formulate their own research ideas, and apply concepts from contemporary epistemology. Maintaining and filling out a reflective or observation journal: This fosters the development of students' reflection and self-observation skills, enhances critical thinking, and promotes the ability to analyze their own research activities. Literature analysis and use: Analyzing and utilizing international literature and scientific publications to enrich students' knowledge and provide them with access to cutting-edge practices in global education and science systems.
Form of examination	Mini project
Training and examination requirements	To acquire high-quality knowledge; To follow the instructor's requirements as outlined in the syllabus; To complete all types of work independently (assignments, course papers, final projects, etc.) and submit them on time; To use reliable and credible sources of information; Not to allow others to copy one's work.
List of references	1. Republic of Kazakhstan. (2007). On Education: Law of the Republic of Kazakhstan, with amendments as of December 27, 2019. 2. Government of the Republic of Kazakhstan. (2021). On the approval of the Concept of Lifelong Education. Resolution No. 471, July 8, 2021. 3. Government of the Republic of Kazakhstan. (2023). On the approval of the Concept for the Development of Higher Education and Science in the Republic of Kazakhstan for 2023–2029. Resolution No. 248, March 28, 2023. 4. Vinogradova, L. I. (2012). Fundamentals of scientific research [Electronic resource]: Textbook. Krasnoyarsk: Krasnoyarsk State Agrarian University. https://e.lanbook.com/book/90770 5. Fundamentals of scientific research [Electronic resource]: Workbook and methodological guide for full-time students in the field of study 110400.62 – Agronomy. Qualification – Bachelor's degree. (2014). Orel: Orel State Agrarian University. http://e.lanbook.com/books/element.php?pl1_id=71272 6. Filippova, A. V. (2012). Fundamentals of scientific research [Electronic resource]. Kemerovo: Kemerovo State University. https://e.lanbook.com/books/element.php?pl1_cid=25&pl1_id=30180 7. Turgynbayeva, A. N. (2008). Innovations and risks: A textbook. Almaty: Kazakh University.

EP	6B01512 – Physics IP
Module name	Methods and technologies of teaching physics
Semester	4 semester

EP BA 6B01502 – Physics (IP)

Module Responsible	Serikbayeva Gulbanu Duisenkyzy
Work language	Kazakh languages
Correlation with the curriculum	Elective component
Teaching methods	TBL
Study load / Labor intensity	Lectures – 15 hours, practical classes – 30 hours, IWST – 25 hours, IWS – 80 hours (lecture, lesson, labworks, project, seminar etc.) / 150 hours
Credits/credits	5
Conditions for admission to study within the module	**Prerequisites:** Pedagogical science and major theories of learning, Mechanics, Molecular physics, Electricity and magnetism
Module objectives/intended learning outcomes	**Module objectives:** to increase competencies in the field of pedagogy and didactics. **learning outcomes:** - critically select theoretical knowledge based on advanced concepts of physics with the help of various information and communication technologies and use the knowledge to improve physics education and their own professional growth; - to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering the physical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of physics; - work in interdisciplinary teams, have the skills to apply scientific knowledge in solving social problems;
Content	Students have a holistic understanding of the methodological system of education, can model strategies and technologies for solving specific pedagogical problems, planning, guidance, teaching and evaluation, are able to use knowledge, forms, methods and technologies of teaching in accordance with the conditions of a particular school and the capabilities of students. Students can: • choose pedagogical models suitable for their training • apply teaching methods creatively and in a variety of ways, taking into account the opportunities offered by technology • use a suitable learning environment in your teaching • know and apply the rules and principles of copyright and data protection
Exam forms	Oral (ticket)
Training and exam requirements	- obtaining quality knowledge; - fulfill the requirements of the teacher, as specified in the syllabus; - independently complete all types of work (SRSP assignments, term papers, graduation theses, etc.) and submit them to the teacher on time; - use reliable and trustworthy sources of information; - do not submit your work to be cheated by other students. - The examination will be administered in accordance with the University's academic integrity policy and examination regulations. - If plagiarism or copying is detected, the exam results will be automatically invalidated and the course will be retaken in the summer semester.
Literature	Primary Literature: 1. T.S. Slambekova. Pedagogy. Book 3. Theory of learning. Almaty, 2020. 2. Nametkulova S.Zh. Practicum on the course of pedagogy. Almaty, Evero, 2018 3. Baidibekova A.O. Methodology of teaching with the use of interactive whiteboard. Training and methodological manual. Almaty: Evero, 2018 4. Zhanatbekova N.J., Boribekova F. Innovative technologies in the education system. Educational tool. Almaty, 2019

	5. Baydibekova A.O. Methodology of teaching with the use of interactive whiteboard. Training and methodological manual. Almaty: Evero, 2018 Additional literature: 1. Methods of teaching physics at secondary school: Theoretical foundations : textbook / A. I. Bugaev. - Moscow : Prosveshchenie, 1981. - 288 c. 2. Fundamentals of Teaching Physics at Secondary School, 1984, V.G. Razumovsky, A.I. Bugaev, Y.I. Dik, et al. 3. Business games at the lessons on the methodology of teaching physics: methodical development, 1988. 4. Topical issues of methodology of teaching physics at the institute and school: Thematic collection, 1981, ed. by G. I. Bokov

EP	6B01512 - Physics (IP)
Module name	Physical practice 1
Semester	6 semester
Module Responsible	Sharipov Samat, Master of Physics, senior Lecturer
Work language	Kazakh
Correlation with the curriculum	Elective
Teaching methods	PBL, teamwork, flipped classroom, etc.
Study load / Labor intensity	Practical classes – 40 hours, IWST – 20 hours, IWS – 60 hours (lecture, lesson, labworks, project, seminar etc.) / 120 hours
Credits/credits	4
Conditions for admission to study within the module	Prerequisites: Mechanics, Molecular Physics, Electricity and magnetism, Optics, Physics of the atom and atomic nucleus
Module objectives/intended learning outcomes	**Module objective:** The discipline is aimed at the formation and constant control of the knowledge, skills and abilities of future teachers in the school physics course, which provides kinematics, dynamics, statics; mastering various methods of solving problems (analytical, graphical, experimental, etc.). **Learning outcomes:** 1. to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering the physical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of physics; 2. conduct integrated lessons with STEAM-learning elements, use CLIL technologies for subject-language teaching of natural subjects; 3. understand the scientific principles and logic of developing a school physics course, apply various learning technologies in their diversity and to the place.
Content	To master this discipline, the student uses knowledge, skills, and abilities formed as a result of mastering disciplines such as mechanics, molecular physics, electricity and magnetism, optics, atomic and nuclear physics, etc. In the course of studying the discipline, the knowledge gained during the development of these courses is generalized, the interrelation and mutual influence of various disciplines is shown, and the professional orientation of the educational process is realized.
Exam forms	Orally
Training and exam requirements	Students who have mastered the course material and scored at least 50% of the total rating based on the results of the 1st and 2nd midterm tests are allowed to take the final exam
Literature	**Main literature:**

	1. A short course in physics with examples of problem solving: a textbook, 2010, T.I. Trofimova. 2. Collection of physics course problems with solutions: A textbook. 2007. Trofimova, T.I. https://rmebrk.kz/book/86928 3. Methods of solving problems in physics, 1972, Kobushkin V.K. https://neb.arsu.kz/kk/view?rid=3839&fid=3813 4. Solving problems in physics. Part 1. 1993, N. Parfentieva, M. V. Fomina 5. Collection of problems in physics. Molecular physics. Thermodynamics. Electrostatics. Direct current. Magnetic field, 1999, Rusakov A.V. Sukhov V.G. http://neb.arsu.kz/kk/view?rid=3859&fid=3835 6. Methodological recommendations: seminars on the theory and methodology of teaching physics, 2010, I.F. Spivak-Lavrov et al. 7. Collection of problems in the general physics course. Volkenstein V.S. Moscow, 1985. 8. Collection of problems in the course of general physics. Edited by M.S.Tsedrik, Moscow, 1989. 9. Collection of problems in elementary physics. Bukhovtsev, Myakishev et al., 1974. 10. Collection of problems in physics. Molecular physics. Thermodynamics. Electrostatics. Direct current. The magnetic field. Rusakov A.V. Sukhov V.G.Sergiev 1999

Module Identification	**13.1. Theory and technologies of teaching physics. Workshop on solving physical problems 1**
Semester(s) in which the module is taught	6
Teacher in charge	Amantayeva Amangul Shalkarbaykyzy
Language of instruction	Kazakh/Russian
Relationship to the curriculum	Basic discipline, elective component
Forms of training	practical classes, IWST, SIW.
Teaching load (including contact hours, SIW)	Teaching load (including contact hours, SIW) Total work load: 120 h Contact hours: 40 h (40 h practical classes) Independent study, including preparation for exams, in hours: 20 h IWST, 60 h SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	Mechanics, Molecular Physics, Mechanics Workshop, Molecular Physics Workshop, Mathematical Analysis
Module objectives/ intended learning outcomes	**Learning objective:** formation of students' practical skills of solving physical problems, development of analytical thinking and ability to apply theoretical knowledge to specific situations. **The intended learning outcomes are:** 1. Defines the structure of a physical problem (definition of simple conditions, object and requirements of the problem); 2. Distinguishes the classification features underlying the typical structure of the problem, understands the peculiarities of solving problems of different types; 3. Solves problems and test tasks in different sections of the physics course; 4. Uses methods of solving problems in a specific situation and the method of building a physical model of the situation described in the problem; **5.** Controls activities and actions in solving educational-physical problems (control over preparation of a plan for solving the problem and verification of the obtained result and its analysis)

Table of Contents	During the course, future teachers develop their competencies of forming the skill of solving physical problems, common approaches to solving any physical problem.
Form of examination	Written examination
Training and examination requirements	The final assessment is in the format of an examination. The exam is administered in accordance with the University's Academic Honesty Policy and Examination Regulations. If plagiarism or copying is detected, the exam results are automatically removed and the course is retaught in the summer term. The format of the examination is written (Control Paper). Control questions are formed on the basis of B. Bloom's taxonomy. Bloom's Taxonomy. You will be given pre-course questions to prepare for the exam.
List of references	1. Trofimova, T. I. Short course of physics with examples of problem solving : textbook / T. I. Trofimova. - MOSCOW: KNORUS, 2010. - 280 c. - ISBN 978-5-406-00312-1 2. T.I. Trofimova. Collection of problems on the course of physics with solutions: Textbook. 2007 Trofimova, T.I. https://rmebrk.kz/book/86928 3. A. V. Kortnev, Y. V. Rublev, A. N. Kutsenko. Practicum on physics : textbook - M. : Higher School, 1965. - 568 c. 4. B.P. Odiyak, R.J. Nametkulova, A.K. Kadirimbetova. Course of general physics in tasks and exercises : textbook. Part 1. Fundamentals of classical mechanics, molecular physics and thermodynamics - Almaty : Evero, 2018. - 252 c. - ISBN 978-601-327-234-4 (in per.) 5. Firgang E. V. Guide to solving problems in the course of general physics : textbook - Moscow : Vysshaya Shkola, 1977. - 349 c.

