Modular Handbook Form

Module name:	**M1 Contemporary History of Kazakhstan/**
Module level as required:	Bachelor's programme
Abbreviation as required:	MHK
Subtitle as required:	
Lesson type as required:	Lectures, seminars (practical)
Training semester:	1 semester
Person responsible for the module:	The Department "History Of Kazakhstan»
Teacher:	candidate of historical Sciences, associate Professor of Yunusbaev Serik Mutanovich
Language:	Russian,kazakh
Connection with curriculum:	General education, compulsory component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 2 hours, seminar- 2 hours, current LIW-3,66 hours; LIWT -1,5hours. Total labor intensity - 9.16 hours.
Training load:	Lectures - 30 hours; practical work- 30 hours; current LIW-55 hours; intermediate LIW-12.5 hours; LIWT -22.5hours, Total labor intensity -150 hours.
Credit points:	5 ECTS-credits
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After completing the module, students should be able to: - to demonstrate historical knowledge that meets the strategic objectives of strengthening the sovereign statehood of Kazakhstan and national security; - to create an ideological and spiritual basis for the consolidation of multi-ethnic and multi-confessional Kazakh society; - to transform the scientific principles that determine the unique and significant place of the history of modern Kazakhstan in the context of world history, in the dialogue of cultures of East and West; - to correlate the creation of a science-based concept of the modern history of the Fatherland with the General paradigm of the world-historical development of human society; - to provide objective information and possess real scientific and historical knowledge of the events of national history, the content of the Kazakh model of development.
Content:	Lectures. Introduction. Socio-economic situation in Kazakhstan – prerequisites for the struggle for independence. The origins of the national movement of the Kazakh people. Historical sources of formation of Soviet Kazakhstan. Formation of the state structure of the Republic of Kazakhstan. Social reforms and changes in education. Ethnodemographic processes and strengthening of interethnic harmony. Socio-political prospects of development. Youth policy in Kazakhstan and the definition of the path of spiritual renewal. The importance of the program of the Leader of the nation "People in the flow of history" for the formation of a new historical consciousness. The significance of the celebration of the 550th anniversary of the Kazakh khanate for the formation of a new social consciousness. "Mangilik El" is the national idea of Kazakhstan of the XXI century. Kazakhstan is a state recognized by the modern world. Seminar: Modern statehood of the Republic of Kazakhstan – its features in comparison with the ancient States in the territory of Kazakhstan and the Kazakh khanate. Kazakhstan in the early

	twentieth century: the struggle for independence. Socio-political life and culture in the 20-30s of the twentieth century in Kazakhstan. Forced resettlement to Kazakhstan of representatives of other nationalities (30-40-ies of XX century). Kazakhstan during the great Patriotic war. Kazakhstan in the postwar years of the "Stalin period" (1945-1953). Kazakhstan in the period of Khrushchev's "thaw" (1953-1956гг.). Development of virgin and fallow lands: consequences and results. Kazakhstan in the years of "stagnation".(1964-1985.). Kazakhstan in the years of "perestroika". USSR collapse. Formation Of Independent Kazakhstan. Kazakhstan model of economic development of independent Kazakhstan. Youth policy in Kazakhstan and the definition of the path of spiritual renewal, measures to educate history. The national idea of Kazakhstan "Mangilik El" is the basis for the consolidation of society.
Learning / examination outcomes / control forms:	Current control: essays defense, essay; oral surveys and interviews on lectures, defense of collective practical work with a written report. Final Control – Exam
Technical teaching aids:	Handouts, interactive whiteboard, modern computers
Literature:	1. History of Kazakhstan. In 5 volumes. 4-5th volume. Almaty: Atamura, 2010. 2. History of independent Kazakhstan - Almaty: "Kazak encyclopedias", 2011 3. History of Kazakhstan. Lecture course. Ed. K.S. Karazhan. - Almaty, 2012. 4. Nazarbayev N.A. Era of Independence. Astana, 2018.-508 p. 5.Ұly Dala tarihy: study guide / Kan G.V., Tugzhanov E.L. - Astana: Zhasyl Orda, 2015. - 328 pp.

Module name:	**M2** Kazakh (Russian) language 1
Module level as required:	Bachelor's programme
Abbreviation as required:	K(R)L
Subtitle as required:	
Lesson type as required:	Seminars
Training semester:	1 semester
Person responsible for the module:	Department "Learning the state language» ; Department "Practical Russian for technical specialties»
Teacher:	the candidate of pedagogical Sciences associate Professor Jamasheva Zhanar Rahmatullaeva candidate of pedagogical newclient Esimhanov Nagima Auelbekovna
Language:	Kazakh (Russin)
Connection with curriculum:	General education, compulsory component
Form of teaching / weekly training load in a semester:	Full-time / seminar- 4 hours, current LIW-3,66 hours; LIWT -1,5hours. Total labor intensity - 9.16 hours.
Training load:	practical work- 60 hours; current LIW- 55 hours; intermediate LIW-12.5 hours; LIWT -22.5hours, Total labor intensity -150 hours.
Credit points:	5 ECTS-credits
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After completing the module, students should be able to: - know the structural and semantic analysis of the text;

	- know General scientific vocabulary; - analyze, synthesize and summarize information; - competently build communication based on the goals and situation of communication; -to master the basics of speech culture in various fields of communication; -translate texts of medium complexity; -apply the basic rules for the formation of proposals.
Content:	**Practical:** Development of communication skills and speech skills. Language and its main functions. Description as a functional-semantic type of speech. Narrative as a functional-semantic type of speech. Reasoning as a functional-semantic type of speech. Structural and linguistic features of reasoning. The development of the stylistically differentiated speech. Functional styles of speech: conversational, artistic, journalistic, official-business, scientific. Scientific speech and language of my specialty. Structural and semantic division of the text. The theme of the scientific text. Communicative tasks of the text. Topics of scientific text. This and new information of the scientific text. The role of the sentence in the text. Methods of information development in the text. Basic and additional information in the text. Structural and semantic analysis of scientific texts. Compression of the scientific text. Secondary scientific texts. The plan and its preparation in the scientific field. Annotation. Annotation of the scientific text. Review and review. Reviewing the text.
Learning / examination outcomes / control forms:	Current control: colloquiums, midterm written and oral surveys, presentation and discussion of abstracts on scientific and professional topics; annotation; mini-test; writing essays, summaries, dictation; written homework. Final control – exam.
Technical teaching aids:	Handouts, interactive whiteboard, modern computers
Literature:	1. Kuzekova Z.S. Kazakh language. Textbook.– Almaty: Rarity, 2011. -208 p. (in Kazakh language). 2. Abaeva J.S. Russian language. - Almaty, 2014. 3. Zhapbarov A. Kazakh language. Textbook.-Shymkent: SKSU im.M.Auezova, 2012. (in Kazakh. Language). 4. Russian language: a textbook for students of Kazakh branches of universities (undergraduate) / ed. K.K. Akhmedyarov, K.K. Zharkynbekova, Mukhamadieva Kh.S. - Almaty: Kazak University, 2012. 5. Zhapbarova G. Kazakh language (e-textbook) Part I, Part II. Astana, 2014. (in Kazakh. Language).

Module name:	**M3 Foreign language 1**
Module level as required:	Bachelor's programme
Abbreviation as required:	FL 1
Subtitle as required:	
Lesson type as required:	Seminars
Training semester:	1 semester
Person responsible for the module:	Department "Foreign languages for technical specialties»
Teacher:	Instructor Nazarova Anelya Nurgalikyzy
Language:	English
Connection with curriculum:	General education, compulsory component
Form of teaching / weekly training load in a semester:	Full-time / seminar- 4 hours, current LIW-3,66 hours; LIWT -1,5hours. Total labor intensity - 9.16 hours.

Training load:	Seminars - 60 hours; current LIW- 55 hours; intermediate LIW-12.5 hours; LIWT -22.5hours, Total labor intensity - 150 hours.
Credit points:	5 ECTS – credits
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After completing the module, students should be able to: -know the practical, lexical, grammatical and phonetic structure of the foreign language; - know the grammar of writing English/German; - to understand the spoken English of average difficulty on technical topics; - read technical texts of medium complexity without a dictionary; -perform translation from a foreign language into a native language and from a native language into a foreign language within the sphere of communication.
Content:	Formation of intercultural and communicative competence of students in the process of foreign language education at a sufficient level (A2), the level of basic sufficiency (B1), the basic standard (B2). Depending on the level of training of the student at the time of completion of training, he can reach the level of C1, if the language level of the student at the start is higher than B1. **Practical Lessons:** Introductory-corrective course. Grammar revision. Grammar: Pronouns (Personal, Possessive, Demonstrative, Reflexive). Family. Grammar: verb to be, to have/has. Family. Relationships. Occupations. My job. Living. Grammar: there is/are. Home. Grammar: prepositions of place. My flat. Food. Grammar: some/any, much/many. Supermarket. Healthy food. Unhealthy food. Clothes. Grammar: The Noun. Fashion. Grammar: Present Simple. Shopping. Time .Grammar: Numerals. Seasons and months. Grammar: Prepositions of Time. My Day off Grammar: Present Continuous. Friendship. Grammar: Degrees of comparison. My friend. Grammar: Past Simple Tense. Describe your friend. Sport. Grammar: Future Simple. Sport is important in Our life. Grammar: Types of questions. The Olympic Games. Types of Olympic Games. Hobbies. Grammar: Present Perfect Tense. My Hobby. Grammar: Past Continuous Tense. Travelling. Traditions and customs. Grammar: Past Perfect Tense. Kazakh culture and national traditions. British Traditions and Customs. Cities and sights. Grammar: Present Perfect Continuous Tense. Almaty. Grammar: Future Perfect Tense. My native town. Astana. Holidays. Grammar: Reported Speech. Why do the British like drinking tea? Independence Day. Famous People. Napoleon Bonaparte. Diana- the People's Princess. Grammar: Passive Voice.
Learning / examination outcomes / control forms:	Monitoring: compliance reports, the compilation of the Glossary, roleplay, essay, presentation. Final control – exam.
Technical teaching aids:	Handouts, books
Literature:	1. Mamekova S.K., Kurbanbayeva S.N. «Entering to the English world» educational aid for the first-year students of technical specialties. – Shymkent: M. Auezov SKSU, 2017. 2. Shymyrbekova A.M. Collection of business games. - Shymkent: M. Auezov SKSU, 2016 3. Aitbekova Zh.N. Games for vocabulary practice. Shymkent: M. Auezov SKSU, 2017.

	4. Ashenova A.S. Grammar games. - Shymkent: M. Auezov SKSU, 2017. 5. Kate Pickering & Jackie McAvoy Global English, Beginner course book Macmillan, 2010.

Module name:	**M 4** Physical training/
Module level as required:	Bachelor's programme
Abbreviation as required:	PhT
Subtitle as required:	
Lesson type as required:	Practical
Training semester:	1 semester
Person responsible for the module:	Department "Physical Education for Technical Specialties"
Teacher:	Stolyarova O.S. – senior teacher
Language:	Russian
Connection with curriculum:	General education, a required component
Form of teaching / weekly training load in a semester:	Full time / Practical classes – 2h.,
Training load:	Practical -30 hours.; Total workload – 60 hours
Credit points:	2 ECTS-credits 2
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After completing the module, students should be able to: - use the means of physical culture and sports to increase their functional and motor abilities to achieve professional goals; - to possess the means of independent, methodically correct use of methods of physical education and health promotion; - possess special applied psycho-physical qualities for successful implementation in life activity and future profession;
Content:	Practical: The development of physical qualities Input control: 30 m run, long jump from the spot. The development of endurance. The development of power. The development of speed-strength qualities. The development of flexibility and mobility in the joints. Development of dexterity and coordination of movements. Assessment of physical development. Mastering the technique of elements in sports.Teaching technique of motor actions in sports.Improving the technique of motor actions in sports.Training tactical and technical actions in sports.Improving tactical and technical actions in sports.Mastering the skills of strategy and tactics in sports. Application of strategy and tactics skills in sports.Improving the skills of strategy and tactics in sports.Evaluation of technical training in sports.
Learning / examination outcomes / control forms:	Current control: tests of physical fitness The final control is differential / offset.
Technical teaching aids:	Handouts
Literature:	1.Barchukov, I.S. Physical culture and sport: methodology, theory, practice: A manual for students. universities, training. on directions "Pedagogy"; UMO / I. S. Barchukov,

	A. A. Nesterov; under general ed. N.N. Malikov. - 2nd ed., Sr. - M.: Academy, 2009. - 528 p. - (Higher vocational education) (Russian) 2. Barshay V.M. Gymnastics: a textbook for students. universities enrolled on special. "Physical culture" / V. M. Barshai, V. N. Kurys, I. B. Pavlov. - 2nd ed., Pererab. and add. - Rostov n / D: Phoenix, 2011. - 330 p. : il. - (Higher education) (Russian) 3. Gymnastics: a textbook for students. universities, training. on spec. "Physical education"; UMO / M.L. Zhuravin [et al.]; ed. M.L. Zhuravina, N.K. Menshikov.-5th ed., Sr. - M.: Academy, 2009. - 448 p. - (Higher vocational education. Pedagogical specialties) (Russian) 4. Goloschapov, B.R. The history of physical culture and sports: a textbook for students. universities, training. on spec. "Physical education"; UMO / B.R. Goloschapov. - 5th ed., Rev. and add. - M.: Academy, 2009. - 320 p. - (Higher vocational education. Pedagogical specialties) (Russian) 5. Ilyinich, V.I. Student's physical culture and life: a textbook for students. universities studying the discipline "Physical Education"; Ministry of Defense of the Russian Federation / V.I. Ilinich. - M.: Gardariki, 2009. - 366 p. : il. 6.Makarova, G.A. Sports medicine: a textbook for stud. universities, training. on spec. "Physical Culture and sport"; State com RF on physical. culture and sport / G. A. Makarova. - 3rd ed., Sr. - M.: Soviet Sport, 2009. - 480 p. : il. (Russian) 7.Nesterovsky, D.I. Basketball: Theory and methods of teaching: a training manual for students. universities, training. on spec. "Physical education"; UMO / D.I. Nesterovsky. - 4th ed., Sr. - M.: Academy, 2009. - 336 p. - (Higher vocational education. Pedagogical specialties) (Russian)

Module name:	**M5** Information and communication technology
Module level as required:	Bachelor's programme
Abbreviation as required:	IKT
Subtitle as required:	
Lesson type as required:	Lectures, laboratories
Training semester:	1 semester
Person responsible for the module:	Department «Informatics»
Teacher:	master, senior lecturer Utekbaeva Akmaral Kaldybekovna; teacher Medetbekov Muratbek Mukhalbekovich
Language:	English
Connection with curriculum:	General education, a required component
Form of teaching / weekly training load in a semester:	Full time / Lectures – 2h., laboratory classes – 2h., SIW – 3.66h, SIWT – 1.5h., Total workload – 9.16 hours
Training load:	Lectures -30 hours.; laboratory classes -30 hours; current LIW-55 hours; intermediate LIW-12.5 hours; LIWT -22.5hours, Total labor intensity -150 hours.
Credit points:	5 ECTS-credits

Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After completing the module, students should be able to: - use information resources for searching and storing information; - work with databases, with spreadsheets, compile data, build charts and graphs; - apply methods and means of information protection; - design and create simple websites; - use various forms of e-learning for professional knowledge.
Content:	**Lectures:** ICT Standards. Introduction to computer systems. Computer systems architecture. Software. Operating Systems. Types of software, goals and specifications. Human-computer interaction. User interface as a means of human and computer interaction. Basics of database systems: concept, characteristics, architecture. Data models Methods and tasks of data mining. Basics of data analysis. Networks and telecommunications. End devices, data transfer devices, transmission media. Information about security risks and their classification. Cybersecurity industry. Internet technologies. Basic concepts of the Internet. Cloud and mobile technologies. Web Services in the Cloud. Data centers. Trends in the development of modern infrastructure solutions. Multimedia technology. Presentation of text, audio, video and graphic information in digital format. Information technology in the professional field. Basic terms and concepts of mobile technology. Mobile services. **Laboratory classes:** Amdahl's law, processor time, speed, efficiency, energy costs. Work with files and directories. Development and creation of lectures, scientific reports. IP addressing Network monitoring. Application EDS and coding in E-mail. Web applications. Creating styles. Creating Google Accounts in Google Docs. Use of mobile technologies for GPS, navigators, GSM alarm systems. Create a video using programs: HyperCam, Adobe Premiere Pro, in Windows Movie Maker. Work with Smart applications: Smart TV, Smart Hub. Work with electronic government http://egov.kz/cms/ru/engine-services / for_citizen.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory tasks; colloquium; written and oral surveys on the material under study; implementation and protection of individual and group projects in the form of presentations. Final control exam.
Technical teaching aids:	Handouts, computer programs, laboratory benches, posters, electronic tutorials.
Literature:	1. D. Shynybekov, R.Uskenbayeva. et.al. Information and communication technologies. Textbook.– Almaty: IITU, 2017. 2. Andrew S., Tanenbaum David J., Wetherall. Computer Networks - 2017. 3. Iztayev D.Zh., Rakhymbek N.Zh. , Utelbaeva A.K., Turganbekova M., Kuanbay N.R. / Collection of lectures on discipline "Information and telecommunication technology". - Shumkent, 2018. 4. Collection of lectures on ICT discipline. / Suleimenova L.A., Dzhusupbekova G.T., Kəribai G.Zh., Utelbaeva A.K. - Shymkent, 2017. 5. Lorenzo Cantoni (University of Lugano, Switzerland) James A. Danowski (University of Illinois at Chicago, IL, USA) Communication and Technology, 2014. - 576 pp.

Module name:	M6 Higher Mathematics 1
Module level as required:	Bachelor's programme
Abbreviation as required:	BM1
Subtitle as required:	
Lesson type as required:	Lectures, practical
Training semester:	1semester
Person responsible for the module:	Department of Higher Mathematics and Physics for Technical Specialties
Teacher:	Candidate of Mathematical Sciences, Associate Professor Takibaeva Gulchehra Abdurakhmanovna
Language:	Russian, Kazakh, English
Connection with curriculum:	General education, a required component
Form of teaching / weekly training load in a semester:	Full time / Lectures – 2h., practical classes – 1h., SIW – 3.33h, SIWT – 1h., Total workload – 7.33 hours
Training load:	Lectures -30 hours.; practica classes -15 hours; current LIW- 50 hours; intermediate LIW-10 hours; LIWT -15 hours, Total labor intensity -120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After completing the module, students should be able to: - know the practical, lexical, grammatical and phonetic structure of the foreign language being studied; - master the grammar of writing English / German; - understand spoken English language of average complexity on technical topics; - read technical texts of medium complexity without a dictionary; - to translate from a foreign language into one's mother tongue and from one's mother tongue into a foreign language within the communication sphere.
Content:	
Learning / examination outcomes / control forms:	Current control: making abstracts, compiling a glossary, role-playing game, essay, presentation. Final control - exam.
Technical teaching aids:	Handouts, tutorials
Literature:	1. Mamekova S.K., Kurbanbayeva S.N. «Entering to the English world» educational aid for the first-year students of technical specialties. – Shymkent: M. Auezov SKSU, 2017. 2. Shymyrbekova A.M. Collection of business games. - Shymkent: M. Auezov SKSU, 2016 3. Aitbekova Zh.N. Games for vocabulary practice. Shymkent: M. Auezov SKSU, 2017. 4. Ashenova A.S. Grammar games. - Shymkent: M. Auezov SKSU, 2017. 5. Kate Pickering & Jackie McAvoy Global English, Beginner course book Macmillan, 2010.

Module name:	**M7** Chemistry
Module level as required:	Bachelor's programme
Abbreviation as required:	Chem
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	1 semester
Person responsible for the module:	Department «Chemistry and basics of chemical technology»

Teacher:	Doctor of technical sciences, professor Nazarbekova Saule Polatovna
Language:	Russian, Kazakh, English
Connection with curriculum:	General education, a required component
Form of teaching / weekly training load in a semester:	Full time / Lectures – 1h., laboratory classes – 2h., SIW – 3.33h, SIWT – 1h., Total workload – 7.33 hours
Training load:	Lectures -15 hours.; laboratory classes -30 hours; current LIW-50 hours; intermediate LIW-10 hours; LIWT -15 hours, Total labor intensity -120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After completing the module, students should be able to: - apply the concepts and laws of chemistry, methods and means to study the composition and structure of the substance; - analyze the dependence of the properties of substances on their composition and structure and understand the general laws governing chemical reactions; - independently solve chemical problems on the basic concepts and laws of chemistry; calculate changes in enthalpy, entropy and Gibbs energy in a chemical reaction; - use acquired knowledge in the study and analysis of chemical processes occurring in technological objects; - plan the organization of laboratory experiments to study the physicochemical properties and processes of transformation of one substance into another.
Content:	**Lectures:** Basic concepts and laws of chemistry. Atomic-molecular teaching, the structure of matter, the general laws governing the course of chemical processes, chemical processes in solutions. Covalent chemical bonding, energy and kinetics of chemical processes, chemical equilibrium, electrolyte solutions and the basics of electrochemical processes. Chemical and physical properties of elements and their basic compounds. Fundamental laws and laws of stoichiometry; Classes of chemical compounds and types of reactions: the main classes of simple and complex compounds, types of chemical reactions. Basics of chemical thermodynamics and kinetics: thermochemistry; chemical equilibrium. Electrolyte solutions: the structure of water and aqueous solutions of electrolytes, the Raul laws, the ionic product of water, the pH of solutions, the strength of electrolytes, the law of dilution of weak electrolytes, acids and bases. Hydrolysis of salts and neutralization: the interaction of acids and bases, the hydrolysis of salts; electrochemical processes. The structure of matter: the historical background of the theory of structure, quantum numbers, the Pauli principle, the Klechkovsky rules. **Laboratory classes:** Obtaining and studying the properties of inorganic compounds, determining the molar mass of a gaseous substance, measuring the thermal effects of chemical reactions, studying the effect of various factors on the reaction rate, studying the effect of various factors on the chemical equilibrium displacement, studying the properties of electrolytes, studying redox reactions.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory tasks; test papers; colloquium; milestone written and

	oral surveys. Final control - exam.
Technical teaching aids:	Interactive whiteboard, visual instructions
Literature:	1. Inorganic chemistry. Chemistry of elements: study book / S. Nazarbekova [et al.]. - Shymkent: SKSU, 2015. - 108 p. 2. Zaitsev, O.S. Chemistry. –M .: Academy, 2008. -544 p. 3. Nazarbekova S.P., Kurbanbekov K.T., Nazarbek U.B. Inorganic chemistry. Chemistry of elements / Electronic textbook. - Shymkent, 2016, 6.98 MB 4. Nazarbekova S., Tukibayeva A., Kurbanbekov K., Nazarbek U. Inorganic Chemistry. Chemistry of elements. - Almaty: Association of higher educational institutions of Kazakhstan, 2017. -268 p. 5. Ian Guch. The Complete Idiot's Guide to Chemistry. - Hodder, 2006. 360 p.

Module name:	M8.1 Fundamentals of economics and law
module level as needed:	Bachelor’s programme
reduction as needed:	FEL
subtitle as needed:	
type of employment as needed:	Lectures, Seminars
semester:	2 semester
the responsible person for the module:	Department of "Economic Theory"
lecturer :	Candidate of Economic Sciences, associate professor Vasily Sherstyuk
language:	Russian, Kazakh, English
relation with curriculum:	Basic discipline, elective component
form of training / weekly academic load in a semester:	Full-time /lectures - 1, practical classes -1,ISW - 3, ISWT – 3, Total working hours - 9
study load:	Lectures-15, seminars - 15, , CPO-45, ISW – 7,5, ISWT – 7,5; Total working hours -90
credit scores:	3 ECTS
prerequisites for accordance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 30 points
recommended prerequisites:	Higher Mathematics, Higher Mathematics 2, Theory of Probability and Statistics
Module Objectives / expected results of study:	After students complete the course, they should be able to: - learn the laws of social production functioning and methods of knowledge and patterns of economic systems functioning; -analyze the factors of competitiveness of a market economy subjects, the effectiveness of ownership forms, the socio-economic situation in the republic by industry, field of activity and regions; - to carry out calculations of options for the effective use of production factors; -to evaluate the dynamics of the main macroeconomic indicators of the national economy; -have skills and use in practice knowledge for advanced training throughout life

content:	Lectures. Economy as a sphere of vital activity of the society. The subject of the economics basis. Needs as a prerequisite for production. The main factors of production: labor, land, capital and entrepreneurial ability. Property as an economic and legal category. Legal regulation of the economy. Natural economy. Commodity production. The essence and function of money. Essence and types of market. Competition: concept and types. The law of supply and demand. The essence of entrepreneurship. Organizational and legal forms of entrepreneurship. Classification and cost structure of the company. Accounting and economic profit. Entrepreneurial capital. Physical and moral deterioration. Depreciation. Investments as a source of financing production assets. Investment structure. Income owner of production factors. National wealth and economic well-being. Economic growth and economic development. Priority directions of development the economy of Kazakhstan. Cyclical development of the economy. Socio-economic consequences of inflation and unemployment. Monetary system. Monetary and credit policy of the Republic of Kazakhstan: essence, goals, tools. Taxes. The system of social protection of the population in the Republic of Kazakhstan. Practical work. Production capabilities in the economy. Determining the equilibrium price with plotting. Socially necessary labor costs. The theory of supply and demand: demand, supply, price. The elasticity of supply and demand. Calculation of GDP by flow of expenses. Calculation of indicators of the use of basic production assets. Calculation of indicators of use of working capital. Drawing up the sheet of the accounting of working hours. Calculation of labor productivity. Payroll preparation. Payroll brigade, taking into account KTU. The definition of profit and profitability. Determination of the economic efficiency of the introduction of new technology. The relationship of unemployment and inflation. Production costs
study / examination results forms of control:	Current control: successful implementation and protection of seminar tasks; colloquium; milestone written and oral surveys. Final control exam.
technical training tools:	Interactive whiteboard, slides, handouts
literature:	1. Bostynets N.D. Basics of Economics. Tutorial. - Minsk: BSUIR, 2015. - 324 p. 2. "Fundamentals of economics in charts, tables and graphs" for students of non-economic specialties (5B075300 - "Chemical technology of refractory non-metallic and silicate materials", 5B072000 - "Chemical technology of inorganic substances", 5B072100 - "Chemical technology of organic substances". Mergenbaeva A.T., Urazbayeva G.Zh., Abishova A.U.2017. 3. Dzhakupova D.Y. The bases of the economic theory: study guide / D. Y. Dzhakupova. - Almaty: Evero, 2014. – 156p. 4. McCarthy E.J.Basic Marketing: A Managerial Approach /

	E.J. McCarthy, W. D. Perreault. - Tenth Edition. - Boston, 2012. - 734 p. 5.Forder James. Economics: A Beginner's Guide. Oneworld Publications, 2016. - 208 p. 6.Rodrik Dani. Economics Rules.W. W. Norton & Company, 2015. - 272 p.
Module name:	M9 Kazakh (Russian) language 2
Module level as required:	Bachelor's programme
Abbreviation as required:	PK (R) L
Subtitle as required:	
Lesson type as required:	Practical classes
Training semester:	2 semester
Person responsible for the module:	"Practical russian language for technical specialties"Department
Teacher:	Esimkhanova N.A., Ph.D., Associate professor
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, a required component
Form of teaching / weekly training load in a semester:	Full-time / Practical classes 4 hours, LIW-3.66hours; LIWT - 1.5hour, Total labor intensity - 9.16 hours.
Training load:	Practical -60 hours; current LIW-55hours; intermediate LIW-12,5 hours; LIWT -22.5 hours. Total labor intensity - 150 hours.
Credit points:	5 ECTS credits
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	Kazakh (Russian) language, introduction to the specialty
Module objectives / planned learning outcomes:	After students complete the course, they should be able to: - know the terminological minimum; methods of analyzing texts in the specialty; constructing specialized texts; the specifics of various genres of scientific style; -apply the basic techniques of processing the text in the specialty; language tools in accordance with the situation of communication; -be able to generalize scientific information; -analyze the problems of the professional sphere; -to draw conclusions on the issues under consideration; -systematize information to form judgments; - master the basics of business and scientific and professional communication;
Content:	Seminar. Introduction to the subject area of the specialty in a professional language. Theoretical foundations of chemical technology. Chemical Technology. The implementation of the principle of interconnected learning: the relationship of the Russian language with the disciplines of the HTEC specialty. Chemical raw materials. Lexical, morphological and syntactic features of the scientific style. Structural features of a scientific work: composition; rubrication; volume Water and water treatment in chemical technology. Air and its use in chemical technology. About scientific research methods. Rules for the selection of methods in accordance with the theme and communicative tasks. Types of methods for different areas of research. Principles of selection of literature on the research topic. Features of work with paper and electronic media. Special professional-

	oriented material and its use in specified professional situations. Production of organic products. Organic Synthesis Scientific texts and their varieties: actually-scientific, popular science, educational reference. Text description. Characteristics of objects, substances, phenomena and their properties. Text-reasoning. Causal relationships between phenomena, events, facts. Text - message as a form of presentation of information of scientific or factual content. Production of lower unsaturated hydrocarbons. General characteristics of the scientific style of speech as a specialty language cts. Professional terminology. Special vocabulary. Professional language, professional jargon: similarities and differences. The terms cTOV in popular science texts, especially their education in the Russian language. Production of vinyl chloride, styrene and phenol. The structure of research work on the specialty profile.
Learning / examination outcomes / control forms:	Current control: colloquiums, written and oral polls, presentation and discussion of essays on scientific and professional topics; writing reviews, annotations. Final control - exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1. Ageeva A.Y., Kasarova V.G. Collection of tasks on the Russian language to the textbook Russian language to the future engineer. Tutorial. - M .: MADI, 2012. – 97p. 2. Alyokhina S.V., Dovgan V.A. Russian language. Scientific style of speech. Tutorial. - Kiev: NAU, 2009. - 100 p. 3. Petrova G.M. and others. Russian language in a technical college. Part 1. Petrova G.M., Kurbatova S.A., Solyanik O.E. - M .: Publishing House of N.E. Bauman Moscow State Technical University, 2010. - 107 p. 4. Seydenova S.D., Almatova N.A. Professional Russian language. - Almaty: ATU, 2015. - 100 p. 5. Dzhaksylykova F.Z. Stylistics. Scientific style. - Shymkent: M. Auezov SKSU, 2007. - 10 p. 6. Kaldykozova S.E., Anartaeva G.U., Lesbekova L.Zh. Russian professional language. Tutorial. - Shymkent, 2009.

