NJSC “K. Zhubanov Aktobe Regional University”

Modular guide
on educational program
6B01501-Mathematics

Aktobe
2025

1. Language module

Module	FL 1101 Foreign language
Semester(s) when the module is taught	1
Responsible teacher	Turmaganbetova G.N.
Language of instruction	English
Connection with the curriculum	General education disciplines, core component
Forms of training	Practical classes SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 150 hours Contact hours: 45 hours (45 hours of practical classes) Independent study, including exam preparation: 25 hours of SIWT, 80 hours of SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully complete the course "English Language", students require knowledge of the following aspects of the language: phonetics – basic rules of reading and pronunciation of letters and letter combinations in the flow of speech; spelling – the correct writing of letters and combinations corresponding to specific sounds; vocabulary – the most frequently used words and word-formation patterns; and grammar – fundamental grammatical structures and rules.
Module objectives / expected learning outcomes	**Course Goal:** The goal is to develop students' intercultural and communicative competence in foreign language education at a minimum sufficient level. **Learning Outcomes:** A. Memorize and reproduce key words, phrases, and expressions on familiar topics; identify basic grammar rules and structures at the elementary level; acquire a basic vocabulary including common phrasal verbs. B. Understand simple and familiar texts at a basic level; extract main ideas and information from texts on familiar topics; comprehend basic directions and instructions in English. C. Use basic words, phrases, and grammatical structures to communicate on familiar topics; construct simple sentences and short texts; apply language skills in everyday situations such as greetings, introductions, asking questions, and expressing basic needs. D. Identify main ideas and details in simple English texts; recognize basic grammar structures and vocabulary; analyse and correct mistakes and inconsistencies in their own speech. E. Assess their level of English proficiency by identifying strengths and weaknesses; evaluate the logic of text structure; maintain conversations on studied material; give recommendations in everyday situations; use language tools effectively and independently correct mistakes.
Content	In the course of foreign language teaching, various types and forms of work are employed to prepare students for the future use of English for professional purposes, as well as for cognitive and communicative activities.
Form of examination	Oral exam
Training and Examination requirements	Regular attendance and active participation in class activities are required. Completion of homework assignments, including vocabulary, grammar, writing, listening, and reading tasks, is expected. Participation in dialogues, role-plays, and oral mini-presentations on everyday topics is essential. Students should demonstrate progress in all four language skills: listening, speaking, reading, and writing.

List of 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. Professional English Language: Textbook / Chernyaeva E.V., Zelenkova S.K. Moscow: MGTU GA, 2014. 3. Oxford Qazaq Dictionary: for the study of the discipline / Kazakh-English and English-Kazakh dictionary. Project leader: R. Kenzhekhanuly. Almaty: National Translation Bureau, 2023. 65 copies. 4. Chazal, E., Rogers, L. Oxford EAP: A Course in English for Academic Purposes. Intermediate/B1+ Teacher's Handbook. China: Oxford University Press, 2013. 30 copies. 5. Professionally-Oriented Foreign Language (English): Textbook / Compilers A.H. Amerkhanova, M.K. Karimbergenova, B.M. Yesengeldin; Pavlodar State University named after S. Toraygyrov. Pavlodar: Toraighyrov University, 2019. 68 pages. ISBN 978-601-238-936-4. https://rmebrk.kz/ 6. Batinova, A.S., Turzhanova, G.N. Practical Course of English Language: for all specialties and directions / Aktobe: K. Zhubanov AGU Publishing, 2008. 7. Nakesheva, S.T. Methodological guidelines for practical classes in the discipline "English Language" for 1st-2nd year full-time students. Aktobe, 2014. http://neb.arsu.kz/view?rid=5239&fid=5222 8. Baizhanova, A.A., Musralina, A.S. Collection of English Language Tests with Exercises for the Discipline Study / Aktobe: IC ARGU named after K. Zhubanov, 2015. 9. Berstenova, A.B. English Grammar Reference Book with Training Exercises. Aktobe, 2014. http://neb.arsu.kz/view?rid=5236&fid=5220 10. Berstenova, A.B. Collection of Exercises for English Grammar Reference. Aktobe, 2015. http://neb.arsu.kz/view?rid=5237&fid=5221 11. Shevyakova, V.E. Modern English: Word Order, Information Structure, Intonation / Moscow: Nauka, 1980. 12. Sabitova, Leila Seitzharovna. The Aspectual System of the Russian Verb and Methods of its Transformation into Kazakh and English: Abstract of Dissertation for PhD (10.00.00) / L.N. Gumilyov Eurasian National University. Astana, 2010. 28 pages. 13. Masalimova, A.S. English Grammar Reference with Training Exercises / Edited by A.S. Masalimova. ARGU Publishing Center named after K. Zhubanov, 2014. 77 pages. http://neb.arsu.kz/view?rid=5236&fid=5220

Module	FL 1101 Foreign language
Semester(s) when the module is taught	2
Responsible teacher	Turmaganbetova G.N.
Language of instruction	English
Connection with the curriculum	General education disciplines, core component
Forms of training	Practical classes, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload:150 hours Contact hours: 45 hours (practice classes), independent study, including exam preparation: 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 A1 'minimal-sufficient' level, which corresponds to the pre-threshold level of foreign language proficiency according to the Common European Framework of Reference for Languages.
Module objectives / expected learning outcomes	**Course Goal:** To develop students' intercultural-communicative competence through foreign language education at the A2 level of the Common European Framework of Reference for Languages. **Learning Outcomes:** A. Identify the topic of a text or dialogue, recognize grammatical structures, and ask and answer simple questions related to the material. B. Reproduce the main ideas of listened or read texts, logically organize parts of a text or dialogue, support conversations and discussions on familiar topics, and simulate everyday life situations. C. Analyze grammatical structures in context, break texts into logical parts, paraphrase and interpret content in simple terms. D. Compose dialogues, summarize studied material, and describe everyday life situations. E. Evaluate the logic of text construction, form opinions on texts or dialogues, maintain conversations based on studied material, and provide practical recommendations for everyday life.
Content	English language teaching in higher education is an independent and comprehensive course designed to provide students with training in the discipline of 'Foreign Language,' which is a compulsory part of the general education cycle. The course covers topics related to socio-domestic and socio-cultural spheres of communication and focuses on developing intercultural-communicative competence at the basic standard level. Students will learn and understand common English words and phrases that include fundamental information about personal and family life, shopping, work, and location. At this level, learners are expected to speak clearly on simple everyday topics, with a vocabulary ranging from approximately 1500 to 2500 words. The Foreign Language course at the A2 level aims to build essential language skills and abilities for communication in straightforward, everyday situations. Students develop the capacity to understand and use frequently occurring expressions and phrases, as well as to read and write simple texts.
Form of examination	Oral exam
Training and Examination requirements	Mandatory attendance at practical classes, active participation in discussions, thorough preparation beforehand, and timely, high-quality completion of assignments are required. Participation in all forms of assessment is also essential. The final assessment is conducted as an oral exam based on ticket questions. This examination follows the university's academic integrity policy and exam regulations, with questions designed according to Bloom's taxonomy.
List of literature	**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. *Professional English Language: Textbook* / Chernyaeva E.V., Zelenkova S.K. – Moscow: MGTU GA, 2014. 3. *Oxford Qazaq Dictionary:* For discipline study / Kazakh-English and English-Kazakh dictionary. Project leader: R. Kenzhehanuly. – Almaty: National Translation Bureau, 2023. 65 copies.

	4. Chazal, E., Rogers, L. *Oxford EAP. A Course in English for Academic Purposes. Intermediate/B1+ Teacher's Handbook.* China: Oxford University Press, 2013. 30 copies. 5. *Professionally-Oriented Foreign Language (English): Textbook* / Compiled by A.Kh. Amerkhanova, M.K. Karimbergenova, B.M. Yesengeldin; Pavlodar State University named after S. Toraighyrov. – Pavlodar: Toraighyrov University, 2019. 68 pages. ISBN 978-601-238-936-4. https://rmebrk.kz/ **Educational and methodical literature:** 1. Batinova, A.S., Turzhanova, G.N. *Practical English Course: for all specialties and training directions.* Aktobe: Publishing House of K. Zhubanov AGU, 2008. 2. Nakesheva, S.T. *Methodological Guidelines for Practical Classes in the Discipline "English Language" for First- and Second-Year Full-time Students.* Edition: Aktobe, 2014. http://neb.arsu.kz/view?rid=5239&fid=5222 3. Baizhanova, A.A., Musralina, A.S. *Collection of Tests with English Language Tasks: for studying the discipline.* Aktobe: IC ARGOU named after K. Zhubanov, 2015. 4. Berstenova, A.B. *Handbook on English Grammar with Practice Exercises.* Edition: Aktobe, 2014. http://neb.arsu.kz/view?rid=5236&fid=5220 5. Berstenova, A.B. *Collection of Exercises from the English Grammar Reference Book.* Edition: Aktobe, 2015. http://neb.arsu.kz/view?rid=5237&fid=5221 **Scientific literature:** 1. Shevyakova, V.E. *Modern English Language: Word Order, Information Structure, Intonation.* Moscow: Nauka, 1980. 2. Sabitova, Leila Seitzharovna. *The Aspectual System of Russian Verbs and Methods of Its Transformation into Kazakh and English: Abstract of a Dissertation for the Degree of Doctor of Philosophy (PhD).* L.N. Gumilyov Eurasian National University. Astana, 2010. 28 pages. 3. Masalimova, A.S. *English Grammar Reference Book with Practice Exercises.* Edited by A.S. Masalimova. Publishing Center of ARGOU named after K. Zhubanov, 2014. 77 pages. 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. English dialogue trainer of varying difficulty levels. https://catchenglish.ru/dialogi/dialogi-srednej-slozhnosti/at-the-pub.htm

Module	K(R)L 1102 Kazakh (Russian) language
Semester(s) when the module is taught	1, 2
Responsible teacher	Tuleusheva Salima Diasovna
Language of instruction	Kazakh/Russian
Connection with the curriculum	General education disciplines, core component
Forms of training	Practical classes, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 150/150 h Contact hours: 45/45 hours of practical classes Independent study, including preparation for exams: 25/25 hours SIWT, 80/80 hours SIW
ECTS	5, 5
Mandatory and recommended prerequisites for studying the module	Participation in all types of classes requires preliminary preparation and active engagement. The successful development of this module depends on the knowledge, skills, and abilities acquired from studying the courses Russian Language and Practical Russian Language.
Module objectives / expected learning outcomes	**Course Goal:** To develop students' knowledge and practical skills in modern Russian language, aligned with established philological traditions and contemporary scientific paradigms. **Learning Outcomes:** A. Demonstrates proficiency in the literary form of the Russian language, mastering basic methods and techniques of various types of oral and written communication. B. Formulates well-reasoned arguments and solves professional tasks using the Russian language. C. Analyzes the language situation in Kazakhstan, identifying issues related to national linguistic originality, culture, and the ethnic and cultural context within a global perspective. D. Explains the studied rules of spelling, orthoepy, and punctuation. E. Communicates effectively in Russian, adhering to the norms of spelling and punctuation.
Content	The discipline is aimed at developing the language personality of the learner, enabling them to engage in cognitive and communicative activities in the Russian language and in various communication contexts within the framework of state programs on trilingualism, spirituality, and the modernization of national consciousness. It focuses on building competencies based on national identity and cultural codes, fostering qualities of internationalism, tolerance, and respect for world cultures and languages. The course also incorporates advanced modern technologies to support the modernization of the country and the future career growth of specialists. The teaching methods used will include seminars and blended learning approaches such as flipped classrooms, face-to-face sessions, collaborative "change worker zones," and individual rotary models. Additional techniques involve exercises, brainstorming sessions, training, dispute-dialogues, and case studies.
Form of examination	Oral exam (tockets)
Training and Examination requirements	All students are required to attend classes regularly and arrive on time. Tasks for practical classes, SRO/SROP, boundary, and intermediate controls must be submitted promptly; late submissions will not be accepted. During classes and assessments, including current, milestone, and final controls, the use of mobile phones is prohibited unless the teacher explicitly allows it.

List of literature	**Educational Literature in Print Format:** 1. Zhanalina, L.K., Musataeva, M.Sh. *Practical Well Russian Language: Textbook*. Almaty: PrintS, 2005. 529 p. 2. Rosenthal, D.E. *Russian Language [Text]: Collection of Rules and Exercises*. M.: Eksmo, 2018. 464 p. 3. Chekina, E.B., Sansyzbaeva, S.K., Abaeva, Zh.S. *Professionally Oriented Russian Language: Educational Allowance*. Almaty: Kazakh Universities, 2017. 272 p. 4. Ippolitova, N.A., Knyazeva, O.Yu., Savova, M.R. *Russian Language and Culture Speeches in Questions and Answers: Educational Manual*. M.: Prospect, 2016. 344 p. 5. Balykhina, T.M. *Basics Theories Tests and Practice Testing (in terms of Russian Language as Foreign): Study Allowance*. M.: MGUA, 2003. 242 p. **In Electronic Editions:** 6. Zhanalina, L.K., Musataeva, M.Sh. *Practical Well Russian Language: Textbook*. Almaty: PrintS, 2005. 529 p. Republican Interuniversity Electronic Library. https://rmebrk.kz **Educational and Methodological Literature in Print Format:** 7. Aikenova, R., Elgina, S.I. *Russian Language for Foreign Students: Educational and Methodological Complex*. Almaty: Evero, 2015. 256 p. 8. Grekov, V.F., Chizhov, V.V. *Benefit for Classes by Russian Language in Senior Classes*. M.: OOO Publishing House Onyx, OOO Publishing House Peace and Education, 2008. 512 p. 9. Khavaidarova, M.M. *Russian Language [Text]: Educational Manual*. Almaty: Aknur, 2018. 186 p. 10. Bespayeva, K.A., Tazhinina, A.B. *Russian Language for Students Educational Programs [Text]: Educational Manual*. [B.m.]: med, 2020. 102 p. 11. Baitenova, R.M. *Practical Stylistics Russian Language [for Students Non-Linguistic Specialties]: Collection of Exercises*. Karaganda: Medet Group, 2020. 121 p. **In Electronic Publications:** 12. Igenbay, T.E., Zhandykeeva, G.E., Yegizbaeva, Z.S. *Practical Course Russian Language: Educational Allowance*. Almaty: "Girls University" Publishing House, 2016. 121 p. Republican Interuniversity Electronic Library. https://rmebrk.kz 13. Karavanova, N.B. *Matryoshka: Elementary Practical Course Russian Language: Course*. M.: Russian Language, 2015. 336 p. Republican Interuniversity Electronic Library. https://rmebrk.kz 14. Iskakova, A.G., Rumyantseva, E.V. *Intensive and Practical Course Russian Language: Educational Allowance*. Almaty: Izd-vo "Girls University", 2015. 260 p. Republican Interuniversity Electronic Library. https://rmebrk.kz 15. Sarsenova, Sh.A., Shuzheeva, J.L., Imanbekova, J.B. *Russian Language*. Almaty, 2017. Aktyubinsk Regional University im. K. Zhubanova. http://neb.arsu 16. Kovnyova, I.A., Rubtsova, E.V., Chirkova, V.M. *Russian Language: Educational and Methodological Allowance for Russian as Foreign for 2-3 Courses for International Students*. Aktyubinsk Regional University named after K. Zhubanova, 2016. http://neb.arsu **Scientific Literature in Print Format:** 17. Kurmanova, B.J., Khalimullina, N.R., Islamgalieva, V.Zh. *New Approach to Teaching Philological Disciplines*. Monograph. Aktobe: LLP Liter A, 2021. 226 p. **In Electronic Publications:** 18. Ungarbaeva, G. *Education Russian Tongue as Non-Native / Foreign in Special Goals: Theory and Practice: Collective Monograph*. 2018. Aktyubinsk Regional University im. K. Zhubanova. http://neb.arsu 19. Idrisova, E. *Current Problems Modern Philology*. 2019. Aktyubinsk Regional University im. K. Zhubanova. http://neb.arsu 20. *Innovative Technology in Three Languages Education: Work Scientific Schools Professor M.R. Kondubeva* [Text]: Monograph. Almaty, 2015. 218 p. Kazakhstan National Electronic Library. http://kazneb.kz

2. Module - General education

Module	MHK 1103 The modern history of Kazakhstan
Semester(s) when the module is taught	1
Responsible teacher	Abdullaev Nurtaza
Language of instruction	Russian, Kazakh
Connection with the curriculum	General education disciplines, core component
Forms of training	Lectures, practical classes, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 150 h Contact hours: 45 h (30 h lectures, 15 h practical classes) Independent study, including preparation for exams: 25 hours SIWT, 80 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. Law".
Module objectives / expected learning outcomes	**Course Goal:** To provide objective knowledge about the main stages of the development of the history of Kazakhstan from ancient times to the present. **Learning Outcomes:** Upon completion of the course, the student: A. Demonstrates knowledge and understanding of world history and the history of Kazakhstan, mastering a system of theoretical knowledge on fundamental issues in historical sciences, and reflects the place and role of Kazakhstan in world history and cultural processes. B. Demonstrates knowledge of the history of Kazakhstan from ancient times to the present day, integrating general, specific, and individual facts into a holistic understanding of world development. C. Analyzes phenomena from Kazakhstan's past and present with historicism and a dialectical understanding of the multidimensional and contradictory nature of historical processes. D. Possesses the ability to comprehensively and critically analyze information from various historical and contemporary sources, independently and creatively interpreting social development issues of both past and present. E. Shows a respectful attitude towards national and world history and culture, along with a commitment to preserving and enhancing humanity's material and spiritual heritage. F. Assesses the uniqueness of modern Kazakhstan's development, critically evaluates historical processes, and identifies ways to address current social challenges.
Content	The program for the discipline "History of Kazakhstan" consists of five thematic blocks: ancient peoples and the formation of nomadic civilization, Turkic civilization and the Great Steppe, Kazakhstan in the new era (18th to early 20th centuries), Kazakhstan in the Soviet period, and independent Kazakhstan. The discipline "History of Kazakhstan" is mandatory for all educational programs. The methods and technologies used in teaching this discipline include interactive and digital technologies, project-based learning, problem-based learning, as well as techniques such as "Jigsaw," "Insert," "Problem Lecture," working with historical documents, "Fishbone," and others.
Form of examination	Computer test
Training and Examination requirements	Mandatory attendance of classroom lessons, active participation in discussions, and thorough preparation for lectures and practical classes are required. Students must complete SRO assignments with quality and on time, and participate in all forms of assessment. Those who have mastered the course material and scored at least 50% of the total rating from the first and second midterm assessments are eligible to take the state exam.

List of literature	1. Abusseitova, M.Kh. *Kazakhstan and Central Asia in the 15th-17th centuries: History, Politics, Diplomacy*. Almaty: Daik-Press, 1998. 592 p. 2. Abylkhozhin, Zh.B. *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. *Country in the Heart of Eurasia: Stories on 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. 5. Abdullaev, N.A. *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. *History of Kazakhstan: Textbook*. Almaty: TOO "Medet Group", 2019. 296 p. 8. *History of Kazakhstan. Documents and Materials (1917–2012): Reader*. Almaty: Shanyrak Media LLP, 2017. 320 p. 9. Nazarbayev, N.A. *Era of Independence*. Astana, 2017. 508 p. 10. Khafizova, K.Sh. *Steppe Rulers and Their Diplomacy in the 18th-19th 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): Study Guide for Specialty 050114 "History"*. Petropavlovsk: IPO SKSU named after M. Kozybaev, 2012. 100 p. Available at: 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. 350 p. ISBN 978-601-7342-14-2. Available at: https://djvu.online/file/Q5IG53yDUwRAo 13. Abzhanov, Kh.M. et al. *History of Independent Kazakhstan* [Monograph]. Ministry of Education and Science of the Republic of Kazakhstan, Ch. Ch. Valikhanov Institute of History and Ethnology. Almaty: Kazakh Encyclopedia, 2011. 399 p. Available at: https://rusneb.ru/catalog/000199_000009_005379944/ 14. Erofeeva, I.V. *Symbols of Kazakh Statehood (Late Middle Ages and Modern Times)*. Almaty: Daik-Press, 2001. 256 p. 15. Erofeeva, I.V. *Khan Abulkhair: Commander, Ruler, Politician*. Almaty: Daik-Press, 2007. 456 p. 16. Ismagulov, O., Ismagulova, A. *Origin of the Kazakh People According to Physical Anthropology*. Almaty, 2017. 196 p. 17. Kumekov, B.E. *The State of the Kimaks in the 9th-11th 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 Repressions in Kazakhstan in the 1920s–1940s*. Almaty, 2009. 448 p. 20. Masanov, N.E. *Nomadic Civilization of the Kazakhs: The Foundations of Life of a Nomadic Society*. Almaty: Gorizont, 1995. 320 p. 21. Sultanov, T.I. *Raised on a White Felt Mat: Khans of the Kazakh Steppes*. Astana: Astana Damu, 2006. 256 p.

Module	Phil 1104 Philosophy
Semester(s) when the module is taught	1
Responsible teacher	Senior teacher Yeshniyazova Ainur Chapaevna
Language of instruction	Kazakh/Russian
Connection with the curriculum	General education disciplines, core component
Forms of training	Lectures, practical classes, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 150 h Contact hours: 45 h (30 h lectures, 15 h practical classes) Independent study, including preparation for exams: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully master the philosophy course, no special prior training is required, but having some basic knowledge and skills is beneficial. These include skills in reading and understanding texts, critical thinking, the ability to analyze arguments, identify logical errors, and formulate your own point of view. Additionally, literacy and the ability to clearly express thoughts, as well as an interest in fundamental questions such as "why" and "what for," are important. Philosophy begins with wonder and the desire to understand the underlying causes of phenomena, the meaning of life, justice, truth, and other profound topics.
Module objectives / expected learning outcomes	**Course goal:** To develop in students the ability to think critically, analyze deeply, and understand fundamental questions of existence, knowledge, morality, consciousness, and society. **Learning outcomes:** A. Develop skills of argumentation and logical thinking, including the ability to construct, analyze, and evaluate arguments. B. Cultivate the ability to think independently by understanding different points of view and forming one's own position. C. Gain an introduction to key philosophical traditions and concepts such as being, epistemology, ethics, and philosophy of mind. D. Understand the historical context of the development of philosophical thought, from antiquity to modern philosophy.
Content	The material of the basic philosophy course is presented as a concise series of lectures that cover a wide range of the most important philosophical topics outlined by the state educational standard. The textbook includes precisely those questions typically asked of students during exams to assess their understanding and depth of knowledge. Philosophical problems are analyzed in close connection with humanism, legal consciousness, and other forms of spiritual and value-based understanding of reality. This course will help students develop their own philosophical perspectives and independently engage with complex life issues based on their knowledge of philosophical material.
Form of examination	Computer test
Training and Examination requirements	Educational requirements during the semester include attendance of classes, regular and mandatory participation in lectures and seminars, active involvement in seminars, studying philosophical texts, mandatory reading of primary sources, preparation for discussing key ideas in seminars, writing written works such as essays, reports, or analytical notes on course topics, and participation in all forms of assessment.

List of literature	1. Khasanov, M.Sh. *Philosophy* (sign language translation). Textbook recommended by Kazakh National University named after al-Farabi, aligned with the standard program of the Ministry of Education and Science of the Republic of Kazakhstan. 2. Abisheva, A.K. *Philosophy*. Textbook for students, master's students, and PhD students of higher educational institutions. Edited by Z.K. Shaukenova. 3. Nurysheva, G.Zh. *Philosophy*. Almaty, 2013. 4. Petrova, V.F., Khasanov, M.Sh. *Philosophy*. Almaty, 2014. 5. Barlybaeva, G.G. *Evolution of Ethical Ideas in Kazakh Philosophy*. Study, Almaty, 2011. 6. Segizbayev, O.A. *History of Kazakh Philosophy*. Translated by Nurysheva G.Zh. and M. Sabit. Almaty, 2017. 7. Begalinova, K.K., Alzhanova, U.K. *Philosophy* (Parts 1 and 2). Almaty, 2014. 8. Masalimova, A.R., Altaev, J.A., Kasabek, A.K. *Kazakh Philosophy*. Textbook. Almaty, 2018. 9. Hess, R. *25 Key Books on Philosophy*. 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. 12. Kenny, A. *New History of Western Philosophy*, Volumes 1–4. Oxford University Press, 2006–2010. 13. Humphreys, P. *The Oxford Handbook of Philosophy of Science*. Oxford University Press, 2016. 14. Estlund, D. *The Oxford Handbook of Political Philosophy*. Oxford University Press, 2017. 15. Cappelen, H., Gendler, T., Hawthorne, J. *The Oxford Handbook of Philosophical Methodology*. Oxford University Press, 2016.

Module	MSPK 1105 The module of the social and political knowledge
Semester(s) when the module is taught	1, 2
Responsible teacher	Sarsembeen W.K.
Language of instruction	Kazakh/Russian
Connection with the curriculum	General education disciplines, core component
Forms of training	Lectures, practical classes, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 120 h Contact hours: 40 h (20 h lectures, 20 h practical classes) Self-study, including preparation for exams: 20 hours SIWT, 60 hours SIW
ECTS	4, 4
Mandatory and recommended prerequisites for studying the module	To study the module "Social and Political Disciplines," the student must have knowledge of history, society and culture, law, and a social and humanitarian orientation.
Module objectives / expected learning outcomes	The goal is to promote the development of students as future specialists and responsible citizens of the state. This involves explaining the nature of society, its laws of development, internal structure, and the functioning of social institutions. It also focuses on forming professional qualifications with a high level of political culture, enabling students to deeply understand policies pursued both globally and nationally, and to contribute to their development.
Content	The concept of society, its social structure, and the laws governing its development. The role of sociology and political science in studying the characteristics of the socio-economic and political development of modern society. The main categories of sociology and political science, sociological research methods, types and functions of social institutions, the role of the family as a social institution, the state, political consciousness, political culture, political ideology, the influence of the political elite on the spiritual and political life of the state, and the activities of political parties.
Form of examination	Computer test
Training and Examination requirements	Complete mastery of the course topics, thorough study of the relevant literature, understanding the specifics and relevance of each subject, and deep knowledge of the social structure of society, the activities of political institutions, as well as the methods and techniques of social and humanitarian sciences.
List of literature	**Core reading** 1. Brinkerhof, D. *Fundamentals of Sociology: Textbook* / D. Brinkerhof; D. Waits, S. Ortega (translators). Almaty: National Translation Bureau, 2018. pp. 215–221. 2. Ritzer, D. *Theory of Sociology: Textbook* / D. Ritzer; D. Stepnitsky (translator). Almaty: National Translation Bureau, 2018. 856 p. 3. Gabdullina, K. *Sociology: Textbook*. Almaty: Nur-Press, 2019. 210 p. ISBN 978-9965-830-86-0. 4. *Sociological and Analytical Studies on Language Policy in the Republic of Kazakhstan: Social Research*. Ed. Committee for Language Development of the Ministry of Culture and Sports of the Republic of Kazakhstan. Astana: Sana LLP, 2018. 145 p. 5. Nazarbayev, N. *Bolashaka Bagdar: Ruhani Zhangyru: A Look into the Future — Modernization of Public Consciousness*. Astana: REGIS-ST Polygraph, 2017. 55 p. 6. Sarsenbekov, N.Zh. *Poison from Politics (Table): Reading Tool*. Almaty: SSK, 2017. 84 p. 7. Sydykov, U. *Political Science*. Almaty, 2012. pp. 53–62. 8. Rakhymbayeva, A. *Political Science (Medical Works Collection)*. Astana, 2012. pp. 67–81, 137–141. 9. Absattarov, R. *Fundamentals of Political Science. Volume 1: Reading Tool*. Almaty: Karasay, 2018. 472 p. 10. Absattarov, R. *Fundamentals of Political Science. Volume 2: Reading Tool*. Almaty: Karasay, 2018. 460 p.

Module	ICT 1106 Information and communication technologies
Semester(s) when the module is taught	1
Responsible teacher	Shangytbaeva G.A.
Language of instruction	English
Connection with the curriculum	General education disciplines, core component
Forms of training	Lectures, practical classes, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 150 h Contact hours: 45 h (15 hours of lectures, 15 hours of practical classes, 15 hours of laboratory classes) Self-study, including preparation for exams: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	For development of this module are necessary knowledge, skills and abilities acquired at studying subject ov natural sciences in secondary school.
Module objectives / expected learning outcomes	**Course goal:** To train highly qualified specialists capable of applying modern information technologies in the professional sphere and to develop the ability to critically evaluate and analyze processes, methods of searching, storing, and processing information, as well as methods of collecting and transmitting information through digital technologies. **Learning Outcomes:** 1. Know and understand the basic methods and tools for processing, storing, transmitting, and accumulating information; the fundamental concepts of automated information processing; the goals and principles of using system and application software; and the basic components and operation principles of information and telecommunication networks. 2. Use information resources, mobile and cloud services, Internet resources, and automated workflows to search for and store information, applying methods and tools for information protection. 3. Be able to manage and analyze data in various fields using digital technologies based on information security tools, e-learning methods, and basic software techniques. 4. Create algorithms and flowcharts, develop programs, test and configure hardware and software, assemble devices, and evaluate the reliability of software and hardware. 5. Use automated systems in office work and specialized software to solve industry-specific problems; understand the purpose and significance of information in modern society; have knowledge of basic information security, including preserving state interests and values; master the use of modern information technology in professional activities; and develop various forms of e-learning to enhance professional knowledge. 6. Develop programs for individual computer work, master necessary methods for generalizing information, and analyze required information via the Internet, abstract journals, and electronic libraries. 7. Assess the significance of the course material, analyze the results obtained during practice, and evaluate the validity of the conclusions. 8. Work effectively both individually and in teams, balancing personal interests with common goals; analyze and organize information obtained from various sources. 9. Evaluate the development of project activities in the specialty using modern ICT. 10. Assess the stages of analysis of results obtained during practice, verify the conformity of conclusions, and evaluate the formation of project activities in the specialty using modern ICT.