EP	6B01502 - Physics IP
Module name	**Techniques of Educational Physical Experiment**
Semester	6 semester
Module Responsible	Akhmetova Marzhan , Master of Science
Work language	Russian, Kazakh languages
Correlation with the curriculum	This module is an essential part of the teacher training program in Physics and is aligned with national curriculum standards for pedagogical education. It directly supports the development of future teachers' methodological and experimental competencies, as well as their ability to design and conduct effective physics lessons incorporating experiments.
Teaching methods	● Interactive lectures ● Practical workshops and discussions ● Digital simulations ● Group-based project work ● Peer assessment and presentations ● Consultations and reflective journals
Study load / Labor intensity	Lectures: 15 hours; Practicals: 15 hours; Independent study: 90 hours; Consultations and project work: 30 hours
Credits/credits	3
Conditions for admission to study within the module	Completion of General Physics, Pedagogy of Physics, and School Physics Curriculum courses.
Module objectives/intended learning outcomes	**Module objective:** To equip students with knowledge of physical experimental techniques suitable for secondary school education. To develop skills in designing, adapting, and analyzing school-level demonstration and laboratory experiments. To promote the use of digital tools (PhET, Tracker, Arduino) and inclusive pedagogical strategies in physics education.
Content	1. Observation Methods in Physics 2. Safety and Inclusion in School Laboratories 3. School Physics Equipment and Low-Cost Alternatives 4. Demonstration Experiments and Predict–Observe–Explain Models 5. Simulations and Hybrid Learning Tools (PhET, Algodoo, GeoGebra) 6. Error Analysis and Graphical Data Interpretation 7. Inquiry-Based Learning through Student Experiments 8. Project Presentation and Peer Evaluation 9. STEM Integration and Interdisciplinary Projects 10. Motion Analysis with Tracker Software 11. Arduino Applications in School Physics 12. Formative Assessment through Experimental Activities 13. Designing Inclusive Experiments 14. Reflective Teaching Practices and Methodological Justification 15. Final Methodological Discussion on Experimentation
Exam forms	Project
Training and exam requirements	Module assessment (6 modules x 100 points) Final exam: 50 questions, 2 points each Final grade: 60% module average + 40% final exam Minimum requirement for admission to final exam: 50 points average
Literature	**Main literature:** 1. Kudaikulov M., Zhanabergenov K. – Methodology of Teaching Physics in High School (Rauan, 1998) 2. Shevchuk E.P. et al. – Modeling of Physical Processes: Laboratory Practicum (TechSmith, 2020) 3. Namazbaev K.T. – Methodology of Teaching Physics in High School. Parts 1 and 2 (Otan, 2016) 4. Kosinov A.A. – Methods of Physical Experiments (Yurayt, 2018) **Additional literature**

	1. Khoroshavin S.A. Methodology of demonstration experiment in physics. Moscow "Enlightenment", 2007. 2. Basharuly R. Physics. 7th grade. Almaty: Atamura, 2017. 3. Basharuly R., Shuyinshina Sh., Seifollina K. Physics. 8th grade. Almaty: Atamura, 2018. 4. Basharuly R., Shuyinshina Sh., Seifollina K. Physics. 9th grade. Almaty: Atamura, 2019. 5. Krongart B.A., Kazakhbaeva D.M., Imambekov O., Kystaubaev T. Physics: a textbook for the 10th grade of a general education school in the field of science and mathematics. 1.2 - section. Almaty: School, 2019. **Electronic resources:** 1. http://www.physic.kz/?p=2485 2.http://zhangozy.wordpress.com/2010/01/29 3. "www physicslab.co.uk" 4. http://physics.nad.ru/physics.htm

EP	6B01512 – Physics IP
Module name	Planning of teaching and individualization of teaching physics
Semester	6 semester
Module Responsible	Serikbayeva Gulbanu Duisenkyzy
Work language	Kazakh languages
Correlation with the curriculum	Elective component
Teaching methods	TBL
Study load / Labor intensity	Lectures – 15 hours, practical classes – 30 hours, IWST – 25 hours, IWS – 80 hours (lecture, lesson, labworks, project, seminar etc.) / 150 hours
Credits/credits	4
Conditions for admission to study within the module	**Prerequisites:** Pedagogical science and major theories of learning, Methods and technologies of teaching physics, Mechanics, Molecular physics, Electricity and magnetism, Optics, Methods of teaching physics: private issues
Module objectives/intended learning outcomes	**Module objectives:** formation of skills of individualization of teaching, taking into account the diversity of students and the use of teaching technologies, based on pedagogical and independent research. **learning outcomes:** - critically select theoretical knowledge based on advanced concepts of physics with the help of various information and communication technologies and use the knowledge to improve physics education and their own professional growth; - to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering the physical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of physics; - work in interdisciplinary teams, have the skills to apply scientific knowledge in solving social problems;
Content	Students can: • understand the requirements of competence, entrepreneurship and sustainable development in their pedagogical and subject area when planning and conducting training; • plan and predict other conditions that affect learning; • apply the principles of individual learning and guidance in practice, take into account the needs of their students, support the development of their personality and self-esteem.
Exam forms	Oral (ticket)
Training and exam requirements	- obtaining quality knowledge; - fulfill the requirements of the teacher, as specified in the syllabus;

	- independently complete all types of work (SRSP assignments, term papers, graduation theses, etc.) and submit them to the teacher on time; - use reliable and trustworthy sources of information; - do not submit your work to be cheated by other students. - The examination will be administered in accordance with the University's academic integrity policy and examination regulations. - If plagiarism or copying is detected, the exam results will be automatically invalidated and the course will be retaken in the summer semester.
Literature	Primary Literature: 1. Methods of teaching physics at secondary school: textbook. Part 1. Theoretical foundations / K. T. Namazbaev. - Almaty: Otan, 2016. - 245 c. - ISBN 978-601-216-148-9 (ed.). 2. Methods of teaching physics at secondary school: textbook. Part 2. Individual topics and chapters / K. T. Namazbaeva. - Almaty: Otan, 2016. - 334 c. - ISBN 978-601-7860-58-5 (ed.). 3. Physics: methodological manual / D.M. Kazakhbaeva, Sh.A. B. Nasokhova, J.J. Abzhalelova. - Almaty: Shkola, 2019. - 224 c. - ISBN 978-601-07-1247-8 4. Methods of teaching physics in higher education institutions: textbook / J. A. Abekova, A. B. Oralbaeva. - Almaty: New Book, 2021. - 220 c. - ISBN 978-601-352-500-6 (ed.) 5. Actual problems of methodology of teaching physics: textbook / S. K. Serkebaev. - Almaty: CyberSmith, 2021. - 252 c. - ISBN 978-9965-876-30-1 (ed.). 6. Methods of teaching physics at secondary school: textbook / M. Kudaykulov, K. Zhanabergenov. - Almaty: Rauan, 1998. - 310 c. - ISBN 5-625-03880-5 Additional literature: 1. A. Karamurzin. Some problems of teaching physics at school. Almaty: Shkola, 1984 2. Methods of teaching physics at secondary school: Theoretical foundations : textbook / A. I. Bugaev. - Moscow : Prosveshchenie, 1981. - 288 c. 3. Fundamentals of Teaching Physics at Secondary School, 1984, V.G. Razumovsky, A.I. Bugaev, Y.I. Dik, et al. 4. Business games at the lessons on the methodology of teaching physics: methodical development, 1988. 5. Topical issues of methodology of teaching physics at the institute and school: Thematic collection, 1981, ed. by G. I. Bokov

EP	6B01512 - Physics (IP)
Module name	Workshop on solving physical problems 2
Semester	7 semester
Module Responsible	Sharipov Samat, Master of Physics, senior Lecturer
Work language	Kazakh
Correlation with the curriculum	Elective
Teaching methods	PBL, teamwork, flipped classroom, etc.
Study load / Labor intensity	Practical classes – 45 hours, IWST – 25 hours, IWS – 80 hours (lecture, lesson, labworks, project, seminar etc.) / 150 hours
Credits/credits	5
Conditions for admission to study within the module	Prerequisites: Mechanics, Molecular Physics, Electricity and magnetism, Optics, Physics of the atom and atomic nucleus, Physical practice 1
Module objectives/intended learning outcomes	**Module objective:** This course contributes to a deeper study of the physics course through problem solving, the formation of methodological knowledge in solving physical problems. In the process of studying the course, they master the methods of studying various natural phenomena, get acquainted with new progressive ideas and views, with the discoveries of domestic

	scientists, with the achievements of domestic science and technology, with new professions. **Learning outcomes:** 1. to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering the physical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of physics; 2. conduct integrated lessons with STEAM-learning elements, use CLIL technologies for subject-language teaching of natural subjects; 3. understand the scientific principles and logic of developing a school physics course, apply various learning technologies in their diversity and to the place.
Content	To master this discipline, the student uses knowledge, skills, and abilities formed as a result of mastering disciplines such as mechanics, molecular physics, electricity and magnetism, optics, atomic and nuclear physics, etc. In the course of studying the discipline, the knowledge gained during the development of these courses is generalized, the interrelation and mutual influence of various disciplines is shown, and the professional orientation of the educational process is realized.
Exam forms	Orally
Training and exam requirements	Students who have mastered the course material and scored at least 50% of the total rating based on the results of the 1st and 2nd midterm tests are allowed to take the final exam
Literature	**Main literature:** 1. Collection of problems in the general physics course. In 5 books. Book 1. Mechanics. Strelkov S.P., and others. Moscow 2006 2. Collection of problems in the general physics course. In Book 5, Book 2. Thermodynamics and Molecular Physics. Ginzburg V.L. and others. Moscow, 2006 3. Problems in physics and methods of their solution. Balash V.A.1993 4. Physics problems with an analysis of their solution. Savchenko N.E.1988 5. Collection of problems in physics. Molecular physics. Thermodynamics. Electrostatics. Direct current. Magnetic field, 1999, Rusakov A.V. Sukhov V.G. http://neb.arsu.kz/kk/view?rid=3859&fid=3835 6. Methodological recommendations: seminars on the theory and methodology of teaching physics, 2010, I.F. Spivak-Lavrov et al. 7. Collection of problems in the general physics course. Volkenstein V.S. Moscow, 1985. 8. Collection of problems in the course of general physics. Edited by M.S.Tsedrik, Moscow, 1989. 9. Collection of problems in elementary physics. Bukhovtsev, Myakishev et al., 1974. 10. Collection of problems in physics. Molecular physics. Thermodynamics. Electrostatics. Direct current. The magnetic field. Rusakov A.V. Sukhov V.G., Sergiev 1999

EP	6B01512 - Physics (IP)
Module name	Physical practice 2
Semester	7 semester
Module Responsible	Sharipov Samat, Master of Physics, senior Lecturer
Work language	Kazakh
Correlation with the curriculum	Elective
Teaching methods	PBL, teamwork, flipped classroom, etc.

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Study load / Labor intensity	Practical classes – 45 hours, IWST – 25 hours, IWS – 80 hours (lecture, lesson, labworks, project, seminar etc.) / 150 hours
Credits/credits	5
Conditions for admission to study within the module	Prerequisites: Mechanics, Molecular Physics, Electricity and magnetism, Optics, Physics of the atom and atomic nucleus, Physical practice 1
Module objectives/intended learning outcomes	**Module objective:** The discipline is aimed at the formation and constant monitoring of the knowledge, skills and abilities of future teachers in the school physics course, which provides for the basics of MKT, electricity and magnetism, optics; mastering various methods of solving problems (analytical, graphical, experimental, etc.) **Learning outcomes:** 1. to recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering the physical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of physics; 2. conduct integrated lessons with STEAM-learning elements, use CLIL technologies for subject-language teaching of natural subjects; 3. understand the scientific principles and logic of developing a school physics course, apply various learning technologies in their diversity and to the place.
Content	To master this discipline, the student uses knowledge, skills, and abilities formed as a result of mastering disciplines such as mechanics, molecular physics, electricity and magnetism, optics, atomic and nuclear physics, etc. In the course of studying the discipline, the knowledge gained during the development of these courses is generalized, the interrelation and mutual influence of various disciplines is shown, and the professional orientation of the educational process is realized.
Exam forms	Orally
Training and exam requirements	Students who have mastered the course material and scored at least 50% of the total rating based on the results of the 1st and 2nd midterm tests are allowed to take the final exam
Literature	**Main literature:** 1. Collection of problems in the general physics course. In 5 books. Book 1. Mechanics. Strelkov S.P., and others. Moscow 2006 2. Collection of problems in the general physics course. In Book 5, Book 2. Thermodynamics and Molecular Physics. Ginzburg V.L. and others. Moscow, 2006 3. Problems in physics and methods of their solution. Balash V.A.1993 4. Physics problems with an analysis of their solution. Savchenko N.E.1988 5. Collection of problems in physics. Molecular physics. Thermodynamics. Electrostatics. Direct current. Magnetic field, 1999, Rusakov A.V. Sukhov V.G. http://neb.arsu.kz/kk/view?rid=3859&fid=3835 6. Methodological recommendations: seminars on the theory and methodology of teaching physics, 2010, I.F. Spivak-Lavrov et al. 7. Collection of problems in the general physics course. Volkenstein V.S. Moscow, 1985. 8. Collection of problems in the course of general physics. Edited by M.S.Tsedrik, Moscow, 1989. 9. Collection of problems in elementary physics. Bukhovtsev, Myakishev et al., 1974. 10. Collection of problems in physics. Molecular physics. Thermodynamics. Electrostatics. Direct current. The magnetic field. Rusakov A.V. Sukhov V.G., Sergiev 1999

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Module Identification	Research, development and innovation in physics
Semester(s) in which the module is taught	7
Teacher in charge	Ubaev Zhiger Kartbaevich, docent
Language of instruction	Kazakh
Relationship to the curriculum	Major discipline, university component
Forms of training	Lectures, laboratory work, IWST (Instructor-guided self-study), SIW (Student independent work)
Teaching load (including contact hours, SIW)	Total workload: 120 hours - Contact hours: 40 hours - 20 hours lectures - 20 hours laboratory work - Independent work: - 20 hours IWST - 60 hours SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	Teaching methods and technologies
Module objectives / intended learning outcomes	Objective: Formation of a mindset focused on research and development, the ability to develop, update and apply innovative approaches and teaching technologies in the context of ongoing changes in society and the educational environment. Intended Learning Outcomes: 1.Possess intercultural and communicative competence, apply skills for independent continuation of further education and build professional relationships in teaching and social activities; purposefully use means and methods to ensure the preservation and strengthening of health in professional activities. 2. To collect and interpret information for the formation of knowledge, taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, and set new goals for their own pedagogical development; 3. Understand the psychological and pedagogical problems of teaching and educating students with disabilities in inclusive education, take into account the diverse abilities of students in the learning process, ethically support their psychological well-being in a life and educational context.
Table of contents	Topics covered in this module include: • Develop your own teaching skills through research-based approaches • Apply critical thinking when collecting and using data for software development • participate in scientific research and/or develop cooperation between universities and stakeholders • Document your own research activities and present the results using various forms of communication
Form of examination	Traditional (written/oral ticket-based exam)
Training and examination requirements	- Active participation in all types of training - Timely submission of IWST and SIW tasks - Mastery of theoretical material and lab skills - Academic integrity and individual work submission - Use of approved textbooks and digital tools
List of references	1. Taubaeva Sh.T. Research competence of a specialist in the field of education /Sh.T.Taubaeva, S.T.Imanbayeva //The electron. scientific. journal. "CITISE." Pedagogical sciences. 2016. - № 1(5). - Pp. 29-37. 2. Zhadrina M.J. Result orientation as a condition for the implementation of a competence-based approach to education in school. - Almaty, 2004.