Module name:	M10 Foreign Language-2
module level as needed:	Bachelor’s programme
reduction as needed:	FL 2
subtitle as needed:	
type of employment as needed:	Practical classes
semester:	2 semester
the responsible person for the module:	"Foreign languages for technical specialties"Department
lecturer :	Nazarova A.N., Lecturer
language:	English
relation with curriculum:	Basic discipline, a required component
form of training / weekly academic load in a semester:	Full-time / Practical classes - 4 hours, LIW - 3,66 hours, LIWT - 1,5 hours, Total labor intensity - 9,16 hours.
study load:	Practical classes -60 hours; current LIW-75 hours; intermediate LIW-7,5 hours; LIWT -7.5hours. Total labor intensity - 150 hours.

credit scores:	5 ECTS-credits
prerequisites for accordance with the examination requirements:	Rating according to the results of intermediate and midterm control is not lower than 25 points.
recommended prerequisites:	Foreign language - 1
Module Objectives / expected results of study:	After completing the module, students should be able to: -demonstrate proficiency in a foreign language at level B1; - know the grammar and vocabulary, history and culture of the country of the foreign language being studied, the rules of speech etiquette; -to learn by heart the main foreign words and expressions of the technical direction; - to demonstrate a conversation of medium difficulty in a foreign language on common topics; - maintain a conversation on technical topics in a foreign language; - translate foreign technical texts of medium complexity without a dictionary; - possess the basic writing skills necessary for the preparation of abstracts, annotations, essays and writing skills of a reasoned statement of his own point of view.
content:	Practical work: Grammar: sentence structure; parts of speech. Service words. Temporary forms of real and passive verbs; modal verbs; subjunctive mood. Non-verbal forms of verbs, forms and functions in the sentence, infinitive and participial turns. Complex and compound sentences. Vocabulary: common (domestic and scientific), terminological and professional content. Conversation topics: My family, Our institute, The country of the studied language, Tourist services, My future profession. Texts of general scientific and professional content.
study / examination results forms of control:	Current control: protection of essays, essay; oral surveys and interviews on lectures, protection of collective practical work with a written report. Final control - exam.
technical training tools:	Handout, study guides.
literature:	1. Yeszhanova L.Sh. “Case situations for mechanical engineering”, M. Auezov SKSU, Shymkent, 2017. 2. L.B. Kadulina, O.I. Tarakanova “Collection of texts and exercises for teaching technical translation of students of technical specialties”. Educational - methodical manual, published in Tomsk TSUCSR, 2007 - 231 p. 3. Galitskaya S. Y. The rules of reading in modern English (theory and practice): a teaching aid. Vladimir: VlSU, 2012.- 118p. 4. Buray E. A. Phonetics of Modern English: a theoretical course: a textbook for university students / E. A. Buray, I. E. Galochkina, T. I. Shevchenko. - Moscow: Akademiya, 2014. - 281 p. 5. Kamyanova T. G. English grammar: practical grammar of the English language / Tatiana Kamyanova .- Moscow: Slavic Book House, 2014.- 447 p.

Module name:	**Training practice**

module level:	Baccalaureate
Reduction:	training programme
Subtitle:	
view class:	
semester of study:	2 semester
responsible person for the module:	Department of «Biotechnology»
teacher:	Candidate of biological Sciences, associate Professor Abildaeva R. A.
language:	Kazakh, Russian
communication with the educational plan:	additional types of training
form of training / weekly teaching load in the semester:	
teaching load:	Total labor intensity – 30 hours'
credit rating:	1 ECTS- credit
prerequisites to comply with the examination requirements:	
recommended prerequisite:	Objects of biotechnology, Introduction to the specialty
objective module / intended learning outcomes:	Once students have passed the training practice, they are able to: - to present the structure of the studied objects of practice; - describe methods of analysis and used analytical instruments for research in laboratories and IRLIP SAPA and the Department of "Biotechnology"; -work in the microbiological and biochemical laboratory: observe safety precautions when working in the laboratory, working in the box; - to apply the basic methods of research of biotechnological objects and biotechnological products; - to draw up the results of acquaintance with the work of laboratories and with the studied technology; - prepare a report and report on the results of the training practice to the Commission and the head of the practice.
content:	Introduction to the specialty. Familiarization with the safety requirements in the laboratory, laboratory utensils, chemical reagents, equipment, chemical utensils. Familiarization with the basic methods used for physical and chemical analyses. An introduction to the structure and scientific work of the Department "Biotechnology", analytical research and testing laboratories of the University of SAPA and IRLIP and test methods. Registration and protection of the report on educational practice.
educational/ exam results form of control:	Current control –safety instruction, survey on familiarization with the objects of practical training. Final control – protection of the practice report.
technical training tools:	Interactive whiteboard, modern computers
literature:	1. The working program of the training practice for specialty 5B070100 "Biotechnology" / compilers L. P. Ivleva, S. N. Derbush, B. M. Salimbaeva. Karaganda: Publishing house Kargtu, 2010. -9 p. [Kazakh] 2. Biotechnology: a textbook / S. N. Orekhov, I. I. Chakalova; under the editorship of A.V. Katlinsky, the First Mosk. state honey. UN-t im. I. M. Sechenov. - 2nd ed., erased. - Moscow: Academy, 2016. - 281c. - ISBN 978-5-4468-3442-6 [Russian] 3. Fundamentals of biotechnology: biotechnology of higher and lower plants: textbook / S. K. Turasheva; M-in

	education and science of Kazakhstan, KazNU. al-Farabi. - Almaty: Kazakh University, 2016. - 270 p. - ISBN 978-601-04-2014-4 [Kazakh] 4. Essentials of laboratory techniques in biotechnology, Eureka Publication - Pune; First edition (2018) - by Dr. Sunita Panchawat, Dr. Abhishek Mathur – 208 p. ISBN-10: 8193749677 [English]

Module name:	**M11** Physical Training
Module level as required:	Bachelor's programme
Abbreviation as required:	PhT
Subtitle as required:	
Lesson type as required:	Practical classes
Training semester:	3 semester
Person responsible for the module:	Department "Physical Education for Technical Specialties"
Teacher:	Stolyarova O.S. – senior teacher
Language:	Russian
Connection with curriculum:	General education, a required component
Form of teaching / weekly training load in a semester:	Full time / Practical classes – 4h.,
Training load:	Practical classes -30 hours.; Total workload – 60 hours
Credit points:	2 ECTS-
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	After completing the module, students should be able to: - use the means of physical culture and sports to increase their functional and motor abilities to achieve professional goals; - to possess the means of independent, methodically correct use of methods of physical education and health promotion; - possess special applied psycho-physical qualities for successful implementation in life activity and future profession;
	Practical: 3 semester Development and improvement of physical qualities by means of OFP. The development and improvement of overall endurance. Development and improvement of speed endurance. Development and improvement of power endurance. Development and improvement of speed-strength qualities. Development and improvement of strength. Development and improvement of flexibility and mobility in joints. Development and improvement of dexterity and coordination of movements. Modern wellness systems. Respiratory gymnastics A. Strelnikova, K. Buteyko. Fitness. Relaxation gymnastics. Assessment of physical development: Running 100m; long jump from the spot; press girls; pulling up on the crossbar - boys. Cross: boys - 2000m, girls - 1000m. Cooper's test.
study / examination results forms of control:	Current control: tests of physical fitness The final control is differential / offset.
technical training tools:	Handouts

Module name:	M11 Higher Mathematics 2
module level as needed:	Bachelor's programme
reduction as needed:	HM2
subtitle as needed:	
type of employment as needed:	Lectures, Practical classes
semester:	2 semester
the responsible person for the module:	"Higher mathematics and physics for technical specialties" Department
lecturer :	Жунисбекова Дана Алхановна
language:	Russian, Kazakh, English
relation with curriculum:	General education, a required component
form of training / weekly academic load in a semester:	Full-time / Lectures - 2hours, Practical classes - 1hour, LIW-3,33hours; LIWT -1hour, Total labor intensity - 7.33 hours.
study load:	Lectures-30hours; Practical classes -15 hours; current LIW-50 hours; intermediate LIW-10hours; LIWT -15 hours, The Total labor intensity-120 hours.
credit scores:	3 ECTS credits
prerequisites for accordance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
recommended prerequisites:	Higher Mathematics 1
Module Objectives / expected results of study:	After completing the module, students should be able to: - know the differential and integral calculus a function of several variables, the elements of probability theory, mathematical statistics; - find partial derivatives function of two variables, the formulas of the theory of probability and mathematical statistics. - to argue the best solution to the problem. - solve typical mathematical problems; - to acquire new knowledge, using the basic concepts of mathematics and independently studying educational literatures in mathematics and its applications.
content:	Lectures. The function of several variables. Differential equations. Double and triple integrals. Numerical and functional series. Elements of probability theory and mathematical statistics. Practical work: Partial derivatives and differentials. Derivative of a complex function. Gradient. Derivative in direction. Extremum function of two variables. Double integral. Calculation of double integral in decort and polar coordinates. Triple integral and its calculation in decort coordinates. Some applications of multiple integrals. Equations with split variables and homogeneous differential equations. Differential warrants of higher orders that allow lowering of order. Linear inhomogeneous differential equations of higher orders with constant coefficients. Various signs of convergence of numerical series. Functional series. Tasks to find the region of convergence of a functional series. Signs of dalamber. Radical and integral signs. Cauchy. But alternating series. Step rows. Abelian theorem. Taylor and Macleroon series. Expansions of

	elementary functions in a Makleron series. Application of series and approximate calculations
study / examination results forms of control:	Current control: making reports, compiling a glossary, role-playing game, essay, presentation. Final control - exam.
technical training tools:	Handouts, interactive whiteboard, modern computers
literature:	1. Oxford University Press, 2003. - 356 p. 2. Zhunisbekova D.A. Mathematical analysis. - Shymkent: M. Auezov SKSU, 2014. 3. Written D.T. Summary of lectures on probability theory, mathematical statistics and random processes. - M .: Iris-press, 2007. - 288 p. 4. Bernd Sturmfels. Algorithms in invariant Theory. - Germany, 2008. 5. M. Sinha. Mathematical Programming: Theory and Methods. - USA, 2006.

Module name:	**M12.2** Probability theory and mathematical statistics
module level as needed:	Bachelor's programme
reduction as needed:	HM2
subtitle as needed:	
type of employment as needed:	Lectures, Practical classes
semester:	2 semester
the responsible person for the module:	"Higher mathematics and physics for technical specialties" Department
lecturer :	Жунисбекова Дана Алхановна
language:	Russian, Kazakh, English
relation with curriculum:	General education, a required component
form of training / weekly academic load in a semester:	Full-time / Lectures - 2hours, Practical classes - 1hour, LIW-3,33hours; LIWT -1hour, Total labor intensity - 7.33 hours.
study load:	Lectures-30hours; Practical classes -15 hours; current LIW-50 hours; intermediate LIW-10hours; LIWT -15 hours, The Total labor intensity-120 hours.
credit scores:	3 ECTS credits
prerequisites for accordance with the examination:	Rating on the results of the current control is not less than 25 points
Module Objectives / expected results of study:	. -To master the basic concepts, laws and theories of mathematics included in the theoretical material of the discipline; -Have a deep knowledge of basic mathematical disciplines and show a high degree of understanding, namely, must know and be able to use; -To acquire practical skills in solving engineering problems, in using the achievements of fundamental science for the successful study of General theoretical and special engineering disciplines, as well as for the development of mathematical thinking and logic for use in chemistry, physics, descriptive geometry.

: content:	**Lectures.** Classical definition of probability. Elements of combinatorics. Theorems of addition and multiplication of probabilities. Conditional probability. Bayes formula. Repetition of tests. Bernoulli's Formula. Local and integral Laplace theorem. Random variable. Numerical characteristics of random variables. Law of averages. Chebyshev's Theorem. Correlation coefficient. Definition of the confidence integral. Selective regression. **Practical class.** 1. Classical definition of probability, statistical probability, geometric probability. Probability. Properties of probability. 2. The theorem of addition of probabilities. The theorem of multiplication of probabilities. 3. Repetition of tests. The Formula Of Bernoulli 4. Types of random variables. The law of probability distribution of a discrete random variable. 5.Mathematical expectation and dispersion of discrete and continuous random variables. 6. Normal distribution. Application of the law of normal distribution. 7. Uniform distribution. Exponential distribution. Student Distribution. 8. Law of averages. chebyshev inequality. 9. General and sample population. Statistical distribution of the sample. Polygon and histogram. 10. Statistical estimates of distribution parameters. Evaluation of the General average, sample average. 11. Point estimates of the distribution parameters, the method of moments, the maximum likelihood method. 12. Confidence intervals of normal distribution for expectation, variance, and other unknown parameters 13. Statistical hypothesis testing. $\chi 2$ criterion and its application to the verification of hypothesis about type of distribution. 14. Sample regression equations. Determination of linear and nonlinear regression parameters by the least squares method.
Technical teaching aids:	Exam
Literature:	Ashirbaev, H. A. Zhogary mathematics : oku kuraly / H. A. ashirbaev. - Shymkent : OMU. – 2014. 1-bolim. - 536 p. Ashirbaev, H. A. Zhogary mathematics : oku kuraly / H. A. ashirbaev. - Shymkent : OMU. - 2014 2-bolim. - 512 p. Danko, P. E. Higher mathematics in exercises and problems : in 2 hours : textbook for universities / P. E. Danko, A. G. Popov, T. Ya. Kozhevnikova. - 6th ed. - M. : Onyx. - 2007H.1. . - 304 p. [In Russian] Danko, P. E. Higher mathematics in exercises and problems : in 2 hours : textbook for universities / P. E. Danko, A. G. Popov, T. Ya. Kozhevnikova. - 6th ed. - M. : Onyx. - 2007H.1. . - 304 p. [In Russian] Shipachev V. S. the higher mathematics : Textbook for stud. universities; Recommended NMS of the Ministry of education and science of the Russian Federation / V. S.

	Shipachev ; ed. Tikhonov. - M. : Onyx, 2009. - 608 p. [In Russian] Zhunisbekova D.A. Conspectus of lectures on the discipline «Mathematics» of specialty of specialty 5B070100 – Biotechnology / D. A. Zhunisbekova. - Shymkent : SKSU named after M. Auezov , 2014 o=эл. опт. диск (CD-ROM)

Module name:	**M13 Physics**
Module level as required:	Bachelor's programme
Abbreviation as required:	Phys 1
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes, practical classes
Training semester:	3 semester:
Person responsible for the module:	Department of Higher Mathematics and Physics for Technical Specialties
Teacher:	master, senior lecturer Pazylova Dana Temirbekova; master, senior lecturer of Zhanabekova Rahya
Language:	Kazakh, Russian, English
Connection with curriculum:	Basic discipline, mandatory component
Form of teaching / weekly training load in a semester:	Full-time / Lectures – 1h., laboratory classes – 1h., practical classes – 1h., SIW – 3.33h, SIWT - 1h. Total labor intensity – 7.33hours
Training load:	Lectures-15 hours.; laboratory -15; practical -15 hours.; LIW-50 hours; intermediate LIW-10hours; LIWT -15 hours, The Total labor intensity-120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After students complete the course, they should be able to: - know and understand the basic physical phenomena and laws of mechanics, molecular physics, thermodynamics, electrostatics, direct current, magnetism, electromagnetism and optics, quantum, atomic and nuclear physics; - analyze the physical situation and solve typical problems in physics; - to carry out the synthesis, synthesis and interpretation of the results of experimental research; - apply knowledge of the laws of physics to study special disciplines; - assess the degree of reliability of experimental research results.
Content:	**Lectures**: Kinematics and dynamics of a material point. Rigid body dynamics. Laws of conservation in mechanics. Elements of continuum mechanics. Mechanical vibrations and waves. Molecular physics. Fundamentals of thermodynamics. Transfer phenomena. Real gas. Electrostatics. Constant electric current. Magnetic field in vacuum and matter. The phenomenon of electromagnetic induction. Maxwell equation. Electromagnetic oscillations and waves. The concept of beam (geometric) optics. Interference of light. Diffraction of light.

	Electromagnetic waves in matter. Quantum physics. Thermal radiation. Photoeffect. Compton effect. Wave-particle dualism. Elements of nuclear physics. Elements of quantum electronics. Condensed state. **Laboratory**: Mathematical processing of the results of indirect measurements. Study of the laws of rotational motion on the Oberbeck pendulum. Determination of the viscosity coefficient of the liquid by Stokes method. Study of phenomena caused by diffraction. Study of light dispersion. The study of the polarization of the light. **Practical**: Kinematics and dynamics of the material point. Kinematics of rotational motion. Rigid body dynamics. Laws of conservation in mechanics. Elements of continuum mechanics. Mechanical vibrations and waves. Molecular physics. Thermodynamics. Electrostatics. Electric intensity. Constant electric current. Magnetic field in vacuum and in substance. The phenomenon of electromagnetic induction. Electromagnetic oscillation. Electromagnetic waves. Geometrical optics. Interference and diffraction of light. Electromagnetic waves in matter. Thermal radiation. Photoeffect. Compton effect. Wave-particle dualism. Atomic nucleus. Radioactive transformations of atomic nuclei.
Learning / examination outcomes / control forms:	Current control: protection of laboratory work; colloquiums, written tests; written and oral surveys. Final control – exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1. Detlef A. A. Physics Course. – Moscow: ACADEMY, 2008. – 720 p. 2. Trofimova T. I. Course of physics: theory, problems and solutions. – Moscow: ACADEMY, 2014. – 250C. 3. Irodov I. E. problems on General physics. – M.: Binom. Laboratory of knowledge 2007, – 416 p. 4. Trofimova T. I. Collection of problems in the course of physics for universities. – M.: Onyx, 2015. – 384 p. 5. Christoph Schiller. Mountain movement. The adventure of physics.Thom.Second. Relativities. 2012. 546p.

Module name:	**M14.1 Objects of biotechnology**
Module level as required:	Bachelor's programme
Abbreviation as required:	OB
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	2 semester
Person responsible for the module:	Narymbayeva Z.K.
Teacher:	Candidate of Chemical Sciences, Associate professor,
Language:	Kazakh, Russian, English
Connection with curriculum:	Profile discipline, optional component
Form of teaching / weekly training load in a semester:	Full time / Lectures – 1h., laboratory classes – 1h., SIW – 3h., SIWT – 0.5h., Total labor coefficient – 5.5 hours
Training load:	Lectures – 15h., laboratory classes – 15h., LIW-45 hours; intermediate LIW-7.5hours; LIWT -7.5 hours, The Total labor intensity-90 hours.

Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Inorganic and analytic chemistry
Module objectives / planned learning outcomes:	After completion of the module, students should be able to: - know features of structural and functional organization of organisms – biological objects that produce the main practically significant cellular metabolites; - cultivate *in vitro* plant and animal cells; - explain principles of selection of biological objects for their use in industrial production; - tell about technological methods of obtaining modified biological objects in order to give them new properties and / or abilities to produce new substances; - use the knowledge gained to improve the level of theoretical training and be able to apply them in practice.
Content:	***Lectures.*** Levels of organization of living systems: Basic properties of living nature. Microorganisms, plants and animals as objects of biotechnology. Biological objects used in biotechnology. Functions of biological objects. Cultures of cells, tissues and organs of plants and animals. Culture of tissues and organs of plants and animals as objects of biotechnology. Typical technological methods and features of cultivation of microorganisms, cells and tissues of plants, animals and humans. Culture media for cultivation of cells. Main sources of carbon, macro- and microelements. Subcellular structures as biological objects. Immobilized biological objects. Features of obtaining immobilized biological objects and their application in biotechnology. ***Laboratory works.*** Preparation of microbiological preparations. Technique of microscopy. Structure of bacterial cell. Gram's stain. Study of morphological features of yeasts. Study of morphological features of filamentous fungi. Actinomycetes. Phototrophic microorganisms. Methods for storing production strains. Methods for sterilization of plant explants. Obtaining of calli from immature wheat germs. Obtaining of calli from the roots of beans. Objects used in animal biotechnology. Biological essence of reproductive apparatus of animals. Embryo transfer methods. Acquaintance with device, equipment, functioning of item of artificial insemination of animals.
Learning / examination outcomes / control forms:	Current control: successful implementation and defense of laboratory works with written report, tasks of SIW and midterm control. Final control: exam.
Technical teaching aids:	Interactive board, electronic microscope EM-14, handouts.
Literature:	1. Netrusov A.I., Kotova I.B. Microbiology. – M.: Publishing center "Academy", 2012. 2. Shigayeva M.Kh., Tszyu V.L. General microbiology. – Almaty. Publishing house "Kazakh University", 2008. – 320 p. 3. Parshina G.N., Nesterova S.G. Plant biodiversity. – Almaty. 2006. – 316 p. 4. Lotova L.I. Botanics: morphology and anatomy of plants. – M.: Publishing house "Komkniga", 2007. – 510 p.

	5. Netrusov A.I. Introduction to biotechnology. – M.: "Academy", 2014. 6. Klunova S.M., Yegorova T.A. Zhivukhtna Ye.A. Biotechnology. – M.: 2010. 7. Freshni R.Ya. Culture of animal cells. Practical guide. – M.: 2014. 8. Biyashev K.B. Fundamentals of biotechnology: textbook for students of "Biotechnology" specialty / K.B. Biyashev, Zh.K. Tulemisova. – Almaty: Evero, 2015. – 192 p. 9. Yessimova A.M., Narymbayeva Z.K.: Virtual laboratory work. Preparation of culture medium / A.M. Yessimova, Z.K. Narymbayeva. – 2013. 10. Yegorova T.A. Fundamentals of biotechnology: Teaching aid. – M.: Publishing center "Academy", 2006. – 208 p.

Module name:	**M14.2 General technology of the industry**
Module level as required:	Bachelor's programme
Abbreviation as required:	GTI
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	2 semester
Person responsible for the module:	Kedelbaev B. Sh.
Teacher:	Doctor of technical Sciences, Professor
Language:	Russian, Kazakh
Connection with curriculum:	Profile discipline, component of choice
Form of teaching / weekly training load in a semester:	Full time / Lectures – 1h., laboratory classes – 1h., SIW – 3h., SIWT – 0.5h., Total labor coefficient – 5.5 hours
Training load:	Lectures – 15h., laboratory classes – 15h., LIW-45 hours; intermediate LIW-7.5hours; LIWT -7.5 hours, The Total labor intensity-90 hours.
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Basics of biotechnology, General and molecular genetics, Industrial biotechnology, Instruments and methods of research of biological systems.
Module objectives / planned learning outcomes:	After completing the module, the student is able to: -know the possibilities of use of microorganisms and a variety of enzymatic reactions that underlie bioprospect; - possess the ability to select raw materials for biosynthesis, including non-scarce secondary products and waste products of a number of industries; - plan the organization of laboratory experiments and own methods of cultivation of microorganisms; - to have knowledge in the study of the stages of obtaining the final products of biotechnology industries.

Content:	**Lectures.** The importance of microorganisms as objects of biotechnological production. Originality and metabolic rate in microbial cells, examples (doubling time, the ability to synthesize secondary metabolites, the ability to regulate the rate of metabolic reactions). The use of different strains of microorganisms depending on the type of biological production. Characteristics of biotechnological production (food and fermentation production, engaged in the processing of agricultural raw materials, in which the use of microorganisms is limited to any stage of the technological cycle, and production, in which the cultivation of microorganisms is the main stage of the technological cycle). Classification of biotechnological production on technological grounds. The main stages and indicators of growth of microorganisms. Stages of development of biotechnological production – laboratory regulations (selection of strains, substrates, cultivation conditions, bioreactor design, methods of isolation and evaluation of the quality of the final product, technological scheme. **Laboratory classes:** Preparation of sowing material depending on the type of producer and the type of initial culture. Features of growth of microorganisms in conditions of periodic cultivation. Master the technique of preparation of nutrient media for the production of forage biopreparations "of Probattery" and "Biovit" in accordance with industry regulations. To study the processes of alcoholic and lactic fermentation.
Learning / examination outcomes / control forms:	Current control: the successful execution and defense of laboratory work with written report, assignments, tasks' SIW and midterm examination. Final control: exam.
Technical teaching aids:	Interactive whiteboard, electron microscope EM-14; handout.
Literature:	1. Netrusov A. I., Kotova I. B. Microbiology. – Moscow:Publishing center "Academy", 2012. [In Russian] 2. Shigaeva M. H., Ju V. L. General Microbiology. – Almaty. Cossack University publ., 2008. – 320 p. 3. Parshina G. N., Nesterova S. G. plant Biodiversity. – Almaty. 2006. – 316 p. 4. Lotova L. I. Botany:morphology and anatomy of plants. – M.:publishing house "Kamminga", 2007. – 510 p. [In Russian] 5. Netrusov A. I. Introduction to biotechnology. – M.: "Academy", 2014. [In Russian] 6. Klonowa S. M., Egorova T. A., E. A. Sivukhina Biotechnology. – Moscow: , 2010 [In Russian] 7. Freshney R. Ya. Culture of animal cells. Practical guide. – M.:, 2014. [In Russian] 8. Biyashev K. B. Fundamentals of biotechnology:textbook for students spec. Biotechnology / K. B. Byashev, J. K. Tulemisova. - Almaty :Evero, 2015.-192 p. 9. Esimova A. M., Z. K. Narymbaev: Virtual laboratory work Preparation of the nutrient medium/ A. M. esimova , Z. K. Narymbaev. – 2013. 10. Egorova, T. A. Fundamentals of biotechnology: Proc.benefit.- Moscow: Publishing center "Academy", 2006.- 208 p. [In Russian]

Module name:	**M15 Introduction to the specialty**
Module level as required:	Bachelor's programme
Abbreviation as required:	ITTS
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	2 semester
Person responsible for the module:	Balkhibekov R.M., Rysbaeva G.A.
Teacher:	Master of Biotechnology, ст. преп.; к.б.н., lecturer
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, mandatory component
Form of teaching / weekly training load in a semester:	Intramural / lectures – 2, Practical classes -1h SIW – 3h., SIWT – 0.5h., Total labor coefficient – 5.5 hours
Training load:	Lectures – 30h., Practical classes – 15h., LIW-50 hours; intermediate LIW-10hours; LIWT -15 hours, The Total labor intensity-120 hours.
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Inorganic and analytical chemistry
Module objectives / planned learning outcomes:	After concluding the study module the student is ready to: - know the fundamentals, modern achievements, and problems in the field of biotechnology; - determine the main directions of solving problems of biotechnology; - know the features of technology for producing products using microbiological synthesis; - apply existing knowledge about the organization of environmental control in the conditions of biotechnological production; - to establish the relationship between the improvement of biotechnological production, improving the quality of the products obtained with the official regulatory documentation that guarantees the quality of the products.