Content	Information and communication technologies are one of the fundamental fields of scientific knowledge, involving a systemic informational approach to analyzing the surrounding world and studying methods and tools for acquiring, transmitting, storing, and using information. The course "Information and Communication Technologies" is aimed at studying the updated content of this general educational discipline. It develops the ability to critically understand the role and importance of modern information and communication technologies in the era of digital globalization, fosters new "digital" thinking, and equips students with knowledge and skills for using modern information and communication technologies in various types of activities.
Form of examination	Computer test
Training and Examination requirements	Mandatory attendance of online and in-person classes, active participation in discussions, preliminary preparation for lectures and practical sessions, high-quality and timely completion of SRO assignments, and participation in all forms of assessment.
List of literature	1. Alshanov, A.K., Abildinova, G.M., Ramazanova, D.A. *Information Communication Technologies: Educational–Methodical Manual*. Almaty: CyberSmith, 2017. 176 p. 2. Urmashev, B.A. *Information and Communication Technology: Textbook*. Almaty, 2016. 410 p. ISBN 978–601–7940–02–7. (Textbook in English, approved by the Ministry of Education and Science of the Republic of Kazakhstan) 3. Bidaybekov, Y.Y. *Mathematical Modeling and Numerical Methods: Textbook*. Almaty, 2016. 416 p. 4. Jomartova, Sh.A. *IT Infrastructure: Textbook*. Almaty, 2016. 308 p. 5. Kisselyova, E.A. *Theoretical Foundations of Computer Science: Textbook*. Almaty, 2016. 265 p. 6. Tokhmetov, A.T., Tanchenko, L.A. *Lecture Course on Computer Science: Textbook*. Almaty: TekhnoErudit, 2018. 440 p. 7. Balapanov, E.K. *New Information Technologies: 30 Lessons in Computer Science: Textbook*. 6th ed., revised and supplemented. Almaty: CyberSmith, 2017. 340 p. 8. Aman, K.P., Ilyasova, T.Zh. *Informatics: Methodological Guide to Practical Classes*. Aktobe: K. Zhubanov AMU BO, 2015. 109 p. 9. Muhambetzhanova, S.T. *Informatics: 6th Grade Textbook*. Almaty: Atamura, 2018. 192 p. 10. Salgaraeva, G.I. *Informatics: 6th Grade General Education School Textbook*. Astana: Arman-PV, 2018. 176 p. 11. Kobdikova, Zh.U., Kopeeva, G.A., Kaptagayeva, A.A., Yusupova, A.G. *Information and Communication Technologies: Textbook for Grade 4*. Nur-Sultan: Arman-PV, 2019. 144 p. 12. Kupeeva, G.A. *Information and Communication Technologies: Textbook for 3rd Grade*. Astana: Arman-PV, 2018. 128 p. 13. Kopeeva, G.A. *Informatics: Textbook for Grade 5 of General Education School*. Astana: Arman-PV, 2018. 192 p. 14. Salgaraeva, G.I. *Informatics: Textbook for Grades 6–10*. Nur-Sultan: Arman-PV, 2019. 176 p. 15. Alibiev, D.B., Nesterik, E.V., Zhumasheva, A.T., et al. *Anglo-Russian-Kazakh Dictionary of Computer and Internet Terms: For the Study of the Discipline*. Almaty: Evero, 2018. 264 p.

Module	UR 1201 Ulttyq rýhanıat
Semester(s) when the module is taught	2
Responsible teacher	Begimbaeva Zh.S.
Language of instruction	Kazakh
Connection with the curriculum	Basic disciplines, University-specific component
Forms of training	Lectures, practical classes (seminars), SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	General working load : 150 hours Time: 45 hours (30 hours lectures, 15 hours practical classes) Personal education, including exam preparation, in hours: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	Understanding of issues related to ethnicity, the historical and contemporary role of the Kazakh people, concepts of national spirituality, national identity, core national values, and national self-awareness.
Module objectives / expected learning outcomes	The course is designed to cultivate a modern personality grounded in spiritual and moral values, fostering respect for both national and universal principles, folk traditions, and the rich heritage of the Kazakh people.
Content	The study system focuses on spiritual values, Kazakh national identity, ethnocultural roots, spirituality, national consciousness, traditions, customs, religious tolerance, rituals, art, literature, national education, and traditional culture. Its aim is to shape broad worldviews, foster benevolence and goodwill in attitudes toward others, and encourage the pursuit of positive values. The disciplines explore the formation of spiritual and moral qualities in individuals, nurturing respect for both global and universal human values, as well as national traditions and spiritual heritage.
Form of examination	Computer test
Training and Examination requirements	Mandatory attendance at all in-person classes and activities; active participation in discussions; thorough preparation for lectures and practical sessions; high-quality and timely completion of SRS assignments; participation in all forms of assessments.
List of literature	1. Tokayev, K.-Zh. *Abai and Kazakhstan in the 21st Century*. Kazakhstanskaya Pravda, January 9, 2020. 2. Nysanbaev, A.N. Development of Farabi Studies in Kazakhstan: Results, Problems and Prospects. *Questions of Philosophy*, No. 5, 2011, pp. 119–129. 3. Ardakani, R.D. *Farabi – The Founder of Islamic Philosophy*. Translated from Persian by A. Absalikova. Moscow: Sadra LLC, 2014. – 132 p. 4. Hodja Ahmet Yassaui. In: *Kazakhstan. National Encyclopedia*, Vol. V. Almaty: Kazakh Encyclopedias, 2006. 5. Balasaguni, Yusuf Khas Khajib. In: *Kazakhstan. National Encyclopedia*, Vol. I. Almaty: Kazakh Encyclopedia, 2004. 6. Kunanbayev, A. *Book of Words* (See Word). Translated by R. Seisenbaeva. Semipalatinsk, 2001. 7. *Twenty Poems by Abai* (All known translations compiled and translated by M. Adibaev). Almaty, 2005. 8. Abay Kunanbaev. *Selected Works* (Series "Wisdom of Ages"). Moscow: Russian Rarity, 2006. 9. Artykbaev, J.O. *Ethnology and Ethnography: Textbook*. Astana: Foliant, 2001. – 304 p. 10. Kadirkulova, A.N. *Kazakh People's Ethnology: Educational and Methodological Complex*. Specialist program 5B050114 – History. Aktobe: K. Zhubanov Aktobe Regional State University, 2014. – 55 p.

3. Professional module

Module	EM 1202.Elementary mathematics
Semester(s) when the module is taught	1
Responsible teacher	Tilesov N. N.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic disciplines, University-specific component
Forms of training	Practical classes, SWIT/SWI
Academic load (incl. contact hours and SIW - Students' Independent Work	Total work load: 180 hours Contact hours: 60 hours (60 hours of practical exercises) Self-study, including exam preparation: 90 h - SIW, 30 h - SIWT
ECTS	6
Mandatory and recommended prerequisites for studying the module	Mastering this module requires knowledge,skills and abilities acquired during the study of the following courses:Subjects geometry and algebra in secondary school
Module objectives / expected learning outcomes	**Course Goal:** To professionally and methodically prepare future mathematics teachers to teach elements of probability theory and mathematical statistics at school. **Learning Outcomes:** A. Know the relationship between chapters of elementary mathematics and methods of teaching higher mathematics and mathematics; understand the main provisions of the theory of modern methodological sciences; be familiar with the mathematical language; know the main stages in the development of teaching mathematics and its methods. B. Be able to prove theorems; apply knowledge and methods from other disciplines; take responsibility for the results of their professional activities. C. Ensure self-improvement of mathematical knowledge and develop skills in conducting analytical geometry for applied problems; use analytical methods on a computer; improve logical and algorithmic thinking. D. Prepare for effective teamwork and collaboration. E. Organize basic training programs and elective courses in various educational institutions; apply modern methods and technologies; foster knowledge and skills in students and maintain a responsible attitude toward professional outcomes.
Content	The set of numbers, ECOB, ECOE, divisibility rules, elementary functions, inequalities, equations and inequalities, trigonometric expressions, equations and inequalities; axioms of planimetry, basic geometric objects, similarity of figures on a plane, inscribed and circumscribed circles; axioms of stereometry, lines and planes in space; polynomials; geometric solids.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in the discussion of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO tasks, participation in all forms of assessment.
List of literature	1. Badayev S.A. *Linear Algebra and Analytical Geometry*, Almaty: Kazakh University, 2010. 2. Aidos E.Zh. *Higher Mathematics-1*, Almaty: Bastau, 2013. 3. Bayarystanov A.O. *Higher Mathematics*, Almaty: Nur-Print, 2015. 4. Aubakir S.B. *Higher Mathematics*, Almaty: Epigraph, 2016. 5. Bazarbekova A.A. *Higher Mathematics: Problem Book*, Almaty: CyberSmith, 2017. 6. Tokbergenov Zh.B. *Higher Mathematics*, Almaty: Otan, 2015. 7. Kochetkov P.A. *Brief Course of Higher Mathematics*, Moscow: MGIU, 2009. 8. Makhmedzhanov N.M. *Collection of Higher Mathematics Problems*, Almaty: Dauir, 2008. 9. Kabdykair K. *Higher Mathematics: Problem Book*, 2007. 10. Bazarbayeva G.S. *Higher Mathematics: Problem Book*, 2017. 11. Cameron, P.J. *Introduction to Algebra* [Textbook], Almaty: Association of Universities of the Republic of Kazakhstan, 2013.

Module	PhE 1(2)107 Physical education
Semester(s) when the module is taught	1-2-3-4
Responsible teacher	Mukhtarov Seitkerey Malikovich , Erzhanov Gabit Kuangalievich
Language of instruction	Kazakh/Russian
Connection with the curriculum	General education disciplines, core component
Forms of training	Practical classes
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 240 h Contact hours: 240 h (60/60/60/60 h practical classes)
ECTS	8
Mandatory and recommended prerequisites for studying the module	Possess essential life skills such as walking, running, skiing, swimming, and other basic movements; be able to use physical culture tools to develop specific physical qualities. Demonstrate skills in conducting independent physical exercise sessions. Understand the basics of physical culture and sports, physical education, self-education, physical development, physical and functional preparedness, psychophysical readiness, and the professional aspects of physical education. Apply knowledge of the functioning of the human body and its systems under the influence of physical activity and sports in various environmental conditions. Analyze the scientific, biological, and practical foundations of physical culture, as well as the principles of a healthy lifestyle. Demonstrate a system of practical skills that support health maintenance and improvement, mental well-being, and the development and enhancement of psychophysical abilities, personal qualities, and self-awareness in the field of physical culture. Evaluate one's own physical condition accurately, including self-assessment of performance, fatigue, and the use of physical culture methods for recovery and correction.
Module objectives / expected learning outcomes	The goal of the educational discipline *"Physical Culture"* at the university is to form students' social and personal competencies, ensuring the purposeful use of physical culture and sports resources for maintaining and strengthening health, as well as for preparation for professional activity.
Content	The discipline "Physical Education" is included in the curriculum for students of all forms of education and training specialties. It is a mandatory component of the humanitarian section of education and is aimed at developing students' physical culture, preparing them for social and professional activities, and maintaining and strengthening their health. The course also contributes to the expansion and deepening of knowledge and skills in physiology, pedagogy, and psychology, thereby enhancing the level of professional competence of future specialists. Teaching methods used include circuit training, the repetition method, the frontal method, and the competitive method.
Form of examination	Graded credit
Training and Examination requirements	Mandatory attendance of classes, active participation in physical education lessons, thorough preparation for practical sessions, high-quality and timely completion of homework, and participation in all forms of assessment are required.

List of literature	1. Aizakov A.D. *Monitoring Physical Health and Healthy Lifestyle of Children, Adolescents and Young People at the Regional Level: A Tutorial*. [B.m.], 2012. – 120 p. 2. Evseev Yu.I. *Physical Education: A Textbook*. 6th ed. [B.m.]: Phoenix, 2010. – 444 p.: ill. – (Higher Education) 3. Barchukova G.V., Mizin A.N. *Table Tennis at the University: A Teaching Aid for Students of Non-Physical Education Universities*. Moscow: SportAkademPress, 2002. – 132 p. 4. Melnikov V.S. *Physical Education in the University: Textbook*. Orenburg: OSU, 2002. – 114 p. Available at: https://rmebrk.kz/ 5. Grishina Yu.I. *Physical Culture Student: A Tutorial for Specialized Fields*. Rostov-on-Don: Phoenix, 2019. – 283 p. – (Higher Education). ISBN 978-5-222-31286-5. Available at: https://rmebrk.kz/ 6. Evseev Yu.I. *Dene Shynyktyru: Oqu Quraly*. 6-shy basylym. [B.m.]: Phoenix, 2010. – 444 b.: sur. 7. Barchukova G.V., Mizin A.N. *Zhogary Oqu Ornynda Üsteldi Tennis: Oqu Quraly*. Moscow: SportAkademPress, 2002. – 132 b. 8. Kulanova K.K., Marchibaeva U.S., Akhmetov A.K. *Ulttyq Oyındar Mektepte: Teoriyasy men Ádistemesi*. Almaty: New Book, 2021. 9. Uanbayev E.K. *Dene Shynyqtyru men Sport Ádisteri: Oqu Quraly*. 4th ed., rev. and compl. Ust-Kamenogorsk: S. Amanzholov University "Berel", 2014. – 360 p. Available at: https://rmebrk.kz/ 10. Uanbayev E.K., Uanbayev F.Zh. *Denelik Mádieniet pen Sport: Teoriyalyq Ádistemelik Oqu Quraly*. Ust-Kamenogorsk: Publishing House of the Kazakh SSR State University, 2006. – 267 p. ISBN 9965-687-86-2.

4.1. Module - Algebra and language training

Module	FA 2203 Fundamentals of Algebra
Semester(s) when the module is taught	3
Responsible teacher	Bayesheva K.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, students need the knowledge and skills acquired through studying elementary mathematics, as well as foundational topics in algebra, geometry, and analysis from the school curriculum.
Module objectives / expected learning outcomes	**Course goal:** To develop students' foundational mathematical knowledge in alignment with their professional specialization. **Learning outcomes:** A. Know and understand general forms, patterns, and formulas within a specific subject area. B. Be able to apply mathematical knowledge and skills to solve professional problems. C. Be able to solve mathematical problems using both classical methods and computer-based tools. D. Be able to work effectively with information related to their professional field. E. Be able to evaluate the relevance of course material and the validity of conclusions.
Content	Operations applied to matrices and their properties. Basic properties of determinants. Minors and algebraic complements. Solutions of the system of homogeneous equations. System of linear equations. Matrix equations. Kramer's rule. Gaussian method for solving a system of equations. The group and its properties. Algebraic systems. Order of group elements. Vector space and its properties. The basis and dimension of the Vector Space. Linear operator. Representation of linear operators by matrices. Complex number field.
Form of examination	Blank test
Training and Examination requirements	Mandatory participation in in-person classes active participation in the discussion of questions, pre-prepared arrival at lectures and practical classes, high-quality and timely execution of tasks of the IWST and IWS, participation in all forms of assessment.
List of literature	12. Badayev S.A. *Linear Algebra and Analytical Geometry*, Almaty: Kazakh University, 2010. 13. Aidos E.Zh. *Higher Mathematics-1*, Almaty: Bastau, 2013. 14. Bayarystanov A.O. *Higher Mathematics*, Almaty: Nur-Print, 2015. 15. Aubakir S.B. *Higher Mathematics*, Almaty: Epigraph, 2016. 16. Bazarbekova A.A. *Higher Mathematics: Problem Book*, Almaty: CyberSmith, 2017. 17. Tokbergenov Zh.B. *Higher Mathematics*, Almaty: Otan, 2015. 18. Kochetkov P.A. *Brief Course of Higher Mathematics*, Moscow: MGIU, 2009. 19. Makhmedzhanov N.M. *Collection of Higher Mathematics Problems*, Almaty: Dauir, 2008. 20. Kabdykair K. *Higher Mathematics: Problem Book*, 2007. 21. Bazarbayeva G.S. *Higher Mathematics: Problem Book*, 2017. 22. Nurymbetov A.U. *Algebra and Number Theory with Problem Book* [Textbook], Almaty: Otan, 2014. 23. Urbissinova B.T. *Algebra and Number Theory* [Study Guide], Almaty: LP-Zhasulan, 2019. 24. Cameron, P.J. *Introduction to Algebra* [Textbook], Almaty: Association of Universities of the Republic of Kazakhstan, 2013.

Module	FL (B1) 2204 Foreign language (B1)
Semester(s) when the module is taught	3
Responsible teacher	Turmagambetova G.N.
Language of instruction	English
Connection with the curriculum	Basic discipline, university component
Forms of training	Practical exercises, SIWT, SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 90 hours Contact hours: 30 hours (30 hours of practical classes) Independent study, including exam preparation: 15 hours of SIWT, 45 hours of SIW
ECTS	3
Mandatory and recommended prerequisites for studying the module	The 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	**Course Goal:** The purpose of the discipline is to develop the student's ability to communicate in a foreign language at an intercultural level, deepen and expand language material, and participate effectively in professional and everyday communication. **Learning Outcomes:** A. Participate confidently in meetings within their area of expertise. B. Produce clear, detailed texts on a wide range of subjects and explain viewpoints on topical issues, including giving advantages and disadvantages of various options. C. Discuss mental processes and how to use them to improve effectiveness at work. D. Explain their education, experience, strengths, and weaknesses, and discuss their career path. E. Talk about personal interests, including reading preferences and make recommendations. F. Discuss common political situations and current events.
Content	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.
Form of examination	Oral exam
Training 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.

List of literature	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.* – Aktobe, 2019. https://neb.arsu.kz/ru 3. Ashirbekov A.N. *Information and Communication Technologies.* – Shymkent, 2018. https://rmebrk.kz/ 4. Jussupbekova G.T. *Information and Communication Technologies.* – Almaty, 2021. https://neb.arsu.kz/ru 5. Oxford Qazaq Dictionary: Kazakh-English and English-Kazakh Dictionary. Project lead: R. Kenzhekhanuly. – Almaty: National Translation Bureau, 2023. – 65 copies. 6. Chazal, E., Rogers, L. *Oxford EAP: A Course in English for Academic Purposes. Intermediate / B1+ Teacher's Handbook.* – China: Oxford University Press, 2013. – 30 copies. **Educational and methodical literature:** 7. Batinova A.S., Turzhanova G.N. *Practical Course of English Language for All Specialties and Fields.* – Aktobe: RIO K. Zhubanov Aktobe State University, 2008. 8. Nakesheva S.T. *Methodological Guidelines for Practical Classes in "English Language" for 1st–2nd Year Full-Time Students.* – Aktobe, 2014. http://neb.arsu.kz/view?rid=5239&fid=5222 9. Baizhanova A.A., Musralina A.S. *Test Collection in English Language for Course Study.* – Aktobe: K. Zhubanov ARSU Publishing Center, 2015. 10. Berstyenova A.B. *English Grammar Handbook with Exercises.* – Aktobe, 2014. http://neb.arsu.kz/view?rid=5236&fid=5220 11. Berstyenova A.B. *Grammar Reference with Practice Exercises in English.* – Aktobe, 2015. http://neb.arsu.kz/view?rid=5237&fid=5221 **Scientific literature:** 12. Shevyakova V.E. *Modern English: Word Order, Information Structure, Intonation.* – Moscow: Nauka, 1980. 13. Sabitova L.S. *Aspectual System of Russian Verbs and Its Transformation into Kazakh and English.* Dissertation Abstract for PhD – L.N. Gumilyov ENU, Astana, 2010. – 28 pages. 14. Masalimova A.S. *English Grammar Guide with Practice Tasks.* Edited by A.S. Masalimova. – K. Zhubanov ARSU Publishing Center, 2014. – 77 pages. http://neb.arsu.kz/view?rid=5236&fid=5220

Module	FL (B2) 2205 Foreign language (B2)
Semester(s) when the module is taught	4
Responsible teacher	Turmagambetova G.N.
Language of instruction	English
Connection with the curriculum	Basic discipline, university component
Forms of training	Practical exercises, SIWT, SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 90 hours Contact hours: 30 hours (30 hours of practical classes) Independent study, including exam preparation: 15 hours of SIWT, 45 hours of SIW
ECTS	3
Mandatory and recommended prerequisites for studying the module	As a result of studying the discipline, the student must have a holistic understanding of the grammatical system of the language and speech. To participate without preparation in a conversation, including with native speakers, to express their own opinion, as well as to exchange interesting information on the material covered.
Module objectives / expected learning outcomes	**Course Goal:** To develop the student's ability to communicate in a foreign language at an intercultural level and to deepen and expand their language skills. **Learning Outcomes:** A. Participate effectively in meetings within their area of expertise. B. Fully understand the communicative intentions of partners and authors of texts at this level. C. Adequately express their own communicative intentions with correct selection and appropriate use of language tools, respecting socio-cultural norms. D. Choose the appropriate form and type of speech or communication, using a logical structure suitable for the type of speech. E. Use correct intonation, maintain lexical richness within the speech topics, and demonstrate grammatical accuracy. F. Understand native speakers' speech spoken at an average pace within the studied topics.
Content	Knowledge of a foreign language is an integral part of the professional training of all specialists at the University. The course provides practical classes, SWS, and SSWT. The study of the discipline "Foreign Language" (level B2) is aimed at the comprehensive development of students' communicative, cognitive, socio-cultural, and linguistic-cultural competencies.
Form of examination	Oral exam
Training and Examination requirements	At this level, the student is able to understand the main ideas of complex texts on both concrete and abstract topics, including technical discussions in their field of specialization. They can communicate with a degree of fluency and spontaneity that makes regular interaction with native speakers possible without strain for either party. They are capable of producing clear, detailed texts on a wide range of subjects and can express an opinion on topical issues, giving the advantages and disadvantages of various options.

List of literature	1. Davies, P.A., & Falla, T. (2017). *SOLUTIONS Intermediate. Student's Book* (3rd ed.). Oxford: Oxford University Press. 165 pages. https://rmebrk.kz/search/?search=SOLUTIONS+Pre+-Intermediate 2. Kulmagambetova Zh.K., & Baiganova A.M. (2019). *Information and Communication Technologies*. Aktobe. https://neb.arsu.kz/ru 3. Oxford Qazaq Dictionary: Kazakh-English and English-Kazakh Dictionary. Project leader: R. Kenzhekhanuly. – Almaty: National Translation Bureau, 2023. – 65 copies. 4. Chazal, E., & Rogers, L. (2013). *Oxford EAP: A Course in English for Academic Purposes. Intermediate / B1+ Teacher's Handbook.* Oxford University Press. – 30 copies. 5. Ashirbekov A.N. (2018). *Information and Communication Technologies.* Shymkent. https://rmebrk.kz/ 6. Jussupbekova G.T. (2021). *Information and Communication Technologies.* Almaty. https://neb.arsu.kz/ru **Educational and methodical literature:** 7. Batinova A.S., & Turzhanova G.N. (2008). *Practical English Course for All Specialties and Fields.* Aktobe: RIO K. Zhubanov Aktobe State University. 8. Nakesheva S.T. (2014). *Guidelines for Practical Classes in English for 1st–2nd Year Full-Time Students.* Aktobe. http://neb.arsu.kz/view?rid=5239&fid=5222 9. Baizhanova A.A., & Musralina A.S. (2015). *Test Book in English Language for Academic Study.* Aktobe: K. Zhubanov ARSU Publishing Center. 10. Berstyenova A.B. (2014). *English Grammar Handbook with Exercises.* Aktobe. http://neb.arsu.kz/view?rid=5236&fid=5220 11. Berstyenova A.B. (2015). *Grammar Reference and Exercise Book in English.* Aktobe. http://neb.arsu.kz/view?rid=5237&fid=5221 **Scientific literature:** 12. Shevyakova, V.E. (1980). *Modern English Language: Word Order, Information Structure, Intonation.* Moscow: Nauka. 13. Sabitova, L.S. (2010). *Aspectual System of Russian Verbs and Its Transformation into Kazakh and English* (PhD Dissertation Abstract). L.N. Gumilyov ENU, Astana. – 28 pages. 14. Masalimova A.S. (2014). *English Grammar Guide with Exercises.* Edited by A.S. Masalimova. Aktobe: K. Zhubanov ARSU Publishing Center. – 77 pages. http://neb.arsu.kz/view?rid=5236&fid=5220

Module	PSPA 2206 Practicum on solving problems of algebra (in English)
Semester(s) when the module is taught	4
Responsible teacher	Nugaeva Z.T.
Language of instruction	English
Connection with the curriculum	Basic discipline, elective component
Forms of training	Practical classes, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 180 h Contact hours: 60 h (60 h practical classes) Self-study, including preparation for exams: 90 hours SIW, 30 hours SIWT
ECTS	6
Mandatory and recommended prerequisites for studying the module	To master this module, you need knowledge, skills and abilities acquired in the following courses: Elementary Mathematics, foreign language.
Module objectives / expected learning outcomes	The aim of the course is the professional and methodological preparation of future mathematics teachers for teaching elements of probability theory and mathematical statistics in schools, along with practical knowledge of the algebra course and the development of skills to explain problem-solving methods in English.
Content	Simplify expressions and rationalize denominators. Solve algebraic, trigonometric, exponential, and logarithmic equations and inequalities.
Form of examination	Writing
Training and Examination requirements	Mandatory attendance of online and in-person classes, active participation in discussions, preliminary preparation for lectures and practical sessions, high-quality and timely completion of independent study assignments (SRO), and participation in all forms of assessment.
List of literature	**Core reading** 1. Weaver, A. *Arithmetic: A*. 5th edition, 2015. Textbook for Math 01. 2. Konev, V.V. *The Elements of Mathematics*. Textbook. Tomsk Polytechnic University, 2009. 3. Konev, V.V. *The Elements of Mathematics*. Workbook, Part 2. Tomsk Polytechnic University, 2009. **Supplementary reading** 4. Konev, V.V. *Higher Mathematics*, Textbook, Part 2. Tomsk Polytechnic University Publishing House, 2009. 5. Konev, V.V. *The Elements of Mathematics*. Workbook. Tomsk Polytechnic University Publishing House, 2009. 6. Konev, V.V. *Mathematics, Preparaory Course Algebra*. Workbook. Tomsk Polytechnic University Publishing House, 2009.

4.2. Module-Bases of Mathematics and language training

Module	FA 2203 Fundamentals of Algebra
Semester(s) when the module is taught	3
Responsible teacher	Bayesheva K.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 150 hours Contact hours: 45 hours (15 hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, you need knowledge and skills acquired during the study of the following courses: Elementary Mathematics, Fundamentals of Algebra, Geometry, and Analysis.
Module objectives / expected learning outcomes	The aim of the course is to develop students' basic mathematical knowledge relevant to their professional field. **Learning outcomes** A. Knows and can understand general forms, patterns, formulas in a separate subject area; B. Able to apply mathematical knowledge and skills in solving professional problems; C. Able to solve mathematical problems using classical methods and using a computer; D. Able to work with information related to their profession; E. Students are able to evaluate the significance of the material on the course, the adequacy of the conclusions.
Content	Operations applied to matrices and their properties. Basic properties of determinants. Minors and algebraic complements. Solutions of the system of homogeneous equations. System of linear equations. Matrix equations. Kramer's rule. Gaussian method for solving a system of equations. The group and its properties. Algebraic systems. Order of group elements. Vector space and its properties. The basis and dimension of the Vector Space. Linear operator. Representation of linear operators by matrices. Complex number field.
Form of examination	Blank test
Training and Examination requirements	Mandatory participation in in-person classes active participation in the discussion of questions, pre-prepared arrival at lectures and practical classes, high-quality and timely execution of tasks of the IWST and IWS, participation in all forms of assessment.
List of literature	1. Badaev S.A. *Linear Algebra and Analytical Geometry*. – Almaty: Kazakh University, 2010. 2. Aidos E.Zh. *Higher Mathematics-1*. – Almaty: Bastau, 2013. 3. Bayarystanov A.O. *Higher Mathematics*. – Almaty: Nur-Print, 2015. 4. Aubakir S.B. *Higher Mathematics*. – Almaty: Epigraph, 2016 5. Bazarbekova A.A. *Higher Mathematics: Problem Book*. – Almaty: CyberSmith, 2017. 6. Tokbergenov Zh.B. *Higher Mathematics*. – Almaty: Otan, 2015. 7. Kochetkov P.A. *A Concise Course of Higher Mathematics*. – Moscow: MGIU, 2009. 8. Makhmedzhanov N.M. *Collection of Problems in Higher Mathematics*. – Almaty: Dauir, 2008. 9. Kabdykaiyr K. *Higher Mathematics: Problem Book*, 2007. 10. Bazarbayeva G.S. *Higher Mathematics: Problem Book*, 2017. 11. Nurymbetov A.U. *Algebra and Number Theory with a Collection of Problems* [Textbook]. – Almaty: Otan, 2014. 12. Urbisinova B.T. *Algebra and Number Theory* [Study Guide]. – Almaty: LP-Zhasulan, 2019. 13. Cameron, P.J. *Introduction to Algebra* [Textbook]. – Almaty: Association of Universities of Kazakhstan, 2013.

Module	FL (B1) 2204 Foreign language (B1)
Semester(s) when the module is taught	3
Responsible teacher	Turmagambetova G.N.
Language of instruction	English
Connection with the curriculum	Basic discipline, university component
Forms of training	Practical exercises, SIWT, SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 90 hours Contact hours: 30 hours (30 hours of practical classes) Independent study, including exam preparation: 15 hours of SIWT, 45 hours of SIW
ECTS	3
Mandatory and recommended prerequisites for studying the module	The process of mastering the course is aimed at the comprehensive development of students' intercultural competencies. The course involves further improvement of language and communication skills. Students acquire the ability to understand both concrete and abstract messages, as well as to discuss topics related to their field in a foreign language.
Module objectives / expected learning outcomes	**Course goal:** To develop the student's ability to communicate in a foreign language at an intercultural level, deepen and expand language material, and participate in professional meetings. **Learning Outcomes:** A. Produce clear, detailed texts on a wide range of subjects and explain viewpoints on topical issues, including advantages and disadvantages. B. Talk about mental processes and apply them to improve job effectiveness. C. Explain education, experience, strengths, weaknesses, and discuss career paths. D. Discuss reading preferences and recommend good materials. E. Engage in discussions on common political situations.
Content	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.
Form of examination	Oral exam
Training 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.