	3. Kudaibergeneva K.S. Kuzyrlylyk bilim sapasyn kriterii: adisnamalyk zhane gylym theory negizderi.- Almaty, 2008. - 328 b. 4. Kenzhebekov B.T. University studentsin kasibi kuzyrettiligin kalyptastrudyn theory and practice: monographs /B.T. Kenzhebekov. — Astana: L.N. Gumilev at. Eurasia ulttyk University, 2001.— 275 b. 5. Rysbaeva A.K., Columbayeva Sh.Zh. Professional self-knowledge of a teacher in the context of a competence approach (for students of pedagogical universities). – Almaty, 2012. – 128 p.

Module Identification	**(12.1) Module - Interdisciplinary integration** **Subject: Digital technologies in education**
Semester(s) in which the module is taught	8
Teacher in charge	Kudaibergenova Kuralay Baytemirkyzy
Language of instruction	Kazakh/Russian
Relationship to the curriculum	BD
Forms of training	Lecture, practical classes, laboratory classes, IWST, SIW.
Teaching load (including contact hours, SIW)	Teaching load Total work load: 90 h Contact hours: 30 h (15 h lectures, 15 h- hands on/ practical classes) Independent study, including preparation for exams, in hours: 15 h IWST
ECTS	3
Mandatory and recommended prerequisites for studying the module	Methods and technologies of teaching physics, Research, development and innovation of physics
Module objectives/ intended learning outcomes	**Learning objective:** Informatization of education. Modern digital technologies and their use in education. Multimedia technologies. 3D-technologies in education. Classification of digital educational resources. Development of high-quality digital educational resources. Virtual reality. Digital robotics. Methods the use of digital educational resources in the learning process. Problems of digitalization of extracurricular and research activities. **The intended learning outcomes are:** 1. Explain the concept of informatization in education and its impact on teaching and learning processes. 2. Identify and classify modern digital technologies used in education, including multimedia, 3D, and virtual reality tools. 3. Evaluate the role and effectiveness of digital educational resources (DERs) in different learning contexts. 4. Develop high-quality digital educational resources using appropriate tools and pedagogical principles. 5. Demonstrate practical skills in applying 3D technologies, virtual reality, and digital robotics in educational settings. 6. Analyze methods for integrating digital tools into both classroom instruction and extracurricular/research activities. 7. Critically assess the challenges and limitations of digitalization in education, particularly in extracurricular and research domains. 8. Reflect on ethical, technical, and pedagogical aspects of using digital technologies in modern education
Contents	Informatization of Education: Characteristics, Goals, and Objectives. The concept of digital technologies. The use of digital technologies in building an open education system.

	Directions of informatization development. Goals of using digital technologies in the process of teacher training. Didactic potential of using digital technology tools. Information Interaction in the Educational Process. Educational digital technologies and the environment for their implementation. The use of multimedia and communication technologies in education. Educational Information Resources: Classification and Didactic Functions. Psychological-pedagogical and ergonomic requirements for the creation and use of electronic educational tools. Modern approaches to the design and development of electronic educational tools. Evaluation of the quality of electronic educational tools. Educational and Methodological, Software and Technical Support of Education. Development of custom applications based on information technologies. Automation of educational and methodological support of the educational process.
Exam form	Traditional (ticket)
Training and examination requirements	**Knowledge:** ● Theoretical foundations of the application of digital technologies in science and education. ● Methods for acquiring, processing, storing, and presenting scientific information through digital technologies. ● Key directions of digital technology integration in education. ● Methodologies and technologies for implementing instruction using digital technologies. ● Fundamental methods for working with online resources. **Skills:** ● Ability to apply modern methods and tools for the automated analysis and systematization of scientific data. ● Proficiency in using contemporary digital technologies for the preparation of both traditional and electronic educational, methodological, and scientific publications. ● Competence in selecting and implementing effective digital technologies in the educational process. ● Practical application of scientific and educational Internet resources to facilitate the organization and execution of educational activities. **Competencies:** ● Mastery of digital technologies in the organization and management of the educational process. ● Expertise in obtaining scientific evidence and conducting research with the assistance of computer modeling. ● Proficiency in the use of multimedia technologies for the processing and presentation of information. ● Expertise in working with various text and graphic editing software. ● Competence in participating in scientific and educational events conducted through remote access.
References	8. Drozd, K.V., & Plaksina, I.V. (2023). Designing the educational environment: A textbook for higher education institutions (2nd ed., revised and expanded). Moscow: Yurait Publishing. 437 p. (Higher education). ISBN 978-5-534-06592-3. Text: electronic. Retrieved from Yurait Educational Platform [website]: https://urait.ru/bcode/516367 9. Dikov, A.V. (2022). Digital educational resources and social networks: Monograph. Moscow: IPAR Media. 256 p. ISBN 978-5-4497-1622-4. Text: electronic. Retrieved from IPR SMART Educational Resource [website]: https://www.iprbookshop.ru/121112.html

	10. Popova, S.A. (2021). Digital educational environment: Foundational concepts and conceptual design: Monograph. Moscow: Institute of World Civilizations. 252 p. ISBN 978-5-907445-63-5. Text: electronic. Retrieved from IPR SMART Educational Resource [website]: https://www.iprbookshop.ru/119091.html 11. Kirichek, K.A., Krasilnikov, V.V., Pelikh, O.V., & Toiskin, V.S. (2022). Pedagogical support for information security in the digital information-educational environment: A textbook. Stavropol: Timchenko O.G. Publishing. 97 p. ISBN 978-5-907425-90-3. Text: electronic. Retrieved from IPR SMART Educational Resource [website]: https://www.iprbookshop.ru/128255.html

EP	6B01512 – Physics IP
Module name	Electricity and Magnetism
Semester	3 semester
Module Responsible	Istlyaup A.S., Master in Physics, Lecturer.
Work language	Russian, Kazakh languages
Correlation with the curriculum	Required component
Teaching methods	Lecture-based teaching, Problem-solving sessions, Case studies, Collaborative learning, Blended learning, etc.
Study load / Labor intensity	Lectures – 35 hours, practical classes – 25 hours, labworks – 10 hours, IWMT – 35 hours, IWM – 105 hours / 210 hours
Credits/credits	7
Conditions for admission to study within the module	Prerequisites: Mechanics, Molecular Physics, Mathematical Analysis
Contents	During the course, future teachers get acquainted with electrical, magnetic and electromagnetic phenomena. They develop a modern scientific view of the nature of electric and magnetic fields, the electromagnetic field and the basic laws of electromagnetism. They also develop their independent work skills, including the study of algorithms, tools and devices necessary to solve problems of electricity and magnetism.
Exam form	Oral exam
Training and exam requirements	Students who have successfully mastered the course material and achieved at least 50% of the total score from the 1st and 2nd midterm assessments are eligible to take the final exam.
References	1. Electricity and magnetism: educational workbook, 2019, L.N. Myasnikova 2. Electricity and magnetism: course of lectures. 2015, Davletov, A.E., Yerimbetova, L.T. https://rmebrk.kz/book/1174333 3. Electricity and Magnetism working curriculum: The course program of discipline "Physics in englisch" for specialites, 2011, Comp. K.B. Tlebaev. https://rmebrk.kz/book/1135566 4. College physics: global edition, 2024, R.A. Serway, Ch. Vuille, J. Hughes. 5. Fundamentals of Physics II Electromagnetism, Optics, and Quantum Mechanics, 2016, SHANKAR R. https://neb.arsu.kz/kk/view?rid=6294&fid=6280 6. Computing Methods of physics: Educational Methodical Complex for specialties, 2011, S.E. Sakipova, A.A. Ganyukova. https://rmebrk.kz/book/1138822 7. Fundamentals of physics, 2014, Walker, Jearl, https://rmebrk.kz/book/1170139

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Module name	Workshop on Mechanics
Semester	3 semester
Module Responsible	Istlyaup A.S., Master in Physics, Lecturer.
Work language	Russian, Kazakh languages
Correlation with the curriculum	Required component
Teaching methods	Lecture-based teaching, Problem-solving sessions, Case studies, Collaborative learning, Blended learning, etc.
Study load / Labor intensity	Practical classes – 30 hours, IWMT – 15 hours, IWM – 45 hours / 90 hours
Credits/credits	3
Conditions for admission to study within the module	Prerequisites: Mechanics, Molecular Physics, Mathematical Analysis
Module objectives/intended learning outcomes	**The objective of the course is to develop students' practical skills in applying fundamental principles of mechanics through experimental work, hands-on problem solving, and modeling.** **Learning outcomes:** ● Apply the fundamental laws of classical mechanics to analyze physical systems. ● Conduct mechanical experiments using standard laboratory equipment and measurement techniques. ● Interpret and process experimental data, including error analysis and graphical presentation. ● Demonstrate skills in modeling and solving practical mechanics problems. ● Work effectively in small groups to plan, conduct, and report on experiments. ● Communicate results clearly in written reports using appropriate scientific terminology and formatting.
Contents	During the course, future teachers study the theory and practice of modern laboratory practice using modern laboratory equipment and mathematical software. They develop their skills in creative execution and application of physical models for laboratory work. They also develop the skills of independent work necessary to solve the problems of mechanics. After completing the course, they will be able to creatively apply physical models in laboratory work and independently solve mechanics problems.
Exam form	Oral exam
Training and exam requirements	Students who have successfully mastered the course material and achieved at least 50% of the total score from the 1st and 2nd midterm assessments are eligible to take the final exam.
References	1. Kulshykova A., Ibraeva G. – Mechanics: A Collection of Short Lectures. Aktobe: K. Zhubanov ARSU, 2016. – 90 pages. 2. Akalbaev Zh., Gladkov V., Ilyina L., Turmukhambetov A. – Mechanics: Textbook. 2nd revised edition. Astana: Foliant, 2015. – 360 pages. 3. Irodov I.E. – Mechanics. Basic Laws. Translated by Mazhenov N.A., Smirnov Yu.M., Kenzhin B.M. Almaty, 2016. – 276 pages. 4. Spabekova R.S. – Mechanics: Study Guide. Karaganda: "Medet Group" LLP, 2017. – 156 pages. 5. Koyshybaev N. – Mechanics. Volume I. Textbook. Almaty: "Ziyat Press", 2015. – 498 pages. 6. Aimagambetova Z.K., Serikbayeva G.D., Shunkeyev K.Sh. – Mechanics. Methodical Manual for Laboratory Work. Aktobe, 2010. – 93 pages.

	7. Tleubergenova G.A., Orazaliyev B.N., et al. – General Physics Practicum. Mechanics. Electricity. Almaty: Mektep, 1987.