Content:	***Lectures.*** Introduction to biotechnology. Brief historical background. The current state and prospects of development of biotechnological production of target products. Economic and commercial features of biotechnology. Achievements of biotechnology in molecular biology, medicine, pharmacy, veterinary medicine, food industry, energy industry, metallurgy and etc. Environmental monitoring with microorganisms. Waste-free technology and prospects for its implementation. The tasks of biotechnology. The main directions of their decision. The link between improving the biotechnological production, improving the quality of the products obtained with the official regulatory documentation that guarantees the quality of the products. Commodity forms of drugs biotechnological production. Ecological aspects of biotechnological production. Characteristic features of biotechnological production, the main types of waste generated, their quantity, pollution, potential danger to the environment. The organization of environmental control in the conditions of biotechnological production: the efficiency of disposal of hazardous waste, a stable long-term active state in the external environment, environmental safety, etc.
Learning / examination outcomes / control forms:	Current control: the successful implementation and protection of the tasks of the ISW and the mid-term control. Final control: exam
Technical teaching aids:	Interactive board, Internet, handout
Literature:	1.Bekker, M.E. Introduction to biotechnology / M.E. Bekker. - M.: Book on Demand, 2012. - 115 p. 2. Biotechnology / Edited by E.S. Voronin. - M .: Giord, 2010. - 704 p. 3. Biotechnology rational use of hydrobionts. - M .: Lan,2013. - 416 p. 4. Biotechnology. Theory and practice / N.V. Zagoskina and others - M .: Onyx,2015. - 496 p. 5. Biotechnology: A Problem Approach by Pranav Kumar, Pathfinder Publication a unit of Pathfinder Academy Pvt. Ltd; 4th edition (1 January 2015), ISBN-10: 9380473001

Module name:	**Training practice**
Module level as required:	Bachelor's programme
Abbreviation as required:	training programme
Subtitle as required:	
Lesson type as required:	
Training semester:	2 semester
Person responsible for the module:	Department of «Biotechnology»
Teacher:	Candidate of biological Sciences, associate Professor Abildaeva R. A.
Language:	Kazakh, Russian
Connection with curriculum:	additional types of training
Form of teaching / weekly training load in a semester:	
Training load:	Total labor intensity
Credit points:	1 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points

Recommended prior knowledge:	Objects of biotechnology, Introduction to the specialty
Module objectives / planned learning outcomes:	Once students have passed the training practice, they are able to: - to present the structure of the studied objects of practice; - describe methods of analysis and used analytical instruments for research in laboratories and IRLIP SAPA and the Department of "Biotechnology"; -work in the microbiological and biochemical laboratory: observe safety precautions when working in the laboratory, working in the box; - to apply the basic methods of research of biotechnological objects and biotechnological products; - to draw up the results of acquaintance with the work of laboratories and with the studied technology; - prepare a report and report on the results of the training practice to the Commission and the head of the practice.
Content:	Introduction to the specialty. Familiarization with the safety requirements in the laboratory, laboratory utensils, chemical reagents, equipment, chemical utensils. Familiarization with the basic methods used for physical and chemical analyses. An introduction to the structure and scientific work of the Department "Biotechnology", analytical research and testing laboratories of the University of SAPA and IRLIP and test methods. Registration and protection of the report on educational practice.
Learning / examination outcomes / control forms:	Current control –safety instruction, survey on familiarization with the objects of practical training. Final control – protection of the practice report.
Technical teaching aids:	Interactive whiteboard, modern computers
Literature:	1. The working program of the training practice for specialty 5B070100 "Biotechnology" / compilers L. P. Ivleva, S. N. Derbush, B. M. Salimbaeva. Karaganda: Publishing house Kargtu, 2010. -9 p. [Kazakh] 2. Biotechnology: a textbook / S. N. Orekhov, I. I. Chakalova; under the editorship of A.V. Katlinsky, the First Mosk. state honey. UN-t im. I. M. Sechenov. - 2nd ed., erased. - Moscow: Academy, 2016. - 281c. - ISBN 978-5-4468-3442-6 [Russian] 3. Fundamentals of biotechnology: biotechnology of higher and lower plants: textbook / S. K. Turasheva; M-in education and science of Kazakhstan, KazNU. al-Farabi. -Almaty: Kazakh University, 2016. - 270 p. - ISBN 978-601-04-2014-4 [Kazakh] 4. Essentials of laboratory techniques in biotechnology, Eureka Publication - Pune; First edition (2018) - by Dr. Sunita Panchawat, Dr. Abhishek Mathur – 208 p. ISBN-10: 8193749677 [English]

Module name:	M16 Philosophy
Module level as required:	Bachelor’s programme
Abbreviation as required:	Phil
Subtitle as required:	
Lesson type as required:	Lectures, seminars (practical)
Training semester:	3 semester:
Person responsible for the module:	Department of Philosophy and Cultural Studies
Teacher:	Ph.D., Associate Professor Ibraeva N.A.
Language:	Kazakh, Russian, English
Connection with	General education, a required component

curriculum:	
Form of teaching / weekly training load in a semester:	Intramural / lectures – 2, Practical classes -2h SIW – 3.66h., SIWT – 1.5h., Total labor coefficient – 9.16 hours
Training load:	Lectures – 30h., Practical classes – 30h., LIW-55 hours; intermediate LIW-12.5hours; LIWT -22.5 hours, The Total labor intensity-150 hours.
Credit points:	5 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
Recommended prior knowledge:	Modern history of Kazakhstan, Introduction to the specialty
Module objectives / planned learning outcomes:	After students complete the course, they should be able to: - to know the place and the role of philosophy in the life of society and man, the main stages in the development of world and Kazakh philosophical thought. - use the provisions and categories of philosophy to evaluate and analyze various social trends and facts. - analyze the features of the genesis and development of philosophical knowledge - work in a team, competently build communication, based on the goals and situations of communication - possess skills in conducting philosophical dialogue and controversy on environmental issues.
Content:	Lectures: The history of philosophical thought. The main problems, concepts and categories of philosophy. Classical and neoclassical philosophy. Dialectics and synergetic, possibilities and limits of knowledge. Philosophical anthropology. Social philosophy. Philosophical understanding of the global challenges of our time. The concept of philosophical knowledge. The ratio of philosophy and private sciences. Philosophy of the Ancient East. Ancient philosophy. The philosophy of the Middle Ages, East and West. Philosophy of the Renaissance. The philosophy of the New time. Seminars: The concept of philosophical knowledge. The ratio of philosophy and private sciences. Philosophy of the Ancient East. Ancient philosophy. The philosophy of the Middle Ages, East and West. Philosophy of the Renaissance. The philosophy of the New time. Classical German philosophy: Kant's ethics. The logic of Hegel. Anthropological materialism of Feuerbach. Western European philosophy of the late 17th - early 21st centuries. Kazakh philosophy: history and modernity. The concept of "being" and "consciousness". Dialectics and synergy. The doctrine of knowledge. Specificity of scientific knowledge. Philosophy of global problems.
Learning / examination outcomes / control forms:	Current control: reports on individual studies of modern methods of pre-scientific, scientific and extra-scientific knowledge with a collective discussion; practical discussions on the realities of modern theory and practice; presentations of scientific reports, abstracts, oral surveys. Final control - exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1. Canke V.A. Philosophy. Historical and systematic course: Textbook / 2nd edition.- Moscow .: Logos, 2001. - 344c. 2. Spirkin A.G. Philosophy: a textbook for high schools. - Moscow: Gadariki, 2005. - 736 p. 3. Baitenov N.Zh.Filosofiya: textbook. Almaty .: KazNU, 2006. -390s. 4. Myrzaly. S.K. Philosophy. Textbook. Almaty .: Evero, 2011. - 240 p. (in kaz language) 5. Esirkepova G. Philosophy. Textbook. Shymkent .: SKSU named after

	M.Auezov, 2017. - 120 p. (in kaz language)

Module name:	**M 17** Physical Training
Module level as required:	Bachelor's programme
Abbreviation as required:	PhT
Subtitle as required:	
Lesson type as required:	Practical
Training semester:	3 semester
Person responsible for the module:	Department "Physical Education for Technical Specialties"
Teacher:	Stolyarova O.S. senior teacher
Language:	Russian
Connection with curriculum:	General education, a required component
Form of teaching / weekly training load in a semester:	Full time / Practical classes – 2h.,
Training load:	Practical -60 hours.; Total workload – 60 hours
Credit points:	2 ECTS-credits
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After completing the module, students should be able to: - use the means of physical culture and sports to increase their functional and motor abilities to achieve professional goals; - to possess the means of independent, methodically correct use of methods of physical education and health promotion; - possess special applied psycho-physical qualities for successful implementation in life activity and future profession;
Content:	Practical: Improving professional-applied physical qualities. Education endurance with game sports. Fostering speed-strength qualities with the help of circular training exercises. Fostering speed with the help of relay races, elements of mobile and sports games. Education of strength with the help of exercises with the weight of the partner and with his opposition, with the resistance of elastic objects (expanders and rubber shock absorbers), with the burden of gymnastic equipment and simulators. Fostering flexibility and mobility in the joints with exercises to stretch the muscles, muscle tendons with increased amplitude of movements due to their own efforts, with the help of a partner or with a burden. Education of dexterity and coordination of exercises with the use of exercises with a quick rearrangement of motor activity in connection with changing external conditions (gymnastics, sports games, martial arts, etc.). Improvement of motor actions in sports. Special preparatory and summing up exercises to improve technical techniques in the chosen sport. Special preparatory and summing up exercises to improve the potential of competitive actions in the chosen sport. Improving resistance to fatigue,

	emotional manifestations by means of sports. Improvement of physical qualities by means of OFP Fostering speed-strength qualities with the help of circular training exercises. Fostering speed with the help of relay races, elements of mobile and sports games.
Learning / examination outcomes / control forms:	Current control: tests of physical fitness The final control is differential / offset.
Technical teaching aids:	Handouts
Literature:	1.Barchukov, I.S. Physical culture and sport: methodology, theory, practice: A manual for students. universities, training. on directions "Pedagogy"; UMO / I. S. Barchukov, A. A. Nesterov; under general ed. N.N. Malikov. - 2nd ed., Sr. - M.: Academy, 2009. - 528 p. - (Higher vocational education) (Russian) 2. Barshay V.M. Gymnastics: a textbook for students. universities enrolled on special. "Physical culture" / V. M. Barshai, V. N. Kurys, I. B. Pavlov. - 2nd ed., Pererab. and add. - Rostov n / D: Phoenix, 2011. - 330 p. : il. - (Higher education) (Russian) 3. Gymnastics: a textbook for students. universities, training. on spec. "Physical education"; UMO / M.L. Zhuravin [et al.]; ed. M.L. Zhuravina, N.K. Menshikov.-5th ed., Sr. - M.: Academy, 2009. - 448 p. - (Higher vocational education. Pedagogical specialties) (Russian) 4. Goloschapov, B.R. The history of physical culture and sports: a textbook for students. universities, training. on spec. "Physical education"; UMO / B.R. Goloschapov. - 5th ed., Rev. and add. - M.: Academy, 2009. - 320 p. - (Higher vocational education. Pedagogical specialties) (Russian) 5. Ilyinich, V.I. Student's physical culture and life: a textbook for students. universities studying the discipline "Physical Education"; Ministry of Defense of the Russian Federation / V.I. Ilinich. - M.: Gardariki, 2009. - 366 p. : il. 6.Makarova, G.A. Sports medicine: a textbook for stud. universities, training. on spec. "Physical Culture and sport"; State com RF on physical. culture and sport / G. A. Makarova. - 3rd ed., Sr. - M.: Soviet Sport, 2009. - 480 p. : il. (Russian)

Module name:	M18 Professional Kazakh (Russian) language
Module level as required:	Bachelor’s programme
Abbreviation as required:	PC (P) I
Subtitle as required:	
Lesson type as required:	Practical classes
Training semester:	3 semester:
Person responsible for the module:	Department "Practical Russian language for technical specialties"; Department "Learning the state language"
Teacher:	Candidate of Pedagogical Sciences, Associate Professor Esimkhanova Nagima Auelbekovna; Master, teacher Saylaubekov Azat Nurzhanuly
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, a required component

Form of teaching / weekly training load in a semester:	Full-time / practical classes - 2 hours. IWS - 3 hours, IWST – 0.5 hours., Total labor intensity – 5.5 hours
Training load:	Practical classes – 30h., LIW-45 hours; intermediate LIW-7.5hours; LIWT -7.5 hours, The Total labor intensity-90 hours.
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Inorganic chemistry, Kazakh (Russian) language, Introduction to the specialty, Integrated subject and language teaching
Module objectives / planned learning outcomes:	After completing the module, students should be able to: - know the terminological minimum; methods of analyzing texts in the specialty; constructing specialized texts; the various genres specifics of scientific style; -apply the basic techniques of processing the text in the specialty; language tools in accordance with the communication situation; -be able to generalize scientific information; -analyze the problems of the professional sphere; -to draw conclusions on the issues under consideration; -systematize information to form judgments; - master the basics of business and professional scientific communication; - to speak and conduct dialogues on the specialty; - have the skills of finding scientific information in Russian; use of scientific literature in the specialty; - independently produce secondary scientific texts;
Content:	Practical work: Introduction to the subject area of the specialty in a professional language. Theoretical foundations of chemical technology. Chemical Technology. The principle implementation of interconnected learning: the relationship of the Russian language with the disciplines of the HTEC specialty. History of formation and prerequisites for the formation of scientific special disciplines. Text - message as a form of presentation of information of scientific or factual content. Production of lower unsaturated hydrocarbons. General characteristics of the scientific style of speech as a specialty language cts. Professional terminology. Special vocabulary. Professional language, professional jargon: similarities and differences. The terms cTOV in popular science texts, especially their education in the Russian language. Production of vinyl chloride, styrene and phenol. The structure of research work on the specialty profile. Requirements for the content and design of scientific work. Characteristics of the content of the subject area in the specialty. General information from the chemistry of polymers. Abbreviations Types of abbreviations. Common abbreviations. Forms of text rubrication. Citation rules. Footnote design rules. Bibliography rules. Production of plastics and polyethylene. Table construction Spelling of headings and subheadings graph table. Feedback on the scientific work in the specialty. Production of polyvinyl chloride, polystyrene and phenol-formaldehyde resins.
Learning / examination outcomes / control forms:	Current control: making reports, compiling a glossary, role-playing game, essay, presentation. Final control - exam.
Technical teaching aids:	Handouts, interactive whiteboard, modern computers

Literature:	1. Ageeva A.Y., Kasarova V.G. Collection of tasks in the Russian language to the textbook. - M.: MADI, 2012. – 97p. 2. Abisheva Sh.S. Kazakh language (textbook for students of a continuous group of oil and gas specialties).Qazaq tili (munai-gaz mamandyqtarynyn jalgasturushy top studentterine arnalgan oqulyq). (in kazakh) Aktau, Sh. Esenov CSTIU, 2011. - 127 p. 3. Seydenova S.D., Almatova N.A. Professional Russian language. - Almaty: ATO, 2015. - 100 p. 4. Yaksylysova F.Z. In terms of style. Marquise style. - Shymkent: M. Auezov SKSU, 2007. - 10 p. 5. Kaliozova S.E., Anartaeva G.U., Lesbekova L.Zh. Russian Professionally spoken language. Tutorial. - Shymkent, 2009.

Module name:	M19 Professionally-oriented foreign language
Module level as required:	Bachelor's programme
Abbreviation as required:	POI
Subtitle as required:	
Lesson type as required:	Practical classes
Training semester:	5 semester
Person responsible for the module:	Department "Foreign languages for technical specialties"
Teacher:	Lecturer Makylbek A.B.
Language:	English
Connection with curriculum:	Basic discipline, a required component
Form of teaching / weekly training load in a semester:	Full-time / practical classes - 2h., IWS - 3h. IWST – 0.5h., Total complexity – 5.5 hours
Training load:	Practical classes -30 hours; LIW-45 hours; intermediate LIW-7.5hours; LIWT -7.5 hours, The Total labor intensity-90 hours.
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Inorganic chemistry, Foreign language - 2, Fundamentals of chemical technology
Module objectives / planned learning outcomes:	After students complete the course, they should be able to: - demonstrate communication skills and abilities, express in writing or verbally their ideas and fundamental professional knowledge; - apply the basics of public speaking (the ability to make scientific reports, abstracts, presentations); - to discuss in the group topics related to the specialty; - read and translate independently the scientific literature on general scientific and special issues using a dictionary; - independently develop and execute publications, theses, correspondence; - put into practice the main methods of commenting, summarizing and translating scientific literature.
Content:	Practical: English as the language of international communication, goals and objectives of the study. Distinctive features of the English language (lexical and grammatical and phonetic). Lexical translation difficulties. Development of terminology in the field of chemical engineering. Drafting sentences of different types. Negative transfer of structure and absolute participial movement. Assessment of semantic accuracy and functional adequacy of written scientific and technical translation. Editing after automatic translation. Features translation of

	scientific and technical literature. Requirements for the preparation of reports on educational research work in English. Dictionary of professional English. Development of practical skills of spoken English. Preparation of a personal resume (CV) in English; features of its structure.
Learning / examination outcomes / control forms:	Current control: successful mastering of scientific and technical vocabulary and special terminology, oral speech (monologue, dialogue, group discussion) special orientation, written and oral surveys, translations of scientific and technical texts, compilation of summaries, reviews, presentations, abstracts and literature reviews on professional topics. Final control - exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1. M.M.Eskandirova, A.A.Kadirbaeva. Terminological dictionary. Shymkent: M. Auezov SKSU, 2017. 39 p. 1. Tleuova A.B., Zhuldyzbayeva S.E., Seitmagzimova G.M., Dzhanmuldaeva Zh.K. Explanatory dictionary. Study guide. Shymkent: M.Auezov SKSU, 2017.-76 p. 3. Technical English. - Oxford University Press, 2013. 4. E.N. Khvostovtseva, N.A. Trofimova. English for technical specialties. Textbook / E.N. Khvostovtseva, N.A. Trofimova.-Tomsk: Tomsk Arch. Publishing House publishing house, 2015.-92 p. 5. O'Sullivan D., Swan M. The New Cambridge English course.-Cambridge University Press, 2010.-128p.

Module name:	**M20.1 Physics 2**
Module level as required:	Bachelor's programme
Abbreviation as required:	Phys 2
Subtitle as required:	
Lesson type as required:	Lectures, practica classes3l
Training semester:	3 semester
Person responsible for the module:	Department "Higher mathematics and physics for technical specialties»
Teacher:	master, senior lecturer Pazylova Dana Temirbekova; master, senior lecturer of Zhanabekova Rahya
Language:	Kazakh, Russian, English
Connection with curriculum:	Basic discipline, elective component
Form of teaching / weekly training load in a semester:	Full-time / Lectures – 1h., practical classes – 1h., SIW – 3h, SIWT – 0.5h., Total labor intensity – 5.5 hours
Training load:	Lectures-15 hours.; practical-15 hours.; LIW-45 hours; intermediate LIW-7.5hours; LIWT -7.5 hours, The Total labor intensity-90 hours.
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Higher mathematics, Physics 1
Module objectives / planned learning outcomes:	Once students have completed this course, they should: - to demonstrate knowledge and understanding of the basic physical phenomena and laws of electromagnetism and optics, quantum, atomic and nuclear physics; - apply knowledge and understanding of the basic physical phenomena and laws of electromagnetism and optics, quantum, atomic and nuclear physics in practice;

	- analyze the physical situation and solve typical problems in physics. - use information technology, periodicals and other sources to find and collect the necessary information in solving professional problems.
Content:	Lectures: Theory of electromagnetism. Environmental and economic problems of physics: electromagnetic oscillations and waves. The role of geometric optics in the development of technology and production. Wave optics: theory, practice, experiment. The laws of light propagation in matter. Problems and laws of thermal radiation. The photoelectric effect and its application in practice. Experimental confirmation of quantum theory. Wave-particle dualism. Elements of nuclear physics. Elements of quantum electronics. Condensed state. Modern physical picture of the world. Practical: the use of knowledge about magnetic phenomena in engineering and manufacturing. Application of knowledge on the theory of electromagnetism in engineering and manufacturing. Electromagnetic oscillations and waves: environmental and economic problems. The role of the laws of geometric optics in the development of technology. The practical application of the knowledge about the interference of light. Practical application knowledge of diffraction of light. The laws of light propagation in matter. Laws and problems of thermal radiation. Elements of nuclear physics. Radioactive transformations of atomic nuclei. The method of dimensions and its application.
Learning / examination outcomes / control forms:	Ongoing monitoring: successful implementation of the case study; colloquiums, written tests; written and oral interviews.
Technical teaching aids:	Final control – exam.
Literature:	1. Detlef A. A. Physics Course. – Moscow: ACADEMY, 2008. – 720 p. 2. Trofimova T. I. Course of physics: theory, problems and solutions. – Moscow: ACADEMY, 2014. – 250C. 3. Irodov I. E. problems on General physics. – M.: Binom. Laboratory of knowledge 2007, – 416 p. 4. Trofimova T. I. Collection of problems in the course of physics for universities. – M.: Onyx, 2015. – 384 p. 5. Christoph Schiller. Mountain movement. The adventure of physics.Thom.Second. Relativities. 2012. 546p.

Module name:	M20.2 Basics of quantum mechanics
module level as needed:	Bachelor's programme
reduction as needed:	BQM 2
subtitle as needed:	
type of employment as needed:	Lectures, practical work
semester:	3 semester:
the responsible person for the module:	"Higher mathematics and physics for technical specialties" Department
lecturer :	Ortaeva K.T., PhD , Associate professor
language:	Kazakh, Russian, English
relation with curriculum:	Basic discipline, a required component
form of training / weekly academic load in a semester:	Full-time / Lectures - 1hour, Practical work - 1hour, Current LIW-3hours; LIWT -0.5hour,Total labor intensity - 5.5 hours.
study load:	Lectures - 15 hours; practical work- 15 hours; current LIW-45hours; intermediate LIW-7,5 hours; LIWT -7.5hours.Total labor intensity-90 hours.

credit scores:	3 ECTS credits
prerequisites for accordance with the examination requirements:	Rating according to the results of intermediate and midterm control not lower than 30 points
recommended prerequisites:	Higher Mathematics, Physics 1, Introduction to the specialty
Module Objectives / expected results of study:	After students complete this course, they must: -sante experimental and mathematical foundations and the basic principles of quantum mechanics, the Schrödinger equation as the basic equation of quantum mechanics and properties of its solutions; -to apply the Schrödinger equation to study the properties of the simplest microsystems; - possess the mathematical apparatus of quantum mechanics for the presentation of theoretical material and problem solving.
content:	Lectures. Experimental foundations of quantum mechanics. Atom models. the onion properties of microparticles. One-dimensional quantum mechanical problems. Linear harmonic oscillator, its energy spectrum and wave functions. The passage of a particle through a potential barrier of rectangular and arbitrary shape. Mathematical apparatus of quantum mechanics. The movement of microparticles in a centrally symmetric field. Fundamentals of the theory of representations. Matrix representation of operators. Schrödinger equation in matrix form. Stationary perturbation theory. Elements of radiation theory. Electron spin Quantum mechanics of systems consisting of identical particles. Practical work. One-dimensional quantum mechanical problems. A particle in a rectangular potential well. The problem of a particle in a potential box. The problem of harmonic oscillator. One-dimensional quantum mechanical problems. The tunnel effect problem. Mathematical apparatus of quantum mechanics. Quantum mechanical operators. The problem of a hydrogen-like atom.
study / examination results forms of control:	Current control: successful implementation of practical tasks; colloquiums, written examinations; written and oral surveys. Final control - exam.
technical training tools:	Interactive whiteboard, slides, handouts
literature:	1. Saveliev I.V. The course of general physics. - M.: Astrel, 2005. 2. Trofimova T.I. The course of physics: theory, problems and solutions. - M .: ACADEMIA, 2014. – 250p. 3. Irodov I.E. Problems in general physics. - M .: Binom. Laboratory of Knowledge, 2007. - 416 p. 4. Trofimova T.I. Collection of problems in the course of physics for universities. - M .: Onyx, 2015. - 384 p. 5. Cristoph Schiller. Motion mountain The adventure of physics.Vol.II. Relativity. 2012. 546p.

Module name:	**M21.1 Fundamentals of biotechnology**
Module level as required:	Bachelor's programme
Abbreviation as required:	FBt
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	3 semester
Person responsible for the module:	Narymbaeva Z.K., Saidullaeva L.N.
Teacher:	Master, senior lecturer
Language:	Kazakh, Russian
Connection with curriculum:	Relevant discipline, elective component
Form of teaching / weekly training load in a semester:	Internal / Lectures – 2h., laboratory classes – 3h., SIW -4h, SIWL – 2h. Total complexity - 11 hours
Training load:	Lectures - 30h., laboratory classes – 45h., SIW-60h, SIWL – 30h., Total complexity - 180 hours
Credit points:	6 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - freely describe and systematize the main technological processes and equipment used in biotechnology; - to understand the essence of biotechnological processes in the production of products; - to evaluate the quality of raw materials and finished products in terms of their enzymatic and microbiological processes; - to determine possible ways of biosynthesis of key intermediates and target products for selection of optimal biotechnological process; - to apply new methods and techniques in the development, production and circulation of biological products.
Content:	**Lectures.** The history of the development of biotechnology. The main stages of development of biotechnology. Connection of biotechnology with other biological and technical Sciences. Interdisciplinary connection of biotechnology. Features of biotechnological processes. Stages of biotechnological processes. Principles of implementation of biotechnological processes. Technical and economic feasibility of the availability of raw materials, manufacturability of industrial bio-projects. Types of plant and animal raw materials. The main technological features of obtaining various products from plant and animal raw materials. The main methods of creation and maintenance of aseptic cultivation of microorganisms, plant and animal cells. Features of sterilizing filtration in biotechnological processes. Typical technological methods and features of cultivation of microorganisms, cells and tissues of plants, animals and humans. The main sources of carbon, nitrogen, phosphorus, trace elements. Continuous, semi-continuous and periodic cultivation processes. Modes of thermal sterilization. Methods of sterilization of liquids, air, equipment. Methods of cellular engineering of plants and animals Methods of cloning medicinal plants, cloning valuable and

	endangered wild plant species. Culture of apical meristems. Methods of artificial insemination of plants, animals and humans. Methods of constructing producers: breeding, recombinant, post-fusional technology. Biotechnology techniques used in agriculture Immobilized cells and enzymes Typical schemes of processes obtaining biomass, amino acids, enzymes, antibiotics, back preparations, processing of organic waste, wastewater treatment Typical schemes of isolation, purification and testing of biologically active substances. Modification of target products. **Laboratory works.** Microflora of drinking water of biotechnological productions. Sanitary assessment of water on microbiological indicators. The effect of the different modes of sterilization to destruction of microorganisms. To study the effectiveness of sterilization regimes by physical and chemical methods. Isolation of microorganisms from food products and production of pure cultures. Development of methods for the isolation of pure culture of microorganisms. Obtaining of callus tissue in cell culture monocotyledonous and dicotyledonous plants on agar medium and its routine passage. Obtaining cell suspension from the callus culture of plants. Subcultivation cells and the analysis of the dynamics of growth of a suspension culture of plant cells. Nutrient media for the cultivation of somatic cell cultures in animal biotechnology. Familiarization with the technical equipment and methodological techniques used in cryopreservation of germ cells and embryos. Method of cryopreservation of mammalian sperm.
Learning / examination outcomes / control forms:	Current control: successful execution and protection of laboratory work with a written report, SIW tasks and mid-term control. Final control: exam.
Technical teaching aids:	Interactive whiteboard, electronic microscope, handout.
Literature:	1. Biyashev K.B. Fundamentals of biotechnology : a textbook for students of spec. "Biotechnology" / K. B. Biyashev, Zh. K. Tulemisova. - Almaty : Evero, 2015. - 192 p. [on Russian] 2. Sheveluha V.S., Agricultural biotechnology and bioengineering. 4th edition. M. Lenand, 2015. – 704 p. [on Russian] 3. Tihonov I.V., Ruban E.A., Gryazneva T.N. and oth..; Under the editorship of E. S. Voronin. Biotechnology: a textbook for high schools.: SPb: GIORD, 2010. 704 p. [on Russian] 4. Zagoskina N. In. Biotechnology: theory and practice: Manual for high schools. M.:Onyx Publishing House, 2009. – 496 p. [on Russian] 5. Introduction to Biotechnology (3rd Edition), Pearson; 3 edition (January 23, 2012) - by William J. Thieman, Michael A. Palladino – 416 p. ISBN-10: 0321766113

Module name:	**M21.2 Theoretical basis of biotechnological production**
Module level as required:	Bachelor's programme
Abbreviation as required:	TBBP
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	3 semester
Person responsible for the module:	Saparbekova A.A..
Teacher:	senior lecturer
Language:	Kazakh, Russian

Connection with curriculum:	Relevant discipline, elective component
Form of teaching / weekly training load in a semester:	Internal / Lectures – 2h., laboratory classes – 3h., SIW -4h, SIWL – 2h. Total complexity - 11 hours
Training load:	Lectures - 30h., laboratory classes – 45h., SIW-60h, SIWL – 30h., Total complexity - 180 hours
Credit points:	6 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry
Module objectives / planned learning outcomes	After studying the module, the student is able: - to apply in practice the basic terms and concepts related to biotechnology; - to demonstrate knowledge of the fundamental and theoretical foundations of biotechnology processes, taking into account the application of biotechnology products. - to study and use of general methods of biotechnology based on the theoretical information necessary to work in biotechnology and means of analysis of the biotechnological process. - to apply in practice knowledge of laboratory equipment used in biotechnology. - to make the standard scheme of biotechnological production and to carry out the analysis of raw materials and products of biotechnological production;
Content:	Lecture material contains: primary understanding of the basics of biotechnology industries; the main stages of biotechnology processes; basic principles of planning and research on biotechnology; application of biotechnology products. In laboratory classes, the student learns methodological techniques of working with cultures of microorganisms, animal and plant cells used in biotechnology production; determines the optimal mode of biotechnological processes; conducts a comprehensive analysis of raw materials and finished products.
Literature:	1.Theoretical foundations of biotechnology : studies. manual / E. A. Faust, O. S. Larionov, T. S. Aspen ; Saratov. GOS. Agrar. UN-t im. N. I. Vavilov. - Saratov : CeCAin, 2017. 102 PP. 2. Fundamentals of biotechnology: studies. manual / E. A. Kalashnikova, M. Yu. Cherednichenko ; ROS. GOS. Agrar. University - MTAA them. K. A. Timiryazev. - M. : publishing house of Russian state agrarian University - MTAA, 2016. - 185 p. 3. Introduction to biotechnology: textbook / A. I. Netrusov. - 2-e ed., erased. - Moscow : Academy, 2015. - 281 p.

Module name:	**M19** Professionally-oriented foreign language
Module level as required:	Bachelor's programme
Abbreviation as required:	POFL
Subtitle as required:	
Lesson type as required:	Practical class
Training semester:	3 semester
Person responsible for the module:	Department "Foreign languages for technical specialties»
Teacher:	Soinbaeva K
Language:	English
Connection with curriculum:	Basic discipline, required component

Form of teaching / weekly training load in a semester:	Internal / Practical class – 3 hours, SIW – 3.33 hours, SIWT – 1 hours, Total labor intensity – 7.33 hours.
Training load:	Practical class**:** -45 hours.; LIW-50 hours; LIW-10hours; LIWT - 15 hours, The Total labor intensity-120 hours.
Credit points:	4 ECTS -
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Inorganic chemistry, Foreign language - 2, Basics of chemical technology
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - demonstrate communication skills, Express ideas and fundamental professional knowledge in writing or orally; - apply the basics of public speaking (ability to make scientific reports, abstracts, presentations); - discuss topics related to the specialty in the group; - read and translate scientific literature on General scientific and special issues using the dictionary; - independently develop and execute publications, abstracts, correspondence; - to apply in practice the main ways of commenting, abstracting and translating scientific literature.
Content:	**Practical class:** Basics of interaction between living organisms and the environment. Biotechnological experiment. Modern methods and equipment used in biotechnology. Application of biotechnological processes for solving environmental problems. Cryopreservation of cells, tissues and organs and their use in medicine and animal husbandry. Biotesting as an integral element in the environmental safety assessment system. Biotechnology in agriculture. Equipment and nutrient media for working with cell cultures. Problems of safety of products of modern biotechnological production. Biotechnological processes in the food industry.
Learning / examination outcomes / control forms:	Current control: successful assimilation of scientific and technical vocabulary and special terminology, oral speech (monologue, dialogue, group discussion) of special orientation, written and oral surveys, translations of scientific and technical texts, preparation of summaries, reviews, presentations, abstracts and reviews of literature on professional topics. Final control – exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1 Colin Ratledge (Editor), BjomKristinsen (Editor). Basic biotechnology- second edition // Cambridge University Press; 3nd edition. – 2012. – PP. 6. Mascull B. Key Words in science and technology. 2005. 7.Gliek B.R., Pasternak J.J. Molecular biotechnology: Principles and applications of recombinant DNA // ASM Press. – 2009. – PP. 1000 8. Scott Freeman// Biological Science Volume 1 with Mastering Biology (4th Edition), 2010. 9.Gary Walsh. Proteins: Biochemistry and biotechnology //JahnWiley&Sons; 2nd edition. – 2002. – PP. 425. 10. R. Ian Freshney (Author). Culture of animal cells: A manual of basic technique, 4th edition // Wiley-Liss; 4th edition. – 2002.

	– PP. 600 11.Bernice M. Martin. Tissue culture techniques: an introduction // Birkhauser Boston; 1st edition. -1997.- Pp. 245 12.Richard A. Dixon (Editor), Rober A. Gonzales (Editor). Plant cell culture: a practical approach (The practical approach # 145) // IrlPr$ 2nd edition. – 1994. – PP. 230 13. Advances in botanical research : incorporating advances in plant pathology/ series editor J.A. Callow. – Amsterdam: Elsevier academic press. -2006 Vol. 43. 14. Advances in botanical research / series editor J.C. Kader, M. Delseny. – Amsterdam: Elsevier academic press. -2009 Vol. 43. 15. David K. What can nanotechnology learn from Biotechnology?: Social and ethical lesson for nanoscience from the debate over agrifood biotechnology and GMOs/ K.David, P.B. Thompson. - 2008 16. Ashraf M. Salinity and water stress: Improving crop efficiency/ M. Ashraft, M. Ozturk, H.R.Athar. - 2009 17. Application of cell immobilization biotechnology/ edited by V. Nedovic, R.Willaert. – Dordrecht: Springer. – 2005 Vol. 8B 18. Biology of microorganisms/ M.T. Madigan. 2009. 19. Katon S., Yoshida F. Biochemical engineering. A textbook for engineers, chemists and biologists. -2009.