List of literature	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.* – Aktobe, 2019. https://neb.arsu.kz/ru 3. *Oxford Qazaq Dictionary: For Studying the Subject / Qazaq-English and English-Qazaq Dictionary.* Project Leader: R. Kenzhekhanuly. – Almaty: National Translation Bureau, 2023. – 65 copies. 4. Chazal E., Rogers L. *Oxford EAP. A Course in English for Academic Purposes. Intermediate/B1+: Teacher's Handbook.* – China: Oxford University Press, 2013. – 30 copies. 5. Ashirbekov A.N. *Information and Communication Technologies.* – Shymkent, 2018. https://rmebrk.kz/ 6. Jussupbekova G.T. *Information and Communication Technologies.* – Almaty, 2021. https://neb.arsu.kz/ru **Educational and methodical literature:** 7. Batinova A.S., Turzhanova G.N. *Practical Course in English Language: For All Specialties and Areas of Training.* – Aktobe: K. Zhubanov ARSU Publishing, 2008. 8. Nakesheva S.T. *Methodical Instructions for Practical Classes on the Discipline "English Language" for 1st–2nd Year Full-Time Students.* – Aktobe, 2014. http://neb.arsu.kz/view?rid=5239&fid=5222 9. Baizhanova A.A., Musralina A.S. *Collection of Tests and Assignments in English Language: For Studying the Discipline.* – Aktobe: K. Zhubanov ARGU Publishing Center, 2015. 10. Berstenova A.B. *English Grammar Handbook with Practice Exercises.* – Aktobe, 2014. http://neb.arsu.kz/view?rid=5236&fid=5220 11. Berstenova A.B. *Grammar Reference Book in English with Exercise Collection.* – Aktobe, 2015. http://neb.arsu.kz/view?rid=5237&fid=5221 **Scientific literature:** 12. Shevyakova V.E. *Modern English Language: Word Order, Thematic-Rhematic Division, Intonation.* – Moscow: Nauka, 1980. 13. Sabitova L.S. *Pair-Aspectual System of the Russian Verb and Its Transformation Methods into Kazakh and English Languages: PhD Dissertation Abstract.* – Astana: L.N. Gumilyov ENU, 2010. – 28 pages. 14. Masalimova A.S. (Ed.) *English Grammar Handbook with Practice Exercises.* – K. Zhubanov ARGU Publishing Center, 2014. – 77 pages. http://neb.arsu.kz/view?rid=5236&fid=5220

Module	FL (B2) 2205 Foreign language (B2)
Semester(s) when the module is taught	4
Responsible teacher	Turmagambetova G.N.
Language of instruction	English
Connection with the curriculum	Basic discipline, university component
Forms of training	Practical exercises, SIWT, SIW
Academic load (incl. contact hours and SIW - Students' Independent Work	Total workload: 90 hours Contact hours: 30 hours (30 hours of practical classes) Independent study, including exam preparation: 15 hours of SIWT, 45 hours of SIW
ECTS	3
Mandatory and recommended prerequisites for studying the module	As a result of studying the discipline, the student must have a holistic understanding of the grammatical system of language and speech. To participate without preparation in a conversation, including with native speakers, to express their own opinion, as well as to exchange interesting information on the material covered.
Module objectives / expected learning outcomes	**Course Goal** The purpose of the discipline is to develop the student's ability to communicate in a foreign language at an intercultural level, deepen and expand their language skills, and participate confidently in meetings within their area of expertise. **Learning Outcomes** A. Fully understand the communicative intentions of partners and the authors of texts at this level. B. Adequately express their own communicative intentions by correctly selecting and appropriately using language tools, while adhering to the socio-cultural norms of the studied language. C. Choose the appropriate form and type of speech or communication, applying a logical structure suitable for the speech type. D. Demonstrate correct speech intonation, lexical richness relevant to the speech topics, and grammatical accuracy. E. Understand speech by native speakers spoken at an average pace within the scope of the studied topics.
Content	Knowledge of a foreign language is an integral part of the professional training of all specialists at the University. The course provides practical classes, SWS and SSWT. The process of studying the discipline "Foreign language" (level B2) is aimed at the comprehensive development of students ' communicative, cognitive, socio-cultural and linguistic-cultural competencies.
Form of examination	Oral exam
Training and Examination requirements	At this level, the student is able to understand the main ideas of complex texts on both concrete and abstract topics, including technical discussions in their field of specialization. They can communicate with a degree of fluency and spontaneity that makes regular interaction with native speakers possible without strain for either party. They are capable of producing clear, detailed texts on a wide range of subjects and can express an opinion on topical issues, giving the advantages and disadvantages of various options.

List of literature	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.* – Aktobe, 2019. https://neb.arsu.kz/ru 3. *Oxford Qazaq Dictionary: For Studying the Subject / Qazaq-English and English-Qazaq Dictionary.* Project Leader: R. Kenzhekhanuly. – Almaty: National Translation Bureau, 2023. – 65 copies. 4. Chazal E., Rogers L. *Oxford EAP. A Course in English for Academic Purposes. Intermediate/B1+: Teacher's Handbook.* – China: Oxford University Press, 2013. – 30 copies. 5. Ashirbekov A.N. *Information and Communication Technologies.* – Shymkent, 2018. https://rmebrk.kz/ 6. Jussupbekova G.T. *Information and Communication Technologies.* – Almaty, 2021. https://neb.arsu.kz/ru **Educational and methodical literature:** 7. Batinova A.S., Turzhanova G.N. *Practical Course in English Language: For All Specialties and Areas of Training.* – Aktobe: K. Zhubanov ARSU Publishing, 2008. 8. Nakesheva S.T. *Methodical Instructions for Practical Classes on the Discipline "English Language" for 1st–2nd Year Full-Time Students.* – Aktobe, 2014. http://neb.arsu.kz/view?rid=5239&fid=5222 9. Baizhanova A.A., Musralina A.S. *Collection of Tests and Assignments in English Language: For Studying the Discipline.* – Aktobe: K. Zhubanov ARGU Publishing Center, 2015. 10. Berstenova A.B. *English Grammar Handbook with Practice Exercises.* – Aktobe, 2014. http://neb.arsu.kz/view?rid=5236&fid=5220 11. Berstenova A.B. *Grammar Reference Book in English with Exercise Collection.* – Aktobe, 2015. http://neb.arsu.kz/view?rid=5237&fid=5221 **Scientific literature:** 12. Shevyakova V.E. *Modern English Language: Word Order, Thematic-Rhematic Division, Intonation.* – Moscow: Nauka, 1980. 13. Sabitova L.S. *Pair-Aspectual System of the Russian Verb and Its Transformation Methods into Kazakh and English Languages: PhD Dissertation Abstract.* – Astana: L.N. Gumilyov ENU, 2010. – 28 pages. 14. Masalimova A.S. (Ed.) *English Grammar Handbook with Practice Exercises.* – K. Zhubanov ARGU Publishing Center, 2014. – 77 pages. http://neb.arsu.kz/view?rid=5236&fid=5220

Module	EG 2206 Elementary geometry (in English)
Semester(s) when the module is taught	4
Responsible teacher	Sultangaliyeva L.S.
Language of instruction	English
Connection with the curriculum	Basic discipline, elective component
Forms of training	Practical classes, SWIT/SWI
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 180 h Contact hours: 60 h (60 h practical classes) Self-study, including preparation for exams: 90 hours SIW, 30 hours SIWT
ECTS	6
Mandatory and recommended prerequisites for studying the module	To master this module, you need knowledge, skills and abilities acquired while studying the following courses: Introduction to Mathematics, Analytical Geometry.
Module objectives / expected learning outcomes	**Course Goal** The aim of the course "Fundamentals of Geometry" is the formation of a modern personality and the development of the student's subject competencies by increasing the level of practical mastery of modern geometric knowledge in various areas of its application within mathematical sciences. **Learning Outcomes** A. Possess the categorical apparatus of pedagogical science, skills for solving pedagogical problems, methods for planning and implementing the educational process, conducting pedagogical experiments, forms and methods of educational and upbringing work, techniques and methods of psychodiagnostics, study of professional activity characteristics, and the application of information and communication technologies in the educational process. B. Be able to use public speaking skills, engage in discussion and polemics; be aware of the social significance of their future profession, motivated to perform professional activities, and able to bear responsibility for the results of their professional actions. C. Be capable of preparing and editing texts of professional and socially significant content; have a command of the basic facts, ideas, and methods of mathematics, including the axiomatic method; master the language of mathematics; prove theorems; create mathematical models for solving problems in various fields; create and study mathematical objects using analytical methods and computers; understand the place of algebra in the system of mathematical knowledge; command the facts and methods of algebra; apply knowledge and methods from other disciplines in algebra; use algebraic knowledge in other scientific fields. D. Be able to analyze and interpret the content of mathematical concepts, theorems, and problems; develop lesson fragments; organize the educational process of teaching mathematics; and design methodologies for introducing concepts, studying theorems, and solving problems. E. Be able to competently apply knowledge and teaching skills and understand the social significance of their future teaching profession.
Content	History of the problem of the fifth postulate of Euclid. Axiomatic construction of Euclidean geometry. Arithmetic model of the Euclidean plane and consistency of the axiomatics of Euclidean geometry. Absolute geometry. Geometry of Lobachevsky. Poincare model of the Lobachevsky plane and consistency of the axiomatics of Lobachevsky geometry.
Form of examination	Writing
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in discussions of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO assignments, participation in all forms of assessment.
List of literature	1. Alexandrov, A.D., Netsvetaev, N.Yu. *Geometry*. – Moscow: Nauka, 1990. 2. Atanasian, L.S., Bazylev, V.T. *Geometry. Part II*. – Moscow: Enlightenment, 1987. 3. Trainin, Ya.L. *Foundations of Geometry*. – Moscow: Uchpedgiz, 1961. 4. Atanasian, L.S., Gurevich, G.B. *Geometry. Part 2*. – Moscow: Education, 1985. 5. Efimov, N.V. *Higher Geometry*. – Moscow: Science, 1993. 6. Kaidasov, Zh. *Lobachevsky zhazyktygyndagy keibir beineler*. – Almaty: Gylym, 2002. 7. Electronic library https://www.biblio-online.ru .

5.1. Module-Fundamental disciplines

Module	DTE 2108 Digital Technologies in Education (in Russian)
Semester(s) when the module is taught	3
Responsible teacher	Nurzhaubaeva Roza Bekaidyrkyzy
Language of instruction	Kazakh/Russian
Connection with the curriculum	General education disciplines, elective component
Forms of training	Lecture, practical classes, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 150 h Contact hours: 45 h (30 h lectures, 15 h practical classes) Independent study, including preparation for exams: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	Basics of computer science, ICT
Module objectives / expected learning outcomes	**Course goal:** Preparation of future specialist teachers who have mastered methods of informatization in education and the ability to use modern digital technologies in their professional pedagogical activities. **Learning outcomes:** A. Be able to communicate effectively in an online environment using email, chats, video conferencing, and other communication tools. B. Be able to create interactive educational materials and provide support and feedback for participants in the educational process. C. Understand the basic principles of digital ethics and safety in the online environment, including protection of personal information, respect for other participants, and compliance with rules for using digital technologies. D. Use digital technologies in general education and specific professional activities. E. Work with text editors (Google Docs), spreadsheets (Google Sheets), and presentation tools (Google Slides) for creating and editing documents, tables, and presentations. F. Work with applications for creating and editing audio and video materials (e.g., Camtasia Studio, Bandicam, Adobe Premiere Pro) for multimedia presentations, video tutorials, and other educational content. G. Use various educational platforms and learning management systems (LMS) such as Google Classroom, Moodle, etc., for creating, distributing, and managing educational materials and tasks. H. Work with interactive tools and applications such as online interactive textbooks and simulators (LearningApps, Kahoot, Genially, etc.). I. Use various web tools and online services, including cloud services, for collaborative work, information exchange, and management of educational projects. J. Use digital educational resources when creating educational content and conducting scientific research. K. Use digital tools when writing abstracts, scientific articles, term papers, and theses. L. Know and apply innovative methods for searching information on the Internet using artificial intelligence.
Content	The introduction of information and communication technologies into all spheres of human life requires specialists of different profiles to have skills in using modern computer equipment and digital technologies. Therefore, it is important for a future specialist to master innovative technologies in the education system. The course "Digital Technologies in Education" instills skills in working with digital technologies in students in various professional areas of their activity.
Form of examination	Blank test

Training and Examination requirements	Obtain quality knowledge; fulfill the teacher's requirements as stated in the syllabus; independently complete all types of work (SIWT assignments, coursework, final papers, etc.) and submit them to the teacher on time; use reliable and trustworthy sources of information; do not provide your work to other students for copying.
List of literature	1. Koneva, S.N. *Intranet Technologies in Education.* In: *Management, Economics and Informatization of Education in a Post-Industrial Society: Collective Monograph*. – Almaty: AF SPbGUP, 2016. – Pp. 61–86. 2. Bidaibekov, E.Y., Grinshkun, V.V., Kamalova, G.B., Bostanov, B.G., Isabaeva, D.N. *Bilimdi Ақпараттанδыру Қән Құту Мәселелері* [Informatization of Education Issues]. – Textbook. – Almaty, 2014. – 352 pages. 3. Uvarov, A.Yu. *Education in the World of Digital Technologies: On the Way to Digital Transformation*. – Moscow: HSE Publishing House, 2018. – 168 pages. 4. Aman, K.P., Musina, A.A. *Digital Technologies in Education: Methodological Recommendations*. – Aktobe, 2020. – 104 pages. 5. Adilbekova, E.T., Baymisheva, A.Zh. *Information and Communication Technologies in Education: Textbook*. – Shymkent, 2014. – 112 pages. (RMEB) 6. Trainev, V.A., Teplyshev, V.Yu., Trainev, I.V. *New Information and Communication Technologies in Education* [Electronic resource]. – 2nd ed. – Moscow: Publishing and Trading Corporation “Dashkov and K”, 2013. – 320 pages. – ISBN 978-5-394-01685. 7. Shevchuk, E.V., Kolyeva, N.S. *Workshop on the Use of Interactive Technologies in the Educational Process: Study Guide*. – Almaty: Otan, 2015. – 90 pages.

Module	AG 2207 Analytic geometry
Semester(s) when the module is taught	3
Responsible teacher	Sultangaliyeva L.S.
Language of instruction	Kazakh / Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully complete this module, students should have foundational knowledge and competencies gained from the following courses: Elementary Mathematics, Linear Algebra
Module objectives / expected learning outcomes	**Course Goal:** To develop professional and methodological competencies in future mathematics teachers through in-depth training in analytical geometry. **Learning Outcomes:** A. Acquire, comprehend, and apply key principles, rules, and formulas in analytical geometry. B. Identify and interpret structured outcomes independently and understand the essential value of fundamental knowledge. C. Master content at a professional level and critically evaluate its applications. D. Select and apply appropriate methods for solving problems, and understand the importance of geometrical problem-solving. E. Engage in lifelong learning independently, communicate acquired knowledge effectively, express ideas using mathematical language, and evaluate the significance of analytical geometry in academic and professional contexts.
Content	Analytical Geometry in the Plane: Point positioning on a line, basic formulas, point positioning in the plane, geometric interpretation of lines, straight lines, conic sections represented by canonical equations, and the general theory of second-order curves. Analytical Geometry in Space: Vector algebra, spatial positioning of points, planes and lines in space, surfaces of the second order represented by canonical equations, and their general theory.
Form of examination	Blank test
Training and Examination requirements	Regular attendance in both online and in-person classes is mandatory. Students are expected to actively engage in discussions of course topics, demonstrate preparedness for lectures and practical sessions, and complete all Independent Study (IS) assignments with high quality and within set deadlines. Participation in all forms of assessment, including formative and summative evaluations, is required.
List of literature	1. Askhanbayeva, G.B., Berkimbai, R.Ə. *Analytical Geometry: Textbook* – Kostanay: A. Baitursynov KSU, 2019. 2. Badaev, S.A., Dosanbai, P.T., Mazhitova, A.D., Talasbayeva, Zh.T. *Analytical Geometry. Problem Book: Textbook* – Almaty: Kazakh University, 2023. 3. Badaev, S.A. *Linear Algebra and Analytical Geometry* – Almaty: LEM Publishing, 2014. 4. Baiarystanov, A.O., Idirisov, Zh.M. *Theory and Problems of Linear Algebra and Analytical Geometry* – Almaty: Almanakh, 2018. 5. Bortakovsky, A.S., Panteleev, A.V. *Analytical Geometry in Examples and Problems* – 2nd ed., Moscow: INFRA-M, 2016. 6. Sagyndykov, B.Zh. *Analytical Geometry* – Almaty: Lantar Trade, 2022. 7. Sarsenov, B.T., Erkisheva, Zh.S. *Linear Algebra and Analytical Geometry: Textbook* – Turkistan: Ahmet Yassawi University, 2016. 8. Stepanova, M.A. *Analytical Geometry. Lecture Course* – Study Guide, 2023. 9. Madiyarov, N.K. *Analytical Geometry* – Almaty: Evero, 2018. 10. Mikhalyov, A.A., Sabitov, I.Kh. *Linear Algebra and Analytical Geometry: Study Guide* – Moscow: Academia, 2013. 11. Musin, A.T. *Course on Analytical Geometry and Linear Algebra* – Almaty: Almanakh, 2022. 12. Pismenny, D.T. *Lecture Notes on Higher Mathematics* – Moscow: Iris Press, 2013.

Module	MAFOV 2208 Mathematical analysis: functions of one variable
Semester(s) when the module is taught	3
Responsible teacher	Otarov K.T.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, the knowledge, skills, and abilities acquired from studying the following courses are required: Elementary Mathematics, Mathematical Analysis.
Module objectives / expected learning outcomes	The goal of the course is the professional-methodical preparation of future mathematics teachers for teaching elements of probability theory and mathematical statistics in school. **Learning outcomes:** **A)** Knows the place of mathematical analysis in the system of mathematical knowledge; possesses facts and methods of mathematical analysis; has a culture of thinking, is capable of generalization, analysis, perception of information, goal setting, and choosing ways to achieve it; is familiar with the basic facts, ideas, and methods of mathematics, the axiomatic method; is able to apply knowledge and methods from other disciplines in mathematical analysis; knows how to use mathematical analysis in other scientific fields; knows the main stages in the development of mathematics. **B)** Is capable of preparing and editing texts with professional and socially significant content; possesses mathematical language; is able to prove theorems; is able to create mathematical models to solve problems from various fields. **C)** Is capable of logically constructing oral and written speech; is capable of creating and investigating mathematical objects using analytical methods; is able to use public speaking, debate, and discussion skills. **D)** Is ready to interact with colleagues, to work in a team. **E)** Knows how to correctly apply knowledge and teaching skills, understands the social significance of their future profession, is motivated to engage in professional activities, and is capable of taking responsibility for the results of their professional work.
Content	Elements of set theory and mathematical logic. Number sets. Functions and sequences. Theory of limits, continuity of functions. Differential and integral calculus of functions of one variable, their properties and graphs (Desmos, QuickGraph+). Differential and integral calculus of functions of several variables. Theory of series and elements of field theory.
Form of examination	Traditional
Training and Examination requirements	Mandatory attendance of online and in-person classes, active participation in discussions, preliminary preparation for lectures and practical sessions, quality and timely completion of independent work assignments, participation in all types of assessments.
List of literature	**Core reading** 1. Otarov, H.T. *Mathematical Analysis*. – Almaty: Ekonomika, 2012. – 536 p. 2. Temirgaliyev, N. *Mathematical Analysis – Part 1*. – Almaty: Mektep, 1987. 3. Ibrashev, K.I., Erkegulov, Sh.T. *Course on Mathematical Analysis – Vol. 1*. – Almaty: Kazmemoqupedbas, 1963. 4. Fikhtengol'ts, G.M. *Course of Differential and Integral Calculus – Vol. 1: Educational Manual*. – 4th ed. – Moscow: Nauka, Chief Editor of Phys.-Math. Literature, 2012. – 656 p. 5. Tokybetov, Z.H. *Mathematical Analysis*. – 2009. 6. Karasheva, G. *Mathematical Analysis*. – 2017. RMEB. 7. Ibraimkulov, A.M., Smatova, G.D. *Mathematical Analysis-I*. – 2010. RMEB. 8. Aktaeva, U.Zh. *Mathematical Analysis*. – 2011. RMEB. 9. Makhimova, S.Zh. *Mathematical Analysis*. – 2011. RMEB.

	10. Zhanabaev, Zh. *Mathematical Analysis*. – 2008. RMEB. **Supplementary reading** 11. Pilidi, V.S. *Mathematical Analysis: Textbook*. – Rostov-on-Don: Phoenix, 2009. – 239 p. 12. Askarova, M.A. *Elementary Mathematics. Algebra: Textbook*. – Karasai, 2013. 13. Musin, A.T. *Mathematics I (Lectures. Test Collection): Educational Tool*. – Almaty: LLP RPBC Daur, 2012. – 312 p. 14. Nadyrebekova, A.Sh. *Mathematical Analysis*. – Taraz: TarMPI, 2012. – 260 p. 15. Akhmetova, S.S. *Mathematical Analysis*. – 2008. RMEB. 16. Ilyin, V.A., Sadovnichiy, V.A., Sendov, Bl.Kh. *Mathematical Analysis – Vol. 1*. – Moscow: MGU Publishing, 2004. 17. Zorich, V.A. *Mathematical Analysis – Vol. 1*. – Moscow: MЦNMO, 2002. 18. Bavrin, I.I., Matrosov, V.L. *General Course in Higher Mathematics*. – Moscow: Prosveshchenie, 1995. 19. Ilyin, V.A., Poznyak, E.G. *Fundamentals of Mathematical Analysis*. – Moscow: Nauka, 1971. **Electronic resources** 20. Republican Interuniversity Electronic Library (RMEB) – http://rmebrk.kz/ 21. Epigraph Publishing House Electronic Database – https://elib.kz/ 22. Electronic Library of ARU – http://neb.arsu.kz/ru 23. Internet Mathematics Library – https://math.ru/lib/ 24. Moscow Center for Continuous Mathematical Education (Vitaly Arnold's Center) – http://ilib.mccme.ru/ 25. Multimedia Textbooks Portal “Epigraph” – https://mbook.kz/ru/index/ 26. Republican Scientific and Technical Library (RNTB) – http://aktobe.rntb.kz/ 27. Electronic Educational Physics-Mathematics Library (EqWorld) – http://eqworld.ipmnet.ru/ru/library/mathematics.htm

Module	MAFMV 2209 Mathematical analysis: functions of many variables
Semester(s) when the module is taught	4
Responsible teacher	Otarov K.T.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, knowledge, skills, and abilities acquired in the following courses are required: Elementary Mathematics, Mathematical Analysis 1.
Module objectives / expected learning outcomes	**Course Goal:** The goal of the course is the professional and methodological preparation of future mathematics teachers for teaching elements of probability theory and mathematical statistics in schools. **Learning Outcomes:** A. Know and understand methods of mathematical research using integral calculus, the theory of multiple integrals, and techniques for constructing mathematical models. B. Apply mathematical tools to solve assigned problems, use appropriate mathematical models for various processes, and verify their adequacy. C. Possess a culture of logical thinking; be capable of generalization, analysis, information processing, goal setting, and selecting strategies to achieve them. Apply general management principles in practice. D. Be able to apply mathematical methods in professional activities. Be capable of working in a team, defending one's point of view appropriately, proposing innovative solutions, and striving for professional and personal growth. E. Be able to find compromises and relate personal opinions to group consensus.
Content	Integration of rational fractions, irrational functions, differential binomials, trigonometric and transcendental functions. Definite integral according to Riemann. Newton-Leibniz formula. Methods for calculating the definite integral, properties and graph (Desmos, QuickGraph+). Applications of the definite integral. Improper integrals. Improper integrals with infinite limits. Integral calculus formulas for improper integrals. Convergence tests for improper integrals.
Form of examination	Traditional
Training and Examination requirements	Mandatory attendance of online and in-person classes, active participation in discussions, preliminary preparation for lectures and practical sessions, high-quality and timely completion of independent work assignments, and participation in all forms of assessment.
List of literature	**Core reading** 1. Temirgaliyev, N. *Mathematical Analysis – Part 3*. – Almaty: Bilim, 1997. 2. Nadyrbekova, A.Sh. *Mathematical Analysis*. – Taraz: TarMPI, 2012. – 260 p. 3. Musin, A.T. *Mathematics I (Lectures. Test Collection): Textbook*. – Almaty: LLC RPBK Dauir, 2012. – 312 p. 4. Fichtenholz, G.M. *Course of Differential and Integral Calculus. Vols. 1, 2, 3: Textbook*. – 4th ed. – Moscow: Nauka, Chief Editor of Phys.-Math. Literature, 2012. – 656 p. 5. Tokybetov, Zh.A. *Mathematical Analysis*. – 2009. 6. Karasheva, G. *Mathematical Analysis*. – 2017. RMEB. 7. Otarov, K.T., Azymbaev, D.T. *Theory of Functions of Several Variables*. – Aktobe, 2022. 8. Aktaeva, U.Zh. *Mathematical Analysis*. – 2011. RMEB. 9. Makhimova, S.Zh. *Mathematical Analysis*. – 2011. RMEB. 10. Zhanabaev, Zh. *Mathematical Analysis*. – 2008. RMEB.

	Supplementary reading 11. Pilidi, V.S. *Mathematical Analysis: Textbook*. – Rostov-on-Don: Phoenix, 2009. – 239 p. 12. Akhmetova, S.S. *Mathematical Analysis*. – 2008. RMEB. 13. Il'jin, V.A., Sadovnichy, V.A., Sendov, Bl.H. *Mathematical Analysis – Part 2*. – Moscow: MGU Publishing House, 2006. 14. Bavrin, I.I., Matrosov, V.L. *General Course of Higher Mathematics*. – Moscow: Prosveshcheniye, 1995. 15. Il'jin, V.A., Poznyak, E.G. *Fundamentals of Mathematical Analysis*. – Moscow: Nauka, 1971. **Electronic resources** 16. Republican Interuniversity Electronic Library (RMEB) – http://rmebrk.kz/ 17. Epigraph Publishing House Electronic Database – https://elib.kz/ 18. Electronic Library of ARU – http://neb.arsu.kz/ru 19. Internet Mathematics Library – https://math.ru/lib/ 20. Internet Library of the Moscow Center for Continuous Mathematical Education (Vitaly Arnold's Center) – http://ilib.mccme.ru/ 21. Multimedia Textbooks Portal "Epigraph" – https://mbook.kz/ru/index/ 22. Republican Scientific and Technical Library (RNTB) – http://aktobe.rntb.kz/ 23. Electronic Educational and Scientific Physics-Mathematics Library of the EqWorld Website – http://eqworld.ipmnet.ru/ru/library/mathematics.htm

Module	NThSOP 2210 Number theory for solving Olympiad problems
Semester(s) when the module is taught	4
Responsible teacher	Tilesov N. N.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully master this module, students must possess the knowledge, skills, and competencies acquired through prior study of the course "Selected Problems of Elementary Mathematics of an Applied Nature."
Module objectives / expected learning outcomes	The course aims to provide professional and methodological training for future mathematics teachers in teaching elements of probability theory and mathematical statistics at the school level. **Learning Outcomes:** Upon successful completion of this course, the student will be able to: A. Understand and apply methods for solving standard mathematical problems, including Olympiad-level and non-standard problems. B. Prove mathematical theorems, construct mathematical models for real-world applications, and apply mathematical knowledge in practical contexts. C. Solve problems using classical mathematical methods, perform geometric transformations manually and with the help of computer tools. D. Effectively work with subject-related information and resources. E. Communicate constructively with peers and consider diverse perspectives in collaborative settings.
Content	Vector algebra, analytical geometry, algebra, theory of functions of complex variables, operational calculation, derivative of continuity of a functionand its properties. application. Olympiad tasks for schoolchildren and students.
Form of examination	Blank test
Training and Examination requirements	Mandatory participation in in-person classes active participation in the discussion of questions, pre-prepared arrival at lectures and practical classes, high-quality and timely execution of tasks of the IWST and IWS, participation in all forms of assessment.
List of literature	**Core reading** 1. Zhetpisov, K. *Mathematical Logic and Discrete Mathematics.* 2011. 2. Talipova, M.Zh. *Discrete Mathematics: A Collection of Short Lectures.* 2016. 3. Monsik, V.B., Skrynnikov, A.A. *Probability and Statistics: Textbook.* Translated by S.Zh. Kabakbayev. Almaty, 2013. 4. Prasolov, V.V. *Problems in Planimetry: Textbook.* 5th ed. Moscow: MTSNMO, 2006. – 640 p. 5. Prasolov, V.V. *Problems in Stereometry: Teaching Manual.* 2nd ed. Moscow: MTSNMO, 2016. – 352 p. 6. Shen, A. *Geometry in Problems.* 3rd ed. Moscow: MTSNMO, 2017. – 240 p. 7. Smirnova, E.S. *Planimetry: Types of Problems and Methods of Solutions: Elective Course for Students in Grades 9–11.* Moscow: MTSNMO, 2016. – 416 p. 8. Elubaev, S. *Logical Problems and Games in Mathematics: First Edition. Educational Tool for University Students.* Almaty: Epigraph, 2016. – 332 p. 9. Salgaraeva, G.I. *Graph Theory.* Almaty: LLP "Era", 2013. – 256 p. 10. Dalinger, V.A. *Classical Inequalities and Problem Solving Using Them: Educational Manual.* Omsk: Amphora Publishing House, 2013. – 130 p.