EP	6B01512 – Physics (IP)
Module name	Optics (in English)
Semester	2 semester
Module Responsible	Zhanturina Nurgul, Associate Professor
Work language	English
Correlation with the curriculum	Required component
Teaching methods	CER, MOOC, etc.
Study load / Labor intensity	Lectures – 30 hours, practical classes – 15 hours, labs – 15 hours, IWMT – 30 hours, IWM – 90 hours (lecture, lesson, labworks, project, seminar etc.) / 180 hours
Credits/credits	6
Conditions for admission to study within the module	Prerequisites: Molecular physics. Mechanics. Mathematical analysis. School physics course.
Module objectives/intended learning outcomes	**Module objective:** The goals of studying the discipline are to form theoretical knowledge and practical skills in using optical laws to solve a wide range of problems in various fields of science and technology, as well as to present the physics of optical phenomena as a generalization of observations, practical experience and experiment. **Learning outcomes:** 1. Analyze and evaluate the prospects of the subject area of physics 2. Know the structure and content of a specific academic discipline of general physics in the logic of ascent from the general to the specific, from the abstract to the concrete 3. Own basic methods and techniques of various types of oral and written communication in state and foreign languages in a dynamically developing multilingual and multicultural world within the competence of a specialist in the field of physics, as well as master the Latin alphabet, academic integrity, anti-corruption culture, economic knowledge, fundamentals entrepreneurship and business, fundamentals of law, fundamentals of ecology and life safety, fundamentals of physiological development.
Contents	Light radiation is an electromagnetic wave, so optics refers to one of the branches of the theory of electromagnetic fields. It is known that electromagnetic wave range is very wide, which covers almost the entire wavelength region of from 0 to 10-12 m. Optical same interval in this range occupies a negligible range of wavelengths from 0,4-0,76 microns. This interval is arbitrary, since it is only one area of the electromagnetic spectrum, which creates a visual sensation. Creation of new instruments associated with the properties of electromagnetic waves, greatly expanded the concept of "light" range. The study of light phenomena such as interference, diffraction, polarization, etc. made it possible to use them widely in the practical activity of man. The proposed program gives the necessary minimum of knowledge in the field of optics, which is required in the course of the university.
Exam form	oral
Training and exam requirements	Students who have mastered the course material and scored at least 50% of the total rating based on the results of the 1st and 2nd midterm tests are allowed to take the final exam
References	**Main literature/ materials** 1. College physics: global edition, 2024, R.A. Serway, Ch. Vuille, J. Hughes.

	2. Geometrical and Visual Optics, SECOND EDITION, 2002, **https://neb.arsu.kz/kk/view?rid=6295&fid=6281** 3. Optics for the student: The educational and methodological complex of the discipline. 2011, Comp. G.A. Spanova. https://rmebrk.kz/book/1135575 4. Fundamentals of Physics II Electromagnetism, Optics, and Quantum Mechanics, 2016, 5. SHANKAR R. https://neb.arsu.kz/kk/view?rid=6294&fid=6280 **Additional literature/ materials** 1. Introduction to the World of Physics: Teaching manual . 2015, L.E. Strautman, https://rmebrk.kz/book/1176110 2. Fundamentals of physics, 2014, Walker, Jearl, https://rmebrk.kz/book/1170139 **Electronic resources:** 3. http://eqworld.ipmnet.ru/ru/library/physics.htm. 4. http://mat.net.ua/mat/index-fizika.htm 5. http://ph4s.ru/books_phys.html 6. Physical practice. Optics. http://optics.sgu.ru/library/education/laboptics 7. https://www.youtube.com/c/TheOrganicChemistryTutor 8. Educational materials on optics posted on the website of the Department of Optics and Biophotonics http://optics.sgu.ru/library/education.

Module Identification	**(12.1) Module - Interdisciplinary integration** **Subject: Workshop on molecular physics and thermodynamics**
Semester(s) in which the module is taught	4
Teacher in charge	Kudaibergenova Kuralay Baytemirkyzy
Language of instruction	Kazakh/Russian
Relationship to the curriculum	PD
Forms of training	Lecture, practical classes, laboratory classes, IWST, SIW.
Teaching load (including contact hours, SIW)	Teaching load (including contact hours, IWST) Total work load: 90 h Contact hours: 30 h (30 h- hands on/ practical classes) Independent study, including preparation for exams, in hours: 15 h IWST.
ECTS	3
Mandatory and recommended prerequisites for studying the module	Methods and technologies of teaching physics, Research, development and innovation of physics

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Module objectives/ intended learning outcomes	During the course, future teachers acquire modern knowledge and practical skills of research work in the field of molecular physics and thermodynamics. They master the methods of scientific research in the field of molecular physics and thermodynamics. After mastering this course, they competently and critically select a theoretical model for the observed phenomena. Learning outcomes: 1. Understand the principles of molecular thermodynamics; relations between microscopic interactions and macroscopic, bulk properties. 2. Formulate chemical engineering problems in a form in which they are amenable to solution by molecular thermodynamics methods. 3. Appreciate the capabilities of different simulation methods and understand the underlying concepts of Monte Carlo and molecular dynamics simulation methods, including relevant statistical mechanical theory.
Contents	1. Introduction to molecular thermodynamics 2. Heat/work/energy from molecular perspectives 3. Entropy/Thermodynamic forces 4. Free energy and Maxwell relations for mixtures from molecular principles 5. Molecular thermodynamics of simple liquids and gases / Intermolecular forces 6. Introduction to molecular simulations: Molecular Dynamics & Monte Carlo methods 7. Molecular thermodynamics of adsorption and binding 8. Molecular simulation of adsorption 9. Molecular simulation of carbon capture processes 10. Molecular thermodynamics of vapour liquid equilibria and mixtures Workshop 1: Molecular dynamics of bulk liquids Workshop 2: Simulation of lipid bilayers Workshop 3: Simulation of adsorption separation for carbon capture
Exam form	Traditional (ticket)
Training and examination requirements	The student should know the fundamental laws of thermodynamics and understand their relationship with statically computable quantities. They should be able to express certain thermodynamic variables in terms of others using differential relations. The student should have an understanding of phase transitions and their thermodynamic descriptions. The student should understand that a thermodynamic macrostate corresponds to a set of changing microstates, and that thermodynamic quantities, according to the Gibbs distribution, can be calculated if the energies and degeneracies of the microstates are known. The student should have a clear understanding of the concept of entropy.

References	1. Khorazov, T.A. (2002). Fundamentals of molecular physics and thermodynamics (Vol. 2). Aktobe: RIO. 310 p. 2. Koishybayev, N., Dossaeva, B.T., Kemelzhanova, S.E., et al. (2013). Practical course in general physics: Volume 1. Mechanics and molecular physics: Textbook (3 vols.). Almaty: Kazakh University. 282 p. ISBN 978-601-04-0220-1 3. Alberts, B., et al. (2004). Mechanics. Molecular physics and thermodynamics: Lecture notes. Almaty: AEZhBI. 64 p. 4. Sakypova, Sh.E. (2017). Physics practicum: Textbook. Almaty: SSK. 244 p. ISBN 978-601-257-016-8 5. Koishybayev, N., Dossaeva, B.T., Kemelzhanova, S.E., et al. (2013). Practical course in general physics: Volume 1. Mechanics and molecular physics: Textbook (3 vols.). Almaty: Kazakh University. 282 p. ISBN 978-601-04-0220-1

EP	6B01512 – Physics (IP)
Module name	Atom, Atomic Nucleus and Solid Physics
Semester	5 semester
Module Responsible	Zhubayev Abzal Kantarbayevich, Ass. Prof.
Work language	Kazakh
Correlation with the curriculum	University component
Teaching methods	CER, MOOC, etc.
Study load / Labor intensity	Lectures – 30 hours, practical classes – 20 hours, laboratory classes – 10, IWST – 30 hours, IWS – 90 hours (lecture, lesson, laboratory work, project, seminar, etc.).) / 180 hours
Credits/credits	6
Conditions for admission to study within the module	Prerequisites: Mechanics, Molecular Physics, Electricity and Magnetism, Optics.
Module objectives/intended learning outcomes	The purpose of studying the discipline is to form students' understanding of the structure of the electronic shells of atoms, the structure of nucleus, the properties of atoms and nuclei, the processes occurring in them. Learning outcomes: 1. Knows physical phenomena, their features, methods of observation and experimental research, basic patterns and their mathematical characteristics, applications in science and technology of atomic and nuclear phenomena. 2. Applies basic methods for determining the properties of atoms, nuclei and fundamental particles. Determines the properties of solids. 3. Analyzes the properties of atoms and fundamental particles, quantum concepts and relativistic ideas when considering the interaction of atomic radiation and radioactive radiations with matter. 4. Performs simple theoretical calculations, solves typical tasks. 5. Evaluates the order of physical quantities.
Contents	Thermal radiation and Planck's postulate. Photons – particlelike properties of radiation. Le Broglie's postulate – wavelike properties of particles. Bohr's model of the atom. Schroedinger's theory of quantum mechanics. Solutions of time-independent Schroedinger equations. One-electron atoms. Magnetic dipole moments, spin, and transition rates. The scale of the phenomena of the microworld. General properties of atomic nuclei. Rutherford's experience in scattering alpha particles. Atomic nucleus. Quantum mechanical description of nuclear states. Instability of atomic nuclei. Alpha decay. Beta decay. Gamma radiation of nuclei. Nuclear reactions. Resonant nuclear reactions. Fission of atomic nuclei. The interaction of charged particles with matter. Cosmic rays. Primary cosmic radiation. The transmission of cosmic radiation through the atmosphere. Variations of cosmic rays. Hypothesis of the origin of cosmic rays. Possible mechanisms for accelerating particles

	of cosmic radiation. Nuclear technology in industry and agriculture. Nuclear power sources. Nuclear rocket engines. Nuclear technology in medicine. Radionuclide diagnostics. Nuclear technology in ecology. The crystal lattice. Defects in the crystal lattice. Thermal, electrical and magnetic properties of solids. Superconductivity. The interaction of radiation with solids.
Exam form	written
Training and exam requirements	Students who have mastered the course material and scored at least 50% of the overall rating based on the results of the 1st and 2nd intermediate tests are allowed to take the final exam
References	Main literature: 1. Eisberg R., Resnick R. Quantum Physics of Atomic, Molecules, Solids, Nuclei, and Particles. Second edition. (John Wiley&Sons, New-York, Chichester, Brisbane, Toronto, Singapore, 2005). 865 p. 2. Abdulla Zh., Ayazbaev T. Lectures on the physics course. Almaty: Dauir Publ., 2012. 528 p. (in Kazakh) 3. Huanbay E. Atomic and nuclear physics: a textbook. –Almaty: CyberSmith, 2019. -108 p. (in Kazakh) 4. Serkebaev S.K. Physics of the atom and atomic nucleus: a textbook. –Almaty: TehnoErudit, 2018. -268 p. (in Kazakh) 5. Spabekova R.S. Atomic and nuclear physics: a textbook. – Karaganda: Medet Group, 2015. -170 p. (in Kazakh) 6. Volkenstein V.S. Collection of problems in the course of general physics: a textbook. Almaty: Nur-print, 2012. 450 p. (in Kazakh) 7. Aikeeva A.A. Measurement errors of physical quantities: an educational and methodical manual. –Almaty: SSK, 2018. -100 p.(in Kazakh) 8. Zhubayev A.K. Foundations of nuclear gamma resonance spectroscopy. Aktobe, 2013. – 197 p. (in Kazakh) 9. Martin B. Nuclear physics and elementary particle physics: a textbook. Part 2. – Almaty: Association of Universities of the Republic of Kazakhstan, 2014. – 376 p. (in Kazakh) 10. Morzabayev A. K. Physics of high energies: a manual. - Almaty: Epigraph, 2016. – 120 p. (in Kazakh) 11. Vintaikin B.E. Solid State physics: A textbook. Moscow, MSTU, 2008. 360 p. (in Russian) 12. Baipakbayev T.S., Karsybayev M.Sh. General physics course collection of problems: textbook. - Almaty, Ak Shagyl, 2014 – 248 p. (in Kazakh)

Module Identification	**(10) Module - Research in physics: observation, experiment, hypothesis** **Subject: Practicum on electricity and magnetism**
Semester(s) in which the module is taught	5
Teacher in charge	Shanina Zamzagul Kuatovna
Language of instruction	Kazakh/Russian
Relationship to the curriculum	Professional discipline, university component
Forms of training	Practical classes, IWST, SIW.
Teaching load (including contact hours, SIW)	Teaching load (including contact hours, SIW) Total work load: 90 h Contact hours: 30 h (30 h practical classes) Independent study, including preparation for exams, in hours: 15 h IWST, 45 h SIW
ECTS	3
Mandatory and recommended prerequisites for studying the module	Mathematical analysis, Mechanics
Module objectives/ intended learning outcomes	**Learning objective:** To train specialists who are well versed in the fundamentals of the physics of electromagnetic phenomena, ensuring the professional quality of future physicists **The intended learning outcomes are:**