Module name:	M 22.2 English in the professional field
Module level as required:	Bachelor's programme
Abbreviation as required:	
Subtitle as required:	Practical class
Lesson type as required:	3 semester
Training semester:	Department "Foreign languages for technical specialties»
Person responsible for the module:	Soinbaeva K
Teacher:	English
Language:	Basic discipline, required component
Connection with curriculum:	Internal / Practical class – 3 hours, SIW – 3.33 hours, SIWT – 1 hours, Total labor intensity – 7.33 hours.
Form of teaching / weekly training load in a semester:	Practical class**:** -45 hours.; LIW-50 hours; LIW-10hours; LIWT - 15 hours, The Total labor intensity-120 hours.
Training load:	4 ECTS -
Credit points:	Rating on the results of the current control is not less than 25 points
Prior knowledge for compliance with the examination requirements:	Inorganic chemistry, Foreign language - 2, Basics of chemical technology
Recommended prior knowledge:	After completing the module, the student is able to: - demonstrate communication skills, Express ideas and fundamental professional knowledge in writing or orally; - apply the basics of public speaking (ability to make scientific reports, abstracts, presentations); - discuss topics related to the specialty in the group; - read and translate scientific literature on General scientific and special issues using the dictionary; - independently develop and execute publications, abstracts, correspondence;

	- to apply in practice the main ways of commenting, abstracting and translating scientific literature.
Module objectives / planned learning outcomes:	Current control: successful assimilation of scientific and technical vocabulary and special terminology, oral speech (monologue, dialogue, group discussion) of special orientation, written and oral surveys, translations of scientific and technical texts, preparation of summaries, reviews, presentations, abstracts and reviews of literature on professional topics. Final control – exam.
Content:	Interactive whiteboard, slides, handouts
Learning / examination outcomes / control forms:	Current control: successful assimilation of scientific and technical vocabulary and special terminology, oral speech (monologue, dialogue, group discussion) of special orientation, written and oral surveys, translations of scientific and technical texts, preparation of summaries, reviews, presentations, abstracts and reviews of literature on professional topics. Final control – exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	Colin Ratledge (Editor), BjomKristinsen (Editor). Basic biotechnology- second edition // Cambridge University Press; 3nd edition. – 2012. – PP. 6. Mascull B. Key Words in science and technology. 2005. 7.Gliek B.R., Pasternak J.J. Molecular biotechnology: Principles and applications of recombinant DNA // ASM Press. – 2009. – PP. 1000 8. Scott Freeman// Biological Science Volume 1 with Mastering Biology (4th Edition), 2010. 9.Gary Walsh. Proteins: Biochemistry and biotechnology //JahnWiley&Sons; 2nd edition. – 2002. – PP. 425. 10. R. Ian Freshney (Author). Culture of animal cells: A manual of basic technique, 4th edition // Wiley-Liss; 4th edition. – 2002. – PP. 600 11.Bernice M. Martin. Tissue culture techniques: an introduction // Birkhauser Boston; 1st edition. -1997.- Pp. 245 12.Richard A. Dixon (Editor), Rober A. Gonzales (Editor). Plant cell culture: a practical approach (The practical approach # 145) // IrlPr$ 2nd edition. – 1994. – PP. 230 13. Advances in botanical research : incorporating advances in plant pathology/ series editor J.A. Callow. – Amsterdam: Elsevier academic press. -2006 Vol. 43. 14. Advances in botanical research / series editor J.C. Kader, M. Delseny. – Amsterdam: Elsevier academic press. -2009 Vol. 43. 15. David K. What can nanotechnology learn from Biotechnology?: Social and ethical lesson for nanoscience from the debate over agrifood biotechnology and GMOs/ K.David, P.B. Thompson. - 2008 16. Ashraf M. Salinity and water stress: Improving crop efficiency/ M. Ashraft, M. Ozturk, H.R.Athar. - 2009 17. Application of cell immobilization biotechnology/ edited by V. Nedovic, R.Willaert. – Dordrecht: Springer. – 2005 Vol. 8B 18. Biology of microorganisms/ M.T. Madigan. 2009. 19. Katon S., Yoshida F. Biochemical engineering. A textbook for engineers, chemists and biologists. -2009.

odule name:	**M23.1 Microbiological basis of biotechnological production**
Module level as required:	Bachelor's programme
Abbreviation as required:	MBBP
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	4 semester
Person responsible for the module:	Rysbaeva G. S.
Teacher:	Senior lecturer
Language:	Russian
Connection with curriculum:	Basic discipline, component of choice
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 2 hours, laboratory classes - 1 hours, SIW -3,33 hours, SIWT – 1 hours. Total complexity – 7,33 hours.
Training load:	Lectures - 30 hours, laboratory classes - 15 hours, LIW-10hours; LIWT -15 hours, The Total labor intensity-120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Basics of biotechnology, General and molecular genetics, Industrial biotechnology.
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - know the basic properties of producers and the requirements for them; - know the principles of cultivation, control and management of biotechnological processes; - to determine the methods of selection of industrial crops, equipment of the process, methods of obtaining finished products; - must acquire practical skills of working in aseptic conditions with cultures of microorganisms, to determine their purity; - to be able to prepare nutrient media, to grow sowing material; - independently determine the biomass and biological activity, the degree of absorption of nutrients. - evaluate the quality of raw materials, nutrient media, intermediates and target products;
Content:	***Lectures.*** The role of biotechnology in modern biotechnology. Definition concepts of biotechnology.. Brief historical background on the development of biotechnology in the world. Substances used for biotechnology. Biosynthesis of biologically active substances (BAS) in the conditions of biotechnological production (generalities). (общие положения). Necessary conditions for biosynthesis. Antibiotics. Beta lactam antibiotics. Groups of antibiotics formed by actinomycetes. Antifungal (polyene antibiotics). Antitumor antibiotic. Determination of antimicrobial activity of antibiotics. Features of cultivation of strains-producers. Features of the nutrient medium. Advantages of the microbiological method of obtaining enzymes. Advantages of the microbiological method of obtaining enzymes. Advantages of the microbiological method of obtaining enzymes. Enzyme producers.Preparation of microbial enzymes (amylase, dextrinase, lactase, invertase, pectinase, proteinase, lipase, etc.) and their use in medicine and various sectors of the folkfarm. The value of vitamins for humans. Source of vitamin. Microbiological synthesis of vitamins. Soluble vitamin. Fat soluble vitamin. Ubiquinone.

	Prospects for the development of biotechnology in the production of vitamin preparations. ***Laboratory work:*** The foundations and technique of autoclaving. Membrane filtration. Study of microbial growth and its effect on pH and cultivation temperature. To determine the content of microorganisms in the air of laboratory premises by sedimentation and using the apparatus of Krotov. The influence of external conditions on the development of microorganisms is studied. Influence of external conditions on the development of microorganisms.
Learning / examination outcomes / control forms:	Current control: colloquiums, written tests; written and oral interviews. Final control – exam.
Technical teaching aids:	Handouts, interactive whiteboard, modern computers
Literature:	1. Prikhodko N. A. Nikitin V. A. Shamanov O. R. Biotechnology of biologically active substances – Shymkent: SKSU, 2006 – page 122. [In Kazakh] 2. Nadirova Zh. K., Saparbekova A. A. Biotechnology in the production of protein products – Shymkent: SKSU, 2012 – 80 p. [In Kazakh] 3. Biryukov V. V. Fundamentals of industrial biotechnology.- M.:Colossus, 2004 - 296 p. [In Russian] 4. Prikhodko N. A. Efimov A. M., Nadirova, J. K., mu. SDS "Biotechnology BAS", Shymkent, SKSU, 2007.- 90 p. [In Kazakh] 5. Prikhodko N. A. Esimova A. M., Nadirova, J. K., lectures on "Biotechnology of biologically active substances ", Shymkent, SKSU, 2007.-80 p.[In Kazakh] 6. Biotechnology: theory and practice: studies. benefit / N. V. Zagoskin ; ed. N. V. Zagoskina, L. V. Nazarenko. - M. : ONYX, 2009. – 492 p. [In Russian] 7. Achievements of modern biotechnology: collection of scientific papers / Feder. state institution of science, State. science. center of Virology and biotechnology "Vector" W ed. I. G. Drozdov. - Novosibirsk, 2008. - 344 p. [In Russian] 8. Himmelfarb G. N. Biologically active substances in General anesthesia and intensive care / Himmelfarb G. N., Gerasimov N. Mmm. - Tashkent : Medicine, 2000. - 192 p. 9. Sazykin, S. D. Biotechnology M. Ed.center Academy, 2006 - 256 p. [In Russian]

Module name:	**M23.2 Microbiology and sanitary hygiene**
Module level as required:	Bachelor's programme
Abbreviation as required:	MSH
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	4 semester
Person responsible for the module:	Rysbaeva .G.A.
Teacher:	Master, ст.преп.; магистр, ст. преп.
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, mandatory component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 2 hours, laboratory classes - 1 hours, SIW -3,33 hours, SIWT – 1 hours. Total complexity – 7,33 hours.
Training load:	Lectures - 30 hours, laboratory classes - 15 hours, LIW-10hours; LIWT -15 hours, The Total labor intensity-120 hours.

Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Preliminary knowledge of the module: Inorganic and analytical chemistry, Biotechnology objects, Introduction to the specialty, Biochemistry, Fundamentals of biotechnology
Module objectives / planned learning outcomes:	After concluding the study module the student is ready to: - to consolidate the concept of the laws of the general basis of microbiology, sanitation, and hygiene in biotechnology, dynamic and other features of biosystems; - experiment and work with cultures of microorganisms, studying their morphological, cultural and physiological properties; —evaluate the quality of raw materials, nutrient media, intermediate products, and target products; - to confirm the requirements for raw materials and end products, as well as the requirements of biological safety, environmental issues; - independently perform bacteriological analysis.
Content:	**Lectures.** The subject and task of the basis of microbiology, sanitation and hygiene in biotechnology. The levels of microbiological, sanitation and hygienic research: research methods and requirements for them. Connection of the basis of microbiology, sanitation, and hygiene in biotechnology with other sciences: physics, mathematics, chemistry, biochemistry, physiology, cytology, cytology, and molecular biology. The boundaries and originality of the manifestation of the laws of biology in microbiology; the principle of qualitative non-reducibility of the laws of the fundamentals of microbiology and sanitation and hygiene in biotechnology. Methodological issues of the basis of microbiology, sanitation, and hygiene in biotechnology: the principles of a systemic and functional - structural approach to the study of the nature of biological phenomena. The history of the development of the basis of microbiology, sanitation, and hygiene in biotechnology. Problems and possibilities of development of the modern security of microbiology, sanitation, and hygiene in biotechnology. The value of the support of microbiology, sanitation, and hygiene in biotechnology for medicine, genetic engineering, food biotechnology, and cosmonautics. Laboratory works. Familiarization with equipment and accessories in the microbiological laboratory. Obtaining pure cultures. The device of the microscope and the rules for working with it. Methods of preparing preparations for microscopy. Microscopic examination of the morphology of bacteria, yeast, and microscopic fungi gramm. Preparation of nutrient media for growing microorganisms. Determining the state of a yeast culture by microscopy. Sanitary and bacteriological analysis of water. The main requirements for the personal hygiene of staff. The value of medical examination of workers. Sanitary and technological requirements for premises, equipment, inventory, and clothing. Preparation of disinfectant solutions and detergents. Conducting sanitization of equipment and inventory.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory work with an addressed report, tasks of the ISW and midterm control. Final control: exam
Technical teaching aids:	Interactive whiteboard, electron microscope, handout, a collection of microorganisms.
Literature:	1. Rysbaeva G.A. Guidelines for the implementation of laboratory

	work on the discipline "Microbiology and sanitation": for students of the specialty 5B070100 - "Biotechnology" / G. A. Rysbaeva, R.A. Abildaeva, E.Zh. Bulabaeva. - Auezov. - 2014. 2. Temerbaeva M.V. Sanitation and food hygiene: a tutorial / M.V. Temerbaeva. - Almaty: Epigraph, 2017- 360 p. 3. Mudretsova-Viss, K.A. Microbiology, sanitation and hygiene / K.A. Mudretsova-Viss, V.P. Dedyukhin. - M .: PH «FORUM»: INFRA-M, 2009, 399p. 4. Martinchik A.N. Microbiology, nutrition physiology, sanitation: textbook / A.N. Martinchik, A.A. Korolev, Yu.V.Nesvizhsky.- M .: Akademiya Publishing Center, 2010. -352p. 5. Handbook of Hygiene and Sanitary Science, Ulan Press (August 31, 2012) - by George Wilson – 430 p. ASIN: B00A7UGS1I

Module name:	M24 Sociology and political science
Module level as required:	Bachelor's programme
Abbreviation as required:	
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	4 semester
Person responsible for the module:	"International relations and political science" Department
Teacher:	Sultanov S.A.-professor, Senior lecturer
Language:	Kazakh, Russian, English
Connection with curriculum:	Common module
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1hour, Practical classes - 2 hours, Current LIW-3.33hours; LIW-1hour, Total labor intensity -7.33 hours.
Training load:	Lectures -15 hours; Practical classes -30 hours; current LIW-50 hours; intermediate LIW-10hours;LIWT-15hours, Total labor intensity-120 hours
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Basics of Law, Modern History of Kazakhstan, Philosophy
Module objectives / planned learning outcomes:	After students complete the course, they should be able to: -to know the history of political science - explain the essence of the political system, political institutions, political culture, the role of political parties and party systems, - on the basis of the knowledge gained in political science and sociology, to correctly navigate in the modern world, in the political structure of our society and in the social life of the Republic of Kazakhstan; - comprehensively and critically analyze the political system of our time;
Content:	Lectures. The history of the formation and development of sociology and political science. Modern sociological and political theories. Problems of applied sociology, the structure of the political sphere of society. Methodology and methods of sociological research. Sociology of personality and deviant

	behavior. Sociology of labor and economics. Political power. Civil society. Political modernization. Modern conflicts and their methods of regulation. World politics and geopolitics. Seminars. The peculiarity of sociology as an independent science. The main paradigms of political science. The history of the formation and development of sociological science. Directions of development of modern sociology. Sociological research as a type of cognitive activity. Sociological research methods. Theories of social development. Social structure of society: groups, organizations, institutions. Sociological study of personality. Social deviations. Systems of social structure and stratification. Labor, work and economic life. Sociological study of culture. Education, media and communication. Family and gender roles. Youth and youth policy as a subject of sociological study. The main stages of the development of political knowledge in the history of civilization. Politics as a social phenomenon, its nature, possibilities, boundaries and perspectives. Political power and mechanisms for its implementation. Subjects of a policy. Political regimes. Elections and electoral systems. Legal state and civil society. Multi-party system in the Republic of Kazakhstan: problems and development trends. Conflicts and crises in the political process. The concept, essence, structural components and functions of political culture. The concept of political modernization. World politics and international relations. Global problems of the present. Modern Kazakhstan in the world geopolitical space. Foreign policy priorities of the Republic of Kazakhstan.
Learning / examination outcomes / control forms:	Current control: successful implementation of practical tasks; colloquiums, written examinations; written and oral surveys. Final control - exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1. Zabirova A.T. Practical sociology: a textbook. Astana .: Evero.2014.-300p. 2. Kaliev I.A.Political power: study guide. Almaty .: Atamura. 2013.-252p. 3. Bagdasaryan N.G., Kozlova M.A., Shushanyan N.R. Sociology. Tutorial for academic bachelor. - 2nd ed., Pererab. and add. - M .: Publishing Yurayt, 2014. 4.Baturin V.K. Sociology. Sociology: a textbook for university students / under. ed. Baturin V.K. - 4th ed., Pererab. and add. - M .: Unity-Dana, 2012. - 487 p. 5. Panarin A.S. Political science: a textbook. Moscow .: Unincorporated business. 2012. 313 p. 6.KENDALL D. SOCIOLOGY IN OUR TIMES: THE ESSENTIALS 10TH ED. - CENGAGE LEARNING, 2016. - 611 P.

Module name:	M25 Culturology and Psychology
Module level as required:	Bachelor’s programme
Abbreviation as required:	
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	4 semester

Person responsible for the module:	“International relations and political science” Department
Teacher:	Sultanov S.A.-professor. Senior lecturer
Language:	Kazakh, Russian, English
Connection with curriculum:	Common module
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1hours, Practical classes - 2hours, Current LIW -3.33hours; LIWT -1hour, Total labor intensity -7.33 hours.
Training load:	Lectures - 15 hours ; laboratory classes -30 hours ; current LIW-50hours; intermediate LIW-10hours; LIWT -15hours., Total labor intensity -120 hours
Credit points:	4 ECTS credits
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Basics of Law, Modern History of Kazakhstan, Philosophy
Module objectives / planned learning outcomes:	After students complete the course, they should be able to: - know the structure and functions of culture, forms of culture; the basic laws of interaction between man and society, scientific, theoretical and practical foundations of psychology; - to comprehend the modern world, as a set of cultural achievements of human society; - analyze the history and theory of the Kazakh and world culture; - to work in a team and competently build communication, based on the goals and situations of communication.
Content:	Lectures. Historical change of concepts about culture. The structure and composition of modern cultural knowledge. Culturagenesis. Culture and nature. The dynamics of culture. Typologies of sociocultural worlds. Forms of culture. "East" as a concept kulturolgii. "West" as a concept of cultural studies. Comparison of Eastern and Western-type cultures. The place and role of Kazakhstan in world culture. The main problems and trends in the development of modern culture of Kazakhstan in a globalized society. The program “Rouhani zahagyru” and its role in the culture of modern Kazakhstan Culture and society. Culture and global problems of modernity The subject and tasks of the psychology and ethics of communication. Historical aspect. Methodological aspects of the study of communication. Perceptual aspect of communication. The communicative aspect of communication. Interactive aspect of communication. Communication difficulties. Lack of communication. Stress and methods of dealing with it. Public speaking. Image of a business man. Practical work. Culture as subject-subject sphere of cultural science. Culturagenesis. Mythology and its place in culture. Myth as the core of primitive culture. Religion as a social institution of culture. Sacred books as monuments of world culture. Art as a language and a mirror of culture. History of development and features of the Kazakh culture. Problems and features of the development of modern culture. The culture of postmodernism. Cultural values and norms. Ethics and etiquette in the history of culture. Culture and Peace. Dialogue of cultures

	as of the main tasks of cultural science. Culture and society. Cultural mechanisms of socialization, enculturation, identification. The concept of social perception. Mechanisms of interpersonal perception. Mechanisms of intergroup perception. The effects of perception. Communication and communication process. Verbal communication. Non-verbal communication. Communicative barriers. Psychological compatibility. Interaction styles Types of interaction. Strategy of behavior in relation to partners. Scheme oratory. Stages of preparation of public speaking. Image of a business person. Rules of etiquette. Communication difficulties. Lack of communication. Factors affecting stress resistance. Stress prevention methods. First aid for acute stress.
Learning / examination outcomes / control forms:	Current control: successful implementation of practical tasks; colloquiums, written examinations; written and oral surveys. Final control - exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1. Cultural Studies: a textbook for university students. Comp. Gabitov T. - Almaty., 2013. 2. Timoshinov V.I. Culturology: Kazakhstan-Eurasia-East-West: Textbook. - Almaty, 2013. 3. The history of world culture. / Ed. Markova A.N. - M., 2010. 4. History of world culture. / Ed. Drach G.V. –Rostov-on-Don., 2008 5. Maliuga Y.Y. Culturology. - M., 2011. 6.Polikarpov VS Lectures on cultural studies. - M., 2011 7. Pavlova E.V. Fundamentals of general psychology. Study guide. - Blagoveshchensk: Amur State university Publishing House. - 2011. - 119 p. 8.Makarova K.V., Tallinn O.A. Human psychology. Tutorial. - M .: MPGU, 2011. - 160 p. 9. Cooper John O., Heron Timothy E., Heward, William L. Applied Behavior Analysis. Trans. from English - M .: Praktika, 2016. - 864 p. 10. Crane Tim. Aspects of Psychologism Harvard University Press, 2014.- 384p. 11.Spielman Rose M. Psychology .OpenStax Rice University, 2017. – 754p.

Module name:	M26 Physical Training
module level:	Bachelor
abbreviation:	PhT
subtitle:	
type of :	Practical
semester:	4 semester
responsible person for the module:	Department "Physical Education for Technical Specialties"
teacher:	Stolyarova O.S. – senior teacher
language:	Russian
relationship with the curriculum:	General education, a required component

form of study/weekly workload per semester:	Full time / Practical classes – 2h.,
study load:	Practical -30 hours.; Total workload – 60 hours
credit scores:	2 ECTS-credits
prerequisites for meeting exam requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
recommended prerequisites:	
module objectives / expected learning outcomes:	After completing the module, students should be able to: - use the means of physical culture and sports to increase their functional and motor abilities to achieve professional goals; - to possess the means of independent, methodically correct use of methods of physical education and health promotion; - possess special applied psycho-physical qualities for successful implementation in life activity and future profession;
Content:	Practical: Improving professional-applied physical qualities. Education endurance with game sports. Fostering speed-strength qualities with the help of circular training exercises. Fostering speed with the help of relay races, elements of mobile and sports games. Education of strength with the help of exercises with the weight of the partner and with his opposition, with the resistance of elastic objects (expanders and rubber shock absorbers), with the burden of gymnastic equipment and simulators. Fostering flexibility and mobility in the joints with exercises to stretch the muscles, muscle tendons with increased amplitude of movements due to their own efforts, with the help of a partner or with a burden. Education of dexterity and coordination of exercises with the use of exercises with a quick rearrangement of motor activity in connection with changing external conditions (gymnastics, sports games, martial arts, etc.). Improvement of motor actions in sports. Special preparatory and summing up exercises to improve technical techniques in the chosen sport. Special preparatory and summing up exercises to improve the potential of competitive actions in the chosen sport. Improving resistance to fatigue, emotional manifestations by means of sports. Improvement of physical qualities by means of OFP Fostering speed-strength qualities with the help of circular training exercises. Fostering speed with the help of relay races, elements of mobile and sports games.
study / examination results forms of control:	Current control: tests of physical fitness The final control is differential / offset.
technical training tools:	Handouts
literature:	1.Barchukov, I.S. Physical culture and sport: methodology, theory, practice: A manual for students. universities, training. on directions "Pedagogy"; UMO / I. S. Barchukov, A. A. Nesterov; under general ed. N.N. Malikov. - 2nd ed., Sr. - M.: Academy, 2009. - 528 p. - (Higher vocational education) (Russian) 2. Barshay V.M. Gymnastics: a textbook for students. universities enrolled on special. "Physical culture" / V. M.

	Barshai, V. N. Kurys, I. B. Pavlov. - 2nd ed., Pererab. and add. - Rostov n / D: Phoenix, 2011. - 330 p. : il. - (Higher education) (Russian) 3. Gymnastics: a textbook for students. universities, training. on spec. "Physical education"; UMO / M.L. Zhuravin [et al.]; ed. M.L. Zhuravina, N.K. Menshikov.-5th ed., Sr. - M.: Academy, 2009. - 448 p. - (Higher vocational education. Pedagogical specialties) (Russian) 4. Goloschapov, B.R. The history of physical culture and sports: a textbook for students. universities, training. on spec. "Physical education"; UMO / B.R. Goloschapov. - 5th ed., Rev. and add. - M.: Academy, 2009. - 320 p. - (Higher vocational education. Pedagogical specialties) (Russian) 5. Ilyinich, V.I. Student's physical culture and life: a textbook for students. universities studying the discipline "Physical Education"; Ministry of Defense of the Russian Federation / V.I. Ilinich. - M.: Gardariki, 2009. - 366 p. : il. 6.Makarova, G.A. Sports medicine: a textbook for stud. universities, training. on spec. "Physical Culture and sport"; State com RF on physical. culture and sport / G. A. Makarova. - 3rd ed., Sr. - M.: Soviet Sport, 2009. - 480 p. : il. (Russian) 7.Nesterovsky, D.I. Basketball: Theory and methods of teaching: a training manual for students. universities, training. on spec. "Physical education"; UMO / D.I. Nesterovsky. - 4th ed., Sr. - M.: Academy, 2009. - 336 p. - (Higher vocational education. Pedagogical specialties) (Russian) 8. Petrov, P.K. Information technology in physical culture and sports: a manual for students. universities, training. on spec. "Physical education"; UMO / P. K. Petrov. - M.: Academy, 2009. - 288 p. - (Higher vocational education. Pedagogical specialties) (Russian)

Module name:	**M27.1 Biochemistry**
Module level:	Bachelor's program
Abbreviation:	BCh
Subtitle:	
Lesson type:	Lectures, laboratory lessons
Training semester:	4 semester
Person responsible for the module:	Mutaliyeva B.Zh.
Teacher:	Candidate of Chemical Sciences, Associate professor
Language:	Kazakh, Russian
Connection with curriculum:	Profile discipline, optional component
Form of teaching / weekly training load in a semester:	Full time / Lectures – 1h., laboratory lessons – 2h., SIW – 3.66h., SIWT – 1h., Total labor coefficient – 7.66 hours
Training load:	Lectures – 15h., laboratory lessons – 30h., SIW – 50h., SIWT – 15h., Total labor coefficient – 120 hours
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Inorganic and analytic chemistry, Objects of biotechnology, Introduction to the specialty
Module objectives / planned	After completion of the module, students should be able to:

learning outcomes:	- demonstrate understanding of biochemistry of proteins, nucleic acids, carbohydrates, lipids, minerals, vitamins and hormones; - understand essence of chemical transformations occurring in organisms, mechanisms of their regulation and their role in ensuring the vital activity of organism; - identify and isolate amino acids and proteins; - independently carry out qualitative and quantitative reactions; - select methods of biochemical control adequate to the assigned tasks and interpret the results obtained during the research.
Module content:	**Lectures.** Introduction to biochemistry. Proteins. Enzymes. Carbohydrates. Lipids. Nucleic acids. Metabolism of nucleic acids. Vitamins. Hormones. Main provisions of metabolism. Metabolism of proteins and amino acids. Metabolism of carbohydrates. Metabolism of lipids. Energetics of biochemical processes. **Laboratory works.** Amino acids. Proteins. Identification of amino acids and proteins (qualitative reactions to proteins and amino acids). Settling of proteins by various chemical agents. Isolation and purification of proteins. Carbohydrates: identification of simple carbohydrates, disaccharides, polysaccharides. Study of properties of carbohydrates. Quantitative determination of glucose in various biological material. Lipids: definition of structural components. Study of physicochemical properties of lipids. Vitamins. Detection and quantitative determination of vitamins in various objects of research. Enzymes. Isolation of enzymes from biological material. Study of specificity of enzymatic action. Nucleic acids. Determination of chemical composition of nucleic acids. Preparation of nucleoprotein hydrolyzate from yeasts. Qualitative reactions to purine bases, sugars, phosphoric acid, proteins.
Learning / examination outcomes / control forms:	Current control: successful implementation and defense of laboratory works with written report, tasks of SIW and midterm control. Final control: exam.

Module name:	M7 Inorganic and Analytical Chemistry
module level:	Bachelor's program
abbreviation:	IAC
subtitle:	
type of :	Lectures, laboratory lessons
semester:	4 semester:
responsible person for the module:	
teacher:	
language:	Английский
relationship with the curriculum:	General education, a required component
form of study/weekly workload per semester:	Full time / Lectures – 1h., laboratory lessons – 2h., SIW – 3.66h., SIWT – 1h., Total labor coefficient – 7.66 hours
study load:	Lectures – 15h., laboratory lessons – 30h., SIW – 50h., SIWT –

	15h., Total labor coefficient – 120 hours
credit scores:	4 ECTS
prerequisites for meeting exam requirements:	Rating according to the results of intermediate and midterm control not lower than 25 points
recommended prerequisites:	Химия
module objectives / expected learning outcomes:	После завершения модуля студенты должны быть в состоянии: - обладать фундаментальными знаниями в области неорганической и аналитической химии; - самостоятельнорешать химические задачи на установление формул химических соединений, количественного состава и содержания вещества; - производить расчеты для приготовления растворов заданной концентрации, составлять уравнения окислительно-восстановительных реакций и предсказывать образуемые продукты; - использовать приобретенные знания при изучении и анализе химических процессов, протекаемых в технологических объектах; - разъяснять основные принципы и законы взаимодействия неорганических соединений; - анализировать процессы, происходящие в растворах и изолированных системах.
Content:	**Лекции:**Основные понятия и законы химии. Строение атома. Периодическая система химических элементов. Химическая связь. Химическая термодинамика. Химическая кинетика. Катализ. Химическое равновесие. Растворы. Электролитическая диссоциация. Гидролиз солей. pH. Окислительно-восстановительные реакции. Комплексные соединения. Качественный химический анализ. Гравиметрический анализ. Титриметрический анализ. Метод кислотно-основного титрования. Метод окислительно-восстановительного титрования. Метод комплексонометрического титрования. **Лабораторные:**Определение влияния концентрации и температуры реагирующих веществ на скорость химической реакции. Приготовление раствора хлорида натрия с заданной концентрацией. Изучение свойств перманганата калия при различных значениях pH. Определение кристаллизационной воде в кристаллогидрате $BaCl_2 \cdot 2H_2O$. Приготовление стандартного раствора тетрабората натрия. Стандартизация раствора HCl по буре. Определение общей жесткости воды. Проведение эксперимента по методу окислительно-восстановительного титрования Перманганатометрия.
study / examination results forms of control:	Текущий контроль: успешное выполнение и защита лабораторных работ; выполнение контрольных работ; коллоквиумы; рубежные письменные и устные опросы. Итоговый контроль – экзамен.
technical training tools:	Интерактивная доска, наглядные пособия
literature:	1. Алов, Н.В. Аналитическая химия и физико-химические методы анализа. В 2-х т.: Учебник / Н.В. Алов. - М.: ИЦ Академия, 2012. - 768 с. 2. Inorganic chemistry. Chemistry of elements: study book / S.