5.2. Module - Selected chapters of mathematics and academic honesty

Module	AI 2108 Academic Integrity (in Russian)
Semester(s) when the module is taught	3
Responsible teacher	Kagazbaeva A K
Language of instruction	Kazakh/Russian
Connection with the curriculum	General education disciplines, elective component
Forms of training	Lecture, practical classes, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 150 h Contact hours: 45 h (30 h lectures, 15 h practical classes) Independent study, including preparation for exams: 25 hours SIWT, 80 hours SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	Participation in all types of classes requires preliminary preparation and active engagement. To master this module, students must have the knowledge, skills, and abilities acquired through the study of the following courses: Philosophy and Pedagogical Practice.
Module objectives / expected learning outcomes	The purpose of the course is to develop a culture of academic integrity in students, foster mastery of the norms and rules of ethical educational and scientific activities, and cultivate critical thinking, responsible decision-making, and adherence to ethical standards within the educational environment. **Learning outcomes:** **A.** Know the fundamental principles of academic honesty (honesty, responsibility, respect, fairness, trust); recognize various forms of academic dishonesty (plagiarism, cheating, falsification, fabrication, etc.); understand the university's academic integrity policy and the consequences of violations. **B.** Be able to apply academic integrity principles in educational and scientific activities; properly format citations, references, and bibliographies; complete educational and research tasks independently while avoiding dishonest practices. **C.** Possess skills for identifying and preventing academic misconduct; demonstrate ethical writing practices (essays, term papers, research papers); utilize effective academic planning strategies to minimize the risk of misconduct.
Content	The concept of academic honesty and its importance. Why academic honesty is essential in the educational and scientific environment. Basic principles: honesty, trust, fairness, respect, responsibility. Plagiarism: what it is and how to avoid it. Self-plagiarism and dual use of works. Falsification and fabrication of data. Cheating and assistance in completing assignments. Using third-party services (including AI) without permission. Citations and bibliography. Working with scientific and educational materials. The difference between paraphrasing and plagiarism. Academic code of honor. Consequences of violations: disciplinary measures, cancellation of results, expulsion. The procedure for considering cases of violations. Effective time management. Independent completion of assignments. Ethics in scientific research. Analysis of case studies on violations. Completing exercises to recognize plagiarism. Writing an essay or paper with correct citations.
Form of examination	Essay
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in discussions of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of independent work assignments, participation in all forms of assessment.

List of literature	1. Code of Academic Integrity of Students of the Republic of Kazakhstan. Astana: League of Academic Integrity, 2019. 2. Methodological Recommendations for Ensuring Academic Integrity in Universities of the Republic of Kazakhstan. Ministry of Science and Higher Education of the Republic of Kazakhstan, 2022. 3. Academic Honesty: A Teaching Aid. Edited by A.B. Aimagambetov. Almaty: Bilim, 2021. 4. Asanova, D.B. *Academic Culture and Academic Honesty of Students.* Almaty: Kazakh Universities, 2020. 5. Serikbaeva, A.K. *Formation of Academic Honesty in Students: Theory and Practice.* Nur-Sultan: L.N. Gumilyov ENU, 2021. 6. Smagulova, R.R. "Problems of Academic Plagiarism in Universities of Kazakhstan." *Bulletin of KazNU, Series: Pedagogical Sciences,* 2020, No. 2. 7. Kusainov, A.K. "Ethics and Academic Honesty in the Digital Educational Environment." *Education and Science of Kazakhstan,* 2022, No. 1. 8. Aidosova, A., et al. "Academic Integrity in Higher Education in Kazakhstan: Challenges and Perspectives." *Central Asian Journal of Education,* 2021. 9. Documents of the League of Academic Integrity of Kazakhstan (Adaldyq League): codes, anti-plagiarism, regulations. adaldyq.kz 10. Anti-Corruption Strategy of the Republic of Kazakhstan for 2022–2026. Approved by the Decree of the President of the Republic of Kazakhstan.

Module	BG 2207 Bases of Geometry
Semester(s) when the module is taught	3
Responsible teacher	Kaidasov Zh.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, you need knowledge, skills and abilities acquired while studying the following courses: Introduction to Mathematics, Analytical Geometry.
Module objectives / expected learning outcomes	The aim of the course "Fundamentals of Geometry" is to develop a modern personality and enhance the subject competencies of students by increasing their practical mastery of contemporary geometric knowledge in various areas of mathematics. **Learning outcomes:** **A.** Has a firm grasp of the categorical apparatus of pedagogical science; possesses skills for solving pedagogical problems; understands methods for planning and implementing the educational process; knows methods of conducting pedagogical experiments; is familiar with forms and methods of educational and upbringing work; masters techniques and methods of psychodiagnostics of the individual and the study of professional activity characteristics; applies information and communication technologies in the educational process. **B.** Able to use public speaking skills, participate in discussions and polemics; aware of the social significance of their future profession; motivated to perform professional duties; able to take responsibility for the results of their professional activities. **C.** Capable of preparing and editing texts of professional and socially significant content; possesses knowledge of basic facts, ideas, and methods of mathematics, including the axiomatic method; proficient in the language of mathematics; able to prove theorems; able to create mathematical models for solving problems from various fields; able to create and analyze mathematical objects using analytical methods and computer tools; understands the place of algebra in the system of mathematical knowledge; masters the facts and methods of algebra; able to apply knowledge and methods from other disciplines in algebra; able to use algebraic knowledge in other scientific fields. **D.** Able to analyze and interpret mathematical concepts, theorems, and problems; able to develop lesson fragments, organize the educational process of teaching mathematics, and design methodologies for introducing concepts, studying theorems, and solving problems. **E.** Able to competently apply knowledge and teaching skills; understands the social significance of their future teaching profession.
Content	History of the problem of the fifth postulate of Euclid. Axiomatic construction of Euclidean geometry. Arithmetic model of the Euclidean plane and consistency of the axiomatics of Euclidean geometry. Absolute geometry. Geometry of Lobachevsky. Poincare model of the Lobachevsky plane and consistency of the axiomatics of Lobachevsky geometry.
Form of examination	Oral exam
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in discussions of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO assignments, participation in all forms of assessment.
List of literature	1. Alexandrov, A.D., Netsvetaev, N.Yu. *Geometry*. Moscow: Nauka, 1990. 2. Atanasian, L.S., Bazylev, V.T. *Geometry. Part II*. Moscow: Enlightenment, 1987. 3. Trainin, Ya.L. *Foundations of Geometry*. Moscow: Uchpedgiz, 1961. 4. Atanasian, L.S., Gurevich, G.B. *Geometry. Part 2*. Moscow: Education, 1985. 5. Efimov, N.V. *Higher Geometry*. Moscow: Nauka, 1993. 6. Kaidasov, Zh. *Images in Lobachevsky's Language* [Lobachevsky zhazyktygyndagy keibir beineler]. Almaty: Gylym, 2002. 7. Electronic library: https://www.biblio-online.ru

Module	DICFOV 2208 Differential and integral calculus: functions of one variable
Semester(s) when the module is taught	3
Responsible teacher	Otarov K.T.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, the knowledge, skills, and abilities acquired from studying the following courses are required: Elementary Mathematics, Mathematical Analysis.
Module objectives / expected learning outcomes	**Course Goal:** To professionally and methodically prepare future mathematics teachers to teach elements of probability theory and mathematical statistics at the school level. **Learning Outcomes:** **A)** Understands the role of mathematical analysis within the broader system of mathematical knowledge; possesses knowledge of key facts and methods of mathematical analysis; demonstrates critical thinking skills including generalization, analysis, information comprehension, goal setting, and strategic problem solving; is familiar with foundational mathematical concepts, the axiomatic method, and can apply interdisciplinary knowledge and methods in mathematical analysis; recognizes the use of mathematical analysis in other scientific fields; knows the major historical milestones in the development of mathematics. **B)** Can prepare and edit texts with professional and socially relevant content; has proficiency in mathematical language; is capable of proving theorems; able to develop mathematical models to solve problems across various fields. **C)** Able to logically construct both oral and written mathematical communication; skilled in creating and investigating mathematical objects through analytical methods; capable of effective public speaking, debating, and participating in discussions. **D)** Prepared to collaborate with colleagues and work effectively in teams. **E)** Knows how to apply teaching knowledge and skills appropriately; understands the social importance of their future profession; is motivated for professional growth and responsible for the outcomes of their work.
Content	Elements of set theory and mathematical logic. Number sets. Functions and sequences. Theory of limits, continuity of functions. Differential and integral calculus of functions of one variable, their properties and graphs (Desmos, QuickGraph+). Differential and integral calculus of functions of several variables. Theory of series and elements of field theory.
Form of examination	Traditional
Training and Examination requirements	Mandatory attendance of online and in-person classes, active participation in discussions, preliminary preparation for lectures and practical sessions, quality and timely completion of independent work assignments, participation in all types of assessments.
List of literature	**Core reading** 1. Otarov H.T. *Mathematical Analysis.* – Almaty: Ekonomika, 2012. - Otarov H.T. *Mathematical Analysis*. Almaty: Ekonomika, 2012. 536 p. 2. Temirgaliyev N. *Mathematical Analysis. Part 1*. Almaty: Mektep, 1987. 3. Ibrashev K.I., Erkegulov Sh.T. *Course on Mathematical Analysis*. Vol. 1. Almaty: Kazmemoqupedbas, 1963. 4. Fikhtengol'ts G.M. *Course of Differential and Integral Calculus*. Vol. 1: Educational Manual. 4th ed. Moscow: Nauka, Chief Editor Phys.-Math. Literature, 2012. 656 p. 5. Tokybetov Z.H. *Mathematical Analysis*, 2009.

	6. Karasheva G. *Mathematical Analysis*, 2017. RMEB. 7. Ibraimkulov A.M., Smatova G.D. *Mathematical Analysis-I*, 2010. RMEB. 8. Aktaeva U.Zh. *Mathematical Analysis*, 2011. RMEB. 9. Makhimova S.Zh. *Mathematical Analysis*, 2011. RMEB. 10. Zhanabaev Zh. *Mathematical Analysis*, 2008. RMEB. **Supplementary reading** 11. Pilidi V.S. *Mathematical Analysis: Textbook*. Rostov-on-Don: Phoenix, 2009. 239 p. 12. Askarova M.A. *Elementary Mathematics. Algebra: Textbook*. Karasai, 2013. 13. Musin A.T. *Mathematics I (Lectures and Test Collection)*: Educational Tool. Almaty: LLP RPBC Daur, 2012. 312 p. 14. Nadyrebekova A.Sh. *Mathematical Analysis*. Taraz: TarMPI, 2012. 260 p. 15. Akhmetova S.S. *Mathematical Analysis*, 2008. RMEB. 16. Ilyin V.A., Sadovnichiy V.A., Sendov Bl.Kh. *Mathematical Analysis*. Vol. 1. Moscow: MGU Publishing, 2004. 17. Zorich V.A. *Mathematical Analysis*. Vol. 1. Moscow: MCNMO, 2002. 18. Bavrin I.I., Matrosov V.L. *General Course in Higher Mathematics*. Moscow: Prosveshchenie, 1995. 19. Ilyin V.A., Poznyak E.G. *Fundamentals of Mathematical Analysis*. Moscow: Nauka, 1971. **Electronic resources** 20. Republican Interuniversity Electronic Library (RMEB): http://rmebrk.kz/ 21. Electronic Database of the "Epigraph" Publishing House: https://elib.kz/ 22. Electronic Library of Aktobe Regional University (ARU): http://neb.arsu.kz/ru 23. Internet Mathematical Library: https://math.ru/lib/ 24. Internet Library of the Moscow Center for Continuous Mathematical Education (Vitaly Arnold's Center): http://ilib.mccme.ru/ 25. Electronic Portal of Multimedia Textbooks of MU "Epigraph": https://mbook.kz/ru/index/ 26. Republican Scientific and Technical Library (RNTB): http://aktobe.rntb.kz/ 27. Electronic Educational Physics-Mathematics Library of the EqWorld Website: http://eqworld.ipmnet.ru/ru/library/mathematics.htm

Module	DICFMV 2209 Differential and integral calculus: functions of many variables
Semester(s) when the module is taught	4
Responsible teacher	Otarov K.T.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, knowledge, skills, and abilities acquired in the following courses are required: Elementary Mathematics and Mathematical Analysis 1.
Module objectives / expected learning outcomes	The goal of the course is the professional and methodological preparation of future mathematics teachers to teach elements of probability theory and mathematical statistics in schools. **Learning outcomes:** A. Know and understand methods of mathematical research involving integral calculus, the theory of multiple integrals, and techniques for constructing mathematical models. B. Apply mathematical tools to solve assigned problems, select appropriate mathematical models for processes, and verify their adequacy. C. Demonstrate a cultured way of thinking; be capable of generalization, analysis, information processing, goal setting, and choosing methods to achieve those goals; apply known management principles in practice. D. Use mathematical methods in professional activities; be capable of teamwork, effectively defending your point of view, proposing new solutions, and striving for professional and personal growth. E. Be able to find compromises and relate your opinion to the opinions of the group.
Content	Integration of rational fractions, irrational functions, differential binomials, trigonometric and transcendental functions. Definite integral according to Riemann. Newton-Leibniz formula. Methods for calculating the definite integral, properties and graph (Desmos, QuickGraph+). Applications of the definite integral. Improper integrals. Improper integrals with infinite limits. Integral calculus formulas for improper integrals. Convergence tests for improper integrals.
Form of examination	Traditional
Training and Examination requirements	Mandatory attendance of online and in-person classes, active participation in discussions, preliminary preparation for lectures and practical sessions, quality and timely completion of independent work assignments, participation in all types of assessments.
List of literature	**Core reading** 1. Temirgaliyev, N. *Mathematical Analysis – Part 3*. Almaty: Bilim, 1997. 2. Nadyrbekova, A. Sh. *Mathematical Analysis*. Taraz: Taraz State Pedagogical Institute (TarMPI), 2012. 260 p. 3. Musin, A. T. *Mathematics I (Lectures. Test Collection): Textbook*. Almaty: LLC RPBK Dauir, 2012. 312 p. 4. Fichtenholz, G. M. *Course of Differential and Integral Calculus*, Volumes 1, 2, 3: Textbook. 4th ed. Moscow: Nauka. Chief Editor: Phys.-Math. Literature, 2012. 656 p. 5. Tokybetov, Zh. A. *Mathematical Analysis*. 2009. 6. Karasheva, G. *Mathematical Analysis*. 2017. RmEB. 7. Otarov, K. T., Azymbaev, D. T. *Theory of Functions of Several Variables*. Aktobe, 2022. 8. Aktaeva, U. Zh. *Mathematical Analysis*. 2011. RmEB. 9. Makhimova, S. Zh. *Mathematical Analysis*. 2011. RmEB. 10. Zhanabaev, Zh. *Mathematical Analysis*. 2008. RmEB.

	Supplementary reading 11. Pilidi, V. S. *Mathematical Analysis: Textbook*. Rostov-on-Don: Phoenix, 2009. 239 p. 12. Akhmetova, S. S. *Mathematical Analysis*. 2008. RmEB. 13. Il'jin, V. A., Sadovnichy, V. A., Sendov, Bl. H. *Mathematical Analysis – Part 2*. Moscow: Moscow State University Publishing House, 2006. 14. Bavrin, I. I., Matrosov, V. L. *General Course of Higher Mathematics*. Moscow: Prosveshcheniye, 1995. 15. Il'jin, V. A., Poznyak, E. G. *Fundamentals of Mathematical Analysis*. Moscow: Nauka, 1971. **Electronic resources** 16. *Republican Interuniversity Electronic Library (RMEB) – http://rmebrk.kz/* 17. *Electronic Database of the "Epigraph" Publishing House – https://elib.kz/* 18. *Electronic Library of ARU – http://neb.arsu.kz/ru* 19. *Internet Library – https://math.ru/lib/* 20. *Internet Library of the Moscow Center for Continuous Mathematical Education (Vitaly Arnold) – http://ilib.mccme.ru/* 21. *Electronic Portal of Multimedia Textbooks MU "Epigraph" – https://mbook.kz/ru/index/* 22. *Republican Scientific and Technical Library (RNTB) – http://aktobe.rntb.kz/* 23. *Electronic Educational-Scientific Physical-Mathematical Library of EqWorld – http://eqworld.ipmnet.ru/ru/library/mathematics.htm*

Module	ANTh 2210, Algebra and Number Theory
Semester(s) when the module is taught	4
Responsible teacher	Omarova B.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
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, covering topics such as divisibility, the Euclidean algorithm, prime numbers, modular arithmetic, properties and factorization of polynomials, as well as the study of algebraic and transcendental numbers. **Learning outcomes**: 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 for decomposing rational fractions. Solve systems of linear equations. C. Analyze mathematical problems based on the studied topics and select appropriate methods for their solution. D. Construct and justify mathematical arguments in a logically coherent and clear manner, both orally and in writing. E. Evaluate personal learning needs and organize independent study in new areas of fundamental sciences.
Content	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.
Form of examination	Traditional
Training and Examination requirements	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.

List of literature	1. Bukhshtab, A.A. *Number Theory*. – 4th ed., revised – St. Petersburg: Lan Publishing, 2015. – 384 pages. 2. Smolin, Yu.N. *Algebra and Number Theory*. 4th ed., revised – Moscow: FLINTA, Nauka, 2012. – 464 pages. 3. Avdoshin, S.M., Nabebin, A.A. *Discrete Mathematics. Modular Algebra, Cryptography, Coding*. – Moscow: DMK Press, 2017. – 352 pages. 4. Deza, E.I., Kotova, L.V. *Collection of Problems in Number Theory*. – Moscow: Librokom Publishing House, 2012. – 224 pages. 5. Sitnikov, V.M. *Number Theory*. – Chelyabinsk: Publishing House of Chelyabinsk State Pedagogical University, 2014. – 116 pages. 6. Veretennikov, B.M., Mikhaleva, M.M. *Algebra and Number Theory. Part 1*. – Yekaterinburg: Ural University Press, 2014. – 52 pages. 7. Cheremisina, M.I. *Selected Topics in Algebra and Number Theory*. – Orenburg: OGPU Publishing, 2016. – 28 pages. 8. Gushchina, O.A., Neeshpapa, T.A. *Congruences in the Ring of Integers*. – Yuzhno-Sakhalinsk: Sakhalin State University Publishing, 2012. – 96 pages. 9. Vorobyov, N.N., Vorobyov, S.N., Naumik, M.I. *Algebra: Theory of Polynomials and Elements of Field Theory*. – Vitebsk: VGU named after P.M. Masherov, 2018. – 87 pages. 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., Kurbatova, G.I. *Practical Exercises in Algebra. Elements of Set Theory, Number Theory, Combinatorics. Algebraic Structures.* – St. Petersburg: Lan Publishing, 2014. – 112 pages. 12. Myrzabekov, S.A., Omarova, B.Zh., Mukash, M.A. *Practice on Solving Number Theory Problems*. – Aktobe, 2014. – 100 pages. 13. Myrzabekov, S.A., Omarova, B.Zh., Mukash, M.A. *Practicum for Solving Number Theory Problems*. – Aktobe, 2014. – 100 pages.

6.1. Pedagogical education

Module	Ped 2211 Pedagogy
Semester(s) when the module is taught	3
Responsible teacher	Kuanzhanova K.T., Sagieva A.A.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 30 hours, Practical Sessions: 15 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully master the course, it is necessary to be familiar with the disciplines that precede studying this course, such as "Philosophy", "ICT", etc.
Module objectives / expected learning outcomes	The purpose of studying the discipline "Pedagogy" is to develop a professional-pedagogical orientation and professional competence in future teachers within the framework of implementing pedagogical activities in the educational system. **Learning outcomes:** A. Understand the technology of constructing the process of teaching mathematics and recognize the importance of innovative technologies in mathematics education. B. Apply fundamental pedagogical knowledge and skills within the context of the updated education system; assess situations in various fields while considering foundational knowledge of history, philosophy, and socio-political disciplines; adhere to academic honesty; master basic concepts of educational management, law, ecology, and financial literacy. C. Acquire knowledge about the nature and characteristics of the teaching profession as the foundation for teacher training, as well as an understanding of the theory of professional and pedagogical activity. D. Demonstrate competencies in designing and implementing the educational process in accordance with the principles and mechanisms of pedagogy. E. Organize research activities, pedagogical communication, and the use of pedagogical technologies; facilitate interaction among all participants in the pedagogical process in a subject–subject format; and effectively apply pedagogical technologies in the educational environment.
Content	In the process of studying the discipline, information is provided on the place of pedagogy within the system of human sciences, the subject of its research, and its basic concepts. The components, essence, patterns, principles, forms, methods, tools, and specifics of the pedagogical process across different types of educational organizations are presented. The basic requirements and challenges related to the development of human capital and the use of innovative technologies in modern pedagogical science are also covered.
Form of examination	Computer-based test
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in discussions of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO assignments, participation in all forms of assessment.

List of literature	**Core reading** 1. Podlasy, I. P. *Pedagogy. New course: In 2 books: book 2: The process of education*. M.: VLADOS, 2000. 256 p. 2. Podlasy, I. P. *Pedagogy in 2 volumes. Volume 1. Theoretical pedagogy in 2 books: textbook for universities. Book 2*. 2nd ed., revised and enlarged. Moscow: Yurait, 2022. 386 p. https://rmebrk.kz/book/1187458 3. Vinenko, V. G. *General foundations of pedagogy: a teaching aid*. Supplementary and revised edition. Moscow: Dashkov i K, 2010. 300 p. 4. Zagvyazinsky, V. I., Emelyanova, I. N. *Pedagogy*. Edited by V. I. Zagvyazinsky. 2nd ed., stereotype. M.: Publishing center "Academy", 2012. 352 p. https://rmebrk.kz/book/1136648 5. Stolyarenko, L. D. *Pedagogy: course for students*. Rostov-on-Don: Phoenix, 2003. 448 p. 6. *Actual problems of pedagogical education of the Eurasian space: development prospects: International scientific and practical conference (October 21, 2016)*. Chief editor M. G. Yeskendirov. Semey: Shakarim State University of Semey, 2016. 268 p. https://rmebrk.kz/book/1168945 **Supplementary reading:** 7. Korkina, V. I., Tishmaganbetova, G. S. *General Foundations of Pedagogy: Textbook*. Karaganda: Aknur, 2013. 172 p. 8. Mynbaeva, A. K. *Fundamentals of Higher Education Pedagogy: Textbook*. 3rd ed., suppl. Almaty: IP Volkova, 2013. 190 p. 9. *Pedagogy: Textbook*. Edited by Prof. L. P. Krivshenko. Moscow: Prospect, 2012. 432 p. 10. Vinenko, V. G. *General Foundations of Pedagogy: A Teaching Aid*. Supplemented and revised edition. Moscow: Dashkov i K, 2010. 300 p. 11. Mynbaeva, A. K. *Fundamentals of Higher Education Pedagogy: A Teaching Aid*. [Place unknown]: IP Volkova, 2010. 171 p. 12. Kurmanalina, Sh. [et al.]. *Pedagogy*. [Place unknown]: Folio, 2010, 2007. 656 p. 13. Ksembaeva, S. K. *History of Pedagogy: Textbook*. Almaty: Otan, 2014. 120 p. 14. Tebenova, K. S. [et al.]. *Fundamentals of Inclusive Education: A Teaching Aid*. Almaty: SSK, 2017. 304 p. 15. Omarova, V. K., Nurgalieva, A. K. *Problems of Transition of Comprehensive School to 12-Year Education: Textbook*. Almaty: Otan, 2015. 130 p. 16. Mynbaeva, A. K., Taubaeva, Sh. T., Bulatbaeva, A. A. [et al.]. *Educational Policy: Theories and Concepts, Trends and Development Strategies: Monograph*. Almaty: Kazakh University, 2014. 227 p. 17. *Lecture Course on the Theory and Methods of Educational Work: Towards the Study of the Discipline* / G. Kh. [Full name not provided]. Aktobe: IC ARSU named after K. Zhubanov, 2017. 121 p. 18. Aldasheva, G. Kh. *Methodological Instructions for Practical (Seminar) Classes on the Discipline "Theory and Methods of Educational Work"*. Aktobe: IC ARSU named after K. Zhubanov, 2017. 55 p. 19. Zavalko, N. A., Sakharieva, S. G. *Modern Pedagogical Technologies: Textbook*. Almaty: Epigraph, 2016. 304 p. 20. Shevchuk, E. V., Kolyeva, N. S. *Modern Technologies in Pedagogical Education: Textbook*. Almaty: Otan, 2015, 2016. 130 p. 21. Kusainov, G. M., Kagazbaeva, A. K., Abykanova, B. T. [et al.]. *Science of Learning and New Educational Practice. Volume 1: Teaching Aid*. Almaty: TechSmith, 2019. 304 p. 22. Kusainov, G. M., Kagazbaeva, A. K., Abykanova, B. T. [et al.]. *Science of Learning and New Educational Practice. Volume 2: Teaching Aid*. Almaty: TechSmith, 2019. 296 p. 23. Zhumataeva, E. *Fundamentals of Modern Didactics: Textbook*. Almaty: Epigraph, 2016. 126 p. 24. Dyachenko, V. K., Kusainov, G. M. *Didactics: Textbook. Volume 1*. Almaty: Evero, 2014. 630 p.

Module	MTM 2210 Methods of Teaching Mathematics
Semester(s) when the module is taught	4
Responsible teacher	Aspet Kagazbayeva, Professor
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 180 hours Contact hours: 60 hours (30hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation, in hours: 30 SIWT, 80 SIW.
ECTS	6
Mandatory and recommended prerequisites for studying the module	To master this module, students need the knowledge, skills, and abilities acquired through the study of the following courses: Pedagogy, Psychology, Elementary Mathematics, Workshop on Solving Problems in Algebra and Geometry, and Mathematical Analysis.
Module objectives / expected learning outcomes	The purpose of the course is to provide professional and methodological training for future mathematics teachers to teach mathematics, algebra, geometry, and elements of probability theory and statistics at school. **Learning outcomes** A. Know the content of the school mathematics curriculum (mathematics, algebra, geometry, and introductory analysis), the characteristics of the methodological system of school mathematics education, the main strands of the school course, methods of scientific inquiry, and the specifics of core and elective mathematics courses. Understand the process of designing mathematics instruction and the importance of innovative technologies in mathematics teaching. *(Knowledge and understanding)* B. Be able to apply knowledge of both general and specialized methodologies (didactic principles, methods of scientific inquiry, interactive teaching methods and forms, and ICT tools) in teaching mathematical subjects. Solve specific instructional problems, design medium- and short-term lesson plans, and implement the curricula of core and elective mathematics courses. *(Application)* C. Be able to analyze the main components of the methodological system of mathematics education and the prevailing trends in the development of mathematics teaching in general secondary education. Develop the competence and readiness to consider socio-cultural trends and value orientations in the modern educational system. *(Analysis)* D. Be able to integrate elements of the methodological system when addressing particular issues in mathematics teaching. Structure knowledge of general, specialized, and specific teaching methodologies to independently solve problems related to mathematics instruction. Plan and write research papers such as essays, projects, or abstracts. *(Synthesis)* E. Be able to assess acquired knowledge from both theoretical and practical perspectives for personal professional development. Work effectively in a team, clearly articulate one's viewpoint, propose innovative solutions, and strive for continued professional and personal growth. *(Evaluation)*
Content	**Teaching Methodology as an Academic Subject and as a Science** Pedagogical and psychological foundations of teaching mathematics: the purpose and content of mathematics education, didactic principles in teaching mathematics, and forms of thinking involved in learning mathematics. **Technologies of Teaching Mathematics**: methods of teaching mathematics; classification of teaching methods and their characteristics; methods of scientific inquiry; the mathematical modeling method; the axiomatic method; instructional tools for teaching mathematics; mathematical tasks as a means of instruction; and the forms of organizing mathematics education. **Pedagogical and Innovative Technologies in Teaching Mathematics**: classifications and types of technologies; critical thinking technology; information and communication technologies (ICT); Bloom's Taxonomy as a framework for comprehensive mastery and assessment of knowledge, skills, and abilities (KSA); and criterion-based assessment of KSA. **Methodology of Teaching the Main Strands of the Algebra Course**: numbers; functions; equations and inequalities.

	Methods of Teaching a Systematic Geometry Course: logical structure of the geometry curriculum; propaedeutic and systematic geometry courses; coordinate systems and vectors; and geometric transformations. **Methodology of Studying the Main Strands of the Algebra Course and the Beginning of Analysis**: functions and the concept of a limit; derivatives and integrals; transcendental functions and their graphs; and elements of probability theory and statistics.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance of online and in-person classes, active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SIW assignments, and participation in all forms of assessment are required. The organization and conduct of the final control (exam) are carried out in accordance with the regulations on interim certification (examination session) of students, approved by the Chairman of the Board of ARU named after K. Zhubanov: P12. Organization of the written exam. 12.3 Evaluation criteria 12.3.1 Written work is evaluated according to five criteria (20 points are assigned to each section): knowledge and understanding of the topic (the ability to disclose the topic); the level of research and analysis, conclusions; the structure and sequence of the project; the level of use of scientific sources; writing style (grammar) and conciseness of presentation.
List of literature	**Core reading** 1. Abilkasymova, A.E. *Theory and Methodology of Teaching Mathematics (Didactic-Methodical Foundations)*. – Almaty: "Mektep", 2023. – 272 pages. 2. Kusainov, G.M., Kagazbaeva, A.K., Abykanova, B.T., et al. *Science About Teaching and New Educational Practice*. – Nur-Sultan–Almaty: Techsmith, 2019. 3. Kusainov, G.M., Kagazbaeva, A.K., Saginov, K.M., Abykanova, B.T., Konurova, Z.K., Nugumanova, S.B. *Fundamentals of Didactics: Teaching-Methodical Manual*. – Nur-Sultan: DBB "Nazarbayev Intellectual School" Pedagogical Excellence Center, 2019. – 422 pages. 4. Elubaev, S. *Methodology of Teaching Mathematics*. – Almaty: Evero, 2015. 5. *Current School Textbooks and Methodical Manuals*, 2017–2024. // https://okulyk.kz/ 6. *Recent Standards, Curricula, and Programs for School Mathematics Courses, Methodical Instructions*, 2017–2024. // https://adilet.zan.kz/rus/docs/V2200029031 7. https://55.alschool.kz/o-detskom-sade/administraciya/1363-tipovye-uchebnye-plany.html **Electronic resources** 8. Kagazbaeva, A.K. *Didactic and Methodical Aspects of Teaching Mathematics*. – Aktobe: Editorial and Publishing Department of the NCPC "Orleu" Branch, 2012. – 151 pages. 9. *Laboratory and Practical Work on Methods of Teaching Mathematics*: Textbook for students of physics and mathematics specialties at Pedagogical Institutes / E.I. Lyashenko, K.B. Zobkova, T.F. Kirichenko, et al.; edited by E.I. Lyashenko. – Moscow: Prosveshchenie, 1988. – 223 pages, illustrated. 10. *Methodology of Teaching Mathematics in Secondary School: Specialized Methodology*: Textbook for pedagogical institute students specializing in physics and mathematics / A.Ya. Blokh, A.A. Gusev, G.V. Dorofeev, et al.; compiled by V.I. Mishin. – Moscow: Prosveshchenie, 1987. – 416 pages. 11. *Methodology and Technology of Teaching Mathematics. Lecture Course*: Textbook for universities / Scientific editor N.L. Stefanova, N.S. Podkhodova. – Moscow: Drofa, 2005. – 416 pages. 12. Qagazbaeva, Ä.K., Qaidásov, Zh. *Practicum on Theory and Methodology of Teaching Mathematics*. – Almaty: "Ğylym" Publishing Center, 2003. – 100 pages.