	1. Knows and understands the theory and laws of electrostatics, direct current, magnetic field, magnetic field in matter, electric current in various environments, alternating current, electromagnetic oscillations and currents. 2. Uses them in observations, solving typical problems, performing laboratory work, studying environmental phenomena. 3. Can select theoretical data, methods for solving problems, conduct research. 4. Can check the correctness of the calculation results, fill in tables and graphs based on the analysis results, process the results, calculate errors, calculate the percentage of deviation from theory, draw conclusions, defend and explain the work. 5. Can evaluate the role of electric and magnetic phenomena in solving current theoretical and practical problems of physics (in engineering calculations, electronics, electrical engineering, computer technology).
Contents	Electric field in a vacuum. Electric charge. Interaction of electric charges. Law of conservation of electric charge. Coulomb's law. Gauss's theorem. Differential formulation of Coulomb's law. Constant electric field. Superposition principle. Work in an electrostatic field. Scalar potential. Calculation of the potential of charges distributed according to various laws. Relationship between field strength and potential. Electrostatic induction. Field near a conductor. Capacitance of an isolated conductor. System of conductors. Capacitor and its capacitance. Connection of capacitors, Types of capacitors. Dipole field. Polarization of dielectrics. Polarizability. Relationship between charges in contact and polarizability. Displacement vector, dielectric permittivity. Gauss's theorem for electrostatic fields in dielectrics. Boundary conditions. Interaction energy of discrete charges. Interaction energy in the case of continuous distribution of charges. Specific energy. Field energy density. Energy of the surface charge field. Energy of a charged conductor. Dipole energy in an external field. Current. Current density. Electrostatic field in the presence of a direct current. External emf. Ohm's law. Integral and differential forms of the Joule-Lenz law. Work and power of current. Isolated closed circuit. Branched circuit. Kirchhoff's rules. Currents in a uniform medium. Verification of physical laws: Ohm's, Joule-Lenz laws. Electrical conductivity of metals. Dissociation. Calculation of electrical conductivity. Dependence of electrical conductivity on concentration. Dependence of electrical conductivity on temperature. Electrolytes. Ionization and recombination processes. Dependent and independent gas discharges and their volt-ampere characteristics. Biot-Savart-Laplace law. Lorentz force. Ampere's law. Magnetic field induction and intensity. Theorem on the circulation of the induction vector. Current law, its differential form. Closed condition of magnetic field lines. Magnetic moment of an elementary current. Magnetic moment. Magnetization of magnets. Magnetizability. Volume and surface molecular currents, their relationship with magnetizability. Current law for magnetic fields in magnets. Magnetic field intensity, magnetic permeability of a magnet. Boundary conditions. Faraday's law of electromagnetic induction, its integral and differential forms. The phenomenon of self and mutual induction. Energy of a magnetic field. Self-induction. AC source, circuit with resistance, capacitance and inductance. Resonances in AC circuits. Vector diagrams. Instantaneous power. Average power. Effective values of current and voltage. Power factor. Electric motors. Complete system of Maxwell's equations and their physical meaning. Law of conservation of energy of electromagnetic field. Equation for vector potential. Solution of wave equation. Lagging and

	leading potentials. Hertz vibrator. Plane waves. Phase velocity. Wavelength. Energy flux density.
Exam form	Writing/ control work
Training and examination requirements	- obtaining quality knowledge; - fulfil the teacher's requirements specified in the syllabus; - independently complete all types of work (IWST assignments, coursework, graduation theses, etc.) and submit them to the teacher on time; - use reliable and trustworthy sources of information; - not to provide their work for cheating other students.
References	1. Bayimbetov F.B., Ramazanov T.S. Electricity and magnetism. – Almaty: Kazakh University, 2011 2. Akylbaev Zh.S., Ermagambetov K.T. Electricity and magnetism. Karaganda: KarMU Publishing House, 2003 3. Spabekova R. S. Electricity and magnetism - Karaganda: Medet Group, 2017.. 4. R. S. Spabekova, G. Sh. Omashova. Mechanical and electromagnetic oscillations and waves - Karaganda: Medet Group, 2020. 5. Savelyev I. V. General physics course: 2 volumes: Electricity - Almaty: School, 2004. 6. Daribekov S. Special chapters of the electricity and magnetism course - Karaganda: Ak Nur, 2012. 7. I.E. Irodov. Electromagnetism: Basic laws. – Almaty, 2013. 8. M. Kulbekov, G. Alimbekova, K. Nurgalieva. General Physics Course. Electricity and Magnetism - Almaty: Republican Publishing House, 1997 9. Tobayakov, Zh. Electricity and Magnetism - Almaty: School, 1988. 10. R. Zh. Nametkulova, A. K. Kadirimbetova. Problems and exercises of the general physics course. Part 2. Electricity and magnetism, oscillations and waves - Almaty: Evero, 2018. 11. Dosbolaev, M. K. Electricity and magnetism. - Almaty: Kazakh University, 2014. 12. Practical course of general physics: a three-volume textbook. Electricity and magnetism. Volume 2 / N. Koishybayev, B. Dosayeva, S. Kemelzhanova et al. - Almaty: Kazakh University, 2015.

EP	6B01512 – Physics (IP)
Module name	Optics Practicum
Semester	6 semester
Module Responsible	Zhanturina Nurgul, Associate Professor
Work language	English
Correlation with the curriculum	Required component
Teaching methods	CER, MOOC, etc.
Study load / Labor intensity	Practical classes – 30 hours, IWMT – 15 hours, IWM – 45 hours (lecture, lesson, labworks, project, seminar etc.) / 90hours
Credits/credits	6
Conditions for admission to study within the module	Prerequisites: Molecular physics. Mechanics. Mathematical analysis. School physics course.
Module objectives/intended learning outcomes	**Module objective:** The goals of studying the discipline are to form theoretical knowledge and practical skills in using optical laws to solve a wide range of problems in various fields of science and technology, as well as to present the physics of optical phenomena as a generalization of observations, practical experience and experiment. **Learning outcomes:** 4. Analyze and evaluate the prospects of the subject area of physics 5. Know the structure and content of a specific academic discipline of general physics in the logic of ascent from the general to the specific, from the abstract to the concrete

	6. Own basic methods and techniques of various types of oral and written communication in state and foreign languages in a dynamically developing multilingual and multicultural world within the competence of a specialist in the field of physics, as well as master the Latin alphabet, academic integrity, anti-corruption culture, economic knowledge, fundamentals entrepreneurship and business, fundamentals of law, fundamentals of ecology and life safety, fundamentals of physiological development.
Contents	Light radiation is an electromagnetic wave, so optics refers to one of the branches of the theory of electromagnetic fields. It is known that electromagnetic wave range is very wide, which covers almost the entire wavelength region of from 0 to 10-12 m. Optical same interval in this range occupies a negligible range of wavelengths from 0,4-0,76 microns. This interval is arbitrary, since it is only one area of the electromagnetic spectrum, which creates a visual sensation. Creation of new instruments associated with the properties of electromagnetic waves, greatly expanded the concept of "light" range. The study of light phenomena such as interference, diffraction, polarization, etc. made it possible to use them widely in the practical activity of man. The proposed program gives the necessary minimum of knowledge in the field of optics, which is required in the course of the university.
Exam form	oral
Training and exam requirements	Students who have mastered the course material and scored at least 50% of the total rating based on the results of the 1st and 2nd midterm tests are allowed to take the final exam
References	**Main literature/ materials** 1. College physics: global edition, 2024, R.A. Serway, Ch. Vuille, J. Hughes. 2. Geometrical and Visual Optics, SECOND EDITION, 2002, **https://neb.arsu.kz/kk/view?rid=6295&fid=6281** 3. Optics for the student: An educational and methodological complex of the discipline. 2011, Comp. G.A. Spanova. https://rmebrk.kz/book/1135575 4.Fundamentals of Physics II Electromagnetism, Optics, and Quantum Mechanics, 2016, 5.SHANKAR R. https://neb.arsu.kz/kk/view?rid=6294&fid=6280 **Additional literature/ materials** 6. Introduction to the World of Physics: Teaching manual . 2015, L.E. Strautman, https://rmebrk.kz/book/1176110 7. Fundamentals of physics, 2014, Walker, Jearl, https://rmebrk.kz/book/1170139 **Electronic resources:** 8. http://eqworld.ipmnet.ru/ru/library/physics.htm. 9. http://mat.net.ua/mat/index-fizika.htm 10. http://ph4s.ru/books_phys.html 11. Physical practice. Optics. http://optics.sgu.ru/library/education/laboptics 12. https://www.youtube.com/c/TheOrganicChemistryTutor 13. Educational materials on optics posted on the website of the Department of Optics and Biophotonics http://optics.sgu.ru/library/education.

EP	6B01512 – Physics IP
Module name	Workshop on the Physics of the Atom and Atomic Nucleus
Semester	7 semester
Module Responsible	Zhubayev Abzal Kantarbayevich, Ass. Prof.
Work language	Kazakh
Correlation with the curriculum	University component

Teaching methods	CER, MOOC, etc.
Study load / Labor intensity	Practical classes – 30 hours, IWST – 15 hours, IWS – 45 hours (lecture, lesson, project, seminar, etc.).) / 90 hours
Credits/credits	3
Conditions for admission to study within the module	Prerequisites: Mechanics, Molecular Physics, Electricity and Magnetism, Optics, Physics of Atom, Atomic Nucleus and Solid.
Module objectives/intended learning outcomes	The purpose of studying the discipline is to form students' understanding of the structure of the electronic shells of atoms, the structure of nucleus, the properties of atoms and nuclei, the processes occurring in them. Learning outcomes: 1. Knows the patterns of atomic and nuclear phenomena and their mathematical descriptions, the fields of application of the phenomena considered in science and technology. 2. Identifies atoms, nuclei, and elementary particles by their parameters. 3. Analyzes the interaction of radioactive radiation with matter. 4. Performs theoretical calculations, determines the parameters of atoms and nuclei. 5. Evaluates the order of physical quantities.
Contents	The quantum nature of radiation. Thermal radiation. De Broglie waves. The Heisenberg uncertainty relation. The wave function. The Schrodinger equation. Scattering of particles. The Rutherford-Bohr atom. Properties of atoms. The spectra. Elements of quantum statistics. The nucleus structure. Radioactivity. Nuclear reactions. Fundamental particles.
Exam form	written
Training and exam requirements	Students who have mastered the course material and scored at least 50% of the overall rating based on the results of the 1st and 2nd intermediate tests are allowed to take the final exam
References	Main literature: 1. Abdulla Zh., Ayazbaev T. Lectures on the physics course. Almaty: Dauir Publ., 2012. 528 p. (in Kazakh) 2. Huanbay E. Atomic and nuclear physics: a textbook. –Almaty: CyberSmith, 2019. -108 p. (in Kazakh) 3. Serkebaev S.K. Physics of the atom and atomic nucleus: a textbook. –Almaty: TehnoErudit, 2018. -268 p. (in Kazakh) 4. Volkenstein V.S. Collection of problems in the course of general physics: a textbook. Almaty, 2012. 450 p. (in Kazakh) 5. Aikeeva A.A. Measurement errors of physical quantities: an educational and methodical manual. – Almaty, 2018. -100 p.(in Kazakh) 6. Martin B. Nuclear physics and elementary particle physics: a textbook. Part 2. – Almaty: Association of Universities of the Republic of Kazakhstan, 2014. – 376 p. (in Kazakh) 7. Baipakbayev T.S., Karsybayev M.Sh. General physics course collection of problems: textbook. - Almaty, Ak Shagyl, 2014 – 248 p. (in Kazakh)

Module Identification	KG 2306 – Computer graphics
Semester(s) in which the module is taught	4
Teacher in charge	Shangytbayeva Gulmira Asaugalikyzy
Language of instruction	Russian/Kazakh
Relationship to the curriculum	Optional component
Forms of training	Lectures, practical and laboratory classes, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total workload: 150 hours. Contact hours: 45 hours (15 hours of lectures, 10 hours of practical classes, 20 hours of laboratory classes) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW.

EP BA 6B01502 – Physics (IP)

ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, you need the knowledge, skills and abilities acquired while studying the disciplines of information and communication technologies, algorithms and programming.
Module objectives/ intended learning outcomes	Purpose of the course is to develop students' skills in working with computer graphics, working with raster, vector and fractal graphics, preparing and editing graphic materials, drawings, logos, sketches using CorelDRAW, Adobe Photoshop and 3D Max programs. 1. To know and understand the types of computer graphics, graphic file formats, their features and disadvantages; 2. To be able to use the capabilities of graphic editors CorelDRAW, Adobe Photoshop and 3D Max; 3. To be able to distinguish between vector, raster and fractal graphics and analyze their actions in practice; 4. In the field of communication, the formation of utterance logic; 5. In the field of education, the ability to analyze key issues in assignments.
Contents	Today, there are computer design, web design, system administrator, etc. The need for specialists can be seen in various newspaper and media advertisements. One of the urgent issues of teaching the subject is the preparation and improvement of these specialties through software training. Computer graphics is one of the optional subjects in the training of computer science specialists. The main purpose of teaching the subject is to teach students how to work with computer graphics using raster, vector and fractal graphics tools, as well as how to process photographs, create drawings, logos, sketches, etc. using computer programs. Learning how to act, getting to know the methods.
Exam form	oral
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW assignments, participation in all types of control.
References	1. I. Nabi., G.Zhumatay., G. Shaparova. Fundamentals of computer graphics. Almaty, 2013. 2. Mukhambetzhanova S. T. computer design. - Almaty, 2013. 3. Victor Porev. Computer graphics. Saint Petersburg. 2014. 4. Galina Dabizha. Computer graphics and layout. Peter. 2014. 5. Shuketaeva K.K., Belgozhaeva Sh.D., Tekesbaeva N.A. Computer graphics. Corel Draw., 2012. -138 p 6. Kirilenko A.P. "Adobe Photoshop CS-become a professional!" Moscow: Self-study, 2013. 7. Gursky Yu., Zhvalevsky A., Gurskaya I. Computer graphics: Photoshop CS3, CorelDRAW X3, Illustrator CS3. St. Petersburg, 2013. 8. Adobe Photoshop 7.0. Official training course. Triumph, 2012. 9. Computer Science. Basic course. Textbook edited by S.V.Simonovich. S.P. "Peter" 2012. 10. Pantyukhin P.Ya., Bykov A.V., Repinskaya A.V. Computer graphics. In 2 parts, Part 1: study.the manual. Moscow, 2013. 11. CorelDRAW X3. Step by step/ Kovtanyuk Yu.S. – Eksmo, 2012. 12. Computer graphics: Photoshop CS3, CorelDRAW X3, Illustrator CS3. / Gursky Yu., Zhvalevsky A., Gurskaya I. – Peter, 2012. 13. CorelDRAW X3: multimedia course/ Sletova L.A. – Eksmo, 2012. 14. CorelDRAW X3 (full version v.13)/ Kudryavtsev A.I. - NT Press, 2012.