	Nazarbekova [et al.]. - Shymkent : SKSU, 2015. - 108 c. 3. Nazarbekova S., Tukibayeva A., Nazarbek U.Chemistry/Text book. – Almaty: Assosiation of higher educational institutions of Kazakhstan, 2016. -268p. 4. Nazarbekova, A. Tukibayeva, K. Kurbanbekov, U. Nazarbek. Inorganic Chemistry. Chemistry of elements / Text book. – Almaty: Assosiation of higher educational institutions of Kazakhstan, 2016.- 304 p. 5. Назарбекова С.П., Курбанбеков К.Т., Назарбек У.Б.Inorganicchemistry. Chemistryofelements/Электронное учебное пособие. -Шымкент, 2016, 6,98 Мб

Module name:	**M 28.1** Special practicum on plant physiology
Module level as required:	Bachelor's programme
Abbreviation as required:	SPPPh
Subtitle as required:	
Lesson type as required:	Practical classes, laboratory classes
Training semester:	4 semester
Person responsible for the module:	Daulbay A.D.
Teacher:	Candidate of agricultural sciences, associated professor
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, elective component
Form of teaching / weekly training load in a semester:	Full-time / Practical classes, - 1 hours, laboratory classes - 2 hours, SIW -3,33 hours, SIWT – 1 hours. Total complexity – 7,33 hours.
Training load:	Practical classes - 15 hours, laboratory classes - 30 hours, LIW-10hours; LIWT -15 hours, The Total labor intensity-120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry.
Module objectives / planned learning outcomes:	After completing the module, students should be able to: − to know the basic concepts, regularities of metabolic systems functioning, mechanisms of their regulation in the plant organism; − to know the basic physiological processes of plant cells: mechanisms of photosynthesis, respiration, water exchange, plant growth and development, plant resistance to adverse factors; − to know the physical and chemical approaches and methods of studying the plant organism at different levels of organization; − to be able to use the basic laws of functioning of plant organisms as a scientific basis of agriculture, plant growing and biotechnology; − to be able to use the methods of theoretical and experimental research in plant physiology; − to master the basic techniques of processing experimental data; − to know the methods of evaluation of indicators of physiological processes at different levels of the organization.

Content:	**Practical classes:** Methods of study of plant cells and turgor pressure. Water regime of plants. Root pressure: value, mechanism and methods of determination. The need of plants in the elements of mineral nutrition. Types of redox reactions .The main ways of carbohydrate dissimilation.Electron-transport chain of plant respiration. Substrate photophosphorylation. Factors affecting oxidative phosphorylation .The influence of external factors on the breathing process. The role of photosynthesis in the processes of energy and plastic metabolism of the plant organism. Pigments of photosynthesis. Electron-transport chain of photosynthesis. Dark stage of photosynthesis. Resistance as adaptation of plants to the conditions of existence. Ways of increase of stability of plants. **Laboratory classes:** Determination of osmotic potential of cellular juice by plasmolytic method. Quantitative determination of pigments in plant tissues by modern chromatography followed by colorimetry. The determination of the respiration rate on the amount of absorbed oxygen. The determination of the respiration rate by the number of isolated carbon dioxide.
Learning / examination outcomes / control forms:	Current control: successful execution and protection of laboratory and practical works; performance of control works; written and oral surveys. Final control – exam.
Technical teaching aids:	Interactive whiteboard, visual aids
Literature:	1 Plants physiology: textbook /V.M.Yurin. – Mn, 2010. – 455 p. [in Russian]. 2 Plants physiology: textbook / V.V. Kuznecov, G.A. Dmitriyeva. – M., 2006. – 742 p. [in Russian]. 3 Plants physiology: textbook / under the editorship I.P. Ermakova. – M., 2005. – 640 p. [in Russian]. 4 Physiology and biochemistry of agricultural plants: textbook / under the editorship of N.N. Tret'yakov. – M., 2005. – 655 p. [in Russian]. 5 Plants physiology / V.V.Polevoi. – M.: Vishaya Shkola, 2006. - 464 p. [in Russian]. 6 Plants physiology: textbook / N.I.Yakushkina. – M., 2005. – 464 p. [in Russian]. 7 Plants physiology: textbook / S.S.Medvedev. – StPet.: StPet. University, 2004. – 336 p. [in Russian]. 8 Plants physiology: textbook for higher educational institutions in the direction of "Forestry business» / A.V.Veretennikov. – M., 2006. – 479 p. [in Russian]. 9 Plant physiology with fundamentals of Microbiology / N.V. Pil'shikova. – M.: Mir, 2004. – 184 p. [in Russian]. 10 Physiology of woody plants / P.D. Kramer, T.T. Kozlovskyi. – M.: Lesnaya promishlennost', 1983. – 464 p. [in Russian]. 11 Physiology of woody plants / Ch. Lir, G.Pol'ster, G.I. Fidler – M.: Lesnaya promishlennost', 1983. – 424 p. [in Russian]. 12 Phytochemistry: textbook / V.V.Rogozhin. – StPb.: GIORD, 2012. - 432 p. [in Russian]. 13 Phytochemistry / B.Hel'd. - M.: Binom. Knowledge laboratory, 2011. - 471 p. [in Russian].

Module name:	**M 28.2 The basics of micropropagation of plants**

Module level as required:	Bachelor course
Abbreviation as required:	TBMP
Subtitle as required:	
Lesson type as required:	Practical classes, laboratory classes
Training semester:	4 semester
Person responsible for the module:	Lesbekova S.Zh.
Teacher:	Master, senior lecturer
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, elective component
Form of teaching / weekly training load in a semester:	Full-time / Practical classes, - 1 hours, laboratory classes - 2 hours, SIW -3,33 hours, SIWT – 1 hours. Total complexity – 7,33 hours.
Training load:	Practical classes - 15 hours, laboratory classes - 30 hours, LIW-50hours LIW-10hours; LIWT -15 hours, The Total labor intensity-120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry.
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - to characterize the stages of clonal micropropagation of plants, the factors affecting the process of micropropagation of plants in vitro; - to select optimal conditions for clonal micro-propagation of plants in vitro; - receive plant explants, micro-spurs and microtubers; - fried callus tissue; - to cultivate regenerants
Content:	**Lectures.**Culture of cells, tissues and organs of plants: object, tasks. History of development of methods of cultivation of isolated cells, tissues and organs of plants. General characteristics of nutrient media. Mineral nutrition. Growth promoters – synthetic and natural origin. Principles of plant reproduction. Tasks and prospects. Potential breeding systems. Totipotency of cells. Stages of clonal micropropagation of plants. Methods of clonal micropropagation of plants. Factors affecting the micro-multiplication of plants. Practical application of healthy planting material in the reproduction of plants. **Laboratory works.** Works on isolation of cultures. Experiments demonstrating the totipotency of living plant cells. Detailed development of tissue culture techniques. Methods of isolation of tissue from the plant. Sterilization method. Sterilization of plant material. Creating conditions for sterility in the cultivation of isolated plant tissues. Obtaining sterile explants from plants. Selection of the optimal substrate. The cultivation of regenerated plants.
Learning / examination outcomes / control forms:	Current control: performance of laboratory works, tasks of SIW and boundary control. Final control: exam
Technical teaching aids:	Interactive whiteboard, computer
Literature:	1. Lesbekova S.Zh. Textbook for students majoring 5B070100 – Biotechnology on the subject "Technology of growing plant cells and tissues" / S. Zh. Lesbekova, R.A.Abildaeva. SKSU – 2013.[in Russian] 2. Turashova S.K. Cellular biotechnology: Textbook. Almaty: LLP «Dauir», 2011 -260 pages. [in Russian]

	3. I.Rahymbaev. Genetically modified plants:benefits and risks. Almaty, 2011.-174 pages. [in Russian] 4. Muhambetzhanov S.K. Guidelines for laboratory studies on tissue culture and plant biotechnology: textbook / S. K. Muhambetzhanov. – 2010. [in Russian] 5. Plant Physiology (Loosleaf), Sinauer Associates, Inc.; Fifth edition (May 31, 2010) - by Lincoln Taiz , Eduardo Zeiger. – 781 p. ISBN-10: 0878935118

Module name:	M29.1 General physiology of the objects of biotechnology
Module level as required:	Bachelor's programme
Abbreviation as required:	GPOB
Subtitle as required:	
Lesson type as required:	Lectures , laboratory classes
Training semester:	4 семестр
Person responsible for the module:	Ahanov U
Teacher:	c.a.c.,
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, elective component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1 hours, laboratory classes - 2 hours, SIW -3,33 hours, SIWT – 1 hours. Total complexity – 7,33 hours.
Training load:	Lectures classes - 15 hours, laboratory classes - 30 hours, LIW-50 hours LIW-10hours; LIWT -15 hours, The Total labor intensity-120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry
Module objectives / planned learning outcomes:	Students have extensive knowledge of the basics of the subject and they can: - to present the General provisions and theoretical foundations of the course of physiology; - list and tell the theoretical and methodological foundations of physiology – the science of the main manifestations of life and their regulation; - explore the mechanisms that ensure the interaction of individual parts of the body and the body as a whole with the external environment; - to experiment with some methods of assessing the functional state of the body; - identify and describe the mechanisms for admission to the cell and movement through the plant water, minerals; - to apply the obtained theoretical knowledge and skills to determine the osmotic pressure, transpiration rate, photosynthesis, respiration, chlorophyll release and determine its physical and chemical properties and quantity, to determine the effect of various mineral elements on plant growth and development, individual growth indicators, plant stability; - conduct research using adequate methods of practical Microbiology and biotechnology;

	- independently organize and conduct laboratory experiments; - conduct group workshops with the teachers at the domestic and individual tasks.
Content:	Lectures'. The section "fundamentals of human physiology and animals": the Physiology of excitable tissue, Physiology of muscles, Mechanisms of regulation of functions in the body, General physiology of the Central nervous system, Private physiology of the Central nervous system, Nervous regulation of vegetative functions, Types of higher nervous activity, General principles of endocrine regulation of the Internal environment of the body, physiology of the heart and blood vessels, Physiology of respiratory system, Physiology of digestion, The section "fundamentals of plant physiology": Structural features of plant cells, Water metabolism, Photosynthesis, Respiration, Mineral nutrition, Growth and development of plants, plant Resistance, The section "fundamentals of physiology of microorganisms»: Physiology of microbial cells, Scientific principles of nutrition of microorganisms, Nutrient media, Isolation of microorganisms from various objects of the environment, the Physiology of growth of microorganisms, environmental Factors affecting the growth and development of microorganisms. aboratory: L**aboratory** Physiological properties of excitable tissues. Physiology of the Central nervous system, mental functions. Hormonal regulation of physiological functions. Morphological followup studies of blood. Physico-chemical study of blood. Determination of blood group membership.Spectral analysis of blood. Physiology of the heart. Physiological properties of the heart muscle. Physiology of the vascular system. Physiology of the respiratory system. Spirometry. Pneumography. Study of metabolism and energy. Physiology of digestion and thermoregulation. Physiology of analyzers. Physiology of plant cells. Water exchange.Photosynthesis. Breath. Transport of substances. Mineral nutrition. Growth and development of plants. Resistance of plants to adverse environmental conditions. Isolation of microorganisms from the environment. The accumulation of culture. Determination of microbial contamination of household items and hands. Quantitative accounting of microorganisms. The value of individual nutrients for the fungus Aspergillus niger. The influence of external factors on the growth and reproduction of microorganisms.
Learning / examination outcomes / control forms:	Current control: performance of laboratory works, tasks of SIW and boundary control. Final control: exam
Technical teaching aids:	Interactive whiteboard, computer
Literature:	1. Eckert R., Randall D., Augustine J. Animal physiology: mechanisms and adaptation. In 2 volumes. M.: World, 2001. 2. Schmidt, K. Nielsen Physiology of animals. Recessed sableye and the environment. In 2 books / Ed. E. M. Kreps. M. Mir, 2002. 3. Georgievsky V. I. Physiology of farm animals. M.: Agropromizdat, 2000.

	4. Basic physiology /edited by P. Eraser. M., 2004. 5.General course of human and animal physiology. In 2 volumes / Under the editorship of A. D. Nozdrachev. M.: Higher school, 2001. 6. Orbeli L. A. Selected works. Vol.. Questions of evolution of physiology. M.-L.: Russian Academy of Sciences, 2001 7. Koshtoyants H. S. Fundamentals of comparative physiology. Vol.1.M.-L.: Russian Academy of Sciences, 2007. 8. Human physiology. In 3 volumes / ed. by R. Schmidt, G. Thews, 2007. 9. Semenov E. V. Physiology and anatomy. M., 2007. 10. Fundamentals of human physiology / Ed. B. I. Tkachenko, CIB, 2004. 11. Human physiology: a Course of lectures in 2 volumes / Under the editorship of L. Z. tel, N..Aghajanian, Almaty, 2012. 12. Guide to practical exercises in physiology: Textbook. Under.ed. G. I. Kositsky, V. A. Polyantseva, M.:Medicine, 2008, 288 p.

Module name:	**M29.2 Modeling of Physiological Processes**
Module level as required:	Bachelor's programme
Abbreviation as required:	**MPP**
Subtitle as required:	
Lesson type as required:	Lectures , laboratory classes
Training semester:	4 семестр
Person responsible for the module:	Ahanov U
Teacher:	c.a.c.,
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, elective component
Form of teaching / weekly training load in a semester:	Internal / Lectures classes – 1h, laboratory classes – 2h, current SIW-3.33 h; SIWL-1 h. the Total complexity -7.33 hours
Training load:	Laboratory classes -15 h; practical classes – 30h, current SIW – 50 h; current SIW - 10 h; SIWL -15 h, Total labor intensity -120 hours
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry
Module objectives / planned learning outcomes:	Students have extensive knowledge of the basics of the subject and they can: - to present the General provisions and theoretical foundations of the course of physiology; - list and tell the theoretical and methodological foundations of physiology – the science of the main manifestations of life and their regulation; - explore the mechanisms that ensure the interaction of individual parts of the body and the body as a whole with the external environment; - to experiment with some methods of assessing the functional

	state of the body; - identify and describe the mechanisms for admission to the cell and movement through the plant water, minerals; - to apply the obtained theoretical knowledge and skills to determine the osmotic pressure, transpiration rate, photosynthesis, respiration, chlorophyll release and determine its physical and chemical properties and quantity, to determine the effect of various mineral elements on plant growth and development, individual growth indicators, plant stability; - conduct research using adequate methods of practical Microbiology and biotechnology; - independently organize and conduct laboratory experiments; - conduct group workshops with the teachers at the domestic and individual tasks.
Content:	Lectures'. Study of characteristics of typical units of automatic control systems. Study of types of structural schemes of automatic control systems used in the modeling of physiological processes. Synthesis and study of the model of formation and regulation of white blood cells in the human body. Synthesis and study of the model of physiological system of regulation of CO2 level in blood during lung ventilation. Synthesis and study of the simplest model of human cardiovascular system. Synthesis and study of the model parameters of periodic processes in the human endocrine system. Study of human biodynamics. Modeling of human biorhythms. Models of population dynamics. Modeling of hemodialysis process. Laboratory: Method of observation. Experimental method. Vivisection. Acute experiment. Methods of chronic experiment. Objective graphic registration. Tomographic method. Biochemical and biophysical methods.
Learning / examination outcomes / control forms:	Current control: performance of laboratory works, tasks of SIW and boundary control. Final control: exam
Technical teaching aids:	Interactive whiteboard, computer
Literature:	1. Altunin A. E., Semukhin M. V. Models and algorithms of decision-making in fuzzy conditions: monograph - Tyumen: publishing House of Tyumen state University, 2000. - 352 p. 2. Kalmykov S. A., Shokin, Y. I., Yuldashev Z. H., Methods of interval analysis, Novosibirsk: Nauka, 2006. - 222 p. 3. Abramovich F. P., Wagenknecht M. A., Khurgin Ya. I. Solution of fuzzy systems of linear algebraic equations of Lß-type // Methods and decision-making systems: collection of articles. Riga: FIR, 2007. - P. 35-47 4. Zakharov A. B. Shokin Yu. I. Algebraic interval solution of systems of linear interval equations Ax = bnAx + d = b: Preprint / VC WITH the Russian Academy of Sciences. -Krasnoyarsk, 1987. -№5 -17 p. 5. Semukhin M. V. Solvability of fuzzy and interval equations. Bulletin of Tyumen state University. Tyumen: Tyumen State University, 2008. -Issue. 2 - p. 23-26. 6. Halenfeld., Herzberger J. Introduction to interval

	computations, Moscow: Mir, 2007. - 360 p. 7. Kane V. M. Optimization of control systems by minimax criterion. -M: Science, 2005. 248 p. 8. Bazarov.B., Shokin Yu. I., Yuldashev Z. H. On the construction of finite-difference interval methods for ordinary differential equations // Problems of computational and applied mathematics: collection of articles. IR AN RU, 2004. - Issue. 71. - P. 131-144. 9. Malanin V. V., Poloskov I. E. Random processes in nonlinear dynamical systems. Analytical and numerical methods. -Izhevsk: SIC "Regular and chaotic dynamics", 2001.160 p. 10. Kazakov I. E., Boys S. V. Analysis of stochastic systems in the state space. M.: Science, 2003. - 384 p.

Module name:	**Industrial practice 1**
Module level as required:	Bachelor's programme
Abbreviation as required:	IP 1
Subtitle as required:	
Lesson type as required:	
Training semester:	4 semester
Person responsible for the module:	Department of «Biotechnology»
Teacher:	Candidate of biological Sciences, associate Professor Abildaeva R. A.
Language:	Kazakh, Russian
Connection with curriculum:	
Form of teaching / weekly training load in a semester:	
Training load:	
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Fundamentals of biotechnology, General and molecular genetics.
Module objectives / planned learning outcomes:	After the students have completed the study of this course they must be able to: - describe the technical conditions for the quality of raw materials and products, instructions and requirements for the conduct of the process; - identify the problematic questions of the technology of the studied production; - explain the requirements for environmental safety of production and ways to ensure it; - observe safety instructions when working in laboratories and boxes; - to make a qualitative report on the production practice with conclusions and to protect its results.
Content:	Production technology at biotechnological enterprises. The safety of working in the labs and cubicles. Classification of raw materials and products. Norms of technological regime. Characteristics of raw

	materials, auxiliary materials, energy resources, production waste. Requirements for the quality of process water. Requirements to quality of products. Familiarization with the main biotechnological products manufactured by the enterprise, with the structure of the organization, raw materials and material and technical base, technological processes, main and auxiliary equipment, specialization of shops and sites, production flows of raw materials and auxiliary materials, quality control and certification of products. Preparation of the report on production practice coordination with the head of practice.
Learning / examination outcomes / control forms:	Current control – passing of the safety test, participation in production meetings. A written report and its protection. Final control – offset.
Technical teaching aids:	Safety instructions, technical conditions for the quality of raw materials and products, instructions for the conduct of the process
Literature:	1. Elemanova Zh. R. plant Biotechnology : 5B070100 –textbook for students of the specialty "Biotechnology" / Zh. R. Elemanova. - Shymkent : SKSU 2014. - 128 p. [Kazakh] 2. Modern methods in biotechnology: textbook for University students / S. Kenzhebaeva. - Almaty : Publishing House "Bastau", 2013. - 272 p. [Kazakh] 3. Netrusov A. I., Kotova I. B. Microbiology. M.: Publishing center "Academy", 2012. – 384 p. [Russian] 4. Klonowa S. M., Egorova T. A., E. A. Sivukhina Biotechnology – Moscow, 2010. [Russian] 5. Downstream Industrial Biotechnology: Recovery and Purification, Wiley; 1 edition (March 12, 2013) – by Michael C. Flickinger – 872 p. ISBN-10: 9781118131244 [English]

Module name:	M30.1 Biotechnology of production of biological products
Module level as required:	Bachelor's programme
Abbreviation as required:	MBSG
Subtitle as required:	
Lesson type as required:	Lectures, Practical classes
Training semester:	4 semester
Person responsible for the module:	Esimov .M.
Teacher:	c.c.s., associate professor
Language:	Kazakh, Russian.
Connection with curriculum:	Basic discipline, optional component
Form of teaching / weekly training load in a semester:	Internal / Lectures classes – 2h, practical classes – 2h, current SIW-3.66 h; SIWL-1.5 h. the Total complexity -9.16 hours
Training load:	Laboratory classes -30 h; practical classes – 30h, current SIW – 55 h; current SIW – 12.5 h; SIWL -22.5 h, Total labor intensity - 150 hours
Credit points:	5 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control is not lower than 25 points
Recommended prior knowledge:	Preliminary knowledge in modules: Inorganic and analytical chemistry, Biotechnology objects, Introduction to the specialty, Biochemistry, Fundamentals of biotechnolog
Module objectives / planned learning outcomes:	After completing the study module the student is able to: - know the principles and features of microbiological processes used in biotechnology for the production of biological products; - know the requirements for raw materials and microorganisms-

	producers, - possess knowledge of the methods of cultivation of microorganisms used in the production of biological products; - to own methods of isolation and purification of target products, specific industrial production based on microbiological synthesis and transformation.
Content:	Lectures. Microbiological plant protection products and bacterial fertilizers. The advantages of microbiological means of protecting plants and animals from pests. Technology of drugs. Obtaining bacterial fertilizers: nitragin, rhizotrophin. Microbial protein production. Requirements for microorganisms - sources of protein substances. Raw materials used to obtain microbial biomass: vegetable raw materials, ethyl and methyl alcohols, natural gas, petroleum hydrocarbons. Commercial protein products. Workshops. Checking the purity of cultures of microorganisms. Determination of the quality (contamination) of raw materials. The study of the antagonistic activity of microorganisms, producers of biopreprats for plant protection. Studying the technology of producing fertilizers based on nodule bacteria (technology of producing rhizotorphin).
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory work with a written report, tasks of the CDS and midterm control. Final control: exam.
Technical teaching aids:	Interactive whiteboard, electron microscope, handout; collection of microorganisms.
Literature:	1.Rysbaeva G.S. Guidelines for the implementation of laboratory work on the discipline "Microbiology and sanitation": for students of the specialty 5B070100 - "Biotechnology" / G. S. Rysbaeva, R. A. Abildaeva, E. Zh. Bulabayeva. - SKSU. - 2014. 2. Temerbaeva M.V. Sanitation and food hygiene: a tutorial / M.V. Temerbaeva. - Almaty: Epigraph, 2017. - 360 p. 3. Mudretsova-Viss, K.A. Microbiology, sanitation and hygiene / K.A. Mudretsova-Viss, V.P. Dedyukhin. - M .: PH «FORUM»: INFRA-M, 2009, 399s. 4. Martinchik A.N. Microbiology, nutrition physiology, sanitation: textbook / A.N. Martinchik, A.A. Korolev, Yu.V.Nesvizhsky.- M .: Akademiya Publishing Center, 2010. - 352c. • 5. Handbook of Hygiene and Sanitary Science, Ulan Press (August 31, 2012) - by George Wilson - 430 p. ASIN: B00A7UGS1I

Module name:	M 30.2 Technology of microbial synthesis of vitamins, antibiotics and enzymes
Module level as required:	Bachelor’s programme
Abbreviation as required:	TMSVAF
Subtitle as required:	
Lesson type as required:	Lectures, Practical classes
Training semester:	4 semester
Person responsible for the module:	Esimova A.M.

Teacher:	Ph.D., associate professor
Language:	Kazakh, Russian.
Connection with curriculum:	Basic discipline, optional component
Form of teaching / weekly training load in a semester:	Internal / Lectures classes – 2h, practical classes – 2h, current SIW-3.66 h; SIWL-1.5 h. the Total complexity -9.16 hours
Training load:	Laboratory classes -30 h; practical classes – 30h, current SIW – 55 h; current SIW – 12.5 h; SIWL -22.5 h, Total labor intensity -150 hours
Credit points:	5 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Preliminary knowledge in modules: Inorganic and analytical chemistry, Biotechnology objects, Introduction to the specialty, Biochemistry, Fundamentals of biotechnology
Module objectives / planned learning outcomes:	After completing the study, the module is able to: - to generalize knowledge in the field of practical biotechnological objects and methods of their cultivation and use of biotechnological equipment; - critically analyze the areas of processes and their occurrence in an industrial situation; - to produce and carry out the necessary work on preclinical testing of the biological activity of preparations prepared by medical and veterinary biotechnological methods.
Content:	Lectures. Production of vitamins. Vitamins obtained by microbiological synthesis. Vitamin B12. Production of vitamins. Vitamins, obtained by microbial synthesis. Enzyme production. The advantages of the microbiological method of obtaining enzymes. Production of microbial enzymes amylase, dextrinase, lactase, invertase, pectinase, proteinase, lipase, etc., and their use in medicine. Immobilized enzymes. Production of antibiotics. Producers of antibiotics. The value of genetic selection works in obtaining highly active strains-producers of antibiotics. Practical lesson. The study of the enzymatic activity (fermentation, proteolytic, cellulolytic) microorganisms. The creation of microorganisms using various sources of hydrocarbons. Isolation of actinomycetes from soil samples, deep cultivation on liquid media, determination of the antibiotic activity of the culture fluid of actinomycetes by diffusion into agar
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory work with a written report, tasks of the CDS and midterm control. Final control: exam.
Technical teaching aids:	Interactive whiteboard, electron microscope, handout; collection of microorganisms.
Literature:	1. Elinov N.P. Basics of biotechnology. St. Petersburg, "Science" 1995. 2. Egorova T.A., Klunova S.M., Zhivukhina E.A. Basics of biotechnology. Moscow: “ACADEMA”, 2003. 3. Industrial Microbiology. Ed. prof. Egorova NS, M.: "Higher School", 1987. • 4. Agricultural biotechnology. Ed. Acad. V.S. Shevelukhi.,

	M.: "Higher School", 2003,

Module name:	**M33 Applied Mechanics**
Module level as required:	Bachelor's programme
Abbreviation as required:	**AM**
Subtitle as required:	
Lesson type as required:	Lectures, practical classes, laboratory classes
Training semester:	5 semester
Person responsible for the module:	"Mechanics and engineering" Department
Teacher:	Abzalova D.A. , Associate professor
Language:	Kazakh, Russian, English
Connection with curriculum:	Interdisciplinary modules
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1hour , Practical classes - 1hour, Laboratory classes - 1hour, Current LIW -3,33hours; LIWT - 1hour, Total labor intensity - 7.33 hours.
Training load:	Lectures - 15 hours; practical classes - 15 hours ; laboratory classes -15 hours; current LIW- 50 hours; intermediate LIW-10hours; LIWT -15hours,Total labor intensity-120 hours.
Credit points:	4 ECTS – credits
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Higher Mathematics, Physics
Module objectives / planned learning outcomes:	After students complete the course, they should be able to: -Know the basic concepts, methods and theoretical foundations of the course of applied mechanics; - to classify machine parts; - understand the requirements for machine parts; - put into practice the basics of calculating machine parts; - perform verification calculations of the safety of machinery and equipment.
Content:	Lectures. Statics - forces, bringing the system of forces to the simplest form; body balance conditions; Kinematics - motion equation, speed, acceleration, movement trajectory and basic dynamics. Basics of material resistance, the concept - strength, stiffness, fatigue and stability. Deformation, types of deformation - tension and compression, shear, torsion, bending and complex deformations. The stress-strain state of the material and the basis of the theory of strength. Classification of machine parts. Requirement for machine parts. Criteria for performance and design of machine parts. Mechanical gears - gear, worm, friction, belt and chain drives. Shafts and axles. Types and calculation of parts detachable and one-piece connection. Practical work. The system of converging forces and parallel forces. Determination of the resultant geometric method. Conditions and equations. A system of converging forces and parallel forces. Determination of the resultant analytical method. Conditions and equilibrium equations. Arbitrary system of forces. Conditions and equilibrium of an arbitrary

	system of forces. A pair of forces and moments of forces relative to the point. The motions of the material point (kinematic methods of the task of movement, trajectory, speed and acceleration, tangent, normal and complete). General theorems of dynamics. Stretching and compression. Internal power factors. Voltage. Longitudinal and transverse deformations. Hooke's law. Torsion. Internal force factors in torsion. Stresses and strains in torsion. Bend Internal force factors in bending. Constructing diagrams of transverse forces and bending moments. Kinematics of mechanical gears. Calculations gears. Calculations belt and chain transmissions. Calculations of shafts and axles. Design and verification calculation of shafts and axles. Selection of bearings. Coupling calculation. The calculation of the connecting parts of machines for strength. Laboratory work. The study of the optical-mechanical coordinate device. Determination of torsional stiffness of the gear-shaft shaft. Measurement of the rigidity of the elastic elements of the devices. Investigation of the stress state of the power element of the test device design. Analysis of the output shaft geometry of the transmission mechanism.
Learning / examination outcomes / control forms:	Current control: protection of practical tasks; performance of control works; colloquia; milestone written and oral surveys. Final control - exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1. Kovalev N.A. Applied mechanics M .: Higher School, 2008, 476 p. 2.Feodosyev V.I. Strength of materials. M .: Publishing House of Moscow State Technical University. N.E. Bauman, 2009 - 539p. 3.Aleksandrov A.V. and others. The resistance of materials. -M .: Higher School, 2007. - 560 p. 4. Zayats M.L. Applied mechanics: Teaching manual. - Ekaterinburg: UrGUPS, 2016. – 238p. 5.Antropova T.A. Applied mechanics in examples and problems. Teaching aid. - Ekaterinburg: UrGUPS, 2015. - 108 p. 6.PFEIFFER F., BREMER H. (EDS.) THE ART OF MODELING MECHANICAL SYSTEMS. NEW YORK: SPRINGER, 2016. 392p.