6.2. Module-Bases of the profession

Module	PedS 2211 Pedagogical Skills
Semester(s) when the module is taught	3
Responsible teacher	Kuanzhanova K.T., Sagieva A.A.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully master the course, it is necessary to be familiar with the disciplines that precede it, such as *Philosophy*, *ICT*, etc.
Module objectives / expected learning outcomes	The purpose of studying the discipline *Pedagogy* is to form a professional-pedagogical orientation and professional competence in teachers within the framework of pedagogical activity in the educational system. **Learning outcomes:** A. Understand the technology of constructing the process of teaching mathematics and recognize the importance of innovative technologies in mathematics education. B. Apply fundamental pedagogical knowledge and skills within the context of the updated education system; assess situations in various areas using basic knowledge of history, philosophy, and socio-political disciplines; apply the basic principles of academic honesty; master key concepts of educational management, law, ecology, and financial literacy. C. Acquire knowledge about the essence and characteristics of a teacher's professional activity as a foundation for training, and understand the theory of professional and pedagogical activity. D. Define competencies for the design and implementation of the educational process in accordance with the laws and mechanisms of the pedagogical process. E. Organize research activities, pedagogical communication, and pedagogical technology; manage interaction among all participants in the pedagogical process within a subject-subject format; and effectively apply pedagogical technologies in the educational environment.
Content	During the study of the discipline, students receive information about the role of pedagogy within the system of human sciences, the subject of its research, and its basic concepts. The essential components, principles, forms, methods, and means of the pedagogical process in various types of educational organizations are presented. Basic requirements and challenges in forming human capital and applying innovative technologies in modern pedagogical science are also addressed.
Form of examination	Computer-based test
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in discussions of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO assignments, participation in all forms of assessment.

List of literature	**Core reading** 1. Podlasy, I. P. *Pedagogy. New course: In 2 books: book 2: The process of education*. M.: VLADOS, 2000. 256 p. 2. Podlasy, I. P. *Pedagogy in 2 volumes. Volume 1. Theoretical pedagogy in 2 books: textbook for universities. Book 2*. 2nd ed., revised and enlarged. Moscow: Yurait, 2022. 386 p. https://rmebrk.kz/book/1187458 3. Vinenko, V. G. *General foundations of pedagogy: a teaching aid*. Supplementary and revised edition. Moscow: Dashkov i K, 2010. 300 p. 4. Zagvyazinsky, V. I., Emelyanova, I. N. *Pedagogy*. Edited by V. I. Zagvyazinsky. 2nd ed., stereotype. M.: Publishing center "Academy", 2012. 352 p. https://rmebrk.kz/book/1136648 5. Stolyarenko, L. D. *Pedagogy: course for students*. Rostov-on-Don: Phoenix, 2003. 448 p. 6. *Actual problems of pedagogical education of the Eurasian space: development prospects: International scientific and practical conference (October 21, 2016)*. Chief editor M. G. Yeskendirov. Semey: Shakarim State University of Semey, 2016. 268 p. https://rmebrk.kz/book/1168945 **Supplementary reading:** 7. Korkina, V. I., Tishmaganbetova, G. S. *General Foundations of Pedagogy: Textbook*. Karaganda: Aknur, 2013. 172 p. 8. Mynbaeva, A. K. *Fundamentals of Higher Education Pedagogy: Textbook*. 3rd ed., suppl. Almaty: IP Volkova, 2013. 190 p. 9. *Pedagogy: Textbook*. Edited by Prof. L. P. Krivshenko. Moscow: Prospect, 2012. 432 p. 10. Vinenko, V. G. *General Foundations of Pedagogy: A Teaching Aid*. Supplemented and revised edition. Moscow: Dashkov i K, 2010. 300 p. 11. Mynbaeva, A. K. *Fundamentals of Higher Education Pedagogy: A Teaching Aid*. [Place unknown]: IP Volkova, 2010. 171 p. 12. Kurmanalina, Sh. [et al.]. *Pedagogy*. [Place unknown]: Folio, 2010, 2007. 656 p. 13. Ksembaeva, S. K. *History of Pedagogy: Textbook*. Almaty: Otan, 2014. 120 p. 14. Tebenova, K. S. [et al.]. *Fundamentals of Inclusive Education: A Teaching Aid*. Almaty: SSK, 2017. 304 p. 15. Omarova, V. K., Nurgalieva, A. K. *Problems of Transition of Comprehensive School to 12-Year Education: Textbook*. Almaty: Otan, 2015. 130 p. 16. Mynbaeva, A. K., Taubaeva, Sh. T., Bulatbaeva, A. A. [et al.]. *Educational Policy: Theories and Concepts, Trends and Development Strategies: Monograph*. Almaty: Kazakh University, 2014. 227 p. 17. *Lecture Course on the Theory and Methods of Educational Work: Towards the Study of the Discipline* / G. Kh. [Full name not provided]. Aktobe: IC ARSU named after K. Zhubanov, 2017. 121 p. 18. Aldasheva, G. Kh. *Methodological Instructions for Practical (Seminar) Classes on the Discipline "Theory and Methods of Educational Work"*. Aktobe: IC ARSU named after K. Zhubanov, 2017. 55 p. 19. Zavalko, N. A., Sakharieva, S. G. *Modern Pedagogical Technologies: Textbook*. Almaty: Epigraph, 2016. 304 p. 20. Shevchuk, E. V., Kolyeva, N. S. *Modern Technologies in Pedagogical Education: Textbook*. Almaty: Otan, 2015, 2016. 130 p. 21. Kusainov, G. M., Kagazbaeva, A. K., Abykanova, B. T. [et al.]. *Science of Learning and New Educational Practice. Volume 1: Teaching Aid*. Almaty: TechSmith, 2019. 304 p. 22. Kusainov, G. M., Kagazbaeva, A. K., Abykanova, B. T. [et al.]. *Science of Learning and New Educational Practice. Volume 2: Teaching Aid*. Almaty: TechSmith, 2019. 296 p. 23. Zhumataeva, E. *Fundamentals of Modern Didactics: Textbook*. Almaty: Epigraph, 2016. 126 p. 24. Dyachenko, V. K., Kusainov, G. M. *Didactics: Textbook. Volume 1*. Almaty: Evero, 2014. 630 p.

Module	MTM 2212 Methods of Teaching Mathematics
Semester(s) when the module is taught	4
Responsible teacher	Aspet Kagazbayeva, Professor
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 180 hours Contact hours: 60 hours (30hours of lectures, 30 hours of practical exercises) Self-study, including exam preparation, in hours: 30 SIWT, 80 SIW.
ECTS	6
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: Pedagogy, Psychology, Elementary Mathematics, a Workshop on Solving Problems of Algebra and Geometry, and Analysis.
Module objectives / expected learning outcomes	The purpose of the course is to provide professional and methodological training for future mathematics teachers to teach mathematics, algebra, geometry, and elements of probability theory and statistics at school. Learning outcomes A. To know the program materials of the school mathematics course (mathematics, algebra, geometry, the beginning of analysis), the features of the methodological system of teaching at school and the main lines of the school course, methods of scientific knowledge, the features of basic and elective courses in mathematics; to understand the technology of designing the process of teaching mathematics and the importance of innovative technologies in teaching mathematics (knowledge and understanding). B. Be able to apply knowledge from general and specific methods (principles of didactics, methods of scientific cognition, interactive methods and forms of learning, ICT technologies) in the process of teaching students mathematical subjects to solve specific learning tasks; design medium- and short-term plans; implement curricula of basic and elective courses in mathematics (application). C. To be able to analyze the main components of the methodological system of teaching mathematics, the main trends in the development of mathematical education in the general secondary school system; to master the ability and willingness to take into account socio-cultural trends and value orientations of the modern educational system in teaching mathematics (analysis). D. Be able to combine elements of a methodological teaching system when considering special and specific problems of teaching mathematics; structure the knowledge gained about general, special, and particular methodology when solving problems of teaching mathematics independently; plan and write research papers such as essays, projects, or abstracts (synthesis). E. Be able to evaluate the acquired knowledge from a theoretical and practical point of view for their own professional growth; work in a team, clearly express their point of view, offer new solutions to issues; strive for professional and personal growth (assessment).
Content	**Teaching Methodology as an Academic Subject and as a Science** Pedagogical and psychological foundations of teaching mathematics: the purpose and content of teaching mathematics; didactic principles in teaching mathematics; forms of thinking in teaching mathematics. **Technologies of Teaching Mathematics:** methods of teaching mathematics; classification of teaching methods and their features; methods of scientific knowledge; mathematical modeling method; axiomatic method; means of teaching mathematics; tasks as a means of teaching mathematics; forms of teaching mathematics. Pedagogical and innovative technologies in teaching mathematics: classifications and technologies; critical thinking technology; information and communication technology; Bloom's Taxonomy as a technology for complete assimilation and assessment of knowledge, skills, and abilities (KSA); criterion-based assessment of KSA. **The Methodology of Teaching the Main Topics of the Algebra Course:** numbers; functions; equations and inequalities. **Methods of Teaching a Systematic Geometry Course:** logical construction of a geometry course; propaedeutic and systematic geometry courses; coordinates and vectors; geometric transformations.

	The Methodology of Studying the Main Topics of the Algebra Course and the Beginning of Analysis: functions and limits of functions; derivative and integral; transcendental functions and their graphs; elements of probability theory and statistics.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance of online and in-person 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 forms of assessment. The organization and conduct of the final control (exam) is carried out in accordance with the regulations on the interim certification (examination session) of students approved by the Chairman of the Board of the ARU named after K. Zhubanov: P12. Organization of the written exam. 12.3 Evaluation criteria 12.3.1 Written work is evaluated according to 5 different criteria (20 points are assigned to each section): 1) Knowledge and understanding of the topic (the ability to explain a topic); 2) The level of research and analysis, conclusions; 3) The structure and sequence of the project; 4) The level of use of scientific sources; 5) Writing style (grammar) and conciseness of presentation.
List of literature	**Core reading** 1. Abilkasymova, A.E. *Theory and Methodology of Teaching Mathematics (Didactic-Methodical Foundations)*. – Almaty: "Mektep", 2023. – 272 pages. 2. Kusainov, G.M., Kagazbaeva, A.K., Abykanova, B.T., et al. *Science About Teaching and New Educational Practice*. – Nur-Sultan–Almaty: Techsmith, 2019. 3. Kusainov, G.M., Kagazbaeva, A.K., Saginov, K.M., Abykanova, B.T., Konurova, Z.K., Nugumanova, S.B. *Fundamentals of Didactics: Teaching-Methodical Manual*. – Nur-Sultan: DBB "Nazarbayev Intellectual School" Pedagogical Excellence Center, 2019. – 422 pages. 4. Elubaev, S. *Methodology of Teaching Mathematics*. – Almaty: Evero, 2015. 5. *Current School Textbooks and Methodical Manuals*, 2017–2024. // https://okulyk.kz/ 6. *Recent Standards, Curricula, and Programs for School Mathematics Courses, Methodical Instructions*, 2017–2024. // https://adilet.zan.kz/rus/docs/V2200029031 7. https://55.alschool.kz/o-detskom-sade/administraciya/1363-tipovye-uchebnye-plany.html **Electronic resources:** 8. Kagazbaeva, A.K. *Didactic and Methodical Aspects of Teaching Mathematics*. – Aktobe: Editorial and Publishing Department of the NCPC "Orleu" Branch, 2012. – 151 pages. 9. *Laboratory and Practical Work on Methods of Teaching Mathematics*: Textbook for students of physics and mathematics specialties at Pedagogical Institutes / E.I. Lyashenko, K.B. Zobkova, T.F. Kirichenko, et al.; edited by E.I. Lyashenko. – Moscow: Prosveshchenie, 1988. – 223 pages, illustrated. 10. *Methodology of Teaching Mathematics in Secondary School: Specialized Methodology*: Textbook for pedagogical institute students specializing in physics and mathematics / A.Ya. Blokh, A.A. Gusev, G.V. Dorofeev, et al.; compiled by V.I. Mishin. – Moscow: Prosveshchenie, 1987. – 416 pages. 11. *Methodology and Technology of Teaching Mathematics. Lecture Course*: Textbook for universities / Scientific editor N.L. Stefanova, N.S. Podkhodova. – Moscow: Drofa, 2005. – 416 pages. 12. Qagazbaeva, Ä.K., Qaidásov, Zh. *Practicum on Theory and Methodology of Teaching Mathematics*. – Almaty: "Ğylym" Publishing Center, 2003. – 100 pages.

7.1 Module -Educational and research

Module	AL 3301 Academic letter
Semester(s) when the module is taught	5
Responsible teacher	Aspet Kagazbayeva, Professor
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	To master this module, need the knowledge, skills and abilities acquired during the study of the following courses: Philosophy, Academic Integrity, Pedagogical practice
Module objectives / expected learning outcomes	The purpose of the course: to familiarize students with the scientific and theoretical foundations of the Academic Writing course, with the requirements for a formal and neutral writing style intended for a scientific audience, to teach them the skills of writing and formatting scientific papers with the publication of research results. **Learning outcomes** A. To know the goals, objectives, features of the content, methods, and forms of academic writing; features and requirements for oral and written speech; and the system of the conceptual apparatus of research. To know and understand the features of the structural components and requirements for writing academic work, concepts and terms used in the work, as well as the sequence and formality of its writing. B. Be able to apply in practice the scientific and theoretical foundations of academic writing when writing academic work, using the methods of scientific knowledge (willingness to solve problems of scientific research). C. Be able to identify similarities and differences based on the analysis of the classification components of an academic text (essay, abstract, scientific article, scientific report, presentation, scientific project, thesis project, etc.). D. Be able to plan research and project work, present results, combine elements and design in new ways; write essays, analytical reports, articles, as well as carry out project activities under guidance and recommendations (synthesis). E. Be able to assess the significance of the academic work performed, formulate conclusions on the course, and identify ways to solve problems of interpersonal and professional interaction.
Content	An introduction to academic writing. The role and importance of academic writing in improving academic literacy. Features of academic work: the structure of the academic text; the organization of academic work; academic genres, their features, and the processing of scientific information. Scientific research methods (theoretical and empirical). Methods of writing an abstract, scientific article, report, and other proprietary scientific genres. Research work: the structure of research work; the beginning of research (selection of the research topic and problem statement); justification of the chosen topic; goals and objectives of the study; an overview of sources and the research program; definition of the object and subject of research; hypothesis; theoretical and practical foundations of the research; conclusions; synopsis; annotation; materials and bibliography. Methodology of writing educational research and graduation projects. Presentation of research results. Formatting of research papers. Approbation of research papers. Academic integrity and plagiarism. Academic mobility.
Form of examination	Written work – project

Training and Examination requirements	Mandatory attendance of online and in-person classes, active participation in discussions, preliminary preparation for lectures and practical exercises, high-quality and timely completion of SIW assignments, and participation in all forms of assessment.
List of literature	**Core reading** 1. Ospanov, E.T. *Academic Writing: Textbook*. – Almaty, 2018. 2. Dinaeva, B.B., Sapina, S.M. *Academic Writing and Reading: Textbook*. – Almaty, 2017. 3. Dinaeva, B.B., Sapina, S.M. *Theoretical and Practical Foundations of Academic Literacy: Textbook*. – Nur-Sultan, 2020. 4. Sapina, S.M., Dinaeva, B.B. *Academic Integrity and Techniques of Writing Scientific Research Papers: Study Guide*. – Nur-Sultan, 2020. 5. Bayakhmetova, A.A., Dusenbina, M.Zh. *Academic Writing. Language and Style of Academic Writing*. Textbook. – Kostanay: Kostanay State University named after A. Baitursynov, 2019. – 106 pages. 6. Kvititsiniya, M.B. *Academic Writing*. Textbook. – Abkhaz State University, 2018. – 145 pages. 7. Kuvshinskaya, Yu.M., Zevakhina, N.A., Ahapkina, Ya.E., Gordienko, E.I. *Academic Writing: From Research to Text*. Textbook and Practicum for Academic Bachelors, edited by Yu.M. Kuvshinskaya. – Moscow: Yurait Publishing, 2019. – 284 pages. 8. Korotkina, I.B. *Academic Writing: Process, Product, and Practice: Textbook*. – Moscow: Yurait, 2020. – 295 pages. **Supplementary reading** 9. Ovcharov, A.O., Ovcharova, T.N. *Methodology of Scientific Research: Textbook*. – Moscow: NITS INFRA-M, 2014. – 304 pages. 10. Gerasimov, B.I., Drobyusheva, V.V., Zlobina, N.V., et al. *Fundamentals of Scientific Research*. – Moscow: FORUM, INFRA-M, 2018. – 271 pages. **Electronic resources:** 11. Introduction to Academic Writing https://kk.eferrit.com/%D0%B0%D0%BA%D0%B0%D0%B4%D0%B5%D0%BC%D0%B8%D1%8F%D0%BB%D1%8B%D2%9B-%D0%B6%D0%B0%D0%B7%D1%83%D2%93%D0%B0-%D0%BA%D1%96%D1%80%D1%96%D1%81%D0%BF%D0%B5/ 12. Goals and Objectives of the "Academic Writing" Course https://melimde.com/kirispe-akademiyali-jazu-penini-masati-men-mindetteri-tairipti.html 13. Textbooks on Academic Writing. http://aperlov.narod.ru/ar/posobija.htm 14. Novikov V.K. Fundamentals of Academic Writing [Electronic Resource]: Course Lectures/ Novikov V.K. — Electronic text data. — Moscow State Academy of Water Transport, 2021. — 162 pages. Access: http://www.iprbookshop.ru/65670.html — EBS "IPRbooks" 15. Yarskaya-Smirnova E.R. Creating Academic Texts Moscow: Variant LLC, CSPGI, 2013. – pp. 21-33 Link: https://social.hse.ru/data/2013/11/28/1337841513/Akademtext.pdf

Module	SOPM 3213 Solving Olympiad Problems of Mathematics (in Russian)
Semester(s) when the module is taught	6
Responsible teacher	Imanchiev A. E.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
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: Elementary Mathematics, Algebra, and Arithmetic
Module objectives / expected learning outcomes	The purpose of the course is to professionally and methodically prepare a future mathematics teacher for teaching in the Russian language school on elements of probability theory and mathematical statistics. **Learning outcomes:** A. Know methods for solving standard problems; be able to solve Olympiad and non-standard problems. B. Be able to prove theorems, build mathematical models of problems that arise in various fields. Be able to apply the knowledge gained in mathematics in practice. C. Be able to solve mathematical problems using classical methods, apply geometric transformation methods, and use a computer. D. Ability to work with information related to their profession. E. Ability to get along with colleagues and take their opinions into account.
Content	Method of mathematical induction. Numerical inequalities. Pascal's triangle. The Cauchy inequality. Bernoulli inequalities. The Cauchy-Bunyakovsky inequality. Algebraic equations and inequalities and their systems. Equations in integers. Problems for solving nonstandard equations and inequalities. Applying various function properties. Application of classical inequalities. Game tasks. Search for strategy from the end. Symmetry. Different game tasks. Invariant and semi-invariant problems. The Dirichlet principle. Problems with elements of combinatorics and probability theory.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in the discussion of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO tasks, participation in all forms of assessment.
List of literature	**Core reading** 1. Zhetpisov K. Mathematical logic and discrete mathematics, 2011. 2. Talipova M.Zh. Discrete mathematics: A collection of short lectures, 2016. 3. Monsik V.B., Skrynnikov A.A. Probability and statistics: a textbook (translated by S.Zh. Kabakbayev), Almaty, 2013. 4. Prasolov V.V. Problems in planimetry: A textbook. 5th ed. M.: MTSNMO, 2006. 640 p. 5. Prasolov V.V. Tasks on stereometry: Teaching manual. 2nd ed. M.: MTSNMO, 2016. 352 p. 6. Shen A. Geometry in tasks. M.: MCNMO, 2017. 3rd ed. 240 p. 7. Smirnova E.S. Planimetry: types of problems and methods of solutions: Elective course for students 9–11 grades. M.: MCNMO, 2016. 416 p. 8. Elubaev S. Logical problems and games in mathematics: first edition. Higher education educational tool for students. Almaty: Epigraph, 2016. 332 p. 9. Salgaraeva G.I. Theory of graphs. Almaty: LLP "Era", 2013. 256 p. 10. Dalinger V.A. Classical inequalities and solving problems with their use: educational allowance. Omsk: Publishing House "Amfora", 2013. 130 p.

Module	RME 3302 Robotics and mechatronics in education (in Russian)
Semester(s) when the module is taught	6
Responsible teacher	Zhubayev Abzal Kantarbayevich, Ass. Prof.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	Mechanics, Information and Communication Technologies, Algebra and Geometry, Mathematical Analysis, Molecular Physics and Thermodynamics, Electricity and Magnetism, Optics, Atomic Physics.
Module objectives / expected learning outcomes	The purpose of the discipline is to explain the methods, laws, models, and basic principles of modern robotics and mechatronics, and to develop students' physical thinking. **Learning outcomes:** A. Knows and understands the basic stages of the development of robotics; features of the mechanical components of mobile robot designs; principles of operation of the control unit and electromechanical drives; functions and principles of operation of sensors in mobile robots; and the basic principles of programming mobile robots. B. Uses the control unit, electromechanical drives, sensors in mobile robots, and programming of mobile robots. C. Classifies electromechanical drives in robotics. D. Designs mobile robots; forms mathematical models for programming the movement of mobile robots. E. Evaluates the effectiveness of developed designs, algorithms, and programs. F. Masters the system of subject, psychological, pedagogical, methodological, and socio-humanitarian knowledge, skills, and competencies in the fields of Mathematics and Physics; carries out further professional development. G. Uses mathematical methods in the analysis and modeling of physical processes, data, and phenomena. H. Uses various types of information and communication technologies in personal activities: 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. Classification 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 indicators. Piezoelectric emitters. Temperature transferability.
Form of examination	Writting
Training and Examination 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
List of literature	**Core reading** 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)

7.2. Module-New technologies in education

Module	AL 3301 Academic letter
Semester(s) when the module is taught	5
Responsible teacher	Aspet Kagazbayeva, Professor
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	To master this module, need the knowledge, skills and abilities acquired during the study of the following courses: Philosophy, Academic Integrity, Pedagogical practice
Module objectives / expected learning outcomes	The purpose of the course: to familiarize students with the scientific and theoretical foundations of the Academic Writing course, with the requirements for a formal and neutral writing style intended for a scientific audience, and to teach them the skills of writing and formatting scientific papers with the publication of research results. **Learning outcomes** A. To know the goals, objectives, features of the content, methods, and forms of academic writing; features and requirements for oral and written speech; the system of conceptual apparatus of research; to know and understand the features of the structural components and requirements for writing academic work, concepts and terms used in the work, as well as the sequence and formality of its writing. B. Be able to apply in practice the scientific and theoretical foundations of academic writing when writing academic work using the methods of scientific knowledge (willingness to solve the problems of scientific research). C. Be able to identify similarities and differences based on the analysis of the classification components of an academic text (essay, abstract, scientific article, scientific report, presentation, scientific project, thesis project, etc.). D. Be able to plan research and project work, present results, combine elements and design in a new way; write essays, analytical reports, articles, as well as carry out project activities under guidance and recommendations (synthesis). E. Be able to assess the significance of the academic work performed, formulate conclusions on the course, and identify ways to solve problems of interpersonal and professional interaction.
Content	An introduction to academic writing. The role and importance of academic writing in improving academic literacy. Features of academic work: the structure of the academic text; the organization of academic work; academic genres, their features, the processing of scientific information. Scientific research methods (theoretical and empirical). Methods of writing an abstract, scientific article, report, and other proprietary scientific genres. Research work: the structure of the research work; the beginning of the research (selection of the research topic and problem statement); justification of the chosen topic. Goals and objectives of the study. An overview of the sources and research program. Definition of the object and subject of research, hypothesis. Theoretical and practical foundations of the research. Conclusions. Synopsis. Annotation. Materials and bibliography. Methodics of writing educational research and graduation projects. Presentation of the research results. Decoration of research papers. Approbation of research papers. Academic integrity and plagiarism. Academic mobility.
Form of examination	Written work – project
Training and Examination requirements	Mandatory attendance of online and in-person 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 forms of assessment.
List of literature	**Core reading** 1. Ospanov, E.T. *Academic Writing: Textbook*. – Almaty, 2018.

	2. Dinaeva, B.B., Sapina, S.M. *Academic Writing and Reading: Textbook*. – Almaty, 2017. 3. Dinaeva, B.B., Sapina, S.M. *Theoretical and Practical Foundations of Academic Literacy: Textbook*. – Nur-Sultan, 2020. 4. Sapina, S.M., Dinaeva, B.B. *Academic Integrity and Techniques of Writing Scientific Research Papers: Study Guide*. – Nur-Sultan, 2020. 5. Bayakhmetova, A.A., Dusenbina, M.Zh. *Academic Writing. Language and Style of Academic Writing*. Textbook. – Kostanay: Kostanay State University named after A. Baitursynov, 2019. – 106 pages. 6. Kvititsiniya, M.B. *Academic Writing*. Textbook. – Abkhaz State University, 2018. – 145 pages. 7. Kuvshinskaya, Yu.M., Zevakhina, N.A., Ahapkina, Ya.E., Gordienko, E.I. *Academic Writing: From Research to Text*. Textbook and Practicum for Academic Bachelors, edited by Yu.M. Kuvshinskaya. – Moscow: Yurait Publishing, 2019. – 284 pages. 8. Korotkina, I.B. *Academic Writing: Process, Product, and Practice: Textbook*. – Moscow: Yurait, 2020. – 295 pages. **Supplementary reading** 9. Ovcharov, A.O., Ovcharova, T.N. *Methodology of Scientific Research: Textbook*. – Moscow: NITS INFRA-M, 2014. – 304 pages. 10. Gerasimov, B.I., Drobyusheva, V.V., Zlobina, N.V., et al. *Fundamentals of Scientific Research*. – Moscow: FORUM, INFRA-M, 2018. – 271 pages. **Electronic resources:** 11. Introduction to Academic Writing https://kk.eferrit.com/%D0%B0%D0%BA%D0%B0%D0%B4%D0%B5%D0%BC%D0%B8%D1%8F%D0%BB%D1%8B%D2%9B-%D0%B6%D0%B0%D0%B7%D1%83%D2%93%D0%B0-%D0%BA%D1%96%D1%80%D1%96%D1%81%D0%BF%D0%B5/ 12. Goals and Objectives of the “Academic Writing” Course https://melimde.com/kirispe-akademiyali-jazu-penini-masati-men-mindetteri-tairipti.html 13. Textbooks on Academic Writing. http://aperlov.narod.ru/ar/posobija.htm 14. Novikov V.K. Fundamentals of Academic Writing [Electronic Resource]: Course Lectures/ Novikov V.K. — Electronic text data. — Moscow State Academy of Water Transport, 2021. — 162 pages. Access: http://www.iprbookshop.ru/65670.html — EBS "IPRbooks" 15. Yarskaya-Smirnova E.R. Creating Academic Texts Moscow: Variant LLC, CSPGI, 2013. – pp. 21-33 Link: https://social.hse.ru/data/2013/11/28/1337841513/Akademtext.pdf

Module	SMPPE 3213 Solving mathematical problems in a programming environment (in Russian)
Semester(s) when the module is taught	6
Responsible teacher	Bayesheva K.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully master this module, students should have the knowledge, skills, and abilities gained from the course on Probability Theory and Mathematical Statistics.
Module objectives / expected learning outcomes	The module aims to teach students the fundamental principles and techniques for using MathCAD and MATLAB software packages to solve statistical problems, particularly in scientific calculator modes. **Learning outcomes** A. Understand the basic definitions and concepts involved in solving statistical problems using MathCAD and MATLAB environments. B. Develop the ability to formulate and prove key results related to these topics. C. Acquire proficiency in solving typical problems based on the theoretical material covered. D. Enhance students' skills for independent work and self-study. E. Demonstrate the ability to work independently on problem-solving, collaborate effectively with peers, and consider their viewpoints.
Content	Operations applied to matrices and their properties. Basic properties of determinants. Minors and algebraic complements. Solutions of the system of homogeneous equations. System of linear equations. Matrix equations. Kramer's rule. Gaussian method for solving a system of equations. The group and its properties. Algebraic systems. Order of group elements. Vector space and its properties. The basis and dimension of the Vector Space. Linear operator. Representation of linear operators by matrices. Complex number field.
Form of examination	Blank test
Training and Examination requirements	Variables and functions in the mathematical system MathCad, Matlab, data types, drawing function graphs, surfaces, numerical expressions, simplifying and transforming expressions, solving equations, solving systems of equations, solving inequalities, performing simple matrix calculations, matrix functions, finding the derivative, calculating integrals, series and limits, solving ordinary differential equations, typical statistical functions, determining the regression line, polynomial regression.
List of literature	1. Potapova N.N., Zabrodina O.M. *Statistical Data Processing in the MathCad System*, Volgograd, VolgGASU, 2014. 2. Buzaubakova K.Zh. *Innovative Technologies in Education*, Taraz, 2014. 3. Belova N.D. *Problem Solving in the MathCad Package*, Khabarovsk, 2007. 4. Kusainov G.M., Kagazbaeva A.K., Abykanova B.T. et al. *Science of Teaching and New Educational Practices*, Nur-Sultan–Almaty: Techsmith, 2019. 5. Kaskataeva B.R. *Methodology and Technology of Teaching Mathematics*, Almaty, 2015. 6. Askhat Alimov *Issues of Applying Interactive Methodology in Higher Education Institutions*, textbook, Almaty, 2013.