	15. The best tricks and effects in Photoshop, CorelDRAW, 3DS Max. Gursky Yu., Bondarenko S.V., Bondarenko M.Yu. – St. Petersburg, 2012. 16. CorelDRAW X3. Easy Start/ Andrey Zhvalevsky – Peter, 2013. 17. CorelDRAW X3. Training course/ Mironov Dmitry – Peter, 2013. 18. Zalogova L.A.Computer graphics. Moscow, 2005.

Module Identification	**2. Module -** Components Of Compulsory Educational Disciplines Prog 2233 – Programming, BP ZhK
Semester(s) in which the module is taught	3
Teacher in charge	Zhakhina Ryskul Uteuovna
Language of instruction	Kazakh
Relationship to the curriculum	Basic discipline, university component
Forms of training	Lectures, practical and laboratory classes, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total working load:120 hours Contact hours: 45 hours (15 hours of lectures, 15 hours of practical and 10 hours of laboratory classes) Self-study, including exam preparation, in hours: 20 hours SIWT, 60 hours SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	To master this module, you need the knowledge, skills and abilities acquired during the study of the following courses: Information and Communication Technologies.
Module objectives/ intended learning outcomes	1. To master the basic levels of solving problems on a computer, the concept of algorithms and methods of their presentation, types of algorithms, principles of their processing and search and their programmatic implementation, dynamic structure of types, methods of creating software, programming style, quality indicator of programming, methods of testing and forming programs.. 2. Development of students ' desire to master modern new algorithmic methods along with fundamental information processing algorithms in the preparation of effective algorithms for solving various problems. LO- 3, 4, 5: 3. To be able to create various programs based on linear, branch and loop types of algorithms using fundamental computational algorithms and their properties; 4. To use tools for the development and implementation of standard algorithms in C++, independently carry out the processing of arrays using various methods of internal sorting, the development of software implementations of abstract data structures; 5. To be able to evaluate algorithmic methods and software solutions in the field of system and applied programming, the importance of the material on the course, the consistency of conclusions. As a result of studying the discipline, students should know and understand the programming paradigm, structure features, algorithmic methods, the ability to use algorithmic methods and modern software, modern computing techniques to solve the problem.
Contents	The course is aimed at preparing students for their future professional activities - teaching mathematics in schools of various profiles. Mastering the discipline is also the basis for successful teaching practice. Programming is a discipline that focuses on creating programs for computers. A modern specialist needs to know the

	principles of computer operation and the possibilities of providing it with programs. "Programming" discipline is devoted to the formation of knowledge on the basic concepts of algorithmization and programming, algorithms and data structures, methods for constructing algorithms, analysis of algorithms, methods and technologies for writing programs, various algorithms for internal sorting of information and search accounting. In the course of studying the discipline, the properties and conditions of algorithms under consideration are considered, and a connection is made with the analysis of the theory of the algorithm and the computational system, and the effectiveness of algorithms is studied.
Exam form	Orally by ticket
Training and examination requirements	Mandatory attendance of online and classroom classes, active participation in the discussion of issues, preliminary preparation for lectures, practical and laboratory classes, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	1. 1. Pavlovskaya T. A. S / S. Programming in a high-level language: a textbook. - Almaty: publishing house "era", 2013 – 504 p. 2. Pavlovskaya T.A. C/C++. Procedural and object-oriented programming. Textbook for universities. The 3rd generation standard. – St. Petersburg: Peter, 2021. 3. 3. Buribaev B. B., Makhmetova A.M. Algorithmization and programming languages : textbook. - Almaty: RPBK "Era" LLP – 328 p. (http://rmebrk.kz/bilim/association/boribaev-algoritmdeu.pdf) 4. Zhoranova N. Zh. Basis of high-level programming languages: a manual. - Almaty: CyberSmith, 2017. - 296 p. 5. Smailova U.M. programming: technologies for creating algorithms: training manual / Smailova U. M. - Almaty: Asyl kitap. 6. Shevchuk E.V. Collection of tasks and exercises on data structures and programming: Textbook, 2014. 7. Koksegen A. E. Algorithmization and programming languages: a textbook. / A. E. Koksegen, A. O. Seifullina; M. education and science of the Republic of Kazakhstan. - Almaty: RPBK "Era" LLP – 191p.- (Association of higher educational institutions of the Republic of Kazakhstan) 8. Kemelbekova Zh. Programming languages and technologies: textbook-Almaty: TechSmith, 2019 – - 284p. 9. Laforet R. Object-oriented programming in C++ / R. Laforet. – St. Petersburg: Peter. 10. Strausstrup Björn. Programming. Principles and practice of using the C++ language. Vol. 1. / AUD. B. Buribayev, M. Abdrakhmanova-Almaty, 2013 11. Strausstrup Björn. Programming. Principles and practice of using the C++ language. Vol. 2. / AUD. B. Buribayev, S. Adilgazhinova-Almaty, 2014. 12. Pavlovskaya T.A. C/C++. Programming in a high-level language for masters and bachelors: Textbook/ T.A. Pavlovskaya; Third generation standard. – St. Petersburg: Peter, 2021. 13. 13. Shevchuk E.V. Programming in C++ : A textbook, 2014.

	14. Gumarov Zh. fundamentals of Algorithmization and programming (collection of problems)/Zh.Gumarov. 15. Buribaev B. B. programming technologies: textbook. - Almaty: RPBK "Era" LLP. -352 p. (http://rmebrk.kz/bilim/association/boribaev_programmalau.pdf) .

Module Identification	SFIP 3301 Special functions and their applications
Semester(s) in which the module is taught	3
Teacher in charge	Turganbaev A.A.
Language of instruction	Kazakh/ Russian
Relationship to the curriculum	Core discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total working load: 150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	To master this module, you need the knowledge, skills and abilities acquired during the study of the following courses: Algebra and geometry, mathematical analysis, differential and integral equations.
Module objectives/ intended learning outcomes	To provide students with in-depth knowledge of special functions arising in applied mathematics, physics and engineering. Teach them how to use these functions to solve differential equations, mathematical modeling, and analysis of physical processes. LO- 3, 4, 5: A. To recognize and classify basic special functions. B. To apply the properties and formulas of special functions for analytical problem solving. C. To solve partial differential equations using special functions. D. To use special functions in modeling physical processes. E. To understand the scientific literature where special functions are used. Solve applied problems in engineering, physics, and applied mathematics using special functions.
Contents	Definition of special functions. Gamma and Beta functions: properties and their applications. Orthogonal polynomials. Legendre, Chebyshev polynomials, Hermite and Laguerre polynomials. Bessel functions, definition and basic properties. The Bessel equation and its solution. Spherical functions. Connection with Laplace's equation in spherical coordinates. Applications in physical tasks.
Exam form	Blank test
Training and examination requirements	Compulsory attendance of classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.
References	1. Bizhigitov T. methods of Mathematical Physics. The textbook.- Almaty, 2014. 2. Ramazanov M. I., Mukhtarov M., Adilbek N. basic equations of Mathematical Physics. Training manual. - Karaganda: IP "AK Nur publishing house", 2013. 3. Tokybetov Zh. A., Khairullin E. M. equations of Mathematical Physics. Astana, 2015.

	4. Orynbasarov M., Sahaev Sh. collection of problems and exercises of equations of Mathematical Physics. Almaty: Kazakh university, 2015. 5. Tikhonov A.N., Samarskiy A.A. Equations of mathematical physics. Moscow: Moscow State University of Science, 2014. 6. Vladimirov V.S. Equations of mathematical Physics. Moscow: Fizmatlit, 2015. 7. Koshlyakov N.S., Gliner E.B., Smirnov M.M. Partial differential equations of mathematical physics. Moscow: Higher School, 2017. 8. Budak B.M., Tikhonov A. N., Samarsky A. A. Collection of problems in mathematical physics. Moscow: Fizmatlit, 2014. 9. Vladimirov V.S. (ed.) Collection of problems on equations of mathematical physics. Moscow: FIZMATLIT, 2003. 10. Arsenin V.Ya. Mathematical physics. Basic equations and special functions. Moscow: Nauka, 1966. 11. Budak B.M., Fomin S.V. Multiple integrals and series. Moscow: Nauka, 1985. 12. Lebedev N.N. Special functions of their application. Moscow: Fizmatgiz, 1963. 13. Mikhlin S.G. Course of mathematical physics. Moscow Nauka Publ., 1968.

Module Identification	MMF 3301 Methods of mathematical physics
Semester(s) in which the module is taught	3
Teacher in charge	Turganbayev A.A.
Language of instruction	Kazakh/ Russian
Relationship to the curriculum	Core discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Teaching load (including contact hours, SIW)	Total working load:150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	To master this module, you need the knowledge, skills and abilities acquired during the study of the following courses: Algebra and Geometry, mathematical analysis, differential equations.

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Module objectives/ intended learning outcomes	Purpose of the course is to study basic concepts and give an idea of the theoretical foundations of mathematical physics methods, to familiarize with the field of mathematical physics and methods of constructing mathematical models of some physical processes, to develop practical skills in solving partial differential equations, to teach the application of basic methods of analytical solution of boundary value problems for partial differential equations. LO- 3, 4, 5: A. To know and understand the basic concepts and methods of mathematical physics. B. To use the basic classical methods of solving these problems, to teach practical methods of solving problems to describe the patterns of various physical phenomena. C. To be able to apply the basic methods of finding solutions to initial and boundary value problems of differential equations and formulate conclusions describing the patterns of the problems under consideration. D. To be able to form a general idea of differential equations, receive, process, collect information and work with them. Be able to work in a team, offer new solutions, strive for professional and personal growth. E. To be able to competently apply knowledge and learning skills, is aware of the social significance of his future profession, is motivated to carry out professional activities; is able to be responsible for the results of his professional activities.
Contents	Partial differential equations. Basic definitions. Basic equations of mathematical physics. A scalar field. The derivative of the direction. The gradient. A vector field. Vector lines. The flow of a vector field. Field divergence. The Ostrogradsky-Gauss formula. Circulation. The Stokes formula. Classification of partial differential equations of the second order and reduction to the canonical form. The equation of string vibration. Boundary value problems. The Cauchy problem for the wave equation. Fourier method for solving boundary value problems for equations of hyperbolic type. Eigenfunctions and eigenvalues. The equation of thermal conductivity. The Cauchy problem for the equation of thermal conductivity. The Poisson formula. Solving the equation of thermal conductivity by the method of separation of variables. The fundamental solution of the equation of thermal conductivity. Solution of the Cauchy problem for the equation of thermal conductivity. Elliptic type equations. The Laplace and Poisson equations. Harmonic functions. Solving the Dirichlet problem for a circle and a ball. The Poisson formula. Dirichlet's external task.
Exam form	Blank test
Training and examination requirements	Compulsory attendance of classroom classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW tasks, participation in all types of control.