Module name:	**M34 Engineering and Computer Graphics**
Module level as required:	Bachelor’s programme
Abbreviation as required:	ECG
Subtitle as required:	
Lesson type as required:	Laboratory classes, practical classes
Training semester:	3 semester
Person responsible for the module:	“Computer engineering and software" Department
Teacher:	Ymbetov N.C. c.t.s..Associate professor Senior lecturer
Language:	Kazakh, Russian, English
Connection with curriculum:	Interdisciplinary modules

Form of teaching / weekly training load in a semester:	Full-time / laboratory classes -1hour, Practical classes -1hour, Current LIW-3hours; LIWT -0.5hour. Total labor intensity - 5.5 hours.
Training load:	Laboratory classes -15 hours; practical classes - 15 hours; current LIW 45hours; intermediate LIW-7,5 hours; LIWT-7.5 hours.Total labor intensity - 90 hours.
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Higher Mathematics, Introduction to Specialty
Module objectives / planned learning outcomes:	After students complete this course, they must: -know the requirements of the general rules of registration of technical documentation, drawings - ESKD -Know the methods: two-image image, the solution of positional problems, the solution of metric problems. Know about computer graphics systems; AutoCAD; -apply the properties of parallel (orthogonal) projection; -solve graphical tasks to build a line of intersection of surfaces; to solve problems on the transformation of the drawing; - be able to create design documentation in the AutoCAD system.
Content:	Lectures. Orthogonal projection and its property. Complex drawing, straight and plane. Mutual position of points, lines and planes. Convert a complex drawing. Metric tasks. Perpendicularity of geometric elements. Ways to transform projections. Surface scan. Projection drawing. Axonometric projections. Design rules - types, cuts, sections, machine-drawing. The solution of graphic problems using computer technology. Practical work. Ways to transform projection planes. Axonometric projections. Geometric surfaces. Construction of surface sweeps. Positional tasks. The intersection of surfaces by planes. Graphic design drawings. Performance of sketches from life. Drawing an assembly drawing. Detailing the drawings of the assembly unit. Initial setting. Dialogue with the program. Shut down and save images. Opening existing drawings. Algorithm for creating new drawings. Compound primitives: construction and dismemberment. Construction of the drawing of a flat figure with elements of conjugation. Image control commands on the screen. Zoom and pan images. Construction drawings of parts. Editing images. Construction of a three-dimensional model of the object. 3D visualization. Commands for editing three-dimensional objects. Solid modeling. Printout of drawings.
Learning / examination outcomes / control forms:	Current control - solving typical tasks with a written report, written surveys. Final control exam.
Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1. Artyukhin G.A. Computer geometry and engineering graphics. Technology to create drawings. Tutorial. - Kazan: publishing house of Kazan arct.buil.university.2014. - 104 p. 2. Abonosimov O.A., Lazarev S.I., Kochetov V.I. Engineering

	Graphics. Tutorial. - Tambov: TSTU, 2017. – 82p. 3. Branoff T.J. Interpreting Engineering Drawings. 8 edition. - Cengage Learning, 2016. - XIV, 514 p. 4.Giesecke F. et al. Technical Drawing with Engineering Graphics. 15th edition. - Prentice Hall, 2016. - 1077 p. 5. Morling K. Geometric and Engineering Drawing. Third Edition. Elsevier, 2010. 360 p. 6.Arustamov Kh.A. Collection of tasks on descriptive geometry. With solutions of typical problems. M .: KnoRus, 2012. - 484 p.

Module name:	**M33.1 Cultivation of animal cell culture**
Module level as required:	Bachelor's programme
Abbreviation as required:	MBSG
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	5 semester
Person responsible for the module:	Lesbekova S.ZH.
Teacher:	Master, Art. Master, Art. prep.
Language:	Kazakh, Russian.
Connection with curriculum:	Basic discipline, optional component
Form of teaching / weekly training load in a semester:	Full-time / Lectures classes – 2h, laboratory classes – 2h, current SIW-3.66 h; SIWL-1.5 h. the Total complexity -9.16 hours
Training load:	Laboratory classes -30 h; laboratory classes – 30h, current SIW – 55 h; current SIW – 12.5 h; SIWL -22.5 h, Total labor intensity -150 hours
Credit points:	6 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control is not lower than 25 points
Recommended prior knowledge:	Preliminary knowledge in modules: Introduction to the specialty, Biochemistry, Fundamentals of biotechnology
Module objectives / planned learning outcomes:	After completing the study, the module is able to: - to consolidate the concept of the laws of the general basis of microbiology, sanitation and hygiene in biotechnology, dynamic and other features of biosystems; - to experiment and work with cultures of microorganisms, studying their morphological, cultural and physiological properties; - evaluate the quality of raw materials, nutrient media, intermediate products and target products; -regulate the requirements for raw materials and final products, as well as the requirements of biological safety, environmental issues; - independently perform the sanitary-bacteriological analysis.
Content:	**Lectures.** Introduction to animal cell culture. Culture of organs and tissues. Cell culture systems. Characteristics of cells cultured in vitro. the main type of animal cell cultures. Features of the cultivation of animal cells. Stages of cultivation of animal cells. Methods of cultivation in suspension culture and in the adhered state. Suspension culturing of Obtaining transgenic organisms. Culture media and conditions **Laboratory** Familiarization with the equipment and accessories in the microbiological laboratory. Preparation of materials and equipment for work with animal cell culture. Preparation of nutrient media for the cultivation of animal cell culture. Reseeding of the cells

	with trypsin. Freezing of cultured cell lines in liquid nitrogen.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory work with a written report, tasks of the CDS and midterm control. Final control: exam.
Technical teaching aids:	Interactive whiteboard, electron microscope, handout; collection of microorganisms.
Literature:	1. Rysbaeva g.s. guidelines for the implementation of laboratory work on the discipline "microbiology and sanitation": for students of the specialty 5b070100 - "biotechnology" / g. s. rysbaeva, r. a. abildaeva, e. zh. bulabayeva. - sksu. - 2014. 2. Temerbaeva m.v. sanitation and food hygiene: a tutorial / m.v. temerbaeva. - almaty: epigraph, 2017. - 360 p. 3. Mudretsova-viss, k.a. microbiology, sanitation and hygiene / k.a. mudretsova-viss, v.p. dedyukhin. - m .: ph «forum»: infra-m, 2009, 399s. 4. Martinchik a.n. microbiology, nutrition physiology, sanitation: textbook / a.n. martinchik, a.a. korolev, yu.v.nesvizhsky.- m .: akademiya publishing center, 2010. -352c.

Module name:	**M33.2 Breeding methods in biotechnology**
Module level as required:	Bachelor's programme
Abbreviation as required:	BMB
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	5 semester
Person responsible for the module:	Daurenbekova K. P., Lesbekova S.Zh.
Teacher:	c.a\s., senior lecturer, master, senior lecturer.
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, elective component
Form of teaching / weekly training load in a semester:	Internal / Lectures classes – 2h, laboratory classes – 3h, current SIW-4 h; SIWL-2h. the Total complexity -11hours
Training load:	Laboratory classes -30 h; laboratory classes – 45h, current SIW – 60 h; current SIW – 15 h; SIWL -30h, Total labor intensity - 180 hours
Credit points:	6 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Biochemistry, objects of biotechnology, Basics of biotechnology, Introduction to the specialty
Module objectives / planned learning outcomes:	After completing the module, the student is able to: -know the methods of increasing the productivity of plant varieties, strains of microorganisms; - to be able to analyze and study the laws of hereditary variability in hybridization and mutation process; - to know the development of artificial selection systems that contribute to the strengthening and consolidation of useful human traits in organisms with different types of reproduction; - be able to use to improve the level of theoretical training, as well as learn how to apply them in practice.
Content:	**Lectures.** Basics of breeding in biotechnology. Theoretical base of selection. Comparative characteristics of the methods of studying the variety. Breeding and seed production. Criteria for the selection of breeding material. Natural selection.

	Hybridization. Intraspecific hybridization. Interspecific. Polyploidy. Modern concepts of mutation and mutational variability the Use of heterosis in plant breeding. Hybridization, its types and importance in animal husbandry **Laboratory work**. Individual selection of wheat. Varietal characteristics of spring wheat for selection. Individual selection of oats. Varietal characteristics of oats for selection. Individual selection of barley. Varietal characteristics of barley for selection.
Learning / examination outcomes / control forms:	Current control: the successful execution and defense of laboratory work with written report, assignments, self-study and midterm examination. Final control: exam.
Technical teaching aids:	Interactive whiteboard, electronic microscope, handout; collection of microorganisms.
Literature:	1.Bakirov A. Animal breeding and biotechnology / A. Bakirov. – 2009. 2. Omirzak, T. O. Factors and forms of variability of breeding characteristics : monograph / T. O. Omirzak ; SHI MKTU im. A. Yasavi. - Shymkent : "Nurly Beine", 2008. - 124 p. 3. Tutorial on the discipline of "Transplantation and cryopreservation of embryos of farm animals" : "Biotechnology" / Beketov O. [and others]. - Shymkent : SKSU, 2017. 104 p. 4. Omirzak T. W. Dictionary of biotechnology Glossary / T. U. Omirzak, B. K. Mihatov, A. A. Saparbekova. - Shymkent : SKSU, 2016. - 270 p. - (Manuals for higher education institutions). 5.Workshop on selection and seed production of field crops – M.: ear, 1976 6.Boroevich S. Principles and methods of plant breeding. /Per. with Serbo-Croatian. Vladimir Inozemtsev. Ed. by A. K. Fedorov.-Moscow: Kolos, 1984.-343p 7.Tuzov Y. L., Fuchs, A., P. Valicek Breeding and seed production of cultivated plants.-M: Agropromizdat, 1991-463p 8.Popova T. M., Leontiev V. M., Kozlov, F. I., Abramova Z. V. a Guide to practical training in breeding and seed production of field crops.-M: Selkhozgiz, 1960.
Module name:	**M34.1 Molecular Genetic Basis of Biotechnology**
Module level as required:	Bachelor's programme
Abbreviation as required:	MGBB
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes,
Training semester:	5 semester
Person responsible for the module:	Ymirzak T
Teacher:	D. a. s., Professor,
Language:	Russian, Kazakh
Connection with curriculum:	Lectures, laboratory classes,
Form of teaching / weekly training load in a semester:	Basic discipline, elective component
Training load:	Internal / Lectures classes – 2h, laboratory classes – 3h, current SIW-4 h; SIWL-2h. the Total complexity -11hours
Credit points:	Laboratory classes -30 h; laboratory classes – 45h, current SIW – 60 h; current SIW – 15 h; SIWL -30h, Total labor intensity -

	180 hours
Prior knowledge for compliance with the examination requirements:	6 ECTS
Recommended prior knowledge:	Rating according to the results of current control – not lower 25 points
Module objectives / planned learning outcomes:	Preliminary knowledge in modules: Introduction to the specialty, Biochemistry, Fundamentals of biotechnology
Content:	After completing the study module the student is able to: - to characterize the features of DNA-protein interactions; - understand the mechanisms of replication of plasmid and genomic DNA, the main participants in the apparatus of replication; - apply knowledge of molecular genetics in the study of other biological disciplines; - to possess the main molecular genetic methods of research of genes of pro- and eukaryotes; - to carry out manipulations when working with basic devices used in molecular genetics and chemical reagents.
Learning / examination outcomes / control forms:	Lectures. The subject, goals and objectives of molecular genetics. Prerequisites and stages of development. Achievements of molecular genetics. Primary DNA structure. Components of DNA molecules and chemical bonds that connect them. Conformation of nucleic acid components. Alternative forms of DNA double helix. Denaturation and renaturation of DNA. DNA restriction analysis. "Walking" and "jumping" on the chromosome. DNA cloning. Nucleic acid hybridization methods. genome structure of viruses and phages. Domain structure of the bacterial chromosome. Operon organization of prokaryotic genes. Structure of prokaryotic genes. Bacterial plasmids. Proteins involved in DNA replication. Molecular mechanisms of replication of pro- and eukaryotes: similarities and differences. Involvement of ribosomes, mRNA, tRNA and auxiliary factors in translation. The structure of the ribosomes is pro- and eukaryotes. Mutational process. DNA repair. DNA recombination. Laboratory classes: The most important achievements of molecular biology and genetics. Fundamentals of genetic engineering and methods of genetic research. Molecular biology methods. Analysis of nucleotide composition and nucleotide sequences of nucleic acid fragments (problem solving). The structure of the genome of prokaryotes. The structure of the genome of eukaryotes. The material basis of heredity. Structure and DNA replication. DNA repair.
Technical teaching aids:	Current control: the successful execution and defense of laboratory work with written report, assignments, self-study and midterm examination. Final control: exam.
Module name:	Interactive whiteboard, electronic microscope, handout; collection of microorganisms.

Literature:	1 Zhimulev I.F. General and Molecular Genetics: Textbook for universities.-Novosibirsk: “Siberian University”, 2006.- 479 p. 2 Коничев А.С., Севастьянов Г.А. Молекулярная биология. 2-издание.-М:«Academia», 2005.- 400 с. 3 Konichev A.S., Sevastyanov G.A. Molecular biology. 2 nd edition. -M: “Academia”, 2005.- 400 p. 4 Bersimbayev I. Obshchaya i molekulyarnaya genetika: Uchebnoye posobiye / R. Bersimbayev K. Mukhambetzhany. - Almaty: Kazakhskiy universitet, 2005. - 264 s. 5 Human genetics with the basics of medical genetics. [Text] / T.N. Borisova, G. and. Dude - 2nd ed. corrected and add. - M.: Yurayt, 2016. - 182s. 6 Omirzak T.U. General and Molecular Genetics (lecture course) .- Shymkent: “Alem”, 2017.-288 p. 7 Mutaliyeva, B.Zh. General and molecular genetics methodical instructions to practical classes on the discipline of "General and molecular genetics" for students 5B070100 - "Biotechnology" specialty / B. Zh. Mutaliyeva. - Shymkent : SKSU, 2013. – 40 8 BRS Biochemistry, Molecular Biology, and Genetics (Board Review Series), LWW; Sixth edition (September 14, 2013) - by Michael Lieberman PhD, Rick Ricer MD – 432 p. ISBN-10: 9781451175363

Module name:	**M34.2 Plants and Animals Genetics**
Module level as required:	Bachelor’s programme
Abbreviation as required:	PAG
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes,
Training semester:	5semester
Person responsible for the module:	Ymirzak T
Teacher:	D. a. s., Professor,
Language:	Russian, Kazakh
Connection with curriculum:	Lectures, laboratory classes,
Form of teaching / weekly training load in a semester:	Basic discipline, elective component
Training load:	Internal / Lectures classes – 2h, laboratory classes – 3h, current SIW-4 h; SIWL-2h. the Total complexity -11hours
Credit points:	Laboratory classes -30 h; laboratory classes – 45h, current SIW – 60 h; current SIW – 15 h; SIWL -30h, Total labor intensity -180 hours
Prior knowledge for compliance with the examination requirements:	6 ECTS
Recommended prior knowledge:	Rating according to the results of current control – not lower 25 points
Module objectives / planned learning outcomes:	Preliminary knowledge in modules: Introduction to the specialty, Biochemistry, Fundamentals of biotechnology

Content: Learning / examination outcomes / control forms:	**Lectures.** Introduction The subject and methods of genetics. The practical importance of genetics for agriculture. Patterns of inheritance of traits during sexual reproduction. Cytological basis of heredity. Irregular types of sexual reproduction: parthenogenesis, apomixis, gynogenesis, androgenesis. The study of the karyotypes of animals and plants. Species specificity of the number and morphology of chromosomes. Karyotype Alternation of haplophase and diplophase in the life cycles of plants, animals and microorganisms. Gametogenesis in animals. Genomic mutations (polyploidy, heteroploidy, haploidy). Sporogenesis, gametogenesis in plants. The law of homologous series in hereditary variability N.I. Vavilova. Interaction of nonallelic genes. Monohybrid crossing. Chromosomal theory of heredity. Analyzing crossing. Returnable crossing. Genetics floor. Sex-linked inheritance. Hybrid crossing. Polybreeding. Mutational variability. Spontaneous and induced mutagenesis. Molecular basis of heredity. Complementarity, epistasis. Blood groups and biochemical polymorphism. Polymerism. Modifying genes. Inheritance of linked traits. Genetics of populations. Analysis of the population structure. Genetic basis of selection. Introduction to biometrics. Variation statistics. Correlation analysis. Reliability of statistical indicators and the difference between two arithmetic averages. Accounting for the hereditary variability of quantitative traits of a population. Genetics and biotechnology.
	Practical classes: Biology and morphology of Drosophila. Cell structure, nucleus, chromosome. Analysis of the karyotype of animals and plants. Mitosis and its phases. Meiosis. Gametogenesis. Monohybrid crossing. Analyzing crossing. Hybrid crossing. Methods of accounting for mutations. Compilation of variation series and their graphic representation. Calculation of matching criteria.
Technical teaching aids:	
Literature:	1 Zhimulev I.F. General and Molecular Genetics: Textbook for universities.-Novosibirsk: “Siberian University”, 2006.- 479 p. 2 Omirzak T.U. General and Molecular Genetics (lecture course) .- Shymkent: “Alem”, 2017.-288 p. 3 Genetics: Study Guide, Recommended Min. s / x RF / A. A Zhuchenko [and others]; Ed. A.A. Zhuchenko; International Association "Agro-education" - Moscow: Kolos S, 2006. - 480 p. : il - (Textbooks and study guides for students. universities) 4 Zorina Z.A. Fundamentals of ethology and genetics of behavior: Textbook / 3. A. Zorin, I. I. Poletaeva, Zh. I. Reznikova. - M.: MGU Publishing House, 1999. - 383 p.

Module name:	**M35.1 Cultivation of plant cell and tissue culture**
Module level as required:	Bachelor’s programme
Abbreviation as required:	
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	5 semester
Person responsible for the module:	Aimenova G
Teacher:	PhD
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, elective component
Form of teaching / weekly training load in a semester:	Full time / Lectures – 2h., laboratory classes – 3h., SIW – 4h., SIWT – 2h., Total labor coefficient – 11 hours

Training load:	Lectures – 30h., laboratory classes – 45h., LIW-60 hours; intermediate LIW-15 hours; LIWT -30 hours, The Total labor intensity-180 hours.
Credit points:	6 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge in modules: Introduction to the specialty, Biochemistry, Fundamentals of biotechnology
Module objectives / planned learning outcomes:	have the skills of biotechnology based on cultured plant cells. - obtaining practical skills in the selection of methods of cultivation of plant cells and tissues; - obtaining skills to compare the main types of media for the cultivation of plant cells and tissues and the selection of the most effective media;
Content:	***Lectures*** Introduction. Cell culture in solving theoretical problems of biotechnology. History of the method of culture of cells, tissues and organs of plants. The technique of cultivation and the conditions of asepsis when performing work on the cultivation of culture plants in vitro. Callus cultures. Dedifferentiation and callus formation as the basis for the creation of transplanted cell cultures. Nutrient media, plant growth regulators, and their application to the cultivation of plant cells. Surface cultivation. Growth rates of callus cultures and tissues in vitro. Suspension culture of plant cells. Deep cultivation of plant cells in a liquid nutrient medium. Composition of nutrient medium for deep cultivation of plant cell culture. Cultivation of individual plant cells. Haploid cell cultures. Culture of isolated protoplasts. Obtaining protoplasts. Methods of isolation and cultivation of protoplasts. Conditions for the cultivation of protoplasts. Fusion of protoplasts. Methods of induction of fusion of protoplasts. Mechanism of protoplast fusion Hybridization of somatic cells. The essence of the method of somatic hybridization of plant cells and tissues. Tubridy. Hybrids. Bioreactors for the cultivation of plant cells and tissues. Design features of bioreactors for growing plant cell and tissue culture The main directions of use of plant cell and tissue culture. Cellular technologies for obtaining economically important substances of plant origin **Laboratory works** Technique of work in the laboratory. Preparation of stock solutions. Cooking liquid and agar nutrient medium MS medium Preparation of plant material and isolation of explants Obtaining callus from immature embryos and wheat tillering nodes Obtaining callus from roots bean Subcultivation of callus
Learning / examination outcomes / control forms:	Current control: the successful execution and defense of laboratory work with written report, assignments, self-study and midterm examination. Final control: exam.
Technical teaching aids:	Interactive whiteboard, electronic microscope, handout; collection of microorganisms.
Literature:	1. Mukhambetzhanov S. K., Valikhanova G. Zh., Erezhepov A. E. Methodological guide to laboratory studies on tissue culture and plant biotechnology: textbook . - 2007. [on Russian] 2. Zagoskina N. V., Nazarenko, L. V., Kalashnikova E. A., Sivukhina E. A. Biotechnology: theory and practice. – M.:

	Publishing House Of Onyx, 2010. – 496 p. [on Russian] 3. Egorova, T. A., Klenova S. M., Sivukhina E. A. Fundamentals of biotechnology.- Moscow: Academy, 2009. – 208 p. [on Russian] 4. Butenko R. G. Biology of higher plants in vitro and biotechnology based on them. – Moscow: FBK – Press, 2008. – 259p. [on Russian]

Module name:	M35.2 Plant Biotechnology
Module level as required:	Bachelor's programme
Abbreviation as required:	PB
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	5 semester
Person responsible for the module:	Yelemanova Zh.R.
Teacher:	Candidate of Agricultural Sciences, senior lecturer Yelemanova Zh.R.
Language:	Kazakh, Russian.
Connection with curriculum:	Component of choice
Form of teaching / weekly training load in a semester:	Full time / Lectures – 2h., laboratory classes – 3h., SIW – 4h., SIWT – 2h., Total labor coefficient – 11 hours
Training load:	Lectures – 30h., laboratory classes – 45h., LIW-60 hours; intermediate LIW-15 hours; LIWT -30 hours, The Total labor intensity-180 hours.
Credit points:	6 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Preliminary knowledge of the modules: Biochemistry, Cell Biotechnology, Biotechnology Objects, Microbiology, Plant Physiology
Module objectives / planned learning outcomes:	After completing the study module the student is able to: to analyze modern biotechnological methods; to make, the purpose of obtaining economically important substances in an industrial way; evaluate the growth of subcultured cells, cultivate cells on agar and in liquid medium, sterilize the source material and isolate explants from it, work in a laminar box, prepare nutrient media for cultivation; compile theoretical and methodological principles in plant biotechnology; to carry out the production of regenerated plants by biotechnological methods for the genetic improvement of plants, facilitating and accelerating the selection process; maintain a unique feature of cultured cells to regenerate in vitro the whole plant; evaluate the quality of raw materials, nutrient media, cloned cell cultures and targeted biotechnological products;
Content:	In the process of studying this module, students get an idea of the goals and objectives of biotechnology; Plant biotechnology and its specificity; Mastering the methods of obtaining sterile cultures, micropropagation and cultivation of plant material on nutrient media; cultivate plant cells as an object of

	biotechnology; Cell technology in the biosynthetic industry, the stages of work on the creation of cell technology for the production of economically important substances; Improving the quality of crop products using biotechnology; Clonal micropropagation and plant health, clonal micropropagation of plants and its advantages, methods of clonal micropropagation; Improvement and improvement of plants using biotechnology; New advances in the treatment of plants with the help of biotechnological research; Variability of cultured cells and its use in breeding, callus cultures on agar and in liquid medium; Cell engineering is an artificial way to get new plant forms; Plant genetic engineering, opportunities and prospects for plant genetic engineering; Cryopreservation of cultured cells, cell preparation, cryoprotectants; Cryobank;
Learning / examination outcomes / control forms:	- as a result of mastering the discipline, the student must know the organization of the biotechnological laboratory, the principles and methods of microclonal propagation of plants; - be able to prepare sterile nutrient media, have an idea about the cultivation of plant material "in vitro"; - possess skills to work on the equipment of a sterile biotechnological laboratory; - analyze and use living organisms, their systems or their vital activity to solve technological problems, as well as the possibility of creating living organisms with the necessary properties by genetic engineering.
Technical teaching aids:	Interactive board, handout
Literature:	

Module name:	**M36.1 Training workshop working profession «Laboratory assistant microbiologist»**
Module level as required:	Bachelor's programme
Abbreviation as required:	
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	5 semester
Person responsible for the module:	
Teacher:	Ablidaeva R.A.
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, component of choice
Form of teaching / weekly training load in a semester:	Full time / Lectures – 2h., laboratory classes – 2h., SIW – 3.66h., SIWT – 1.5h., Total labor coefficient – 9.16 hours
Training load:	Lectures – 30h., laboratory classes – 30h., LIW-55 hours; intermediate LIW-12.5 hours; LIWT -22.5 hours, The Total labor intensity-150 hours.
Credit points:	5 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Basics of biotechnology, General and molecular genetics, Industrial biotechnology, Instruments and methods of

	research of biological systems
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - explain the basic laws of the flow of microbiological processes of life in biological objects: - to give information about the modern achievements of science in microbiological and biotechnological processes, the use of tools and devices, to give an idea of biotechnological installations and equipment; -prepare sterile culture media for microbiological control; - independently maintain and operate the equipment of chemical-analytical and microbiological laboratory; - -complete the documentation during the selection and registration of samples; - perform the preparation and holding of microbiological and chemical analytical testing; - to cultivate microorganisms, viruses and carry out the preparation of drugs for microscopy; - to argue the requirements for raw materials and the final product, as well as the requirements of biological safety, environmental issues;
Content:	**Lectures.** Microbiology as a science. Microorganisms in the national economy. Shape and size of prokaryotes. General principles and some details of the structural organization of the prokaryotic cell, the chemical composition and functions of its individual organelles and compartments. Research methods and requirements to them. Taxonomy and morphology of microorganisms. Bacteria – prokaryotic single-celled microorganisms. The accumulation of culture and the principle of elective. Cultivation of microorganisms. The power and features of microorganisms. Features of protein and carbohydrate metabolism in bacteria. **Laboratory work.** Rules of work in microbiological laboratory. Microscope and microscopy technique. Preparation of preparations for microscopic studies. Morphology of microorganisms and methods of its study. Structure of bacteria and yeast cells. Cultivation of microorganisms. The cumulative allocation of pure culture of microorganisms.
Learning / examination outcomes / control forms:	Current control: Exam
Technical teaching aids:	Interactive whiteboard., microscope, collection of microorganisms, tubes with agar.
Literature:	1. Lecture Notes on the discipline "Microbiology and Virology", Shymkent, SKSU, 2011 2. Belyasova, N. And. Microbiology: A Textbook / N. And. Belasova. - Meganewton.: Vysheishaya SHK., 2012. - 443 p. [In Russian] 3. Volin, E. G. Private Microbiology: study guide / G. E. Volin, E. L. Saruhanov. - M.: RUDN, 2016. - 222 p. [In Russian] 4. Rubina, E. A. Microbiology, nutrition physiology, sanitation: Textbook / E. A. Rubina, V. F. Malygina. - Moscow: Forum, SIC INFRA-M, 2013. - 240 p. [In Russian] 5. Microbiology, OpenStax College (November 1, 2016) - by Nina Parker, Mark Schneegurt, Anh-Hue Thi Tu, Brian M. Forster, Philip Lister – 1309 p. ISBN-10: 1938168143 [In English] 6. Mudretsova-viss, K. A. Microbiology, sanitation and hygiene / K. A. Mudretsova-viss, V. P. Dedyukhina. – Moscow: publishing house "FORUM": INFRA-M, 2009,- 399 p. [In Russian]

Module name:	**M 36.2 Training workshop working profession « Inseminator technician »**
Module level as required:	Bachelor's programme
Abbreviation as required:	TWWPIT
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	5 semester
Person responsible for the module:	Bigara T.C.
Teacher:	candidate of agricultural Sciences, associate Professor
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, component of choice
Form of teaching / weekly training load in a semester:	Full time / Lectures – 2h., laboratory classes – 2h., SIW – 3.66h., SIWT – 1.5h., Total labor coefficient – 9.16 hours
Training load:	Lectures – 30h., laboratory classes – 30h., LIW-55 hours; intermediate LIW-12.5 hours; LIWT -22.5 hours, The Total labor intensity-150 hours.
Credit points:	5 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Objects of biotechnology, Introduction to the specialty, Basics of biotechnology, Agricultural biotechnology.
Module objectives / planned learning outcomes:	After completing the module, the student is able to: -demonstrate knowledge of anatomical structures, physiological state, pathology of farm animals; -to know the requirement and to acquaint with the main structures of genitals of females and males, and functions of genitals as objects of selection and biotechnology of farm animals; -to be able to solve the possibilities and values of artificial insemination of animals as a theoretical basis for a system of techniques aimed at improving the productivity of farm animals, improving the quality of agricultural products;
Content:	**Lectures.** A brief history of the development of artificial insemination of animals. Physiological purpose of the sexual apparatus of females and males. Sexual cycle, its stages and phenomena. Physiology and biochemistry of animal sperm. The receipt of semen by using artificial vagina. The study and evaluation of semen. Sperm storage and transportation. Technique of insemination of farm animals. **Laboratory work.** Rules in paragraph insemination of animals. Microscope and microscopy technique. Preparation of preparations for microscopic studies. Getting sperm. Study of the structure of animal sperm cells. Preparation of insemination equipment.
Learning / examination outcomes / control forms:	Current control: Dif. Reckon
Technical teaching aids:	Interactive whiteboard., microscope, инструменты для искусственного осеменения
Literature:	1. Veterinary obstetrics and animal reproduction Biotechnics : textbook for universities on spec. "Veterinary", "Zootechnics", "Technology of agricultural production"; Rivers.s/x RF / N. I. Polyantsev, V. V. Podberesky. - Rostov n/A : Phoenix, 2001. -480 p. [In Russian] 2.Polyantsev N. So. Veterinary obstetrics and animal reproduction Biotechnics : textbook for universities on spec. "Veterinary",

	"Zootechnics", "Technology of agricultural production"; Rivers.s/x RF / N. I. Polyantsev, V. V. Podberesky. - Rostov n/A : Phoenix, 2001. - 480 p. [In Russian] 3.Doroshenko M. V. Diseases of sheep and goats : reference manual / M. V. Dorosh. - M. : Veche, 2007. - 160 p. [In Russian]

Module name:	**M32 Ecology and Fundamentals of Life Safety**
Module level as required:	Bachelor's programme
Abbreviation as required:	LSF
Subtitle as required:	
Lesson type as required:	Lecture, practical classes
Training semester:	5 semester
Person responsible for the module:	"Life safety and environmental protection" chair
Teacher:	Candidate of Technical Sciences, Associate professor Shingisbaeva J.
Language:	Russian, Kazakh
Connection with curriculum:	General education discipline, elective component
Form of teaching / weekly training load in a semester:	Full time / Practical classes – 2h., current SIW – 3h., SIWT – 0.5h., Total labor coefficient – 5.5 hours
Training load:	Practical classes – 30h., current SIW – 45h., intermediate SIW – 7.5h., SIWT – 7.5h., Total labor coefficient – 90 hours
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Modern history of Kazakhstan, Physics
Module objectives / planned learning outcomes:	After completion of the module, students should be able to: - have idea of the basic laws and problems of ecology; - understand relationship of production and environmental processes; - explore the impact of production processes on the environment; - take precautions when working in laboratories and use personal protective equipment; - analyze negative factors in an emergency situation and make competent decisions on the preservation of life and health; - organize basic measures of protection, labor protection and life safety; - independently prepare documentation for environmental activities at industrial enterprises; - carry out group presentations of results of practical tasks on ensuring occupational safety in enterprises; - carry out safety instructions and provide first aid to injured persons.
Content:	**Lectures:** Basics of general ecology. Concept of biocenosis, biogeocenosis, ecosystem. Paradigms of ecology development. The law of Liebig, the law of Shelford, the law of sustainability of ecosystems. Teachings of V. Vernadsky about the biosphere and its evolution. Technosphere. Basic laws of ecology of the Commoner. Global, regional, republican environmental problems. Ecological aspects of the use of natural resources. Ecological and economic methods of environmental impact assessment. Physical pollution. Organization of work and labor

	protection measures at industrial enterprises. Administrations and services of civil defense and emergency situations. **Practical lessons:** Calculation of industrial lighting. Fire and explosion prevention systems, fire protection. Fire fighting technique. Danger zones, safety devices and safety signs. Effect of electric current on a human body and factors that determine the outcomes of human damage. Basics of electrical safety. Global, regional, republican environmental problems.
Learning / examination outcomes / control forms:	Current control: successful implementation and defense of practical lessons; colloquium; midterm written and oral surveys. Final control: exam.
Technical teaching aids:	Handouts, computer programs, laboratory stands, posters, electronic teaching aids
Literature:	1. Ivanova N.I., Fadina I.M. Engineering ecology and environmental management. – M.: Logos, 2014. – 520 p. 2. Galperin M.V. General ecology. – M.: Forum, Infra-M, 2007. – 336 p. 3. V.T. Medvedev, S.G. Novikov, A.V. Karalyunets, T.N. Maslova. Labor protection and industrial ecology. – M.: Academy, 2016. – 416 p. 4. Michael L. Cain. Ecology. Sinauer Associates, Inc. 2008. Hardback 544 pages. 5. Alexeyev V.S., Ivanyukov M.I. Life safety fundamentals. – M.: Dashkov and Co., 2008. – 240 p. 6. Whitacre, David M. (Ed.) Reviews of Environmental Contamination and Toxicology, Springer 2012, ISBN 978-1 - 4614-1462-9.