Module	RME 3302 Robotics and mechatronics in education (in Russian)
Semester(s) when the module is taught	6
Responsible teacher	Zhubayev Abzal Kantarbayevich, Ass. Prof.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	Prerequisites: Mechanics, Information and communication technologies, Algebra and geometry, Mathematical analysis, Molecular physics and thermodynamics, Electricity and magnetism, Optics, Atomic physics.
Module objectives / expected learning outcomes	The purpose of the discipline is to explain the methods, laws, models, and basic principles of modern robotics and mechatronics, and to develop students' physical thinking. **Learning outcomes:** 1. Knows and understands the basic stages of the development of robotics; features of the mechanical components of mobile robot designs; principles of operation and functioning of the control unit and electromechanical drives; functions and principles of operation of sensors in mobile robots; and the basic principles of programming mobile robots. 2. Uses the control unit, electromechanical drives, sensors in mobile robots, and programming of mobile robots. 3. Classifies electromechanical drives in robotics. 4. Designs mobile robots; forms mathematical models for programming the movement of mobile robots. 5. Evaluates the effectiveness of developed designs, algorithms, and programs. 6. Masters the system of subject, psychological, pedagogical, methodological, socio-humanitarian knowledge, business skills in Mathematics and Physics, and carries out further professional development. 7. Uses mathematical methods in the analysis and modeling of physical processes, data, and phenomena. 8. Uses various types of information and communication technologies in 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. Classification of technological complexes where robots are used. 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 sensing.
Form of examination	Writting
Training and Examination 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.
List of literature	**Core reading** 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)

8.1. Module-Applied

Module	DE 3214 Differential Equations (in English)
Semester(s) when the module is taught	5
Responsible teacher	Mynbayeva ST, PhD, senior lecturer
Language of instruction	English
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 180 hours Contact Hours: 60 hours (Lectures: 30 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 30 hours, SIW - 90 hours
ECTS	6
Mandatory and recommended prerequisites for studying the module	Mathematical analysis
Module objectives / expected learning outcomes	Teach students mathematical culture, help them understand the basics of applied and practical problems, and develop their ability to establish interdisciplinary connections using simple differential equations. 1. Knowledge of problem-solving in the theory of elementary differential equations and its applications. 2. Application of basic classical methods for solving given problems; familiarization with practical methods for describing physical processes. 3. Understanding practical methods for solving boundary and initial value problems of differential equations; ability to summarize the given problem. 4. Development of a general understanding of differential equations; ability to perceive, process, accumulate information, and interact with it. 5. Ability to work with various methods for solving differential equation problems.
Content	Differential equations of the first and upper order. System of differential equations. Differential equations of independent derivatives of the first order.
Form of examination	Oral exam
Training and Examination requirements	The final evaluation will take place in the format of an exam. The exam will be conducted in accordance with the university's academic integrity policy and examination regulations. The examination form for the subject is oral. According to the credit value of the subject, a pool of tasks is created using a special template. Questions are formulated according to Bloom's taxonomy. Each examination ticket contains 3 questions. The maximum score for the ticket is 100 points. If plagiarism or copying is detected, the exam results will be automatically canceled, and the subject must be retaken in the summer semester. Final control questions (exam) are available at: https://univer.arsu.kz/
List of literature	**Core reading** 1. Trench, W.F. *Elementary Differential Equations*. – Department of Mathematics, Trinity University, San Antonio, Texas, USA, 2013. – 663 p. 2. Nagy, G. *Ordinary Differential Equations*. – Mathematics Department, Michigan State University, 2020. – 419 p. 3. Lebl, Jiri. *Notes on Diffy Qs: Differential Equations for Engineers*. – eBook, 2020. – 466 p. 4. Adkins, W.A., Davidson, M.G. *Ordinary Differential Equations*. – Springer, Heidelberg Dordrecht London, 2012. – 815 p. 5. Tracy, Graig A. *Lectures on Differential Equations*. – Department of Mathematics, University of California, 2017. – 165 p. 6. Chasnov, J.R. *Differential Equations*. – The Hong Kong University of Science and Technology, 2020. – 128 p. 7. Kupferman, R. *Ordinary Differential Equations*. – Institute of Mathematics, The Hebrew University, 2012. – 118 p. 8. Ipatova, V.M., Pyrkova, O.A., Sedov, V.N. *Differential Equations: Solution Methods*. – Moscow: MIPT, 2012. – 140 p. 9. Feofanova, V.A. *Differential Equations: Lectures, Examples and Problems*. – Nizhny Tagil: NTI (UrFU branch), 2015. – 128 p. 10. Muratova, T.V. *Differential Equations: Textbook and Practical Training for Secondary Vocational Education*. – Moscow: Yurait Publishing House, 2016. – 435 p.

11. Kolekeev, K.D., Nazarova, K.Zh. *Differentsialdyq Tendeuler* (*Differential Equations*). – Almaty: Housing Society RPBK "Dauir", 2012. – 216 p.
12. Joshi, M.C. *Ordinary Differential Equations: A Modern Perspective*. – Department of Mathematics, IIT Bombay, 2006. – 276 p.
13. Kapadia, D. *Differential Equation Solving with DSolve*. – Wolfram Research, Inc., 2008. – 118 p.
14. Ross, Clay C. *Differential Equations: An Introduction with Mathematica*. 2nd Ed. – Department of Mathematics, University of the South, 2004. – 444 p.
15. Coddington, E.A., Carlson, R. *Linear Ordinary Differential Equations*. – Society for Industrial and Applied Mathematics, 1997. – 354 p.
16. Chicone, C. *Ordinary Differential Equations with Applications*. – Department of Mathematics, University of Missouri, Columbia, 1999. – 571 p.
17. Grigorian, A. *Ordinary Differential Equations: Lecture Notes*. – University of Bielefeld, 2008. – 133 p.
18. Arino, J. *Fundamental Theory of Ordinary Differential Equations: Lecture Notes*. – Department of Mathematics, University of Manitoba, 2006. – 164 p.

Online resources

19. http://neb.arsu.kz – Electronic Library of K. Zhubanov ARU
20. http://rmebrk.kz – "RJOAEK" Information System
21. http://kazneb.kz – National Electronic Library of Kazakhstan
22. http://aktobe.rntb.kz – Republican Scientific and Technical Library
23. https://elib.kz – Epigraph Publishing House Electronic Database
24. https://math.ru/lib – Internet Library of Mathematics
25. https://www.oldrochester.org – Old Rochester Regional High School
26. https://www.math24.net – Calculus and Differential Equations Website
27. http://eqworld.ipmnet.ru/ru/library/mathematics.htm – EqWorld Physics and Math e-Library

Module	MSPP 3303 Methods for solving planimetric problems (in English)
Semester(s) when the module is taught	5
Responsible teacher	Irgalieva I. S.
Language of instruction	English
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, students need the knowledge, skills, and abilities acquired during the study of the following courses: Analytical Geometry, Elementary Mathematics.
Module objectives / expected learning outcomes	The purpose of the course is the professional and methodological preparation of future mathematics teachers for teaching elements of probability theory and mathematical statistics at school. **Learning outcomes:** A. Knowledge of the essence and place of the subject within the system of mathematical education; knowledge of the basic concepts of school geometry. B. Mastery of mathematical language and the ability to use it competently; ability to use properties of figures and prove theorems. C. Ability to correctly apply methods and techniques in solving simple mathematical problems; ability to set goals related to professional functions; thorough mastery of scientific methods and techniques. D. Ability to reach agreements and align personal opinions with collective views; ability to use mathematical methods in professional activities. E. Ability to competently apply knowledge and skills in teaching; understand the social essence of the teaching profession; develop motivation for professional activity.
Content	Point, line, plane, figure, body; measurement of geometric quantities; parallel and perpendicular lines; geometric relationships in triangles; right polygons; length of a circle; area of a circle.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance of online and in-person classes; active participation in discussions; preliminary preparation for lectures and practical classes; high-quality and timely completion of SRO tasks; participation in all forms of assessment.
List of literature	**Core reading** 1. Madiyarov, N. K. *Analytical Geometry: A Textbook*. Almaty: Evero, 2018. 2. Arep'eva, S. V. *Analytical Geometry on the Plane: A Textbook*. Rudny: Rudnensky Industrial Institute (RII), 2018. **Supplementary reading** 3. Omarova, B. Zh., Baesheva, K. S. *Educational and Methodological Complex AG 2213 "Algebra and Geometry"* for specialty 5B011100 "Informatics". Aktobe, 2012. 4. Tleubergenova, M. A. *Educational and Methodological Complex Discipline "AG 2206 Algebra and Geometry"* for specialty 5B011100 "Informatics". Aktobe, 2012. 5. Smirnov, S. V. *Advanced Topics in Geometry*. Faculty of Mechanics and Mathematics, Moscow State University, 2021. 6. Konev, V. V. *The Elements of Mathematics*, Workbook, Part 2. Tomsk Polytechnic University, 2009. 7. Konev, V. V. *The Elements of Mathematics*, Textbook. Tomsk Polytechnic University, 2009. 8. Konev, V. V. *Higher Mathematics*, Textbook, Part 2. Tomsk Polytechnic University, 2009. 9. Konev, V. V. *The Elements of Mathematics*, Workbook. Tomsk Polytechnic University, 2009. 10. Gorinov, Alexey. "Two-Sided Fundamental Theorem of Affine Geometry." *Arnold Mathematical Journal*, 2022, Vol. 8, No. 3-4, pp. 469–480. **Electronic resources** 1. https://neb.arsu.kz/view?rid=5749&fid=5734 2. https://neb.arsu.kz/view?rid=5749&fid=5734 3. https://neb.arsu.kz/view?rid=10718&fid=10697

	4. https://neb.arsu.kz/view?rid=1756&fid=1752 5. http://portal.tpu.ru/SHARED/k/KONVAL/Textbooks 6. https://neb.arsu.kz/view?rid=1964&fid=1958 7. https://nashol.com/knigi-po-matematike/ 8. http://www.books4all.ru/ganre/ganre.html

Module	PTMS 3215 Probability Theory and Mathematical Statistics
Semester(s) when the module is taught	6
Responsible teacher	Azhymbaeva D.T. Ph.D., Associate Professor, Department of Mathematics
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, you need knowledge, skills and abilities acquired in the following courses: Algebra, Mathematical Sciences.
Module objectives / expected learning outcomes	The aim of the course is the professional and methodological preparation of future mathematics teachers for teaching elements of probability theory and mathematical statistics at school. **Learning outcomes** A. Knowledge of the basic fundamental concepts of probability theory and mathematical statistics. B. Ability to state and prove the main results of these sections. C. Ability to solve typical problems based on the main theoretical material and practical work results. D. Ability to reach agreements and align personal opinions with collective views; ability to use mathematical methods in professional activities. E. Ability to competently apply knowledge and skills in teaching, understand the social significance of the teaching profession, and develop motivation for professional activity.
Content	Combinatorial formulas. Theorems of addition and multiplication of probabilities. Formula of total probability. Bayes' theorem. Repeated trials. Random variables. Numerical characteristics of random variables. Law of large numbers. Chebyshev's inequality. Population and sample. Empirical distribution function. Estimation of distribution parameters. Functional, statistical, and correlation dependencies.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in discussion of issues, preliminary preparation for lectures and practical classes, high-quality and timely performance of SRO assignments, participation in all forms of assessment.
List of literature	1. Akanbay, N. Collection of Problems and Exercises in Probability Theory: Textbook. 2019. 336 pages. 2. Akanbay, N. Collection of Problems and Exercises in Probability Theory. Part II: Textbook. 2019. 296 pages. 3. Koshchanova, G.R. Probability Theory and Mathematical Statistics: Textbook. 2020. 143 pages. 4. Rakhimzhanova, S.K. Probability Theory and Mathematical Statistics: Teaching Manual. 2020. 192 pages 5. Rakhimzhanova, S.K. Probability Theory and Mathematical Statistics: Educational and Methodological Tool. 2020. 188 pages. 6. Iskakova, A.S. Collection of Problems in Probability Theory: Textbook. 2018. 176 pages. 7. Iskakova, A.S. Solving Problems in the Theory of Probability Using MATLAB: Textbook for Students and Undergraduates. 2018. 195 pages. 8. Iskakova, A.S. Solving Problems in Probability Theory Using MATLAB: Textbook. 2018. 192 pages. 9. Akanbay, N. Course of Probability Theory and Mathematical Statistics: Textbook. 2016. 396 pages. 10. Bektaev, K.B. Probability Theory and Mathematical Statistics: Textbook. 2014. 432 pages.

Module	Phys 3216 Physics (in Russian)
Semester(s) when the module is taught	6
Responsible teacher	Sagimbayeva Shynar Zhanuzakovna Associate Professor
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 120 hours Contact Hours: 40 hours (20 hours of lectures, 5 hours of practical classes, 15 hours of laboratory classes) Independent Study (including exam preparation): SIWT - 20 hours, SIW - 60 hours
ECTS	4
Mandatory and recommended prerequisites for studying the module	Prerequisites: Higher mathematics, physics subject in the school course.
Module objectives / expected learning outcomes	**Module Objectives:** Formation of students' understanding of the modern physical picture of the world and scientific outlook; development of students' knowledge and skills in applying fundamental laws and theories of classical and modern physics, as well as physical research methods, as the foundation for professional activities. **Learning Outcomes:** 1. Ability to independently identify, understand, and evaluate prospects within the subject area of physics. 2. Ability to use basic theoretical knowledge of physics and practical skills to solve organizational and management tasks. 3. Ability to apply knowledge of theoretical and experimental foundations of physics and technology in physics teaching. 4. Knowledge and understanding of physical phenomena, their theories, and laws. 5. Ability to apply this knowledge in observations, solving typical problems, performing laboratory work, and studying environmental phenomena. 6. Ability to select theoretical data, problem-solving methods, and conduct research. 7. Skills in verifying the accuracy of results, filling tables based on analysis, creating graphs, processing data, calculating errors, determining percentage deviations from theory, and drawing conclusions. 8. Competence in presenting, generalizing, monitoring, testing, and report writing.
Content	The course aims to reveal the essence of the main concepts, laws, and theories of classical and modern physics, emphasizing their internal interconnections and unity. It covers the following sections: mechanics, molecular physics and thermodynamics, electricity and magnetism, optics, atomic physics, and nuclear physics.
Form of examination	Oral exam
Training and Examination requirements	Students who have mastered the course material and scored at least 50% of the total grade based on the results of the 1st and 2nd midterm tests are eligible to take the final exam.
List of literature	**Core reading** 1. Trofimova T.I. Physics Course. Moscow: Vysshaya Shkola, 2003. 2. Trofimova T.I., Pavlova Z.G. Collection of Problems for Physics Course with Solutions. Moscow: Vysshaya Shkola, 2002. 3. Tatenov A.M., Savelyeva V.V. Teaching Manual on Physics for Technical Specialists. Almaty, 2017. 4. Volkenstein V.S. Collection of Problems for the General Course of Physics. Moscow, 2002. 5. Zisman G.A., Todes O.M. General Physics Course. Volumes 1–3. Saint Petersburg: Lan, 2016. 6. Odiyak B.P., Nametkulova R.Zh., Kadirimbetova A.K. Course of General Physics in Tasks and Exercises, Part 1. Almaty: Evero, 2018. 7. Mingaleeva A.M. Methodical Instructions and Control Tasks in Physics. Almaty, 2019. 8. Salihoja J.M. Workshop on Molecular Physics. Medical Allowance. Almaty: Evero, 2018.

	9. Frish S.E., Timoreva A.V. General Physics Course. Volumes 1–3. Saint Petersburg: Lan, 2016. 10. Grabovsky R.I. Physics Course. Saint Petersburg: Lan, 2016.

Module	MSSP 3304 Methods for solving Stereometric problems (in Russian)
Semester(s) when the module is taught	6
Responsible teacher	Kokotova Yelena, Associate Professor of the Department of Mathematics
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 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 following courses: Elementary Mathematics and The Methodology of Solving Planimetric Problems.
Module objectives / expected learning outcomes	The aim is to generalize and systematize students' knowledge of the main sections of stereometry, expand and deepen their understanding of techniques and methods for solving stereometric problems, and develop practical skills in solving such problems. Methodological issues related to solving stereometry problems are considered, and problem-solving skills are developed. Expected learning outcomes: 1. Master the basic theoretical foundations of the stereometry course; 2. Perform geometric constructions in space; be able to depict spatial shapes and build sections of polyhedra; 3. Know and understand the basic techniques and methods of solving stereometry problems, including the stages of problem analysis; 4. Be able to solve stereometry problems involving proof, calculation, and construction; 5. Be able to correctly formulate theoretical propositions and present own reasoning when solving problems; 6. Be able to consider different approaches to solving a problem and assess the advantages and disadvantages of each method; 7. Be able to apply software tools when making drawings.
Content	Classification of stereometric tasks. Methods for solving stereometric problems. The stages of solving a problem. Methods for solving problems in the sections: "Parallelism, perpendicularity of straight lines and planes in space," "Intersecting straight lines," "Polyhedral angles," "Polyhedra," "Round bodies, bodies of rotation," "Body volume," "Surface area," "Inscribed and circumscribed polyhedra," "Combinations of polyhedra and bodies of rotation." General information about image construction. Tasks for constructions in stereometry. Basic methods for constructing cross sections.
Form of examination	Blank test
Training and Examination requirements	Students are required to attend all classes according to the schedule; preliminary preparation for classes, study of recommended literature; active participation in lectures, active work in practical classes, timely completion and delivery of independent work and homework assignments; passing all forms of assessment.

List of literature	**Core reading** 1. Soltan G.N., Soltan A.E., Zhumadilova A.Zh., Alibekov S.Sh. Learning to Solve Problems in Stereometry. Textbook for Grade 10. Kokshetau: IP Keleshek-2030, 2020. 112 p. 2. Soltan G.N., Soltan A.E., Zhumadilova A.Zh., Alibekov S.Sh. Learning to Solve Problems in Stereometry. Textbook for Grade 11. Kokshetau: IP Keleshek-2030, 2020. 134 p. 3. Bezukhov D.M., Peker V.M., Khalikov M.A. et al. Mathematics. Stereometry. Effective Methods of Solving Problems. Manual for Self-Study. Moscow: Prosveshchenie, 2012. 168 p. 4. Rabinovich E.M. Tasks and Exercises on Ready-Made Drawings. Grades 10–11. Geometry. Moscow: ILEX, 2014. 80 p. 5. Balayan E.N. Geometry: Tasks on Ready-Made Drawings for Preparation for the Unified State Exam. Grades 10–11. Rostov-on-Don: Felix, 2013. 217 p. 6. Gotman E.G. Stereometric Problems and Methods of Their Solution. Moscow: ICNMO, 2006. 160 p. 7. Gusev V.A., Litvinenko V.N., Mordkovich A.L. Practicum on Elementary Mathematics. Geometry: Textbook for Students. Moscow: Prosveshchenie, 1992. 352 p. 8. Koryanov A.G., Prokofiev A.A. Mathematics. Unified State Exam. Task 14. Polyhedra: Types of Problems and Methods of Their Solution. Rostov-on-Don: Legion, 2017. 256 p. 9. Prokofiev A.A., Koryanov A.G. Mathematics. USE. Polyhedra, Round Bodies. Rostov-on-Don, 2019. 10. Lyubimova V.V. The Volume Method as a Convenient Way to Solve Stereometric Problems. // Mathematics at School, 2019, No. 3, pp. 27–35. 11. Ustimenko E.S., Voskoboinikova. Methods of Solving Stereometric Problems. // Bulletin of Vitebsk State University, 2022, No. 1(114), pp. 92–97. 12. Smirnov V.A., Smirnova I.M. Visualization of Problems for Finding the Distance Between Intersecting Straight Lines. // Mathematics High School, 2019, No. 6, pp. 10–16. 13. Smirnov V.A., Smirnova I.M. Geometry with GeoGebra. Stereometry. Moscow: Prometheus, 2018. 172 p. 14. Soltan G.N., Soltan A.E., Zhumadilova A.Zh., Alibekov S.Sh. Geometry. Textbook for Grade 10. Kokshetau: IP Keleshek-2030, 2020. 113 p. 15. Shynybekov A.N., Shynybekov D., Zhumabaev R. Geometry. Textbook for Grade 10. Almaty: Atamura, 2019. 113 p. 16. Soltan G.N., Soltan A.E., Zhumadilova A.Zh., Alibekov S.Sh. Geometry. Textbook for Grade 11. Kokshetau: IP Keleshek-2030, 2020. 113 p. 17. Shynybekov A.N., Shynybekov D., Zhumabaev R. Geometry. Textbook for Grade 11. Almaty: Atamura, 2019. 113 p. **Supplementary reading** 1. Dalinger V.A., Ataev B.K. Skillful work with a drawing is the basis for successful solution of geometric problems. // Mathematics High School, 2020, No. 2, pp. 26–34. 2. Sahakian S.M., Butuzov V.F. Studying Geometry in Grades 10–11: A Book for Teachers. Moscow: Prosveshchenie, 2010. 248 p. 3. Dalinger V.A. Methods of Teaching Students Stereometry through Problem Solving. 2nd ed., revised and expanded. Moscow: Yurait, 2022. 370 p. 4. Alexandrov A.D., Werner A.L., Ryzhik V.I. Stereometry. Geometry in Space: Study Manual for Students and Applicants. Visaginas: Alfa, 1998. 576 p. 5. Smirnova I.M., Smirnov V.A. Tasks on Finding Volumes of Polyhedra that Develop Students' Spatial Representations. 6. Smirnova I.M., Smirnov V.A. Polyhedra: Elective Course, Grades 10–11. Study Manual for General Education Institutions. Moscow: Mnemosyne, 2007. 95 p. 7. Smirnova I.M., Smirnov V.A. The Image of Spatial Figures: Elective Course, Grades 10–11. Study Manual for General Education Institutions. Moscow: Mnemosyne, 2007. 64 p. 8. Abylkasymova A.E. et al. Construction of Sections. Almaty: Atamura, 2009. 9. Smirnova I.M., Smirnov V.A. Polyhedron Sections. Moscow: Exam, 2011. 10. Smirnov V.A., Smirnova I.M. Extreme Problems in Geometry. 11th Grade. // Math at School, 2021, No. 6, pp. 17–25.

11. Zemlyakov A.N. Geometry in the 10th Grade: Methodological Recommendations by A.V. Pogorelov. Teacher's Guide. 3rd ed., revised. Moscow: Prosveshchenie, 2002. 222 p.
12. Zemlyakov A.N. Geometry in the 11th Grade: Methodological Recommendations by A.V. Pogorelov. Teacher's Guide. 3rd ed., revised. Moscow: Prosveshchenie, 2003. 272 p.
13. Methods and Technology of Teaching Mathematics: A Course of Lectures. Manual for Universities / Ed. N.L. Stefanova, H.S. Podkhodova. 2nd ed., revised. Moscow: Bustard, 2008. 415 p.
14. Kuzmin S.G., Kostyuchenko R.Yu. The Stages of Solving Stereometric Problems as the Basis for Teaching Schoolchildren to Solve Them. // The World of Science: Pedagogy and Psychology, 2022, Vol. 10, No. 3.
15. Zharov S.V. Generalization of the Concept of the Centroid in Solving Stereometric Problems. // Mathematical Education, 2022, No. 4, pp. 26–27.
16. Veresova E.E. et al. A Workshop on Solving Mathematical Problems: Textbook for Teachers. Moscow: Prosveshchenie, 1979. RMEB.
17. Dalinger V.A. The Use of Digital Resources in Teaching Geometry Students. // Education and Epoch: Socio-Philosophical, Pedagogical, and Medical Theories and Experience: Monograph. Ed. Prof. V.A. Dalinger (Resp. Ed. Prof. O.N. Kirikov). Voronezh: HSV; Moscow: Nauka; Inform, 2020, Book 19, pp. 74–107.
18. Kaidasov J., Gusev V., Esengazin E. Geometry: Collection of Tasks. Textbook for Grade 10, Natural-Mathematical Direction of Secondary Schools. Almaty: Mektep, 2006. 40 p.
19. Gusev V., Kaidasov J., Yesengazin E. Geometry: Collection of Tasks. Textbook for Grade 11, Natural-Mathematical Direction of Secondary Schools. Almaty: Mektep, 2007. 48 p.
20. Gusev V., Kaidasov J., Kagazbayeva A. Geometry: Textbook for Grade 11, Natural-Mathematical Direction of General Education Schools. Almaty: Mektep, 2007. 96 p.
21. Kaidasov Zh., Gusev V., Kagazbayeva A. Geometry: Textbook for Grade 10, Natural-Mathematical Direction of General Education Schools. Almaty: Mektep, 2006. 88 p.
22. Atanasyan L.S. et al. Geometry. Grades 10–11: Textbook for General Education Institutions. Moscow: Prosveshchenie, 2014.

Electronic resources

1. 1C: Mathematical Constructor – a software environment for creating interactive mathematical models. URL: http://obr.1c.ru/mathkit
2. User's Guide for the dynamic software environment "Mathematical Constructor" – https://obr.1c.ru/mathkit/help/manual/index.html
3. Virtual laboratories for mathematics grades 7-11 / Stereometry – https://urok.1c.ru/library/mathematics/virtualnye_laboratorii_po_matematike_7_11_kl/stereometriya/
4. Video presentation: An overview of the laboratory's capabilities – https://urok.1c.ru/?login=yes&backurl=/library/mathematics/virtualnye_laboratorii_po_matematike_7_11_kl/stereometriya/179180.phd
5. Visual Geometry: Shapes in Space – https://urok.1c.ru/library/mathematics/Elekron_resursy_FGOS_2022_5-11_kl/Matematika_6/kub_prizma_itd/
6. Desmos 3D Calculator – https://www.desmos.com/3d?lang=ru
7. Author's website – Smirnov I.M., Smirnov V.A. Educational and methodical set on geometry for grades 5-11: thematic planning; didactic materials; presentations for all textbook sections; articles on teaching geometry; methodological manuals; additional task collections, etc. Website: www.vasmirnov.ru Additional resource: https://geometry2006.narod.ru/geogebra/geogebra.htm
8. GeoGebra Program – http://geogebra.org

Module	CIThA 3305 Classical inequalities and their applications (in English)
Semester(s) when the module is taught	6
Responsible teacher	Tokmurzin Zh.S. Senior lecturer. PhD
Language of instruction	English
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	To successfully complete this module, students should have foundational knowledge and competencies acquired through the study of Elementary Mathematics.
Module objectives / expected learning outcomes	The purpose of the course is the professional and methodological preparation of future mathematics teachers for teaching the topic "Classical Inequalities and Their Applications" in schools. **PO-A,B,C,D,E** A. Be able to use classical inequalities in solving Olympiad and non-standard problems. **B.** Possess knowledge of the mathematical apparatus and be able to use it in solving problems and proving theorems. **C.** Learn how to independently approach problem-solving using mathematical methods. **D.** Develop a general understanding of the subject, including the ability to perceive, process, and accumulate information, and to interact with it effectively. **E.** Be able to apply the acquired knowledge creatively, including in the context of preparing for mathematical Olympiads.
Content	Ability to use well-known basic formulas to prove inequalities.
Form of examination	Blank test
Training and Examination requirements	Regular attendance in both online and in-person classes is mandatory. Students are expected to engage actively in the discussion of course topics, demonstrate preparedness for lectures and practical sessions, and complete all Independent Study (IS) assignments with high quality and within set deadlines. Participation in all forms of assessment, including formative and summative evaluations, is required.
List of literature	1. Kungozhin A.M. et al. *Problems of the International Zhautykov Mathematics Olympiad 2005–2021*. Books of the Al-Farabi Olympic Training Center, 2023. 2. Riasat Samin. *Basics of Olympiad Inequalities*, 2008. 3. Yakovlev I.V. *Proof of Inequalities*, 2012–2023. 4. Pham Kim Hung. *Secrets in Inequalities* (Volume 1), GIL Publishing House, 2007. 5. Chen Evan. *A Brief Introduction to Olympiad Inequalities*, 2014. 6. Banerjee Eeshan. *Titu's Lemma*, 2015. 7. Rubanov I.S. *Mathematical Olympiads for Eighth Graders Named After Leonardo Euler: Problems and Solutions 2008–2022*. Books of the Al-Farabi Olympic Training Center, 2023. 8. Dalinger V.A. *Classical Inequalities and Problem Solving Using Them*. Textbook, Omsk, 2013.