References	1. Bizhigitov T. methods of Mathematical Physics. The textbook.- Almaty, 2014. 2. Ramazanov M. I., Mukhtarov M., Adilbek N. basic equations of Mathematical Physics. Training manual. - Karaganda: IP "AK Nur publishing house", 2013. 3. Tokybetov Zh. A., Khairullin E. M. equations of Mathematical Physics. Astana, 2015. 4. Orynbasarov M., Sahaev Sh. collection of problems and exercises of equations of Mathematical Physics. Almaty: Kazakh university, 2015. 5. Sarsekeeva A. S. equations of Mathematical Physics. Almaty: Kazakh university, 2015, RSE. 6. Tikhonov A.N., Samarskiy A.A. Equations of mathematical Physics - Moscow: MSU Nauka, 2014. 7. Ilyinsky A. N. Jr. Equations of Mathematical Physics, Jr.: Fizmatlit, 2019. 8. Mamontov A.E. Lectures on equations of mathematical physics. Part 1. Elements of the general theory of partial differential equations Textbook. Novosibirsk, NSPU, 2016. 9. Mamontov A.E. Lectures on equations of mathematical physics. Part 2. Classical Solutions Tutorial. Novosibirsk: NSPU, 2014. 10. Yemelyanov V.Jr., Rybakina E. N.A. Equations of mathematical physics A practical guide to problem solving, 2nd edition. St. Petersburg: Lan Publ., 2016. 11. Vladimirov V. N.I. Equations of Mathematical Physics, Moscow: Fizmatlit, 2015. 12. Koshlyakov N.I., Gliner E.B., Smirnov M.Jr. Partial differential equations of Mathematical Physics, Jr.: Higher School, 2017. 13. Budzhak B.Jr., Tikhonov A. N., Samarsky A. A. Collection of problems in mathematical physics. Moscow: Fizmatlit, 2014. 14. Pikulina V.P., Samobodaev S. N.I. Practical course on equations of mathematical physics 2016. 15. Blinova I. N.V., Popov I.Yu. The simplest equations of mathematical physics Textbook. St. Petersburg: St. Petersburg State University of ITMO, 2019. 16. Vladimirov V. N.I. (ed.) Collection of problems on equations of mathematical physics. Ml.: FIZMATLIT, 2003. 17. Vladimirov V. N.I., Zharinov V. N.V. Equations of mathematical physics Textbook for universities. Moscow: Fizmatlit, 2004. 18. Korzyuk V. I. Equations of mathematical physics - Minsk: BSU, 2010. 19. Y. Ochanskogo.I. Collection of problems on methods of mathematical physics. Ml.: Higher School, 1973. 20. Mamontov A.E., Mamontov E.V. Collection of problems on equations of mathematical physics. The training manual. Novosibirsk: NSU, 2016. 21. Shubinsky M. N.A. Lectures on equations of Mathematical Physics, Jr.: ICNMO, 2013. 22. Kostin A. N.B., Tikhonov I. N.V., D. Tkachenko.I. Equation of mathematical physics Practical training manual, Part II. Ml.: 2008. 23. Pichugin, B.Yu., Pichugina A.N. Equations of mathematical physics Course lectures. Omsk: Publishing House of Omsk State University. University, 2016.

Module Identification	**(11.2) Module - Fundamental physics** **Subject: Theoretical mechanics**
Semester(s) in which the module is taught	6
Teacher in charge	Shanina Zamzagul Kuatovna
Language of instruction	Kazakh/Russian

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Relationship to the curriculum	Professional discipline, elective course component
Forms of training	Lecture, practical classes, IWST, SIW.
Teaching load (including contact hours, SIW)	Teaching load (including contact hours, SIW) Total work load: 180 h Contact hours: 60 h (30 h lectures, 30 h practical classes) Independent study, including preparation for exams, in hours: 30 h IWST, 90 h SIW
ECTS	6
Mandatory and recommended prerequisites for studying the module	Mathematical analysis, Differential equations, "Mechanics" course.
Module objectives/ intended learning outcomes	**Learning objective:** To teach students the basic ideas of theoretical mechanics, including the physical basis of the predictions of classical mechanics, and modern ideas about space and time, the important role of conservation laws and their connection with the properties of space and time and the symmetry of force fields, and to teach students to solve various problems in the motion of material points and rigid bodies by mastering various methods of analytical mechanics. **The intended learning outcomes are:** 1. Knowledge of the basic concepts, laws and models of general theoretical physics, competent presentation and interpretation of the results, seeing the applied aspect in solving scientific problems. 2. Ability to formulate the main results of fundamental and applied research in the field of physics and mathematics as a theory related to the phenomenon or law being studied. 3. Ability to use mathematical knowledge and methods to solve practically-oriented problems, analyze quantitative data presented in the form of graphs, diagrams, statistical information analysis, use mathematical methods in the analysis and synthesis of observed physical processes, facts and phenomena. 4. Ability to analyze problems by classifying them in the course of research and know methods for solving them. 5. Ability to check the correctness of the results of the calculation, fill in tables and graphs based on the analysis results, process the results, calculate errors, calculate the percentage of deviation from the theory, draw conclusions, defend and explain the work. 6. Assess the role of the laws of theoretical mechanics in solving current theoretical and practical problems of physics (physical transitions, critical phenomena, astrophysics, biophysics).
Contents	Basic concepts and axioms of statics. Addition of forces. System of cumulative forces. Theory of moments. Reduction of a system of forces to a given center. Any system of forces in a plane. Friction. System of forces in space. Center of gravity. Kinematics of a material point. Vector and coordinate methods of describing motion. Kinematics of a rigid body. Complex motion of a material point. Newton's laws. Galileo's principle of relativity Differential equations of motion of a material point. Basic theorems of dynamics. Dynamics of a mechanical system. Moments of inertia. General theorems of the dynamics of a mechanical system. Relations and their classification. Lagrange's function and Lagrange's equation. Hamilton's function and Hamilton's equations.
Exam form	Traditional (ticket)
Training and examination requirements	- obtaining quality knowledge; - fulfil the teacher's requirements specified in the syllabus; - independently complete all types of work (IWST assignments, coursework, graduation theses, etc.) and submit them to the teacher on time; - use reliable and trustworthy sources of information; - not to provide their work for cheating other students.

References	1. Adyrbekov M.A. Theoretical mechanics, 2018. - http//elib.kz 2. Torekozhaev A. N., Tuganbayeva D. T., Kyrykbaev B. Zh.. Theoretical mechanics. Almaty, 2019. - 502 pages. 3. Alimzhanov M.D., Duzelbaev S.T., Tuyakbaev Sh.T. Theoretical mechanics, 2018. - http//elib.kz 4. Imanbayeva L.Kh. Theoretical mechanics: Textbook, 2019. - http//elib.kz 5. Odiyak B.P., Nametkulova R.Zh., Kadirimbetova A.K. Problems and exercises of the general physics course (fundamentals of classical mechanics, molecular physics and thermodynamics) Part 1, 2020 - http//elib.kz 6. Inkarbekov A. Theoretical mechanics: dynamics: Textbook. - Almaty: Bastau, 2012. - 292 pages. 7. Kurenkeev T.B. Theoretical Physics Course: 1 book. Theoretical Mechanics. Textbook. - Almaty: Evero, 2017. - 106 pages 8. Kairbayev K.K. Fundamentals of classical mechanics. Textbook. - Pavlodar: PSPI Publishing House, 2006. - 176 p. 9. Zholdasbekov O.A., Akhmetov A.K. Collection of theoretical mechanics problems. Textbook. - Almaty: Nauka, 2003. - 394 p. 10. Kozhakhmetova A.K. Theoretical mechanics (collection of problems and examples of solving problems). Textbook, 2003. - 185 p. 11. Abishev M.E. Lecture notes on theoretical mechanics. - Almaty: Kazakh University, 2009. - 128 p. 12. Toybayev S.N., Yerzhanov N.M. Theoretical and applied mechanics. - Almaty: IP "Otan", 2015. - 360 p. 13. Meshchersky I.V. Collection of problems on theoretical mechanics. Uch. allowance. - St. Petersburg: Izd-vo "Lan", 2005. 14. Toibaev S.N. The basis of theoretical mechanics. - Almaty: IP "Otan", 2016. - 76 p. 15. Kepe, O.E. Collection of short problems in theoretical mechanics. - M., 2012. - 620 c. 16. Arkusha A.I. Guide to solving problems in theoretical mechanics. - M.: VSH, 2003. - 336 p. 17. Zhirnov N.I. Classical mechanics. - M., 1980. - 811 c

EP	6B01512-Physics (IP)
Module name	Theoretical Physics -1
Semester	6 semester
Module Responsible	Taskaliyev Abish Kanievich, senior lecturer
Work language	Kazakh language
Correlation with the curriculum	Necessary component
Teaching methods	CER, MOOC, etc.
Study load / Labor intensity	Lectures – 30 hours, practical classes – 30 hours, IWST – 30 hours, IWS – 90 hours (lecture, lesson, laboratory work, project, seminar, etc.).) / 180 hours
Credits/credits	6
Conditions for admission to study within the module	Prerequisites Electricity and magnetism, physics of the atom and atomic nucleus, electrodynamics.
Module objectives/intended learning outcomes	The purpose of the module Teaching students to solve various problems in the movement of a material point and a solid body by demonstrating the basic ideas of theoretical mechanics, which include the physical basis of Theoretical Physics, and modern ideas about space and time, the important role of conservation laws and their relationship with the properties of space and time and the symmetry of force fields, and mastering various methods of analytical mechanics. Learning Outcomes: Mastering the basic knowledge of Theoretical Physics in the field of modern information technologies.

	Be able to formulate the main results of fundamental and Applied Research in the field of physics as a theory related to the studied phenomenon or law. The ability to apply mathematical knowledge and methods to solve practical-oriented problems, analyze quantitative data presented in the form of graphs, diagrams, analysis of information of a statistical nature, apply mathematical methods in the analysis and synthesis of physical processes, facts and phenomena under control. Ability to see the applied aspect in solving a scientific problem, correctly understand and interpret the result; ability to analyze the result and correct the mathematical model underlying the problem. Can check the correctness of the report result, fill out tables based on the results of the analysis, build graphs, process the results, calculate errors and deduce the percentage of deviations from the theory, draw conclusions, defend and explain the work.
Contents	Theoretical physics is the main component of the physical and mathematical literacy of the future specialist. The course narrative course is carried out through the physical justification of the laws of theoretical mechanics and the assignment of various physical movements by Vector and coordinate methods. The important role of conservation laws and their relationship with the properties of space and time and the symmetry of force fields are mentioned. The course discusses various methods of analytical mechanics and focuses on solving various problems in the movement of a material point and a solid body.
Exam form	written
Training and exam requirements	Students who have mastered the course material and scored at least 50% of the overall rating based on the results of the 1st and 2nd intermediate tests are allowed to take the final exam
References	Main literature: 1.Adyrbekov M. A. theoretical mechanics, 2018. (in Kazakh) 2. Torekozhaev A. N., Tuganbayeva D. T., Kyrykbayev B. Zh.. Theoretical mechanics. Almaty, 2019. - 502 pages. (in Kazakh) 3. Alimzhanov M. D., Duzelbayev S. T., Tuyakbayev Sh. T. theoretical mechanics,2018. (in Kazakh) 4. Imanbayeva L. H. theoretical mechanics: textbook, 2019. (in Kazakh) 5. Odiyak B. P., Nametkulova R. zh., Kadirimbetova A. K. problems and exercises of the course of General Physics (fundamentals of classical mechanics, molecular physics and thermodynamics) Part 1,2020. (in Kazakh) 6.Inkarbekov A. theoretical mechanics: dynamics: teaching. - Almaty: Bastau, 2014. - 292 pages. (in Kazakh) 7. Kurenkeev T. B. course of Theoretical Physics: 1 book. Theoretical mechanics. Oculus. - Almaty: Evero, 2017. - 106 pages. (in Kazakh) 8. Abdula zh., Ayazbaev T. lectures of the physics course: textbook. - Almaty: LLP RPBK "ERA", 2014. - 520 pages. (in Kazakh) 9. Akilbekov A. T. Condensed Matter Physics: A. T. Akilbekov, A. T. Dauletbekova, M. V. Zdorovets. - Astana: IM. L. N. Gumileva, 2014. - 129 pages (in Kazakh) 10.Aikeeva, A. A. errors of measurement of physical quantities: educational and methodical manual / Aikeeva A. A. - Almaty: SSK, 2018. - 100 pages. (in Kazakh)

Module Identification	**Module – interdisciplinary connections** **Problems of cosmology**
Semester(s) in which the module is taught	1
Teacher in charge	Shugayeva Tilectes Zhalgasovna
Language of instruction	Kazakh/Russian English