Module name:	**M37.2 Green ecology**
Module level as required:	
Abbreviation as required:	ZE
Subtitle as required:	
Lesson type as required:	Practical classes
Training semester:	6 semester
Person responsible for the module:	Chair: Ecology
Teacher:	Candidate of Technical Sciences, Associate professor Shingisbaeva J.
Language:	Kazakh, Russian
Connection with curriculum:	Base discipline, optional component
Form of teaching / weekly training load in a semester:	Full time / Practical classes – 1h., SIW – 3h., SIWT – 0.5h., Total labor coefficient – 5.5 hours
Training load:	Practical classes 15h., current SIW – 45h., intermediate SIW – 7.5h., SIWT – 7.5h., Total labor coefficient – 90 hours
Credit points:	3ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After completion of the module, students should be able to: - lists tools of “green” economy; - explain integrity of the surrounding world’s perception as a

	source for development of "green" economy; - reveal structure of the nature's organization, relationship of its elements from the standpoint of "green" economy development; - solve problems by natural science method of knowledge, continuity, adequacy of its reflection; - analyze statistical information on the global investment in the green economy; - discuss issues of environmental conditionality of the economy.
Content:	**Practical lessons.** Study of theoretical prerequisites for formation of "green" economy strategy. Study of theoretical prerequisites for formation of "green" economy and current research directions in the field of green economy. Study of environmental conditionality issues of economy. Consideration of issues of ensuring sustainable development based on the principles of "green" economy. Research and classification of green economy tools and need for their application. Consideration of main directions contributing to the "planting of greenery" of the entire economy. Study of ecological-economic system and conditions for its sustainable development. Consideration of main segments of "green" economy. Study of activities of international organizations promoting the principles of "green" economy, as well as investment directions of funds for transition to "green" economy. Discussion of global energy-ecological strategy for sustainable development of the 21st century.
Learning / examination outcomes / control forms:	Current control: drawing up a glossary, writing an essay, defense of a library-research paper, midterm written and oral surveys by the studied topics. Final control: exam.
Technical teaching aids:	Handouts, electronic teaching aids
Literature:	1. Natural science and fundamentals of ecology: Teaching aid / R.A. Perrosova, V.P. Golov, V.I. Sivoglazov, E.K. Stroud. 4th ed., stereotyped. M.: "Academy", 2013. – 246 p. 2. Voitkevich G.V., Vronsky V.A. Fundamentals of theory on the biosphere. – Rostov-on-Don, 1996. 3. Concept for transition of the Republic of Kazakhstan to "green economy". 4. Danilova V.C., Kozhevnikov N.N. Basic concepts of modern natural science. – M.: Aspect Press, 2010. – 257 p. 5. Environmental Science: A Global Concern / W.P. Cunningham, M.A. Cunningham. – eleventh edition. – New York: McGraw-Hill Irwin, 2010. – 616 p. 7. Barbier Edward B., Markandya Anil, A New Blueprint for a Green Economy, Earth scan from Routledge, New York 2013.

Module name:	M38.1 Engineering Economics and Entrepreneurship
Module level as required:	Bachelors
Abbreviation as required:	IEP
Subtitle as required:	Bachelor's program
Lesson type as required:	Lectures, practical classes

Training semester:	6 semester:
Person responsible for the module:	Department of "Economics"
Teacher:	Ph.D., associate professor Polezhaeva Inna Sergeevna; Ph.D., Art. teacher Apsenbetova Gulnara Tursynbekovna
Language:	Kazakh, Russian, English
Connection with curriculum:	Basic discipline, a required component
Form of teaching / weekly training load in a semester:	Full time / Lectures – 1h., Practical classes – 1h., SIW – 3h., SIWT – 0.5h., Total labor coefficient – 5.5 hours
Training load:	Lectures – 15h Practical classes 15h., current SIW – 45h., intermediate SIW – 7.5h., SIWT – 7.5h., Total labor coefficient – 90 hours
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Fundamentals of Economics, Chemistry and technology of inorganic substances, Fundamentals of design and equipment of plants
Module objectives / planned learning outcomes:	After students complete the course, they should be able to: - independently make informed decisions on the business activities of production, clearly formulate conclusions and suggestions; - describe the main economic categories and patterns of economic development; -explain the policy of foreign economic activity of production; - discuss various economic systems; - to take part in discussions on business activities; - to conduct presentations of macro and microeconomic systems.
Content:	Lectures: Social production is the basis of the development of society. Types of economic systems and patterns of transition economies. The essence and mechanism of functioning of a market economy. Fundamentals of the theory of supply and demand. The essence of capital. Circulation and turnover of capital. Enterprise and management. Entrepreneurial activity of productions. The development of small and medium businesses. Costs and income of the enterprise. National economy as a system. Macroeconomic equilibrium and deviations. Cyclicity as a pattern of economic development. State in a market economy. Foreign economic activity of the state. Practical: The problem of economic realization of property. The main features and evolution of natural and commodity economy. Types of markets. Market infrastructure. Business principles. Key macroeconomic indicators, objectives and tools of macroeconomics. The economic functions of the state. The essence of the main forms of international economic relations.
Learning / examination outcomes / control forms:	Current control: collective discussions and discussions at lectures with the ability to express their thoughts and ideas; abstracts, role-playing games, oral polls. Final control - exam.

Technical teaching aids:	Interactive whiteboard, slides, handouts
Literature:	1. Raizberg B.A. Industrial economics: a textbook for students. - Almaty: Economy, 2012. (рус.) 2. Tusmaganbetova D.G. Bases of economic theory: studying book / D. G. Tusmaganbetova. - Almaty: Evero, 2015. - 292 p (рус.) 3. Tusmaganbetova D.G. Basics of investing: a tutorial / D. G. Tusmaganbetova. - Almaty: Evero, 2015. - 151 p. (рус.) 4. Polezhaeva I.S., Tulemetova A.S., Shevchenko I.I. Study Guide "Entrepreneurship" Shymkent, 2018 (рус.) 5. Baymukhanov, Bayneeva F.T., Alzhanova A.A. Entrepreneurship. Tutorial. Almaty, 2015(рус.)

Module name:	**M39 Standardization, certification and metrology**
Module level as required:	Bachelor's program
Abbreviation as required:	SCM
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	6 semester
Person responsible for the module:	Department «Standardization and certification»
Teacher:	c.t.s., associate professor Tulekbayeva Ayzhamal Konisbayevna, PhD, associate professor Kaldybayeva Botagoz Myrzakhmetovna
Language:	Russian, Kazakh
Form of teaching / weekly training load in a semester:	Full time / Lectures – 1h., Practical classes – 1h., SIW – 3h., SIWT – 0.5h., Total labor coefficient – 5.5 hours
Training load:	Lectures – 15h Practical classes 15h., current SIW – 45h., intermediate SIW – 7.5h., SIWT – 7.5h., Total labor coefficient – 90 hours
Credit points:	3 ECTS-credits
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	After students completed studying of this course, they are capable: - to have an idea of the standard and legal documents regulating the relation of subjects in the course of introduction and application of standards in the system of technical regulation and metrology; about the basic principles and provisions of systems of standardization, certification and metrology in the Republic of Kazakhstan, certification scopes, schemes and subjects to certification, rules and procedures of certification of products and services, scientific and technical ensuring certification; - to know about story and the current state of standardization, metrology and certification, about the organization of activities for standardization, metrology and certification in the field of the professional activity; terms and definitions, legal bases of systems of standardization, certification and metrology; legislative and normative documents, methodical materials on standardization, certification and metrology, rules and procedures of certification of products and services, rules of certification of quality systems

	and products; - to be able to carry out measures for protection of water objects, to prevent and eliminate consequences of their pollution as a result of anthropogenic activity on the basis of requirements of normative documents; to use standards and other normative documents at assessment, quality control and certification of products; to use terminology and normative and technical documents in the field of certification; to apply computer technologies to planning and work for certification; to apply methods of quality control of products and processes at work on certification; - to have skills to apply methods of the analysis of processing of experimental data, systematization of scientific and technical information; revision of the existing standards and other certified documents; introduction of systematic verification of the standards applied at the enterprise and other certified documents; studying and systematization of the best domestic and foreign practices in the field of chemical technology of refractory nonmetallic and silicate materials;
Content:	Lectures. Introduction. Standardization and certification. Purpose and problems of discipline. Standardization emergence history as sciences. Development of standardization in Kazakhstan. Legislative base of standardization, metrology and certification. Law of the Republic of Kazakhstan "On Technical Regulation". Purposes and problems of standardization. Principles of standardization. Standardization methods. Types of standards. International standardization organizations ISO. Regional standardization organizations. Standardization of systems of quality management. Ecological standardization. Standardization of services. Shaped coding of the Republic of Kazakhstan. Standard documents in the field of shaped coding of products. Basic concepts and essence of certification. Certification of products. Order of carrying out certification of products. Compliance confirmation. Confirmation of compliance and ensuring unity of measurements. Types of assessment of compliance of products, processes, works and services. Bodies for confirmation of compliance of products, processes, works, activity of testing laboratories. Marks of conformity. State and top trends of development of certification. Concept of confirmation of compliance. Branch features of confirmation of compliance. Schemes of certification. Inspection control certified products/services. Certification of services. History of measurements. Law of the Republic of Kazakhstan "About Ensuring Unity of Measurements". Role and value of achievement of unity of measurements in trade, science, industry and equipment. Classification of measurements. Methods of measurements. Types of measurements. International System of Units of physical quantities. Measurement methods. Types of control. Calibration and checking of measuring instruments. Technique of performance of measurements. A concept about an error, their classifications Seminar: Work with annual indexes of standards. Work with monthly indexes of standards (CAC, ISC). Basic principles and methods of standardization. Introduction of the ISO standards. Basic concepts and essence of certification. Certification of products. Order of carrying out certification of products. Standardization and priority of consumers. Law of the Republic of Kazakhstan "About Consumer Protection". Certification and technical barriers in trade. Schemes of certification. Legal bases of the state system of technical regulation in RK. Harmonization of schemes of certification of the countries of the CU / Evraes. Rules and documents on work in the field of certification.

	Documenting of processes at the enterprises according to ISO. Responsibility for selling of goods without certificate of conformity. Similarity and differences in the status of the international ISO standards, MEK standards and Kazakhstan. Standards of units of physical quantities, their classification and development. Metrological characteristics, indicators of reliability of SI. Definition of limits of the absolute, relative and given admissible basic error. Measurement error assessment. Summation of an error. Standards, schemes of check and equipment for check. Systematic errors and methods of their exception.
Learning / examination outcomes / control forms:	Current control: protection of papers, essay; oral polls and an interview on materials of lectures, protection of collective practical works with the written report. Total control - examination
Technical teaching aids:	Distributing materials, interactive board, modern computers
Literature:	1. Shakkaliyev A.A., Kanayev A.T., Alchikanova A.T. Standardization Manual, Astana, 2014. - 218 pages. 2. Belobragin V.Ya. Bases of technical regulation: Manual for higher education institutions. - the 2nd edition corrected and added. - M: RIA "Standards and quality", 2012.-424 pages. 3. Lifits I.M. Standardization, metrology and certification: The textbook - M. "Prod.Yurayt", 2015. - 296 pages. 4. Alekseev V.V. Metrology, standardization and certification: the textbook for higher education institutions. - M, 2015. - 279 pages. 5. Goncharov A.A. Metrology, standardization and certification. Manual for higher education institutions. - M, 2015. - 354

Module Name:	**M 40.1 Methods of teaching biology**
Module level as necessity:	Baccalaureate
Abbreviation as necessity:	**MTB**
Subtitle as necessity:	
Type of lesson as necessity:	
Semester:	6 Semester:
Responsible person for the module:	Rysbaeva G.S.
Lecturer:	senior lecturer
Language:	Kazakh, Russian.
Connection with the curriculum:	Basic discipline, optional component
Form of study / weekly workload per semester:	Full-time / Lectures - 1h, practical classes - 1h, SIW -3h, SIWT – 0,5h. Total complexity – 5,5 hours
Study load:	Lectures - 15 hours, practical classes - 15 hours, SIW -45h, SIW - 7,5h, SIWT – 7,5h. Total workload - 90 hours
Credit points:	3 ECTS
Prerequisites for matching exam requirements:	Rating according to the results of current control is not lower than 25 points
Recommended prerequisites:	
Module objectives / expected learning results:	After completing this course, students should be able to: - to diagnose and plan the educational process; - to organize the educational process in biology - correctly use visual teaching aids, training and laboratory equipment during lessons, excursions.
Content:	Lectures

	Trends in the development of the theory of education and training. Research methodological and theoretical foundations of biological education. Historical stages of the emergence of "Methods of teaching biology." Methodical works of Kazakhstan scientists-methodologists. Modern problems of the theory of biological education and upbringing. Methodical foundations of biological education. Problems of optimization and modeling of the content of biological education. Components and structure of biological education. The system of biological knowledge: theories, laws, patterns and factors. Biology teaching methods, their definitions and criteria. Classification of teaching methods. The lesson is the main form of organization of educational work in biology. Modern requirements for biology lessons. Functions of the lesson. Technological basis of biological education. Practical: Biology subject, planning of the educational process, methods of forming and developing biological concepts, methods of teaching biology, their types and classification, choosing methods of teaching biology, forms of teaching biology, developing a lesson method as an integral system of the learning process, non-traditional biology lesson.
study / examination results forms of control:	Current control - substantiated reports of students' independent work, tasks on modeling specific situations corresponding to scientific facts and concepts, theoretical questions on the test of knowledge; specific situations formulated or shown to test the ability to recognize biological phenomena.
technical training tools:	Handouts, interactive whiteboard, laptops
references	1.Ponomarev I.N., Solomin V.P., Sidelnikova G.D. General methods of teaching biology textbook for students of pedagogical institutes-3 ed. Ster-Higher professional education Pedagogical specialty, GRIF., 2003 2. Nikishin S.A. Methods of teaching biology, -M., 2007 3. Konyushko V.S., Chubaro S.V., Pavlyuchenko S.E. Methods of teaching biology. -Mn, 2003.-168s.

Module name:	**M 40.2 Technology of criteria assessment**
Module level as required:	Bachelor's program
Abbreviation as required:	TCA
Subtitle as required:	
Lesson type as required:	Lectures, Practical classes
Training semester:	6 semester
Person responsible for the module:	Rysbaeva G. S.
Teacher:	Senior lecturer
Language:	Russian
Connection with curriculum:	Basic discipline, component of choice
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1 hours, Practical classes - 1 hours., SIW -3 hours, SIWT – 0.5 hours. Total complexity – 5.5 hours.
Training load:	Lectures - 15 hours, Practical classes - 15 hours, SIW-45 hours,– intermediate SIW – 7.5h., SIWT – 7.5h., Total labor coefficient – 90 hours.
Credit points:	3 ECTS
Prior knowledge for	Rating on the results of the current control is not less than 25 points

compliance with the examination requirements:	
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Basics of biotechnology, General and molecular genetics, Industrial biotechnology.
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - know the main approaches to monitoring and evaluation of learning outcomes; - choose approaches to monitoring and evaluation that correspond to the goals and content of the taught disciplines; - determine the models, types and methods necessary to monitor and evaluate the learning outcomes of the subjects taught; - create materials that control the achievement of learning outcomes - develop evaluation parameters and criteria; - use reflection and feedback to improve the effectiveness and quality of teaching;
Content:	Modern concepts of monitoring and evaluation of learning outcomes. Competence-based approaches to setting goals and determining learning outcomes. Models of monitoring and evaluation of learning outcomes. Forms and methods of monitoring and evaluation of surface and deep learning. Types of control and evaluation: diagnostic, formative, summative, alternative. Methods of evaluation of learning outcomes. Testing and types of tests: based on the rule and on the criteria. Principles and format of testing. Reflection. Types of reflection. Various methods of reflection. The role of feedback in the educational process. Assessment systems in different countries. Practical approaches to learning: planning and conducting micro-lessons. **Practical class:** Relationship between assessment criteria and the methodological objectives of the study. The link between assessment criteria and didactic learning objectives. How criteria-based assessment contributes to the development of students have an objective self-assessment. Category, criterion, descriptor, how they are related to the goals and objectives of training. Practical approaches to learning: planning and conducting micro-lessons.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of practical work with a written report, tasks SIW and midterm control.Final control – exam.
Technical teaching aids:	Handouts, interactive whiteboard
Literature:	1. Baehr, M. Distinctions between assessment and evaluation. *Faculty Guidebook.* Pacific Crest, pp. 441-444. [In English] 2. Biggs, J., & Tang, C. (2011). Teaching for Quality Learning at University, 4th editionю Berkshire: Open University Press. [In English] 3. Pakhomova N. Method of the educational project in an educational institution: a Guide for teachers and students of pedagogical universities. – M.: ARCTI, 2003. - 100 p. [In Russian] 4. Ksenzova G. Lessons of self-control and self-assessment: goals, components, types // Director of the school. 2001. No. 2. [In Russian] 5. Kuznetsova L. M. Assessment of students ' knowledge and new learning technology // Education in modern school. 2001. No. 9. [In Russian] 6. Rodionov V. A. Criteria evaluation: history of development // Social prevention and health. 2006. -№ 6. [In Russian] 7. Stupnitskaya M. A., Belov A.V., Rodionov V. A. Criteria assessment as a health-saving factor of the school environment. School of health. 2003. -№ 3. [In Russian]

	8. Golub G. B., Churakova O. V. Methodical recommendations "Method of projects as technology of formation of key competences of pupils". – Samara, 2003. – 150 p. [In Russian]

Module name:	**M41.1 Organization of Biotechnological Productions in Agriculture**
Module level as required:	Master's program
Abbreviation as required:	OBPA
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes, Practical classes
Training semester:	6 semester
Person responsible for the module:	Saparbekova A.A. Nadirova G.K.
Teacher:	k.b. n., associate professor
Language:	Russian, Kazakh
Connection with curriculum:	Profile discipline, component of choice
	Full-time / Lectures - 2 h, laboratory classes -2h. Practical classes - 1h., SIW - 4 hours, SIWT – 2 hours. Total complexity – 11hours.
	Lectures - 30 hours, laboratory classes – 30. hours, practical classes - 15h. SIW-60hours,–intermediate SIW – 15h., SIWT – 30h., Total labor coefficient – 180 hours.
Credit points:	6 ECTS
Module objectives / planned learning outcomes:	After studying the module, the student is able: - to know about the basics, features and diversity of biotechnology industries, problems and prospects of new industries; - to understand the basic principles, methods and technological stages of obtaining finished products of biotechnological industries; - to use modern approaches to the organization of biotechnological productions and separate stages of technological process, applying system approach to the organization of the biotechnological enterprise: - to analyze the principles of organization of biotechnological productions on the basis of standard biotechnological schemes; using the features of modeling and optimization of biotechnological schemes and processes; - evaluate and identify the most appropriate biotechnological production from an environmental and economic point of view .
Content:	The lecture material contains information about the main achievements and prospects of development of biotechnology as a diversified field of activity; technologies and principles of organization of the biotechnological process in traditional and new industries; economic aspects of the oranization of biotechnological industries;. In laboratory classes, the student learns the types of producers, as a determining component of production and their basic properties. Requirements for nutrient medium. Factors affecting the characteristics of the cultivation process. Characteristics of the final stages of biotechnological production. Methods of storage and use of the product. The main products of the biotechnological process. Features of their production.
Literature:	1 Biotechnology / A. Ya. Samuylenko. - 2nd ed. - M. : [b. I.], 2013. - 746 p.

	2. Modern aspects of biotechnology : studies.-method. manual / E. A. Kalashnikova, R. N. Kirakosyan ; Grew. GOS. Agrar. University - MTAA them. K. A. Timiryazev. - M. : publishing house of Russian state agrarian University - MTAA, 2016. 125 p. 3 Filatov O. Yu., Malyshev I. Yu. Cell biotechnologies in endocrinology (textbook for students of the medical faculty and students of the faculty of postgraduate education). — M., 2010

Module name:	**M41.2 Processes and devices of chemical technology**
Module level as required:	Bachelor's program
Abbreviation as required:	PADCH
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes, Practical classes
Training semester:	6 semester
Person responsible for the module:	Eskendirov Ch,Z.
Teacher:	k.t. n., associate professor
Language:	Kazakh, Russian
Connection with curriculum:	Profile discipline, elective component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 2 h, laboratory classes -2h. Practical classes - 1h., SIW - 4 hours, SIWT – 2 hours. Total complexity – 11hours.
Training load:	Lectures - 30 hours, laboratory classes – 30. hours, practical classes - 15h. SIW-60hours,–intermediate SIW – 15h., SIWT – 30h., Total labor coefficient – 180 hours.
Credit points:	6 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Fundamentals of chemical technology, Higher mathematics, Physics
Module objectives / planned learning outcomes:	After students completed studying of this course, they have to be able: - to explain a physical basis of standard processes of chemical technology; - to classify the main processes and devices of chemical productions; - to apply theoretical bases of processes of chemical technology for the analysis, calculation and design of the main devices of chemical productions; - to count the capital and service equipment of standard chemical productions; - to apply the gained knowledge in team during the calculating and design of the capital chemical equipment; - to determine optimum parameters of the main processes of chemical productions.
Content:	Lectures: Theoretical bases of processes of chemical technology. Fundamentals of applied hydraulics. Hydromechanical processes: upholding, filtering, centrifuging, pseudo-liquefaction of granular material, purification of gases. Mechanical processes: crushing, crushing, classification of solid material. Thermal processes. Heat transfer bases. Industrial ways of transfer of warmth in the chemical equipment. Classification of the heat-exchanging equipment and its calculation. Evaporation. Mass-exchanged processes. Mass transfer bases. Classification and total characteristic of mass-exchanged

	processes. Molecular and convective mass transfer. Main equation of a mass transfer. General information and scopes of mass-exchanged processes and devices: absorption; simple distillation and rectification; liquid extraction; adsorption; drying; dissolution and extraction in a system firm bodied liquid; crystallization from solutions and fusions; membrane processes. Laboratory: A research and calculation of hydraulic resistance in pipelines, the modes of fluid movement, hydrodynamics of a fluidized layer, sedimentation processes by gravity, processes of filtering, processes of hashing, operation parameters of a cyclone and the lamellar filter. A research and calculation of a heat transfer in the heat exchanger like "Pipe in a pipe", process of simple distillation. Research of process of radiation drying. Practical: Calculation of hydromechanical processes of division - sedimentation, filtering, centrifuging. Calculation of an evaporating ustanovkiya of heat exchangers. Calculations of mass-exchanged devices – absorbers, adsorbers, drying devices, rectifying and distillation columns.
Learning / examination outcomes / control forms:	Current control: successful performance, protection of laboratory and practical tasks; an oral group interview on colloquium materials; rubezhny written and oral polls. Total control – examination.
Technical teaching aids:	Interactive board, slides, distributing materials
Literature:	1. Yurkinsky V. P. Processes and devices of chemical technology. Parts 2, 3./SPb.: СПбГПУ, 2011. – 216 p. 2. Eskendirov M.Z. Processes and devices. / the Manual by calculation and design of devices/. – Shymkent: YuKGU of M. Auezov, 2011. – 120 pages. 3. Hankhodzhayev Sh.H., Tleuov A. S., Suygenbayeva A.Zh. ""Examples and tasks of discipline "Processes of chemical technology and devices"". Textbook. – Shymkent: KIPUDN. 2017 of-565 pages (on каз. language). 4. Welty J.R., Rorrer G.L., Foster D.G. Fundamentals of Momentum, Heat, and Mass Transfer. – Sixth edition. – New-York: John Wiley & Sons, 2013. – 758 p. 5. Peube J. L. Fundamentals of fluid mechanics and transport phenomena. – London: ISTE Ltd., Inc SW19 4EU. UK, 2009. – 502 p.

Module name:	**M 42.1 Applied aspects of microbial biotechnology**
Module level as required:	Bachelor's program
Abbreviation as required:	AAMB
Subtitle as required:	
Lesson type as required:	Lectures, laboratoryclasses. Practical classes
Training semester:	6 semester:
Person responsible for the module:	Nadirova Z.K
Teacher:	Candidate of Tehnical Sciences,
Language:	Kazakh, Russian, English
Connection with curriculum:	Profiling discipline, optional component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 2 h, laboratory classes -2h. Practical classes - 1h., SIW - 4 hours, SIWT – 2 hours. Total complexity – 11hours.
Training load:	Lectures - 30 hours, laboratory classes – 30. hours, practical classes -15h. SIW-60hours,–intermediate SIW – 15h., SIWT – 30h., Total labor coefficient – 180 hours.
Credit points:	6 ECTS

Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Preliminary knowledge of the modules: Introduction to the specialty, Biotechnology objects, Biochemistry
Module objectives / planned learning outcomes:	After completing the study, the module is able to: - to formulate and generalize the basics of cultivation of microorganisms, technological processes for obtaining biomass and products of fine microbiological synthesis; requirements for raw materials and end products; - work with cultures of microorganisms; determine the purity and activity of crops and preparations; control the growth of producers; - have an idea of the principles and features of microbiological processes; - use knowledge about the biotechnology of microorganisms in practice; - Independently obtain highly productive industrial strains of microorganisms, cultivate them and store.
Content:	Lectures. Modern methods of creating industrial strains of microorganisms and the problem of preserving their valuable properties. The main methods of storage of strains of microorganisms. Biotechnological processes: principles of implementation, systematization and stages. Raw materials used in bioproducts. Formulation of nutrient medium for the cultivation of microorganisms. Cultivation of microorganisms. Getting seed. The effect of cultivation conditions on the growth of industrial strains and the synthesis of metabolites. Microbialproteinproduction. Laboratory works. Checking the purity of cultures of microorganisms. Determination of the quality (contamination) of raw materials. The study of the growth of microorganisms and the effect on it of pH and temperature of cultivation. The study of the enzymatic activity of microorganisms. The creation of microorganisms using various sources of hydrocarbons. Microflora of lactic acid products.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory work with a written report, tasks of the CDS and midterm control. Final control: exam.
Technical teaching aids:	Interactive whiteboard, electron microscope, handout.
Literature:	1. Biryukov V.V. Fundamentals of industrial biotechnology: Textbook. manual for universities. - M .: Koloss, 2011. - 296 p. (рус.) 2. Askarov, Sh.K. Biotechnology of microorganisms: a teaching aid / Sh. K. Askarova. - Almaty: Epigraph, 2015. - 196 p. (рус.) 3. Esimov A.M. Microorganism biotechnology: Electrodynamics / A. M. Esimova. - 2010. (рус.) 4. MutaliyevaB.Zh. Biotexchnology of microogahisms: Electonic textbook (Compile of video-lectures, presentations, tests)/ B. Zh. Mutaliyeva. SKSU.– 2013. (рус.) 5. Industrial Biotechnology: Microorganisms (Advanced Biotechnology), Wiley-VCH; 1 edition (April 10, 2017) - by Christoph Wittmann, James C. Liao, Sang Yup Lee, Jens

	Nielsen, Gregory Stephanopoulos – 792 p. ISBN-10: 352734179X

Module name:	**M 42.2 Industrial microorganisms**
Module level as required:	Bachelor's program
Abbreviation as required:	IM
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	6 semester:
Person responsible for the module:	Nadirova Z.K
Teacher:	Candidate of Tehnical Sciences,
Language:	Kazakh, Russian, English
Connection with curriculum:	Profiling discipline, optional component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 2 h, laboratory classes -2h. Practical classes - 1h., SIW - 4 hours, SIWT – 2 hours. Total complexity – 11hours.
Training load:	Lectures - 30 hours, laboratory classes – 30. hours, practical classes -15h. SIW-60hours,–intermediate SIW – 15h., SIWT – 30h., Total labor coefficient – 180 hours.
Credit points:	6 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Preliminary knowledge of the modules: Introduction to the specialty, Biotechnology objects, Biochemistry
Module objectives / planned learning outcomes:	After completing the study module the student is able to: - to formulate and generalize the basics of cultivation of microorganisms, technological processes for obtaining biomass and products of fine microbiological synthesis; requirements for raw materials and end products; - work with cultures of microorganisms; determine the purity and activity of crops and preparations; control the growth of producers; - have an idea of the principles and features of microbiological processes; - use knowledge about the biotechnology of microorganisms in practice; - independently obtain highly productive industrial strains of microorganisms, cultivate them and store.
Content:	Lectures. Modern methods of creating industrial strains of microorganisms and the problem of preserving their valuable properties. The main methods of storage of strains of microorganisms. Biotechnological processes: principles of implementation, systematization and stages. Raw materials used in bioproducts. Formulation of nutrient medium for the cultivation of microorganisms. Cultivation of microorganisms. Getting seed. The effect of cultivation conditions on the growth of industrial strains and the synthesis of metabolites. Microbial protein production. Laboratory works. Basics and autoclaving technique. Membrane filtration. Checking the purity of cultures of microorganisms. Determination of the quality (contamination)

	of raw materials. The study of the growth of microorganisms and the effect on it of pH and temperature of cultivation. The study of the enzymatic activity of microorganisms. The creation of microorganisms using various sources of hydrocarbons. Microflora of lactic acid products.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory work with a written report, tasks of the CDS and midterm control. Final control: exam.
Technical teaching aids:	Interactive whiteboard, electron microscope, handout.
Literature:	1. Biryukov V.V. Fundamentals of industrial biotechnology: Textbook. manual for universities. - M .: Koloss, 2011. - 296 p. (рус.) 2. Askarov, Sh.K. Biotechnology of microorganisms: a teaching aid / Sh. K. Askarova. - Almaty: Epigraph, 2015. - 196 p. (рус.) 3. Esimov A.M. Microorganism biotechnology: Electrodynamics / A. M. Esimova. - 2010. (рус.) 4. MutaliyevaB.Zh. Biotexchnology of microogahisms: Electonic textbook (Compile of video-lectures, presentations, tests)/ B. Zh. Mutaliyeva. SKSU.– 2013. (рус.) 5. Industrial Biotechnology: Microorganisms (Advanced Biotechnology), Wiley-VCH; 1 edition (April 10, 2017) - by Christoph Wittmann, James C. Liao, Sang Yup Lee, Jens Nielsen, Gregory Stephanopoulos – 792 p. ISBN-10: 352734179X