8.2 Module-Natural and mathematical

Module	ODE 3214 Ordinary Differential Equations (in English)
Semester(s) when the module is taught	5
Responsible teacher	Tokmurzin Zh.S. Senior lecturer. PhD
Language of instruction	English
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 180 hours Contact Hours: 60 hours (Lectures: 30 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 30 hours, SIW - 90 hours
ECTS	6
Mandatory and recommended prerequisites for studying the module	To successfully complete this module, students should have foundational knowledge and competencies gained from the following course: *Differential Equations*.
Module objectives / expected learning outcomes	The study of boundary value problems for differential equations includes theoretical information and practical methods from this section, such as solutions of single Cauchy problems, their infinite extension, elements of the theory of linear systems, derivatives of the main types of boundary value problems, and their interrelationships. A. To know and be able to apply the basic laws of natural science disciplines in professional activity. B. To know the theorems related to the study of boundary value problems for partial differential equations, including building the Green's function for basic boundary value problems. C. Has a culture of thinking, can present the results of work performed, and is able to conduct work to achieve the goals of developing analytical thinking. D. Has knowledge of new directions in fundamental sciences, readiness for independent work, and the ability to formulate and solve mathematical problems in practice. E. Willingness to independently study new areas of basic sciences and the ability to work independently.
Content	Basic methods for solving boundary value problems using Green's functions, and properties of the Sturm–Liouville problem. Their application to solving nonlinear boundary value problems.
Form of examination	Blank test
Training and Examination requirements	Regular attendance in both online and in-person classes is mandatory. Students are expected to engage actively in the discussion of course topics, demonstrate preparedness for lectures and practical sessions, and complete all Independent Study (IS) assignments with high quality and within set deadlines. Participation in all forms of assessment, including formative and summative evaluations, is required.

List of literature	1. Kolekeev K.D., Nazarova K.J. *Differentialdyk tendeuler*. Almaty, 2012. 2. Nefedov N.N., Popov V.Yu., Volkov V.T. *Ordinary Differential Equations: A Course of Lectures*. Moscow: Faculty of Physics, Lomonosov Moscow State University, 2016. 200 p. 3. *(Title unclear – please verify)* [Author Unknown] *Central Computational Methods for Solving Applied Problems*. Moscow: Mir, 1982. 296 p. 4. Paskonov V.M., Polezhaev V.I., Chudov L.A. *Numerical Modeling of Heat and Mass Transfer Processes*. Moscow: Nauka, 1984. 288 p. 5. Isachenko V.P., Osipova V.A., Sukomel A.S. *Heat Transfer*. Moscow: Energiya, 1975. 488 p. 6. Samarskii A.A. *Introduction to the Theory of Difference Schemes*. Moscow: Nauka, 1971. 552 p. 7. Suleyman J. *Differentialdyk tendeuler: Course Book*. Almaty, 2009. 8. Ashirbaev N.K. *Zhaibaldyk tendeuler*. Almaty: Evero, 2014. 228 b. 9. Zill D.G., Cullen M.R. *Differential Equations with Boundary-Value Problems*. 7th ed. Boston: Cengage Learning, 2009. 614 p. 10. Bober W. *Boundary Value Problems of Ordinary Differential Equations*. Boca Raton: CRC Press, 2013. 11. Krainov A.Yu., Moiseeva K.M. *Numerical Methods for Solving Boundary Value Problems for Ordinary Differential Equations: Textbook*. Tomsk: STT, 2016. 44 p. 12. Denisov A.M., Razgulin A.V. *Ordinary Differential Equations. Part 2*. Moscow, 2008.

Module	MCPS 3303 The method of coordinates in the plane and in space (in English)
Semester(s) when the module is taught	5
Responsible teacher	Tutkusheva Zh.S. Senior lecturer. PhD
Language of instruction	English
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	School geometry course, analytical geometry
Module objectives / expected learning outcomes	Familiarization of the future mathematics teacher with the coordinate system on the plane and in space; mastering the coordinate method, one of the special methods in solving geometric problems. Competence, skills, and abilities to acquire basic knowledge of the program and the ability to think independently, think logically, develop ingenuity, mobility, and a sufficient level of mathematical culture. The ability to understand the creative, research nature of mathematical problems, thereby strengthening intellectuality.
Content	Affine and rectangular coordinate systems on the plane. Dividing the segment in a given ratio. Coordinate transformation formulas. Polar coordinates. Circle. Application of the coordinate method in problem-solving. Coordinates in space. Transform coordinates. Mixed and vector products of vectors.
Form of examination	Blank test
Training and Examination requirements	Regular attendance in both online and in-person classes is mandatory. Students are expected to engage actively in the discussion of course topics, demonstrate preparedness for lectures and practical sessions, and complete all Independent Study (IS) assignments with high quality and within set deadlines. Participation in all forms of assessment, including formative and summative evaluations, is required.
List of literature	1. Alexandrov A.D., Netsvetaev N.Yu. *Geometry*. – Moscow: Nauka, 1990. 2. Atanasian L.S., Bazylev V.T. *Geometry. Part II*. – Moscow: Enlightenment, 1987. 3. Trainin Ya.L. *Foundations of Geometry*. – Moscow: Uchpedgiz, 1961. 4. Atanasian L.S., Gurevich G.B. *Geometry Part 2*. – Moscow: Education, 1985. 5. Efimov N.V. *Higher Geometry*. – Moscow: Science, 1993. 6. Kaidasov Zh. *Some Images in Lobachevsky's Geometry*. – Almaty: Gylym, 2002.

Module	ThPRP 3215 Theory of Probability and random processes
Semester(s) when the module is taught	6
Responsible teacher	Seilova R.D.
Language of instruction	Kazakh / Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 150 hours Contact Hours: 45 hours (Lectures: 15 hours, Practical Sessions: 30 hours) Independent Study (including exam preparation): SIWT - 25 hours, SIW - 80 hours
ECTS	5
Mandatory and recommended prerequisites for studying the module	Mathematical Analysis I, II; Differential Equations.
Module objectives / expected learning outcomes	**Module objectives:** To introduce students to modern results, problems, and methods in the theory of random processes, emphasizing its main areas of application. Topics include differential and integral aspects of random processes, spectral theory of stationary random processes, Markov processes with discrete states and Markov chains, the death process, multiplicative and cyclic processes, queuing processes, simplest flows, waiting time, and service time. **Learning outcomes:** A. Ability to reason logically and develop a sufficient level of mathematical culture. B. Application of fundamental laws of natural sciences in professional activities; practical use of known management principles; possession of relevant professional skills. C. Willingness to use appropriate scientific tools and apply management principles in practice. D. Ability to work collaboratively, effectively articulate personal viewpoints, propose innovative solutions, and pursue professional and personal growth. E. Ability to apply mathematical methods in professional contexts, utilize acquired knowledge practically, and demonstrate compromise by considering team opinions alongside personal views.
Content	Random function. Stationary random processes. Normal processes. Markov and Poisson processes. Elements of stochastic analysis.
Form of examination	Blank test
Training and Examination requirements	Regular attendance in both online and in-person classes is mandatory. Students are expected to engage actively in the discussion of course topics, demonstrate preparedness for lectures and practical sessions, and complete all Independent Study (IS) assignments with high quality and within set deadlines. Participation in all forms of assessment, including formative and summative evaluations, is required.

List of literature	11. Akanbay, N. Collection of Problems and Exercises in Probability Theory: Textbook. 2019. 336 pages. 12. Akanbay, N. Collection of Problems and Exercises in Probability Theory. Part II: Textbook. 2019. 296 pages. 13. Koshchanova, G.R. Probability Theory and Mathematical Statistics: Textbook. 2020. 143 pages. 14. Rakhimzhanova, S.K. Probability Theory and Mathematical Statistics: Teaching Manual. 2020. 192 pages 15. Rakhimzhanova, S.K. Probability Theory and Mathematical Statistics: Educational and Methodological Tool. 2020. 188 pages. 16. Iskakova, A.S. Collection of Problems in Probability Theory: Textbook. 2018. 176 pages. 17. Iskakova, A.S. Solving Problems in the Theory of Probability Using MATLAB: Textbook for Students and Undergraduates. 2018. 195 pages. 18. Iskakova, A.S. Solving Problems in Probability Theory Using MATLAB: Textbook. 2018. 192 pages. 19. Akanbay, N. Course of Probability Theory and Mathematical Statistics: Textbook. 2016. 396 pages. 20. Bektaev, K.B. Probability Theory and Mathematical Statistics: Textbook. 2014. 432 pages.

Module	GCPh 3216 General course of Physics (in Russian)
Semester(s) when the module is taught	6
Responsible teacher	Sagimbayeva Shynar Zhanuzakovna Associate Professor
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Problem-Based Learning (PBL), Teamwork, Flipped Classroom	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 120 hours Contact Hours: 40 hours (20 hours of lectures, 5 hours of practical classes, 15 hours of laboratory classes) Independent Study (including exam preparation): SIWT - 20 hours, SIW - 60 hours
ECTS	4
Mandatory and recommended prerequisites for studying the module	Higher Mathematics and Physics as taught in the school curriculum.
Module objectives / expected learning outcomes	**Module objectives:** Formation of students' understanding of the modern physical picture of the world and scientific outlook; development of students' knowledge and skills in applying fundamental laws, theories of classical and modern physics, and methods of physical research as the foundation of professional activity. **Learning outcomes:** 1. Ability to independently identify, understand, and evaluate prospects within the field of physics. 2. Ability to use fundamental theoretical knowledge of physics and practical skills to solve organizational and management tasks. 3. Ability to apply knowledge of theoretical and experimental physics and technology in teaching physics. 4. Knowledge and understanding of physical phenomena, their theories, and laws. 5. Ability to use this knowledge in observations, solving typical problems, performing laboratory work, and studying environmental phenomena. 6. Skill in selecting theoretical data, problem-solving methods, and conducting research. 7. Ability to verify the accuracy of results, complete tables based on analysis, create graphs, process results, calculate errors, determine percentage deviations from theory, and draw conclusions. 8. Skills in defending work, generalizing findings, monitoring, testing, and academic writing.
Content	To reveal the essence of the main concepts, laws, and theories of classical and modern physics in their internal interconnection and integrity. This course includes the following sections: mechanics, molecular physics and thermodynamics, electricity and magnetism, optics, atomic and nuclear physics.
Form of examination	Oral exam
Training and Examination 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.
List of literature	**Core reading** 1. Trofimova T.I. Physics Course. Moscow: Vysshaya Shkola, 2003. 2. Trofimova T.I., Pavlova Z.G. Collection of Problems for Physics Course with Solutions. Moscow: Vysshaya Shkola, 2002. 3. Tatenov A.M., Savelyeva V.V. Teaching Manual on Physics for Technical Specialists. Almaty, 2017. 4. Volkenstein V.S. Collection of Problems for the General Course of Physics. Moscow, 2002. 5. Zisman G.A., Todes O.M. General Physics Course. Volumes 1–3. Saint Petersburg: Lan, 2016. 6. Odiyak B.P., Nametkulova R.Zh., Kadirimbetova A.K. Course of General Physics in Tasks and Exercises, Part 1. Almaty: Evero, 2018. 7. Mingaleeva A.M. Methodical Instructions and Control Tasks in Physics. Almaty, 2019.

	8. Salihoja J.M. Workshop on Molecular Physics. Medical Allowance. Almaty: Evero, 2018. 9. Frish S.E., Timoreva A.V. General Physics Course. Volumes 1–3. Saint Petersburg: Lan, 2016. 10. Grabovsky R.I. Physics Course. Saint Petersburg: Lan, 2016.

Module	FA 3304 Functional analysis (in Russian)
Semester(s) when the module is taught	6
Responsible teacher	Utesov A. B
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	To successfully master this module, students should have the knowledge, skills, and abilities acquired from the following courses: Mathematical Analysis 1, 2, and 3, Algebra Basics, Geometry Basics.
Module objectives / expected learning outcomes	This course presents the basic concepts and principles of functional analysis, a fundamental part of the research tools in theoretical and applied mathematics. It aims to help students understand concepts, principles, and facts that were previously encountered in isolated, specific contexts, now viewed from a general functional-analytical perspective. Learning Outcomes: A) Students will be able to grasp the meaning of core mathematical concepts and theorems that are important both directly and in many applications. They should study and master material that can be learned independently with ease. B) Students will perform tasks independently. C) The course facilitates the improvement and retention of knowledge and skills not only in developing new concepts but also through revisiting classical courses from the general viewpoint of functional analysis. D) Students will develop the ability to argue their own opinions, have a strong desire for professional growth, and learn to work effectively with literature. E) Students will gain teamwork skills, the ability to express their opinions clearly, value colleagues' perspectives, and achieve a high level of mathematical culture.
Content	Elements of set theory, metric spaces, linear spaces, linear functors and operators, Lebesgue integral, spaces of adjunctive functions, Hilbert spaces, stationary point.
Form of examination	traditional
Training and Examination requirements	Regular attendance at both online and in-person classes is mandatory. Students are expected to actively participate in discussions, come prepared for lectures and practical sessions, and complete all Independent Study (IS) assignments with high quality and on time. Participation in all forms of assessment, including formative and summative evaluations, is required.
List of literature	1. Nauryzbayev K.Zh. *Functional Analysis*. Almaty, 2007. 2. Dosymov T.B. *Fundamentals of Functional Analysis*. Almaty, "Mektep" Publishing, 1988. 3. Kenzhebayev K.K., Utarbayev S.I., Balmagambetova R.E. *Functional Analysis and Integral Equations through Exercises and Problems*. Aktobe, 2002. 4. Kolmogorov A.N., Fomin S.V. *Elements of the Theory of Functions and Functional Analysis*. Moscow, "Nauka", 1989. 5. Ljusternik L.A., Sobolev V.I. *A Short Course in Functional Analysis*. Moscow, "Higher School", 1982. 6. Temirgaliev N. *Mathematical Analysis. Volume I. Textbook*. Almaty: Mektep, 1987. 7. Temirgaliev N. *Mathematical Analysis. Volume II. Textbook*. Almaty: Ana tili, 1991.

Module	AChMA 3305 Additional chapters of mathematical analysis (in English)
Semester(s) when the module is taught	6
Responsible teacher	Otarov K.T.
Language of instruction	English
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 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 following courses: Mathematical analysis-1,2,3, Functional theory, and functional analysis of elements.
Module objectives / expected learning outcomes	Familiarization with the fundamental approaches to the study of variable quantities, which are based on the analysis of finite small quantities and the use of properties of the field of complex numbers. **Learning Outcomes:** A) Upon completion of the course, the student should: understand the basic concepts and methods of the discipline, know important definitions, theorems, and basic formulas, be able to prove theorems independently, apply theoretical results to solve problems. B) Master the essential concepts, knowledge, qualifications, and skills required by the discipline. C) Understand the concept of describing the laws of natural and technical phenomena through analytical functions of a single complex variable. D) Be able to know and apply these laws through the use of analytical functions of one complex variable. E) Acquire the ability to use important definitions to prove theorems and formulas and to derive meaningful results within the theory of complex variable functions.
Content	Complex numbers, sequences and series of complex numbers, curves and regions on the complex plane, continuous functions of complex variables, integration of functions of complex variables, regular functions, Laurent series, isolated special points, multivalued analytical functions, subtraction theory and its applications chapters.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in the discussion of issues, preliminary preparation for lectures and practical exercises, high-quality and timely fulfillment of SRO tasks, participation in all forms of assessment.

List of literature	**Core reading** 1. Otarov, H. T., Turganbaev, A. A. *Theory of Complex Variable Functions*. Aktobe, 2020. 2. Abduakhitova, G. *Complex Variable Functions*. Almaty: Kazakh University, 2009. 3. Kairbekov, T. *Methods ofSolving Problems in the Theory of Complex Variable Functions*, 2008. 4. Beisebay, P. B. *Theory of Complex Variable Functions*, 2009. 5. Privalov, I. I. *Introduction to the Theory of Complex Variable Functions*. Almaty, 1991. **Supplementary reading** 1. Domrin, A. V., Sergeev, A. G., Ushakov, N. G. *Lectures on Complex Analysis*. Moscow, MIAH, 2004. 2. Volkovysky, L. I., Lunts, G. L., Aramonovich, I. G. *Collection of Problems on the Theory of Functions of a Complex Variable (TFCP)*. Moscow, FIZMATLIT, 2004. 3. Shvedenko, S. V. *Introduction to the Analysis of the TFCP*. Moscow, MEPhI, 2008. 4. Solomentsev, E. D. *Functions of a Complex Variable and Their Applications*. Moscow: Higher School, 1988. 5. Sidorov, Yu. V., Fedoryuk, M. V., Shabunin, M. I. *Lectures on the Theory of Analytic Functions*. Moscow: Nauka, 1982. **Electronic resources** 1. Republican Interuniversity Electronic Library (RMEB) – http://rmebrk.kz 2. Electronic Database of the Publishing House "Epigraf" – https://elib.kz 3. AGC Electronic Library – http://neb.arsu.kz/en 4. Online Library – https://math.ru/lib/ 5. Internet Library of the Moscow Center for Continuing Mathematical Education (Vitaly Arnold) – http://ilib.mccme.ru/ 6. Electronic Portal of Multimedia Textbooks of the MU "Epigraf" – https://mbook.kz/en/index/ 7. Republican Scientific and Technical Library (RNTB) – http://aktobe.rntb.kz/ 8. EqWorld Electronic Educational Physics and Mathematics Library – http://eqworld.ipmnet.ru/en/library/mathematics.htm

9. Module-Modern education

Module	FL (C1) 3217 Foreign language (C1)
Semester(s) when the module is taught	5
Responsible teacher	Turmagambetova G.N.
Language of instruction	English
Connection with the curriculum	Basic discipline, university component
Forms of training	Practical clases, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload:120 hours Contact hours: 40 hours (40 hours of practical classes) Independent study, including exam preparation: 20 hours of SIWT, 60 hours of SIW
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 to develop students' communicative and professional competence. This includes: 1. Achieving a full understanding of a communication partner's intentions and of authors' ideas in texts at this level; 2. Expressing opinions spontaneously in conversations, discussions, debates, and scientific conferences on topics of general cultural or professional relevance; 3. Preparing clearly detailed, well-structured messages or reports, and conveying the content of a book along with personal impressions; 4. Improving skills in writing essays, articles, speech texts, and reports aligned with the communicative goal—particularly essays with elements of reasoning and a well-articulated personal viewpoint; 5. Listening to authentic monologues and dialogues of various functional styles and levels of complexity—both in real-time and recorded formats—such as speeches by public or political figures, literary works (prose, poetry, drama), and commentary from scholars, philologists, teachers, literary critics, TV shows, and films (at a natural speech rate and in original recordings); 6. Mastering various reading strategies (skimming, in-depth, and scanning) using authentic socio-political, literary, and professional texts of philological nature across different styles, while extracting information relevant to the selected strategy.
Content	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 C1) is aimed at the comprehensive development of students ' communicative, cognitive, socio-cultural and linguistic-cultural competencies
Form of examination	Oral exam
Training 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.

List of literature	1. Davies, P.A., Falla, T. *SOLUTIONS Advanced. Student's Book*. Third Edition. Oxford University Press, 2018. 171 pages. Available online: https://rmebrk.kz/search/?search=SOLUTIONS+Pre+-Intermediate 2. Romanovskaya, N.V. *Professional English Language: Textbook* / E.V. Chernyaeva, S.K. Zelenkova. – Moscow: MSTU GA, 2014. 3. *Oxford Qazaq Dictionary: For the Study of the Discipline* / Kazakh-English and English-Kazakh Dictionary. Project Leader: R. Kenzhehanuly. – Almaty: National Translation Bureau, 2023. 65 copies. 4. Chazal, E., Rogers, L. *Oxford EAP. A Course in English for Academic Purposes. Intermediate/B1+ Teachers Handbook*. China: Oxford University Press, 2013. 30 copies. 5. *Professionally Oriented Foreign Language (English): Textbook* / Compiled by A.Kh. Amerkhanova, M.K. Karimbergenova, B.M. Yesengeldin; Pavlodar State University named after S. Toraighyrov. – Pavlodar: Toraighyrov University, 2019. 68 pages. ISBN 978-601-238-936-4. Available online: https://rmebrk.kz/ 6. Batinova, A.S., Turzhanova, G.N. *Practical Course of English: For All Specialties and Training Directions*. Aktobe: Publishing House of K. Zhubanov Aktobe State University, 2008. 7. Nakesheva, S.T. *Methodological Guidelines for Practical Classes in the Discipline "English Language" for First and Second Year Full-Time Students*. Aktobe, 2014. Available online: http://neb.arsu.kz/view?rid=5239&fid=5222 8. Baizhanova, A.A., Musralina, A.S. *Collection of Tests with English Language Tasks: For Studying the Discipline*. Aktobe: Publishing Center of K. Zhubanov Aktobe Regional State University, 2015. 9. Berstenova, A.B. *English Grammar Reference Book with Practice Exercises*. Aktobe, 2014. Available online: http://neb.arsu.kz/view?rid=5236&fid=5220 10. Berstenova, A.B. *Collection of Exercises for English Grammar Reference*. Aktobe, 2015. Available online: http://neb.arsu.kz/view?rid=5237&fid=5221 11. Shevyakova, V.E. *Modern English: Word Order, Topic-Focus Articulation, Intonation*. Moscow: Nauka, 1980. 12. Sabitova, Leila Seitzharovna. *The Aspectual System of the Russian Verb and Methods of its Transformation into Kazakh and English Languages*: Abstract of dissertation for the degree of Doctor of Philosophy (PhD) (10.00.00). L.N. Gumilyov Eurasian National University, Astana, 2010. 28 pages. 13. Masalimova, A.S. *English Grammar Reference Book with Practice Exercises* / Edited by A.S. Masalimova. Publishing Center of K. Zhubanov Aktobe Regional State University, 2014. 77 pages. Available online: http://neb.arsu.kz/view?rid=5236&fid=5220

Module	IE 3306 Inclusive education
Semester(s) when the module is taught	5
Responsible teacher	Turebaeva K.Zh.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully master the course, it is necessary to be familiar with the disciplines that precede the study of this course, such as "Pedagogy" and others.
Module objectives / expected learning outcomes	The aim of the course is to familiarize students with the theoretical foundations of inclusive education and the methods of its implementation in Kazakhstan. It also aims to provide comprehensive knowledge of the key principles and regulations for organizing and managing inclusive practices, with the goal of ensuring equal access to quality education for all learners. **Learning outcomes:** A) Knows and understands the continuity of socialization, education, and upbringing for children of early, preschool, and school age with various developmental disabilities; B) Applies methods to enhance the cognitive functions of individuals with special educational needs in everyday contexts; C) Analyzes strategies for developing socially significant skills and cognitive abilities in individuals with special educational needs; D) Organizes and applies socially important skills to support daily functioning of persons with special educational needs; E) Evaluates the effectiveness of continuous socialization, education, and upbringing processes for children with developmental disabilities across different age stages.
Content	The course covers the purpose and subject of "Inclusive Education" and introduces the concept of inclusive education. It examines the history of the development of inclusive education in the Republic of Kazakhstan and abroad, as well as the values and principles underlying inclusive practices. The course explores models of inclusive education and reviews relevant normative and legal documents. Special emphasis is placed on the role of the teacher in inclusive settings, as well as on effective forms of interaction and collaboration among teachers, parents, and specialists. The course also provides psychological and pedagogical characteristics of children with hearing, vision, and speech impairments; intellectual disabilities; motor disorders; behavioral and emotional challenges. It includes the characteristics of gifted children and those with learning difficulties caused by adverse environmental factors. Students will study technologies for planning individualized educational trajectories for learners with special educational needs (SEN) and methods for teaching in inclusive environments. The course also addresses the organization of a criteria-based assessment system tailored to inclusive education contexts.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in discussions of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO assignments, participation in all forms of assessment.

List of literature	**Core reading** 1. Likhodedova L. N. Theory and practice of inclusive education: textbook / L. I. Likhodedova. - Karaganda: Medet Group, 2020. - 194 pages. 2. Methodological recommendations for training teachers to implement inclusive education: to study the discipline / Z.A.Movkebaeva, I.A.Denisova, I.A.Oralkanova and others. - 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 pages. 4. Movkebayeva Z.A. et al. Methodological recommendations for training teachers to integrate inclusive education. - 2nd edition - Almaty: Publishing House "Sagatudinova", 2019. - 160 p. https://rmebrk.kz/book/1177495 5. Zhanibekova G.O. Inclusive education: a collection of lectures. / 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 textbook. . - Ster. ed. - Almaty: Kazakh University, 2020. - 232 p.https://rmebrk.kz/book/1178826 7. Movkebaeva Z.A. Inclusive education: theory and practice. Monograph. Almaty, 2016. 8. Turebaeva K.Zh., Doszhanova S.E., Shestakova E.V. Socialization of children in inclusive education. Monograph. Aktobe, 2016. – 344 p. 9. Training of special educators in Kazakhstan. Monograph. – Ed. by D.N.Bilyalov, Z.A.Movkebaeva. Almaty, 2023. – 358 p. **Supplementary reading** 10. Bakhtiyarova, G.R., Kenshilikova K.M. I take inclusive whites: mani zhane maseleleri. – Aktobe, “Zhubanov University” baspasy, 2019. - 160 bet. 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. Abaeva G.A., Torebaeva K.Zh., Orazaeva G.S., Kartbaeva 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. Measurement technologies of assessment. – Aktobe, 2019. -240 p. 17. Urmashev B.A. Criterion-based assessment technology. – Almaty, 2017. -140 p.

Module	TCE 3218 Technology of criterial estimation
Semester(s) when the module is taught	5
Responsible teacher	Sarman A.
Language of instruction	Kazakh / Russian
Connection with the curriculum	Basic discipline, University component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	Methods of teaching mathematics
Module objectives / expected learning outcomes	The purpose of mastering the discipline is to gain knowledge in the field of dimensional assessment and to develop the ability to apply this knowledge in pedagogical practice. Learning Outcomes: A. Demonstrate knowledge of the basic definitions and concepts of the studied sections. B. Possess the ability to formulate and prove key results related to these sections. C. Acquire skills in solving typical problems during practical training, based on the studied theoretical material. D. Develop the ability to reach consensus and align one's opinion with that of a group; apply mathematical methods in professional activities. E. Be able to competently apply acquired knowledge and skills in teaching; understand the social significance of the teaching profession; develop motivation for professional practice.
Content	The discipline "Dimensional Assessment Technologies" is considered an integral part of mathematical knowledge of a pedagogical orientation. As a result of studying the discipline, the student must know the basic rules and methods for assessing students' educational achievements; have knowledge of the very important rules when assessing students' educational achievements; be able to make calculations during the assessment.
Form of examination	Blank test
Training and Examination requirements	Regular attendance in both online and in-person classes is mandatory. Students are expected to engage actively in the discussion of course topics, demonstrate preparedness for lectures and practical sessions, and complete all Independent Study (IS) assignments with high quality and within set deadlines. Participation in all forms of assessment, including formative and summative evaluations, is required.
List of literature	1. Narenova A.B., Yesengulova M.N. *Dimensional Technologies of Assessment*, textbook, Almaty, 2021. 2. Kamarova N.S. *Dimensional Technologies of Assessment*, textbook, Almaty, 2021. 3. Urumshaev B.A. *Criterion-based Assessment Technology*, textbook, Almaty, 2016. 4. Suleimenova Z.E. *Criterion-based Assessment Technology*, textbook, Almaty, 2021. 5. Turmanova Zh.E. *Criterion-based Assessment and Monitoring of Student Learning*, textbook, Almaty, 2021. 6. *Critical Thinking in the Educational Process*, teaching and methodological manual, edited by Z.U. Imzharova, Aktobe, 2012. 7. Kusainov G.M., Kagazbaeva A.K., Abykanova B.T., et al. *Science of Teaching and New Educational Practice*, Nur-Sultan–Almaty: Techsmith, 2019.

10. Module - Professional and methodological

Module	DMML 4307 Discrete Mathematics and Mathematical Logic (in English)
Semester(s) when the module is taught	7
Responsible teacher	Izgarina G.K., Senior lecturer
Language of instruction	English
Connection with the curriculum	Profile discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 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: Mathematical analysis -1.2, Fundamentals of Algebra
Module objectives / expected learning outcomes	The purpose of the course is to familiarize students with the concepts of the main sections of the course, such as propositional algebra, discrete analysis, set theory, combinatorics. A. Students should know the basic definitions and concepts of the studied sections of discrete mathematics. B. They must be able to prove theorems, be able to solve problems, be able to build mathematical models for solving problems, and must be able to use mathematical logic to construct proofs, compile and analyze logical formulas and algorithms. C. Students should be able to analyze complex problems and identify their key elements by applying theorems and methods from discrete mathematics. D. Students should be able to combine various methods of discrete mathematics to solve complex problems. Students should be able to develop new algorithms and problem solving methods. E. Students should be able to evaluate the effectiveness and correctness of applied problem solving methods. Students should be able to critically evaluate different approaches to solving mathematical problems and choose the most effective and appropriate methods.
Content	Set theory. Relationships, correspondences, and functions. Statements and operations on them. Formulas of the algebra of propositions. Tautology. Equivalence of formulas. Normal forms for propositional algebra formulas. Logical following. Applications of the algebra of propositions to logical and mathematical practice. Boolean functions. Elements of combinatorics. The binomial of Newton. Graph theory.
Form of examination	Oral (ticket)
Training and Examination requirements	Compulsory attendance of in-person classes preliminary preparation for lectures and practical exercises, high-quality and timely completion of assignments, participation in all forms of assessment. The final assessment takes place in the format of an exam. The exam is conducted in accordance with the university's academic integrity policy and the exam rules.
List of literature	1. Madenova, A. A., Bekmoldayeva, R. B. *Mathematical Logic and Discrete Math: Manual*. Almaty: CCK, 2018. – 112 pages. 2. *A First Course in Mathematical Logic and Set Theory*. 2016. 3. Drobotun, B. N. *Guide to Solving Problems in Discrete Mathematics and Mathematical Logic: Study Guide. Part 1*, 2019. 4. Prosvetov, G. I. *Discrete Mathematics: Problems and Solutions: Educational and Practical Manual*, 2009. 5. Yablonsky, S. V. *Introduction to Discrete Mathematics: Educational-Methodical Guide*, 1986. 6. Burgumbayeva, S. K. *Elementary Mathematics: Educational and Teaching Aid*, 2021. 7. Baizhumanov, A. A., Ibragimov, O. A. *Discrete Mathematics and Mathematical Logic*, Almaty, 2021. 8. Bimendina, A. U. *Discrete Mathematics and Mathematical Logic*, Almaty, 2019. 9. Paliy, I. A. *Discrete Mathematics and Mathematical Logic: Textbook for Universities*, 3rd edition, revised and supplemented. Moscow: Yurayt Publishing, 2020. 10. Levin, O. *Discrete Mathematics: An Open Introduction*, 3rd Edition, 2021. 11. Johnsonbaugh, R. *Discrete Mathematics*, 8th Edition, 2018. 12. Rosen, Kenneth H. *Discrete Mathematics and Its Applications*, 7th Edition, 2012.