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Relationship to the curriculum	PD EC
Forms of training	Lecture, practical classes, IWST, SIW.
Teaching load (including contact hours, SIW)	Teaching load (including contact hours, SIW) Total work load: 90 h Contact hours: 45 h (15 h lectures, 15 h practical classes, laboratory classes 15 h) Independent study, including preparation for exams, in hours: 3 h IWST, 45 h SIW
ECTS	3
Mandatory and recommended prerequisites for studying the module	Introductory Astronomy. General Physics (especially mechanics and thermodynamics). Basic Calculus and Linear Algebra. Fundamental concepts of modern astrophysics
Module objectives/ intended learning outcomes	**Learning objective:** To provide students with a comprehensive understanding of modern cosmology, its theoretical foundations, observational evidence, and open questions, fostering scientific and philosophical reflection on the Universe as a whole. **The intended learning outcomes are:** ON2 — To collect and interpret information for the formation of knowledge taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, set new goals for their own pedagogical development. ON3 — Critically select theoretical knowledge based on advanced concepts of physics with the help of various information and communication technologies and use the knowledge to improve physics education and their own professional growth. ON5 — To recognize and understand fundamental scientific concepts that have fundamental methodological and theoretical significance for understanding and mastering the physical sciences, to argue their own position of applying and integrating knowledge from other fields of sciences to solve global and local problems of physics. ON7 — Demonstrate strong academic and practical knowledge in the field of physics, operate with forms and methods of scientific knowledge, various ways of mastering the surrounding world, understand the role of science in the development of society. ON8 — To conduct scientific research in the chosen field of experimental and/or theoretical physical research with the help of modern instrumentation and information technology, taking into account domestic and foreign experience. ON9 — Apply modern methods of processing, analysis and synthesis of physical information in their chosen field of physical research, operate with basic mathematical concepts and operations and are able to apply them in solving physical problems, implement analytical and technological solutions in the field of experimental and theoretical physics.
Contents	The course includes basic questions about the structure, origin and evolution of the universe. The theories of the big bang, dark matter and energy, the formation of aggregates and cosmic structures are considered. Students study current research and philosophical aspects of cosmology, expanding their understanding of our place in the universe
Exam form	Traditional (ticket)
Training and examination requirements	- obtaining quality knowledge; - fulfil the teacher's requirements specified in the syllabus; - independently complete all types of work (IWST assignments, coursework, graduation theses, etc.) and submit them to the teacher on time; - use reliable and trustworthy sources of information;

	- not to provide their work for cheating other students.
References	Ryden, B. Introduction to Cosmology. Cambridge University Press, latest edition. Weinberg, S. The First Three Minutes: A Modern View of the Origin of the Universe. Basic Books, 1993. Liddle, A. R. An Introduction to Modern Cosmology. Wiley, latest edition. Mukhanov, V. Physical Foundations of Cosmology. Cambridge University Press, 2005. Peebles, P. J. E. Principles of Physical Cosmology. Princeton University Press, 1993. Harrison, E. Cosmology: The Science of the Universe. Cambridge University Press. Padmanabhan, T. Structure Formation in the Universe. Cambridge University Press. NASA & ESA Online Resources (e.g., HubbleSite, ESA's Planck Mission Archive).

Module Identification	**Module – interdisciplinary connections** **Astronomy**
Semester(s) in which the module is taught	1
Teacher in charge	Shugayeva Tilectes Zhalgasovna
Language of instruction	Kazakh/Russian English
Relationship to the curriculum	PD EC
Forms of training	Lecture, practical classes, IWST, SIW.
Teaching load (including contact hours, SIW)	Teaching load (including contact hours, SIW) Total work load: 90 h Contact hours: 45 h (15 h lectures, 15 h practical classes, laboratory classes 15 h) Independent study, including preparation for exams, in hours: 3 h IWST, 45 h SIW
ECTS	3
Mandatory and recommended prerequisites for studying the module	General Physics (mechanics, optics, thermodynamics). Basics of Mathematics (geometry, trigonometry, algebra). Pedagogical Foundations (for education majors)
Module objectives/ intended learning outcomes	**Learning objective:** To provide future educators with foundational knowledge in astronomy and astrophysics, enabling them to understand celestial phenomena and convey scientific concepts about the Universe effectively in an educational setting. **The intended learning outcomes are:** 1. **ON1** — Possess intercultural and communicative competence, apply skills of independent continuation of further education and build professional relationships in pedagogical and social activities; purposefully use means and methods that ensure the preservation and strengthening of health in professional activities. 2. **ON2** — To collect and interpret information for the formation of knowledge taking into account social, ethical and scientific considerations, critically evaluate their values, attitudes, ethical principles and teaching methods, set new goals for their own pedagogical development. 3. **ON3** — Critically select theoretical knowledge based on advanced concepts of physics with the help of various information and communication technologies and use the knowledge to improve physics education and their own professional growth.

	4. **ON4** — Understand the psychological and pedagogical problems of teaching and educating students with disabilities in inclusive education, take into account the diverse abilities of students in the learning process, ethically support their psychological well-being in the life and educational context. 5. **ON7** — Demonstrate strong academic and practical knowledge in the field of physics, operate with forms and methods of scientific knowledge, various ways of mastering the surrounding world, understand the role of science in the development of society. 6. **ON10** — Conduct integrated lessons with STEAM-learning elements, use CLIL technologies for subject-language teaching of natural subjects. 7. **ON12** — Understand the scientific principles and logic of developing a school physics course, apply various learning technologies in their diversity and to the place.
Contents	During the course, future teachers study basic information about the celestial sphere and coordinate systems, the structure of the Solar System and the phenomena occurring in it, the structure of our Galaxy, and the broader Universe. The course introduces fundamental concepts of astrophysics and methods of astronomical research. Students also explore the historical evolution of humanity's understanding of the cosmos and form a modern scientific view of the structure of the Universe.
Exam form	Traditional (ticket)
Training and examination requirements	- obtaining quality knowledge; - fulfil the teacher's requirements specified in the syllabus; - independently complete all types of work (IWST assignments, coursework, graduation theses, etc.) and submit them to the teacher on time; - use reliable and trustworthy sources of information; - not to provide their work for cheating other students.
References	Main literature: 1. P. I. Bakulin, E. V. Kononovich, V. I. Moroz: Course of General Astronomy: textbook. - M. Nauka, 1970. - 536 p. 2. P. I. Bakulin, E. V. Kononovich, V. I. Moroz: Course of General Astronomy: textbook / P. I. Bakulin, - 3rd corrected ed. - M.: Nauka, 1974. - 512 p. 3. Vorontsov-Velyaminov, B. A.: Collection of problems and practical exercises in astronomy: textbook. - 6th supplemented ed. - M.: Nauka, 1974. - 282 p. 4. Zagaynova, V. I.: Entertaining practical course in astronomy / V. I. Zagaynova, U. K. Tokbergenova. - Almaty : RIK, 2000. - 60 p. 5. Volynsky , B. A.: Astronomy : a tutorial / B. A. Volynsky. - M. : Education, 1971. - 208 p. 6. Solodovnik, A. A., Golovashchenko, I. I. Astronomy: A tutorial, 2011, https://rmebrk.kz/book/56125

Module	Radioelectronics
Semester(s) in which the module is taught	**2**
Teacher in charge	Ainur Serikovna Nurtazina, Senior Lecturer
Language of instruction	Kazakh / Russian
Relationship to the curriculum	Core discipline, university component
Forms of training	Lectures, laboratory work, IWST (Instructor-guided self-study), SIW (Student independent work)

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Teaching load (including contact hours, SIW)	Total workload: 90 hours • 30 contact hours (15 lectures, 15 lab sessions) • 60 hours of independent work (20 IWST, 40 SIW)
ECTS	**3**
Mandatory and recommended prerequisites for studying the module	6B01512 – Physics
Module objectives / intended learning outcomes	Objective: To study the principles and operation of radioelectronic devices, radio frequency (RF) signal processing, modulation techniques, and communication systems. Learning Outcomes: • Understand the fundamentals of radioelectronics and electromagnetic signal behavior. • Analyze and apply components such as oscillators, amplifiers, modulators, and demodulators. • Design and evaluate simple radio circuits. • Use measurement equipment to test RF systems. • Apply theoretical knowledge to solve real-world tasks in telecommunications and wireless systems. • Follow safety practices when working with radioelectronic equipment
Contents	1. Introduction to Radioelectronics 2. Electromagnetic Waves and Signal Propagation 3. RF Signal Generation and Oscillators 4. Modulation and Demodulation Techniques 5. Radio Receiving Systems 6. Basics of Radiolocation and Wireless Communication 7. Components Used in Radio Devices 8. Radio Measurement Techniques 9. Safety Procedures in Radioelectronics
Form of examination **Training and examination requirements**	Traditional written and/or oral ticket-based exam • Attendance and active participation in all sessions • Timely completion of IWST and SIW • Laboratory work reports and assessments • Original and academically honest work • Familiarity with approved textbooks and practical guides
References	1. Vasilyev A.V. Radioelectronics and Radiotechniques: Textbook. — Moscow: Radio i Svyaz, 2020. 2. Kalashnikov A.P. Fundamentals of Radioelectronics. — Moscow: Academia, 2019. 3. Morozov V.V. Radio Receiving Devices. — Moscow: Hot Line – Telecom, 2017. 4. Andreev V.K. Radiotechniques and Communication. — SPb: Lan, 2021. 5. Klyuev V.I. Radioelectronics: University Textbook. — Moscow: Fizmatlit, 2018. 6. Abramenko A.N. Practicum on Radioelectronics. — Moscow: Bauman MSTU Press, 2016. 7. Melnikov A.I. Electronics and Radiotechniques for Beginners. — Moscow: Eksmo, 2020. 8. Bessonov L.A. Theoretical Foundations of Electrical Engineering: Radioelectronics. — Moscow: Vysshaya Shkola, 2019.

Module	Electronics
Semester(s) in which the module is taught	2
Teacher in charge	Ainur Serikovna Nurtazina, Senior Lecturer
Language of instruction	Russian/Kazakh
Relationship to the curriculum	Major discipline, university component
Forms of training	Lectures, laboratory work, IWST (Instructor-guided self-study), SIW (Student independent work)

EP BA 6B01502 – Physics (IP)

Teaching load (including contact hours, SIW)	Total workload: 90 hours • 30 hours contact (15 lectures, 15 lab) • 60 hours independent work (20 IWST, 40 SIW)
ECTS	3
Mandatory and recommended prerequisites for studying the module	6B01512 Physics IP
Module objectives / intended learning outcomes	Objective: To study the principles and functioning of electronic devices, analog and digital electronics, and measurement tools. ● Learning Outcomes: ● Understand basic concepts of electronics and semiconductor devices. ● Analyze and apply electronic circuit components (diodes, transistors, op-amps). ● Work with analog and digital electronic systems. ● Use measuring equipment and interpret experimental results. ● Solve practical problems using acquired theoretical knowledge.
Contents	● Basic concepts of electronics ● Semiconductor devices: diodes, transistors ● Operational amplifiers and analog circuits ● Digital electronics: logic gates, combinational and sequential circuits ● Measuring devices and methods ● Signal processing basics ● Practical applications and safety in electronics
Form of examination	Traditional written and/or oral ticket-based exam.
Training and examination requirements	● Attendance and active participation in all sessions ● Timely completion of IWST and SIW ● Laboratory work reports and assessments ● Original and academically honest work ● Familiarity with approved textbooks and practical guides
	● Attendance and active participation in all sessions ● Timely completion of IWST and SIW ● Laboratory work reports and assessments ● Original and academically honest work ● Familiarity with approved textbooks and practical guides
References	● 1. Lachin V.I., Savelov N.S. Electronics. The training manual.- Rostov b/n: publishing house "Phoenix", 2020- 576 p. (Series "Higher Education"), InEU Reading Room. ● 2. Sidnev Yu.G. Electrical engineering with the basics of electronics. Academic year - 3rd edition- Rostov n/a: Phoenix.- 2022.- 384 p. InEU Reading Room. ● 3. Information and measurement technology and electronics/Edited by G.G. Rannev, Moscow: Academia, 2010. 448 p. ● 4. Electrical engineering and electronics: an illustrated textbook/Edited by butyrina P.A., Moscow: Academia, 2018, 892 p. ● 5. Poster: Electrical engineering and Electronics. Illustrated accounting Edited by Butyrina P.A., Moscow: Academia, 2017. 352 p.

	● 6. Electrical engineering and Electronics/Edited by Petlenko B.I., Moscow: Academia, 2017. 31 p. ● 7. Alyokhin, V.A. Electrical engineering and Electronics. Computer laboratory practice in the TINA-8 software environment: A textbook for universities./V.A. Alekhin. - M.: RiS, 2014. - 208 p. ● 8. Aliverti, P. electronics for beginners. The simplest step-by-step tutorial/P. Aliverti. - M.: Eksmo, 2014. - 160 p. ● 9. Astapenko, V.A. Photoelectronics. Part 1. Applied electronics/Astapenko V.A., Movnin S.M., Protasov Yu.Y. - M.: Janus-K, 2010. - 654 p. ● 10. Baranochnikov, M.L. Micromagnetelectronics. Vol. 2/Baranochnikov M.L. - DMK, 2014. - 888 p. ● 11. Barybin, A.A. Electronics and microelectronics. Physico-technological foundations/A.A. Barybin. - M.: FIZMATLIT, 2006. - 424 p. ● 12. Barybin, A.A. Electronics and microelectronics. Physico-technological foundations/A.A. Barybin. - M.: Fizmatlit, 2008. - 424 p.