Module	MTSPTh 4308 Methods of teaching statistics and probability theory
Semester(s) when the module is taught	7
Responsible teacher	Akhmetova Ayimgul Utegulovna
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To successfully develop this module, knowledge, skills, and abilities acquired from studying the following courses are necessary: Probability Theory and Mathematical Statistics, and Methods of Teaching Mathematics.
Module objectives / expected learning outcomes	The aim of the course is the professional and methodological preparation of a future mathematics teacher for teaching elements of probability theory and mathematical statistics at school. **Learning outcomes**: A. Be able to apply the acquired theoretical knowledge in the process of teaching mathematics, for logical and didactic mathematical content on the main components and lines of the mathematics course; B. Be able to correctly use the language of the subject area and correctly set the tasks of teaching mathematics; C. Possess skills in teaching methods of mathematical disciplines, as well as have a high level of language culture in professional activities. As a result of studying the discipline, students should know the definitions of the main fundamental concepts and terms of probability theory and mathematical statistics; be able to prove and apply basic theorems, be able to classify the components of educational material; know the methods of solving problems in statistics and probability theory, formulate results; be able to write an essay, make a plan, write a report.
Content	the course is well designed to prepare students for their future professional activities - teaching mathematicians in schools various profile. The development of this discipline also forms the basis for successfully completing pedagogical practice. The ability to solve problems is one of the most important components of the mathematical training of future teachers. This skill is developed only if, throughout their entire university studies, students solve problems of varying difficulty and content, while exploring different solution methods. In classes on the methodology of teaching mathematics, methodological issues related to problem-solving are discussed, and this course provides practice in developing those methodological skills.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance of online and in-person classes, active participation in discussions of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO assignments, participation in all forms of assessment.

List of literature	1. Bektaev K.B. Probabilities theory and mathematical statistics. Study tool . – Almaty: Evero , 2014. – 432 p. 2. Croft E., Davison R. Fundamentals of Mathematics. Part 2: Textbook. Ed. Kabakbayev S.Zh. – Almaty, 2014. – 324 p. 3. Akanbay N. Collection of problems and exercises in the theory of probability: a textbook. - Karaganda: Medet Group, 2016. 4. Rahimzhanova S.K. , Karataeva D.S. Probability theory and mathematical Statistics : a teaching aid. - Almaty: TechSmith, 2020. - 188 p. 5. Koshchanova G.R., Kulzhagarova B.T. The probability is narrow. theory and mathematical statistician a : reading tool . - Almaty : LP- Zhasulan , 2020. - 143 p. 6. Seitova S.M. Methodical model implementations professional directions course Theory I probability to her and mathematical statistician a through system exercises : educational allowance . Karaganda : AҚNҰR, 2018. - 160 p. 7. Iskakova AS estimates theorist pannen esepter demon Almaty , TechnoErudit , 8. 8. Gmurman VE. Problem Solving Guide to Probability Theory and Mathematical Statistics. Uch. пос. for universities. M.: Higher School , – 40 5 s. 9. 9. Akanbay N. Yktimaldyktar theories and mathematics, statistics and MS EXCEL-de shygaru. Almaty, Kazakh universities , 2014. 10. Statistical processing of experimental data: a tutorial / P.S. Shpakov, V.N. Popov. - M.: MGGU, 2003. 11. Mansurova E.R., Sergeeva I.N. On the continuity of content in the study of probability theory at school and at the university. // International research journal. No. 4 (46). Part 3. April, 2014. P. 81-86. 12. Bunimovich E.A., Tyurin Yu.N., Semenov P.V., Bulychev V.A., Makarov A.A., Mordkovich A.G., Vysotsky I.R., Yashchenko I.V. On probability theory and statistics in the school course (methodological recommendations) // Mathematics at school, No. 7, 2009. P. 3-13. 13. Gmurman V.E. Probability Theory and Mathematical Statistics: Study Guide. 2015 . - . https://rmebrk.kz/book/1005825 14. 14. Akanbay N. Course of probability theory and mathematical statistics: For students of higher educational institutions specializing in "Mathematics": textbook. I. - Almaty: Kazakh University, 2020. - 292 p. http://rmebrk.kz/book/87502 15. 15. Akanbay N. Probability theory and mathematical statistics II: textbook. - Almaty: Kazakh University, 2017. - 458 p. http://rmebrk.kz/book/1180268 16. 16. Zholdasov S.A. Collection of problems for probability theory and mathematical statistics: a textbook. - Almaty: Evero, 2022. - 160p. http://rmebrk.kz/book/1184228 17. 17. Rakhimzhanova S.K., Karataeva D.S. Probability theory and mathematical statistics . Educational and methodological tool. – Almaty: TechSmith, 2020. – 188 p. https://neb.arsu.kz/kk/view?rid=10768&fid=10747

11.1. Module-Modern technologies

Module	ITDRTM 4309 IT and digital resources in teaching mathematics (in Russian)
Semester(s) when the module is taught	7
Responsible teacher	Bekbauova A.U.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	ICT, school-level mathematics, elementary mathematics, methods of teaching mathematics, assessment technologies, inclusive education
Module objectives / expected learning outcomes	Introduce future teachers to IT and digital resources as teaching tools and management systems at the teacher level. Develop teaching strategies using digital educational resources. Learning Outcomes: 1. Understand and apply the technology for preparing digital educational resources. 2. Configure and modify existing systems. 3. Analyze configuration objects for IT/digital resource development. 4. Design lesson plans using IT and digital resources. 5. Evaluate educational platforms.
Content	IT in education and digital resources. Technology for preparing digital resources. Educational IT materials. Messengers for learning and artificial intelligence.
Form of examination	Project
Training and Examination requirements	- Mandatory attendance, active participation in discussions. - Preparation for lectures/practical sessions. - Timely completion of tasks. - Participation in all forms of assessment.
List of literature	1. E. G. Dadyan – Application of Innovative Technologies in Professional Education // Informatics and Education, 2014. 2. A. U. Aktaeva – Use of Artificial Immune Systems for Intrusion Detection Systems: Analysis and Prospects for the Development of Innovative Technologies // Higher School of Kazakhstan, 2014. 3. I. S. Klimenko – Innovative Technologies in Education, Science and Management: Textbook – Almaty: Otan, 2015 – 144 p. 4. I. V. Korovaiko – Innovative Teaching Technologies in Universities: Textbook – Almaty: Otan, 2015. 5. Karmenova M.A. et al. – Innovative Technologies in Education, Republican Interuniversity Electronic Library.

Module	TPISATGMATGRE 4219 Technologies for preparing for the international SAT, GMAT and GRE exams (in English)
Semester(s) when the module is taught	7
Responsible teacher	Mukash M.A.
Language of instruction	English
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 90 hours Contact Hours: 30 hours (15 hours of lectures, 15 hours of practical classes) Independent Study (including exam preparation): SIWT - 15 hours, SIW - 45 hours
ECTS	3
Mandatory and recommended prerequisites for studying the module	Basic knowledge, skills, and competencies in: Elementary Mathematics, Linear Algebra, and Number Theory
Module objectives / expected learning outcomes	A. Know how to solve standard, Olympiad-level, and non-standard problems. B. Prove theorems, model applied problems mathematically, and apply knowledge in practice. C. Solve problems using classical methods, geometric transformations, and computer tools. D. Work with profession-related information. E. Communicate effectively and respect colleagues' opinions.
Content	This course examines the structure of the SAT, GMAT, and GRE math sections and effective strategies for successful exam preparation.
Form of examination	Blank test
Training and Examination requirements	Mandatory attendance (online and in-person), active participation in discussions, preparation for lectures and practicals, timely and high-quality completion of tasks, participation in all types of assessment.
List of literature	1. Shanshieva, S.A. English for Mathematicians (in English) 2. Sheriyazdan, T.T. Olympiad Problem Solving Manual (in Russian) 3. Grechina, O.V., Mironova, E.P. English for Students of Mathematics (in Russian) 4. Non-standard Problems in Algebra (in Russian) 5. Kulikov, L.Ya. Problems in Algebra and Number Theory, 1993 (in Russian) 6. Number Theory: Teaching and Methodological Guide, 2013 7. Tleubergenova, M.A. Unconventional Methods for Solving Rational Equations of Higher Order 8. Dr. John Chung's SAT Math: 16 Complete Tests, 2018 9. SAT Prep Flashcard Workbook 7: Arithmetic Review, 2016 10. Practice Tests for the SAT, 2020 11. Digital SAT Study Guide Premium, 2025 (Barron's) 12. Digital SAT Practice Questions, 2025 (Barron's) 13. Ozduman, M.A., Ozduman, B. Geometry Question Bank 14. Cassel, D. et al. Statistics 2, Cambridge University Press, 2004 15. Cambridge IGCSE Math Past Papers (0580 & 0606), 2008–2015 16. London GCE Mathematics Past Papers 17. Edexcel GCSE Mathematics Past Papers 18. Burkenov, N.S. Task Book for External Assessment Based on NIS Mathematics Curriculum, 2016

11.2. Module-Innovative technologies

Module	ITDRTM 4309 IT and digital resources in teaching mathematics (in Russian)
Semester(s) when the module is taught	7
Responsible teacher	Bekbauova A.U.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, university component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	ICT, school-level mathematics, elementary mathematics, methods of teaching mathematics, assessment technologies, inclusive education
Module objectives / expected learning outcomes	Introduce future teachers to IT and digital resources as teaching tools and management systems at the teacher level. Develop teaching strategies using digital educational resources. Learning Outcomes: 1. Understand and apply the technology for preparing digital educational resources. 2. Configure and modify existing systems. 3. Analyze configuration objects for IT/digital resource development. 4. Design lesson plans using IT and digital resources. 5. Evaluate educational platforms.
Content	IT in education and digital resources. Technology for preparing digital resources. Educational IT materials. Messengers for learning and artificial intelligence.
Form of examination	Project
Training and Examination requirements	- Mandatory attendance, active participation in discussions. - Preparation for lectures/practical sessions. - Timely completion of tasks. - Participation in all types of assessment.
List of literature	1. E. G. Dadyan – Application of Innovative Technologies in Professional Education // Informatics and Education, 2014. 2. A. U. Aktaeva – Use of Artificial Immune Systems for Intrusion Detection Systems: Analysis and Prospects for the Development of Innovative Technologies // Higher School of Kazakhstan, 2014. 3. I. S. Klimenko – Innovative Technologies in Education, Science and Management: Textbook – Almaty: Otan, 2015 – 144 p. 4. I. V. Korovaiko – Innovative Teaching Technologies in Universities: Textbook – Almaty: Otan, 2015. 5. Karmenova M.A. et al. – Innovative Technologies in Education, Republican Interuniversity Electronic Library.

Module	ME 4219 Management in Education
Semester(s) when the module is taught	7
Responsible teacher	Togaybaeva A.K.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Basic discipline, elective component
Forms of training	Lectures, Practical Sessions, SIWT/SIW
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total Academic Workload: 90 hours Contact Hours: 30 hours (15 hours of lectures, 15 hours of practical classes) Independent Study (including exam preparation): SIWT - 15 hours, SIW - 45 hours
ECTS	3
Mandatory and recommended prerequisites for studying the module	To successfully master the course, students should be familiar with prerequisite disciplines such as "Pedagogy" and others.
Module objectives / expected learning outcomes	The purpose of this course is to explore leadership in education as a management tool for educational organizations. It aims to develop the leadership potential of future specialists as a psychological and pedagogical resource, as well as to foster students' reflective competence as future leaders in education. **Learning outcomes:** A. Know the characteristics of mathematics as a science and academic subject, along with the goals and objectives of teaching mathematics at various levels of the education system. B. Apply foundational pedagogical knowledge and skills within the framework of the updated educational system; evaluate various situations using knowledge from history, philosophy, and social-political disciplines; uphold academic integrity; understand the basics of educational management, law, ecology, and financial literacy. C. Be able to select effective leadership styles and apply them in different pedagogical contexts. D. Be capable of building collaborative teams within educational institutions, motivating staff, and fostering a productive working environment. E. Apply innovative methods and technologies in the educational management process.
Content	"Management in Education and Leadership" addresses a real need within the education system, aligns with current labor market demands, and develops skills in analyzing and diagnosing specific educational situations. The course equips students with the ability to make organizational and managerial decisions and enhances their skills in interacting with stakeholders in education.
Form of examination	Computer-based test
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in discussions of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO assignments, participation in all forms of assessment.

List of literature	**Core reading** 1. Northouse, Peter. *Leadership: Theory and Practice.* – 560 pages. 2. Rosenbaum-Elliott, Richard; Pervan, Simon; Percy, Larry. *Strategic Brand Management.* – Almaty: "Ulttyk audarma bureausy" Public Foundation, 2020. – 368 pages. 3. Battle, Francis; Maclan, Stan. *Managing Relationships with Consumers: Concepts and Technologies* / *Tutynushymen karym-katynas management: ұgymdar men technologylar.* – Almaty: "Ulttyk audarma bureausy" Public Foundation, 2020. – 444 pages. 4. Beauvais, Courtland; Till, John. *Business Communication Today* / *Kazirgi Business Communication.* – Almaty: "Ulttyk audarma bureausy" Public Foundation, 2019. – 736 pages. 5. Gamble, John; Peter, Margaret; Thompson, Arthur. *Fundamentals of Strategic Management: The Search for Competitive Advantage* / *Strategic Management Essentials: Basics arytkyshylykka umtylu.* – Almaty: "Ulttyk audarma bureausy" Public Foundation, 2019. – 536 pages. 6. Shilling, Melissa A. *Strategic Management in Technological Innovations* / *Technology Innovations Strategic Management.* – Almaty: "Ulttyk audarma bureausy" Public Foundation, 2019. – 380 pages. 7. Robbins, Stephen; Judge, Timothy. *Fundamentals of Organizational Behavior* / *Ұyimdyk minezkulyk negizderi*, 14th edition. – Almaty: "Ulttyk audarma bureausy" Public Foundation, 2019. – 488 pages. 8. Sadvakasova, Z.M.; Bulatbaeva, A.A. *Pedagogical Management: Leadership Lessons: Textbook* / Z.M. Sadvakasova, A.A. Bulatbaeva. – Almaty, 2014. – 156 pages. 9. On approval of the list of documents mandatory for maintenance by teachers of preschool education and training organizations, secondary, special, additional, technical and vocational, post-secondary education, and their forms. Order of the Minister of Education and Science of the Republic of Kazakhstan dated April 6, 2020, No. 130. 10. Zhaytapova, A.A.; Sadvakassova, Z.M. *Management Lessons in the Organization of Education: Diagrams and Tables.* Study guide – Almaty, 2007. – 230 pages. 11. On approval of the structure and rules for developing a program for the development of the organization of preschool, secondary, technical and vocational, and post-secondary education. Order of the Minister of Education of the Republic of Kazakhstan dated August 28, 2023, No. 273. **Supplementary reading** 1. Shiplina, L.A. *Management in Education: A Textbook for Students of Higher Educational Institutions Studying in the Field 44.04.04 – Professional Training (by Industry)*. – 2nd edition, revised and supplemented. – Omsk: OmskGPU Publishing House, 2017. – 312 pages. 2. Schwab, Klaus. *The Fourth Industrial Revolution* / *Tortinshi Industrial Revolution*. – Almaty: Ulttyk Audarma Bureausy, 2018. – 200 pages. 3. *"Quality Education Accessible to Everyone" Draft National Report.* Ministry of Education of the Republic of Kazakhstan and the Ministry of Science and Higher Education of the Republic of Kazakhstan. Astana, 2023. 4. Mann, I.B. No. 1. *How to Become the Best at What You Do.* 5. *Methodological Recommendations for Management Personnel of Secondary Education Organizations to Improve the School Management System.* – Astana: NAO named after I. Altynsarin, 2019. – 94 pages.

12.1. Module-Geometry of curves and surfaces, training in a small school

Module	OTMSS 4310 Organization of teaching mathematics in a small school
Semester(s) when the module is taught	7
Responsible teacher	Bayesheva K.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	To master this module, students need prior knowledge and skills gained from courses in pedagogy, information and communication technologies (ICT), and methods of teaching mathematics.
Module objectives / expected learning outcomes	The aim of the course is to provide students with a solid basic education in the field of mathematics for younger learners and develop the ability to apply them in practice. **Learning outcomes** A) In the conditions of a small Comprehensive School, the necessary skills for action are formed; B) Expands theoretical knowledge about the essence of a small-scale school, its features, goals and objectives, and the organization of the process of teaching mathematics; C) Knows didactic approaches and methods of organizing classes and independent work, forming mathematical knowledge, skills and abilities of students; D) Knows how to choose the right methods, tools and forms of teaching mathematics in a small complex school environment; E) Able to plan, conduct classes grouped in different versions and analyze them.
Content	Types of lesson schedules and technology of their design. Mutual combination of classes in the Ministry of education and science. Planning of teaching disciplines at the SCS. Organization of classes in a small cumulative school.Independent work, its types and methodology for organizing independent work in the teaching of disciplines. Extracurricular activities in the conditions of secondary schools. Modern pedagogical technologies for managing the activities of students in the process of teaching disciplines in the conditions of secondary education. Assessment threshold in mathematics in small complex classes. Methodology for teaching computational approaches in a small cumulative school. The use of computer technology in the conditions of SCS.
Form of examination	blank test
Training and Examination requirements	Mandatory participation in in-person classes active participation in the discussion of questions, pre-prepared arrival at lectures and practical classes, high-quality and timely execution of tasks of the IWST and IWS, participation in all forms of assessment.
List of literature	1. Ulzhabaeva, S. S., Kaymakbayeva, G. B. *Features of Management in Small-Scale Schools: Conditions, Problems, and Development Prospects* // Management in Education. 2010, No. 3, pp. 251–255. 2. Kusainov, G. M., Igibaeva, A. K., Shalginbayeva, K. K. *Organizing Work in Small-Scale Schools within the Framework of Updating Secondary Education Content: Practical Guide*, Almaty: New Book, 2021. – 180 pages. 3. Igenbayeva, R. T., Omirzakova, A. M. *Basics of Education in Small-Scale Schools under the Conditions of Updated Educational Content: Textbook*, Almaty: New Book, 2021. – 248 pages. 4. Qantarbai, S. E. *Small-Scale Schools and Learning Activities: Textbook*, Aktobe: K. Zhubanov Aktobe State University, 2005. – 115 pages. 5. Baymoldayev, T. M., et al. *Ways to Use New Pedagogical Methods in Teaching Subjects at Small-Scale Schools: Methodological Guide*, Almaty, 2002. 6. *Small-Scale Schools: From the Experience of Single- and Double-Shift Schools Teachers*, Moscow: Academy of Pedagogical Sciences of RSFSR, 2014. 7. Astambaeva, Zh. Q., Uayisova, G. I. *Theory and Technology of the Pedagogical Process in Small-Scale Primary Schools*, Almaty, 2010.

Module	ThCS 4311 Theory of curves and surfaces
Semester(s) when the module is taught	7
Responsible teacher	Kaidasov Zh.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 SIW
ECTS	5
Mandatory and recommended prerequisites for studying the module	To master this module, you need knowledge, skills and abilities acquired in the following courses: Mathematical analysis , analytical Geometry , theory of ordinary differential equations
Module objectives / expected learning outcomes	The aim of the course, relying on the methods and visual images of classical differential geometry, is to introduce students to the area of the basic concepts and ideas of modern differential geometry. The program includes both the theory of curves and surfaces in Euclidean space and elements of topology A. To master the methods of differential geometry; acquire practical skills in working with differential-geometric objects and to have an idea of their application in geometry and integration theory. B. As a result of studying this discipline, students should know a modern approach to defining the basic concepts of the theory of curves and surfaces; C. Be able to apply the basic theorems and formulas of classical differential geometry in solving problems.; D . Be able to analyze and interpret the content of mathematical concepts, theorems, problems, develop lesson fragments, organize the educational process of teaching mathematics, design a methodology for introducing concepts, studying theorems, solving problems; E. To be able to competently apply the basic theorems and formulas of differential geometry in their future teaching profession.
Content	Theory of curves. Vector functions. Definition of a curve in differential geometry. Methods of definition. Singular points of a curve. Arc length and natural parametrization. Tangent line, osculating plane, and normals of a curve. Accompanying trihedron of a curve, curvature and torsion, Frenet formulas . Natural equations of a curve. Curves with general natural equations. Fundamental theorem of the theory of curves. Theory of surfaces . Definition of a surface in differential geometry. Methods of definition. Curves on a surface. Tangent plane and normal. First quadratic form. Concept of intrinsic geometry and curvature of a surface. Second quadratic form of a surface . Euler's formula. Gaussian and mean curvature. Types of points of a regular surface. Asymptotic lines. Elements of network theory on surfaces. Chebyshev networks . Surfaces of constant Gaussian curvature . Lobachevsky model and planes.
Form of examination	Oral exam
Training and Examination requirements	Mandatory attendance of online and in-person classes active participation in discussions of issues, preliminary preparation for lectures and practical classes, high-quality and timely completion of SRO assignments, participation in all forms of assessment.
List of literature	1. Poznyak E.G., Shikin E.V. Differential Geometry: First Acquaintance. – M.: Moscow State University Publishing House, 1990. -384 p. 2. Pogorelov A. V ., Geometry.–M.: Prosveshchenie ,19 83 . 3. Atanasyan L.S., Bazilev V.T. Geometry. Ch. II. – M.: Enlightenment, 1987. 4. Collection of problems and exercises in differential geometry (edited by V. T. Vodnev). Publishing house " Higher School " , Minsk, 1970. 5. Atanasian L.S., Gurevich G. B. Geometry Part 2. – M.: Education, 1985. 6. Efimov N.V. Higher geometry. - M.: Science, 1993. 7. Kaidasov Zh. Differential geometry and topology of elements - Aktobe, 2004. 8. Electronic library https://www.biblio-online.ru .

12.2. Module-Advanced mathematics, 9 academic credits

Module	SIP 4310 Series and infinite processes
Semester(s) when the module is taught	7
Responsible teacher	Tleubergenova M.A.
Language of instruction	Kazakh/Russian
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	Total workload: 120 hours Contact hours: 40 hours (20 hours of lectures, 20 hours of practical exercises) Self-study, including exam preparation, in hours: 20 SIWT, 60 SIW
ECTS	4
Mandatory and recommended prerequisites for studying the module	Mathematical analysis.
Module objectives / expected learning outcomes	To teach students to investigate numerical series and infinite products for convergence, to prove their convergence, to find the sum of series and the values of infinite products**.** The aim of the course is to provide students with a solid basic education in the field of mathematics for younger learners and develop the ability to apply them in practice. **Learning outcomes** A) Know the definition of a series and an infinite product, the criteria for their convergence. B) Be able to test series for convergence and absolute or conditional convergence, and to find their sums. C) Be able to draw conclusions about the convergence of series. D) Be able to organize and apply acquired knowledge to develop practical skills. E) Be able to evaluate the results of solving problems.
Content	This course covers numerical series, convergence criteria, arithmetic operations on series, and infinite products.
Form of examination	blank test
Training and Examination requirements	Mandatory attendance and active participation in class discussions. Students are expected to come prepared for lectures and practical sessions, complete IWST and IWS tasks on time and with quality, and participate in all forms of assessment.
List of literature	**Core reading** 24. N. Temirgaliyev. *Mathematical Analysis* – Part 3. Almaty: Bilim, 1997. 25. Nadyrbekova A.Sh. *Mathematical Analysis.* – Taraz, TarMPI, 2012, 260 p. 26. Musin, A.T. *Mathematics I (Lectures. Test Collection): Textbook* / A.T. Musin. – Almaty: LLC RPBK Dauir, 2012. – 312 p. 27. Fichtenholz, G.M. *Course of Differential and Integral Calculus. Vol. 1, 2, 3: Textbook.* – 4th ed. – Moscow: Nauka. Chief Editor. Phys.-Math. Literature, 2012. – 656 p. 28. Tokybetov Zh.A. *Mathematical Analysis,* 2009. 29. Karasheva, G. *Mathematical Analysis* 2017, RmEB. 30. K.T. Otarov, D.T. Azymbaev. *Theory of Functions of Several Variables* – Aktobe, 2022. 31. Aktaeva, U.Zh. *Mathematical Analysis* 2011. RmEB. 32. Makhimova, S.Zh. *Mathematical Analysis* 2011. RmEB. 33. Zhanabaev, Zh. *Mathematical Analysis* 2008. RmEB. **Supplementary reading** 34. Pilidi, V.S. *Mathematical Analysis: Textbook* – Rostov n/Don: Phoenix, 2009. – 239 p. 35. Akhmetova, S.S. *Mathematical Analysis:* 2008. RmEB. 36. Il'jin V.A., Sadovnichy V.A., Bl.H. Sendov. *Mathematical Analysis.* – Part 2. Moscow: MGU Publishing House, 2006. 37. I.I. Bavrin, V.L. Matrosov. *General Course of Higher Mathematics.* Moscow, Prosveshcheniye, 1995. 38. Il'jin V.A., Poznyak E.G. *Fundamentals of Mathematical Analysis.* Moscow, Nauka, 1971.

	Electronic resources 25. *Republican Interuniversity Electronic Library (RMEB) –* http://rmebrk.kz/ 26. *Electronic Database of the "Epigraph" Publishing House –* https://elib.kz/ 27. *Electronic Library of ARU –* http://neb.arsu.kz/ru 28. *Internet Library –* https://math.ru/lib/ 29. *Internet Library of the Moscow Center for Continuous Mathematical Education (Vitaly Arnold) –* http://ilib.mccme.ru/ 30. *Electronic Portal of Multimedia Textbooks MU "Epigraph" –* https://mbook.kz/ru/index/ 31. *Republican Scientific and Technical Library (RNTB) –* http://aktobe.rntb.kz/ 32. *Electronic Educational-Scientific Physical-Mathematical Library of EqW Website.*

Module	NM 4311 Numerical methods
Semester(s) when the module is taught	7
Responsible teacher	Mynbayeva ST, PhD, senior lecturer
Language of instruction	Kazakh/ Russian
Connection with the curriculum	Profile discipline, elective component
Forms of training	Lectures, practical exercises, SIWT, SIW.
Academic load (incl. contact hours and SIW - Students' Independent Work)	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 SIWT, 80 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: Mathematical Analysis I, II, III, Differential equations, Algebra and Number Theory, Programming, courses on Boundary Value Problems for ordinary differential equations.
Module objectives / expected learning outcomes	Formation of students' systematic understanding of approximate methods for solving applied problems, mathematical modeling methods, sources of errors and methods for evaluating the accuracy of results. A. To know the basic methods of computational mathematics. B. To apply basic classical methods to solve problems, to familiarize themselves with practical methods of describing physical processes, to be able to conduct numerical and qualitative analysis. C. To develop a culture of thinking, skills of analysis, generalization and processing of the results of the work done. D. Be able to argue their point of view, strive for professional growth, possess skills in working with literature. E. Be able to work in a team, express their own opinion, take into account the opinion of colleagues, strive for mathematical culture.
Content	Numerical methods is one of the important disciplines in the professional training of mathematics specialists. The main sections of the course include: elements of error theory, solving systems of linear algebraic equations, iterative methods, theory of approximation of functions, numerical integration, solving differential equations, and others.
Form of examination	Blank test
Training and Examination requirements	1. Everyone is required to attend classes and arrive on time. 2. If you are unable to attend for a valid reason, you must be notified in advance. 3. Assignments must be completed on time. 4. Be able to argue your point of view, strive for professional growth. Possess the skills of working with literature. 5. Overdue assignments will not be accepted.

List of literature	**Core reading** 1. Bektemesov M. A., Gusmanova F. R., Turganbaeva A. R. *Quantitative Methods: Teaching Methods*. Almaty: Kazakh University, 2020. – 252 p. 2. Babaliyev A. M. *Quantitative Methods*. Almaty: Association of Universities of the Republic of Kazakhstan, 2014. 3. Dilman et al. *Quantitative Methods*. Teaching-methodical manual, 2015. 4. Zholdasova K. *Quantitative Methods*. Laboratory workshop, teaching manual, 2015. 5. Mamaev K. S. *Quantitative Methods: Electronic Learning*, 2014. 6. Nurymbetov A. U. *Quantitative Methods*. Teaching manual, 2014. 7. Kurenkeev et al. *Quantitative Methods*. Textbook, 2017. **Supplementary reading** 8. Baibaktina A. T. *Guidance for Laboratory Work in the Discipline "Quantitative Methods"*. Aktobe: Aktobe Regional University named after K. Zhubanov, 2011. 9. Omarbekova A. S. *Quantitative Methods*. Textbook, 2013. **Electronic resources** 10. Baibaktina A. T. *Guidelines for Laboratory Work in the Discipline "Quantitative Methods"*. Aktobe: Aktobe Regional University named after K. Zhubanov, 2011. 11. Omarbekova A. S. *Quantitative Methods*. Textbook, 2013. 12. K. Zhubanov Aktobe Regional University Electronic Library – neb.arsu.kz 13. "Epigraph" Database – elib.kz 14. "Epigraph" Multimedia Textbook – mbook.kz 15. "Smart Kitap" – web.smart-kitap.kz 16. RJOAEK Information System – rmebrk.kz 17. Republican Scientific and Technical Library – aktobe.rntb.kz