Module name:	**Industrial practice 2**
module level:	Baccalaureate
Reduction:	IP 2
Subtitle:	
view class:	
semester of study:	7 semester
responsible person for the module:	Department of «Biotechnology»
teacher:	Candidate of biological Sciences, associate Professor Abildaeva R. A.
language:	Kazakh, Russian, English
communication with the educational plan:	
form of training / weekly teaching load in the semester:	
teaching load:	'
credit rating:	6 ECTS
prerequisites to comply with the examination requirements:	
recommended prerequisite:	Inorganic and analytical chemistry,Educational practice, Objects of biotechnology, Introduction to the specialty, Biochemistry, Fundamentals of biotechnology, Biochemistry, General and molecular genetics, Industrial biotechnology, Devices and methods of research of biological systems, Basic research and patenting, Industrial practice 1
objective module / intended learning outcomes:	After the students have completed the study of this course they must be able to: - describe the technological regulations of production, structure and composition of production;

	- describe the type of device and modes of operation of the apparatus, the conditions of the safe operation of the apparatus; - to identify problematic issues of the production; - present the interrelated work of the auxiliary services of the shop to ensure the continuous operation of the production; - to apply standards and technical conditions applied to the quality of raw materials and products used at the place of practice; - to make a detailed report on the production practice with the conclusions; protection of the report on the practice.
content:	The structure of production and procurement network, types of incoming raw materials and their ratio; types of containers used for delivery; organization of delivery of raw materials; radius of delivery. The order of acceptance and sorting; organization of control carried out by the factory laboratory; methods of analysis, forms of documents for the delivered raw materials. Basic principles of processing of raw materials (plant, animal, microbiological origin). The introduction of technological and ecological production problems. Preparation and protection of the report on industrial practice.
educational/ exam results form of control:	Ongoing monitoring – ongoing consultations, participation in production meetings. A written report and its protection. Final control - offset
technical training tools:	Technological regulations, technological schemes, instructions for work on the equipment, technical conditions for the quality of raw materials and products
literature:	1. Klonowa S. M., Egorova T. A., E. A. Sivukhina Biotechnology. Moscow, 2010. [Russian] 2. Современные методы в биотехнологии : учеб. пособие для студ. вузов / С. С. Кенжебаева. -Алматы : Издательство "Бастау", 2013. - 272 с. [Kazakh] 3. Gradova N. B., Babusenko E. S., Panfilov V. I. Biological safety biotechnology industries. Moscow, 2010. [Russian] 4. Krasnikova L. V. Microbiology: Studies. benefit. – SPb.: Trinity bridge, 2012. – 296 p. [Russian] 5. Upstream Industrial Biotechnology, 2 Volume Set, Wiley; 1 edition (March 4, 2013) - by Michael C. Flickinger – 1854 p. ISBN-10: 1118131231 [English]

Module name:	**M 43.1 Planning and Statement of Scientific Research Works/**
Module level as required:	Bachelor's program
Abbreviation as required:	PSRW
Subtitle as required:	
Lesson type as required:	Lectures, Laboratory classes
Training semester:	7 trimester:
Person responsible for the module:	
Teacher:	Dzhakasheva M.A.
Language:	Kazakh, Russian
Connection with curriculum:	Core discipline, elective component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1 h, laboratory classes -2h. SIW – 3.33 hours, SIWT – 1 hours. Total complexity – 7.33hours.
Training load:	Lectures - 15 hours, laboratory classes – 15 hours,. SIW-50hours,–intermediate SIW – 10h., SIWT – 15h., Total labor coefficient – 120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points

Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Basics of biotechnology, General and molecular genetics, Industrial biotechnology, Instruments and methods of research of biological systems, Physics
Module objectives / planned learning outcomes:	– independently set the goal and objectives of scientific research; – determine the object and subject of research; – justify the relevance of the chosen topic; – search for sources of literature with the use of modern information technologies; – to formulate and solve problems arising in the course of research work; – apply modern information technologies in the organization and conducting research; – to carry out selection of necessary materials for scientific research; - analyze the results and present them in the form of completed research papers, scientific articles.
Content:	**Lectures:** Introduction. General information about science and research. Classification of scientific research. The main types of research. Main scientific direction. Research objectives and study of the problem. Definition of the object and subject of research. The study of the state of the object of knowledge or production. Role in the creation of biotechnological industries. Planning of scientific research. Setting goals and objectives of research. Scientific documents and publications. Organization of work with scientific literature. Sources of information on the degree of study of the problem. Search for existing analogies and clarification of research tasks. Prediction of research results, scientific efficiency of their use. Methods of scientific research. Methodology of theoretical research. Methodology of experimental studies. Analysis of the material obtained on the basis of scientific or engineering search. Theoretical analysis of the problem, possible methods of experimental research. Identification of equipment required for research.Selection of the optimal method of experimental research, development of research methods **Laboratory classes:** Main scientific direction. Research objectives and study of the problem. Definition of the object and subject of research Presentation of the results of scientific research. The main methods of scientific research. Processing of measurement results. Carrying out patent search, preparation of the report. Preparation of the formula and description of the invention. Preparation and submission of applications for inventions and utility models. Writing a scientific article. Primary processing of experimental data. Coordination of theoretical and experimental studies. Formulation of research results taking into account the analysis of theoretical and experimental studies. General requirements and rules of registration of research work. Reviewing research. Report on the work. Preparation of abstracts.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of practical work with a written report, the tasks of the SIW and boundary control. Final control: exam
Technical teaching aids:	Interactive whiteboard, handout
Literature:	1 Firsanova O.V, research work. Textbook for high schools. – Orel: OrelSTU , 2010. – 106 p. [in Russian]

	2.Sulzdal'cev A.I. Fundamentals of engineering search and patenting. Textbook for high schools. – Orel: OrelSTU, 2009. – 311 p. [in Russian] 3. Ogurcov, A.N. Basic research: educational and methodical manual / A.N.Ogurcov. – Har'kov: NTU «ChPI», 2008. – 178 p. [in Russian] 4. Pivoev, V.M. Methodology and methodology of scientific research: textbook / V.M.Pivoev. –Petrozavodsk: Petr SU publishing, 2006. – 100 p. [in Russian]

Module name:	**M 43.2 Fundamentals of Scientific Research and Patenting**
Module level as required:	Bachelor's program
Abbreviation as required:	FLSRP
Subtitle as required:	
Lesson type as required:	Lectures, Laboratory classes
Training semester:	7 trimester:
Person responsible for the module:	
Teacher:	Dzhakasheva M.A.
Language:	Kazakh, Russian
Connection with curriculum:	profile discipline, elective component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1 h, laboratory classes -2h. SIW – 3.33 hours, SIWT – 1 hours. Total complexity – 7.33hours.
Training load:	Lectures - 15 hours, laboratory classes – 30 hours,. SIW-50 hours,–intermediate SIW – 10h., SIWT – 15h., Total labor coefficient – 120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Biochemistry, objects of biotechnology, Basics of biotechnology, Introduction to the specialty Inorganic and analytical chemistry, Introduction to the specialty, Basics of biotechnology, General and molecular genetics, Industrial biotechnology, Instruments and methods of research of biological systems, Physics Biochemistry, objects of biotechnology,
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - know the principles of organization of scientific research; -be able to make reviews and reports on the results of research, preparation of scientific publications and applications for inventions, development of recommendations for the practical use of the results; - independently carry out the formulation of the research problem, the formation of its implementation plan, the choice of research methods and processing of results; - know the methods of processing the results of experimental studies; -to present the results of the research in the form of reports, abstracts, publications and public discussions; -apply the skills of logical and methodological analysis of scientific research and its results.
Content:	**Lectures.** Organization, structure and elements of scientific research, presentation of results. Fundamentals of scientific and technical creativity. Technical objects, regularities of their development and construction. General scientific and heuristic methods for solving creative problems. Mathematical models and methods in scientific research. Experimental studies and processing of measurement results. Intellectual property. Industrial property and legal protection of its objects. Copyright and related rights, their protection.

	Laboratory work.: Presentation of research results. The main methods of scientific research. Processing of measurement results. Carrying out patent search, preparation of the report. Preparation of the formula and description of the invention. Preparation and submission of applications for inventions and utility models. Writing a scientific article.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of practical work with a written report, the tasks of the SRS and boundary control. Final control: exam
Technical teaching aids:	Interactive whiteboard, handout
Literature:	1. Alekseev V. P., Serkin D. V. Fundamentals of scientific research and patenting. Textbook. — Tomsk: TUSUR, 2012. — 172 p. 2. Sudarikov S. A. intellectual property law. – M.: Prospekt, 2013. – 367 p. 3. Zhantasov K. T., Zhantasov M. K., Dosaliev K. S. Organization, planning and management of research and innovation activities. Tutorial, SKSU them.M. Auezova, 2018 4. V. A. Gorokhov. Fundamentals of experimental studies and methods of their implementation. Textbook. –Minsk, Belarusian state technological University. 2015. 5. Patent Searching Made Easy: How to do Patent Searches Online and in the Library (Patent Searching Made Easy: How to Do Patent Searches on the Internet & in the Library), NOLO; Sixth edition (April 30, 2013) - by David Hitchcock – 272 p. ISBN-10: 141331872X

Module name:	**M44.1 Industrial biotechnology**
Module level as required:	Bachelor's program
Abbreviation as required:	IB
Subtitle as required:	
Lesson type as required:	Lectures, Practical classes
Training semester:	7 trimester
Person responsible for the module:	Kedelbaev B. Sh.
Teacher:	Doctor of technical Sciences, Professor
Language:	Russian, Kazakh
Connection with curriculum:	Profile discipline, component of choice
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1 h, practical classes -2h. SIW – 3.33 hours, SIWT – 1 hours. Total complexity – 7.33hours.
Training load:	Lectures - 15 hours, practical classes – 30 hours,. SIW-50hours,–intermediate SIW – 10h., SIWT – 15h., Total labor coefficient – 120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Basics of biotechnology, General and molecular genetics, Industrial biotechnology, Instruments and methods of research of biological systems.

Module objectives / planned learning outcomes:	After completing the module, the student is able to: - know the classification of different types of waste and technology of their disposal; - apply technologies of utilization and processing of waste generated as a result of economic activity; - possess the skills of waste processing in a biotechnological way, as a result of which biogas and organic fertilizers are obtained; - calculate the maximum allowable emissions and analyze the results; -to determine the degree of purification of sewage according to the dissolved oxygen content
Content:	**Lectures.** Anthropogenic and technogenic impact on the environment. Local and global environmental problems. Basic concepts and methodological principles of low-waste production. Problems of development of highly effective technological processes (TP), eco-protective processes and technologies (EP and T). The problem of pollution of water resources by industrial and agricultural wastewater. Pollution of the environment by gaseous and aerosol emissions of industrial enterprises. The problem of environmental pollution by solid industrial and household waste. Legal basis for the organization of environmentally safe production. **Laboratory classes.** Calculation of maximum permissible emissions (MPE) and analysis of the results. Determination of the toxicity class of agricultural waste. Thermodynamic assessment of OS pollution and efficiency of treatment methods (comparison of three competing methods of wastewater treatment). Determination of the degree of wastewater treatment by the content of dissolved oxygen.. Study of the chemical composition of manure for the manufacture of fertilizer in the cultivation of forage crops. Study of hydrolyzed, acid-forming, acetogenic and methanogenesis phases in the production of biogas from organic raw materials.
Learning / examination outcomes / control forms:	Current control: the successful execution and defense of laboratory work with written report, assignments, tasks' SIW and midterm examination. Final control: exam.
Technical teaching aids:	Interactive whiteboard. Autoclave, Dialyzer, Photoelectrocolorimeter, handout, etc.
Literature:	1. Galperin, M. V., Ecological bases of nature management: Textbook / M. V. Galperin. - 2-e ed., Rev. - M.: ID FORUM: INFRA-M, 2012. - 256 p. [In Russian] 2. Zhanadilov-ay, A. Yu., Agricultural ecology : study guide / A. Yu. zhanadilov-ay. - Almaty : Evero, 2016. - 232 p. 3. Zhanadilov-ay, A. Yu., Ecological aspects of natural science : textbook / A. Y. zhanadilov-ay, G. K. zhanadilov-ay, A. A. Muratov. - Almaty : Evero, 2016. - 584 p. 4. Abubakirov, A. A. Abstract of lectures on discipline "the Creation of industries with waste-free technology" for students of specialty 5B070100 "Biotechnology" / A. A. Abubakirov, A. Ospanova. - Shymkent : SKSU, 2014. 5. Agricultural Waste Management, Callisto reference (August 6, 2016) - by Thelma Bosso – 300 p. ISBN-10: 1632397153[In English]

Module name:	**M44.2 Creation of Less-Waste Technologies in Agroindustrial Productions**
Module level as required:	Bachelor’s program
Abbreviation as required:	

Subtitle as required:	
Lesson type as required:	Lectures, Practical classes
Training semester:	7 trimester
Person responsible for the module:	Aitkulova R. E.
Teacher:	Candidate of chemical Sciences, associate Professor Aitkulova R. E.
Language:	Kazakh, Russian
Connection with curriculum:	Relevant discipline, component of choice
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1 h, practical classes -2h. SIW – 3.33 hours, SIWT – 1 hours. Total complexity – 7.33hours.
Training load:	Lectures - 15 hours, practical classes – 30 hours,. SIW-50hours,–intermediate SIW – 10h., SIWT – 15h., Total labor coefficient – 120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Basics of biotechnology, General and molecular genetics, Industrial biotechnology, Instruments and methods of research of biological systems
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - know the classification of different types of waste and technology of their disposal; - apply technologies of waste disposal and recycling, formed as a result of economic activity; - possess the skills of waste processing in a biotechnological way, as a result of which biogas and organic fertilizers are obtained; - calculate maximum allowable emissions and analyze the results; -to determine the degree of purification of sewage according to the dissolved oxygen content
Content:	**Lectures.** Anthropogenic and technogenic impact on the environment. Local and global environmental problems. Basic concepts and methodological principles of formation of low-waste production. методологические принципы формирования малоотходных производств. Problems of development of highly effective technological processes (TP), eco-protective processes and technologies (EP and T).The problem of pollution of water resources by industrial and agricultural wastewater. Pollution of the environment by gaseous and aerosol emissions of industrial enterprises. The problem of environmental pollution by solid industrial and household waste. Legal basis for the organization of environmentally safe production. **Laboratory .** Calculation of maximum permissible emissions (MPE) and analysis of the results.Determination of the toxicity class of agricultural waste. Thermodynamic assessment of OS pollution and efficiency of treatment methods (comparison of three competing methods of wastewater treatment). Determination of the degree of wastewater treatment by the content of dissolved oxygen.Study of the chemical composition of manure for the manufacture of fertilizer in the cultivation of forage crops. Study of hydrolyzed, acid-forming, acetogenic and methanogenesis phases in the production of biogas from organic raw materials.
Learning / examination outcomes / control forms:	Current control: the successful execution and defense of laboratory work with written report, tasks of SIW and midterm examination. Final control: exam

Technical teaching aids:	Interactive whiteboard. Autoclave, Dialyzer, Photoelectrocolorimeter, handout, etc.
Literature:	1. Galperin, M. V., Ecological bases of nature management: Textbook / M. V. Galperin. - 2-e ed., Rev. - M.: ID FORUM: INFRA-M, 2012. - 256 p.[In Russian] 2. Zhanadilov A. Yu., Agricultural ecology : study guide / A. Yu. Zhanadilov. - Almaty : Evero, 2016. - 232 p.[In Kazakh] 3. Zhanadilov A. Yu., Ecological aspects of natural science : textbook / A. Y. Zhanadilov, G. K. Zhanadilov, A. A. Muratov. - Almaty : Evero, 2016. - 584 p. [In Kazakh] 4. Abubakirova A. A. Abstract of lectures on discipline "the Creation of industries with waste-free technology" for students of specialty 5B070100 "Biotechnology" / A. A. Abubakirov, A. Ospanova. - Shymkent : SKSU, 2014.[In Kazakh] 5. Agricultural Waste Management, Callisto reference (August 6, 2016) - by Thelma Bosso – 300 p. ISBN-10: 1632397153 [In English]

Module name:	M 45.1 Biotechnology of production and processing of agricultural products
Module level as required:	Bachelor's program
Abbreviation as required:	BPPAP
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	7 trimester
Person responsible for the module:	D. a.s., professor
Teacher:	Alibaev N.N.
Language:	Russian, Kazakh
Connection with curriculum:	Profile Discipline, Optional Component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 1 h, practical classes -1h. SIW – 3hours, SIWT – 0.5 hours. Total complexity – 5.5hours.
Training load:	Lectures - 15 hours, practical classes – 15 hours,. SIW-45hours,– intermediate SIW – 7.5h., SIWT – 7.5h., Total labor coefficient – 90 hours.
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control not less than 25
Recommended prior knowledge:	Preliminary knowledge of the modules: Inorganic and analytical chemistry, Biotechnology objects, Introduction to the specialty, Biochemistry, Fundamentals of biotechnology, General and Molecular Genetics, Industrial biotechnology, Devices and methods for the study of biological systems
Module objectives / planned learning outcomes:	After completing the study, the module is able to: - know the features of crop and livestock products as an object of production, processing and storage; - assess the impact of the quality of raw materials and materials on the quality of the finished product; - own methods of analyzing phenomena and processes in the production, processing and storage of agricultural products; - analyze the state of biotechnological products in the production

	of processing and storage; - have the skills to work with and carrying out the processes of production processing and storage of agricultural products.
Content:	Lectures: The history of the development of biotechnology production and processing of agricultural products. Modern areas of biotechnology production and processing of agricultural products. Biotechnology of crop production. Biotechnology processing of crop production. General principles of storage of crops and their products. Biotechnology for the production of animal products. Biotechnology processing of livestock products. General principles for the storage of animal raw materials and their products. Priorities of biotechnology for the production and processing of agricultural products and prospects for their development. Practical lessons: General principles for the storage of crops and their products. General principles for the storage of animal raw materials and their products. Priorities of biotechnology for the production and processing of agricultural products and prospects for their development.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of practical work with a written report, tasks of the SIW and midterm control. Final control: exam
Technical teaching aids:	Interactive board, handout
Literature:	• 1. Valikhanova G.Zh. Plant biotechnology. Pavlodar - 2009. - 272s. • 2. Nadorenko L.V., Dolgikh Yu.I. Zagoskina N.V. Plant biotechnology. M.: Onyx, 2018. - 161s. • Safonov A.F. Technology of crop production .- M.: Kolos, 2013. - 487 with • 4. Lichko N.M. Processing technology of crop production. - M.: Kolos., 2008. - 583c • 5. Bogareva T.A. Technology storage and processing of crop production with the basics of standardization. - Barnaul, 2008. - 115s • 6. Aubakirov Kh.Ә., libaev NN, Kokzhokhodzhaev M. Zhanuar biotechnology. - Almaty, 2014. - 504б • 7. Murusidze D7N7 Technology of livestock production. - M.: Kolos, 2013. - 432 p. • 8. Lisenkov A.A. Technology processing of livestock products. - M.: Kolos, 2009. - 293s

Module name:	**M45.2 Assessment of quality and safety of agricultural products**
Module level as required:	Bachelor's program
Abbreviation as required:	AQSAP
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	7 trimester
Person responsible for the module:	Bigara T.C.
Teacher:	candidate of agricultural Sciences, associate Professor
Language:	Kazakh, Russian
Connection with curriculum:	Profile discipline, component of choice
Form of teaching / weekly training load in a semester:	Intramural / Lectures - 1 hours, practical classes - 1 hours, current SIW -3 hours; SIWT -0,5 hours. Total labor intensity –

	5,5 hours.
Training load:	Lectures-15 hours; practical classes – 15 hours, current SIW-45 hours; intermediate SIW-7.5 hours; SIWT -7.5 hours. Total labor intensity – 90 hours.
Credit points:	3 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	Preliminary knowledge on modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Basics of biotechnology, General and molecular genetics, Industrial biotechnology, Instruments and methods of research of biological systems
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - to know the basic biotechnological processes of obtaining useful for human products from raw materials of animal and plant origin; - to know the relationship of biotechnological processes, equipment and control systems in food production; - own methods for the use of standards and other regulatory documents in the assessment, quality control and certification of raw materials and products of food biotechnology; - to assess the prospects of Bioprocess (technology) from the standpoint of environmental safety and efficiency of ecological support of food production and environmental protection; - to carry out the synthesis of biologically active substances for the production of biologically active additives; - combine food industry products with biotechnological methods in order to obtain therapeutic and preventive food products based on them.
Content:	**Lectures:** Current state of biotechnology of food products. Fundamentals of biotechnological processes. Food products from raw materials of animal origin. Food products from raw materials of plant origin. Biotechnology of enzymes. Various forms and classifications of food additives obtained by biotechnology. **Practical classes:** Biosafety of food products. Types of agricultural raw materials and the main technological features of obtaining various products from vegetable raw materials.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of practical work with a written report, the tasks of the SIW and boundary control. Final control: exam.
Technical teaching aids:	Interactive whiteboard, handout
Literature:	1. Storage of food products: Textbook / MA Nikolaev, G. Ya. Rezgo. – M.: ID FORUM: nits INFRA-M, 2015. [In Russian] 2. Food biotechnology of products from raw materials to rise. origin.: Studies'. / O. A. Neverova, A. Yu. Prosekov et al. - M.: SIC INFRA-M, 2014. - 318 p. [In Russian] 3. Nilova L. P. commodity science and examination of grain-scientific goods: Textbook / L. P. Nilova. - 2-e ed. - M.: INFRA-M, 2011. - 448 p. [In Russian] 4. Itkulova R. E. Food biotechnology: 5B070100 –lecture Notes for students of the specialty "Biotechnology" / Itkulova R. E., W. B. Tasybaeva, A. D. Dauylbay. – SKSU, 2014 5. Microorganisms in Foods 8: Use of Data for Assessing Process Control and Product Acceptance (Intl Commission on Microbiological Specifications for Foods), Springer; 2011 edition (June 8, 2011) – 400 p. ISBN-10: 9781441993731[In English]

Module name:	**M 46.1 Transgenic animals, plants and methods for their production**
Module level as required:	Bachelor's program
Abbreviation as required:	TAP&MTP
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	7 trimester
Person responsible for the module:	D. a. s., professor
Teacher:	Alibaev N.N.
Language:	Russian, Kazakh
Connection with curriculum:	Profile discipline, a component of choice
Form of teaching / weekly training load in a semester:	Intramural / Lectures - 2hours, practical classes - 1 hours, current SIW -3.33hours; SIWT -1hours. Total labor intensity – 7.5 hours.
Training load:	Lectures-30 hours; practical classes – 15 hours, current SIW-50 hours; intermediate SIW-10 hours; SIWT -15 hours. Total labor intensity – 120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control is not lower than 25 points
Recommended prior knowledge:	Preliminary knowledge of the modules: Inorganic and analytical chemistry, Biotechnology objects, Introduction to the specialty, Biochemistry, Fundamentals of biotechnology, General and Molecular Genetics, Industrial biotechnology, Devices and methods for the study of biological systems
Module objectives / planned learning outcomes:	After completing the study, the module is able to: - Know the theoretical and applied aspects of the selection of organisms from microorganisms to animals and plants for the target product; - analyze the theoretical and methodological concepts underlying the creation and use of genetic engineering products; - explain the properties and principles of action of the 4 basic enzymes used in molecular cloning; - to obtain and clone recombinant DNA molecules; - to carry out molecular genetic analysis and biotesting of transgenic organisms.
Content:	Lectures. Features of genetic modification of bacteria. The main directions of genetic engineering of microorganisms. Transformation of plant cells. Transgenic plants for practical breeding purposes. Transgenic plants for pharmacology and medicine. Genetic transformation of animal cells. Transgenic animals for the purposes of practical breeding. Laboratory works. Obtaining and cloning of recombinant DNA molecules. Cultivation of cells and tissues of higher organisms in vitro. The study of the system of gene transfer from the donor to the recipient (transgenosis). Conducting molecular genetic analysis and biotesting of transgenic organisms.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory work with a written report, tasks of the CDS and midterm control. Final control: exam
Technical teaching aids:	Interactive board, handout.

Literature:	1. Biotechnology: studies. for higher ped. prof. of education / S.M.Klunova, T.A.Egorova, E.A. Zhivukhina - Moscow: Academy of Arts, 2010. - 255 2. Schmid R. Visual biotechnology and genetic engineering. M., "Bean", 2014. 3. Wilson, K. Principles and methods of biochemistry and molecular biology. [Electronic resource]: Textbooks / K. Wilson, D. Walker., Electron. Dan. , M.: Publisher 'Knowledge Laboratory', 2013., 848 p. 4. Kuznetsov, V.V. Molecular genetic and biochemical methods in modern plant biology. [Electronic resource]: Teaching aids / V.V. Kuznetsov, V.V. Kuznetsov, G.A. Romanov. , Electron. Dan., M.: Publisher 'Knowledge Laboratory', 2012., 487 p. • 5. Transgenic Plants: Methods and Protocols (Methods in Molecular Biology), Humana Press; 2nd ed. 2012 edition (February 14, 2012) - by Jim M. Dunwell, Andy C Wetten - 497 p. ISBN-10: 1617795577

Module name:	**M46.2 Genetic Engineering and Biosafety**
Module level as required:	Bachelor's program
Abbreviation as required:	GEB
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	7 trimester
Person responsible for the module:	D. a. s., professor
Teacher:	Ymirzak T.
Language:	Russian, Kazakh
Connection with curriculum:	Profile discipline, a component of choice
Form of teaching / weekly training load in a semester:	Intramural / Lectures - 2hours, practical classes - 1 hours, current SIW -3.33hours; SIWT -1hours. Total labor intensity – 7.5 hours.
Training load:	Lectures-30 hours; practical classes – 15 hours, current SIW-50 hours; intermediate SIW-10 hours; SIWT -15 hours. Total labor intensity – 120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	Interactive board, handout.
Content:	Lectures. Methods used in genetic engineering to create recombinant molecules. Principles of construction of recombinant organisms. Methods for introducing recombinant DNA and RNA into recipient cells. Identification and selection of GM cells and organisms. GMO technology. Preparation of recombinant DNA. Prospects for GMO technology. Vectors for gene transfer. Agrobacterial Ti and Ri plasmid structure. Physical methods for the introduction of recombinant DNA into the cell. Transgenic plants and animals. Technologies for

	creating transgenic animals. Methods for producing transgenic plants. Genetic engineering and selection. The goals of creating GM varieties of plants, animal breeds, strains of microorganisms. Transgenic products, drugs, vaccines. Recombinant DNA technologies and general principles for the design of industrially important producers for biotechnology. Molecular basis of genetic engineering. Biosafety issues. Expression and isolation of target proteins. Construction of secreting organisms. Metabolic engineering. Isolation of genetically modified organisms and the problem of the removal of marker genes. Genetically important producers. Cell cultures for protein production. Genetic engineering and molecular diagnostics. Molecular cloning. Polymerase chain reaction. **Practical classes**: The principle of the connector method. The principle of restriction ligase method. Use of linker molecules (linkers). Modification of the restriction-ligase method using linkers. Method CaCl2-dependent transfection. EDTA-lysozyme spheroplast method. Electroporation. DEAE-dextran method. Calcium phosphate method. Infection method. Microinjection of viral DNA molecules. Phenotypic screening. Screening with hybridization. Radioimmunological screening. Dideoxynucleotide DNA sequencing method. DNA sequencing using a phage M13 vector. DNA amplification by PCR.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of laboratory work with a written report, tasks of the CDS and midterm control. Final control: exam
Technical teaching aids:	Interactive board, handout.
Literature:	1 Nefedova L.N. The Use of Molecular Research Methods in Genetics: Study Guide / L.N. Nefedova. - M .: SIC Infra-M, 2012. - 104 p. 2 Gupal V. M. Mathematical methods for analysis and recognition of genetic information: Monograph / V.M. Gupal. - M .: ITs RIOR: SIC Infra-M, 2012. - 154 p. 3 Schelkunov, S. N., Genetic Engineering [Text]: studies.-ref. manual / S. N. Schelkunov. - 4th ed., Sr. - Novosibirsk: Sib. univ publishing house, 2010

Module name:	**Pedagogical practice**
Module level as required:	Bachelor's program
Abbreviation as required:	PP
Subtitle as required:	
Lesson type as required:	
Training semester:	7 trimester
Person responsible for the module:	Department of «Biotechnology»
Teacher:	Candidate of biological Sciences, associate Professor Abildaeva R. A.
Language:	Kazakh, Russian
Connection with curriculum:	
Form of teaching / weekly training load in a semester:	
Training load:	Total labor intensity - 210 hours'
Credit points:	7 ECTS- credit

Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Preliminary knowledge of the modules: Kazakh (Russian) language 1, Information and communication technologies, Inorganic and analytical chemistry, Kazakh (Russian) language 2, Objects of biotechnology, Introduction to the specialty, educational practice, Professional Kazakh (Russian) language, biochemistry.
Module objectives / planned learning outcomes:	After completing the module, the student is able to: - know the regulatory framework activities of educational institutions; - analyze the normative -legal documents regulating the educational policy of the Republic of Kazakhstan; - self-guided in the normative documents regulating activity of the teacher; - possess the skills of value-ethical self-assessment and self-control, self-education and self-improvement; - to use teaching methods for conducting classes in higher school; - to organize self-educational training activity of students; - own means of pedagogical communication.
Content:	Familiarity with program practices, the decision of organizational-methodical questions (time allotted for visiting institutions; the procedure and conditions for visits to institutions). Development of an individual curriculum of pedagogical practice. Individual planning and development of the content of training classes, methodical work on the subject. Independent conduct of training classes on educational discipline (lectures, seminars, practical class). Methodical work. Production of didactic materials for training classes. Pedagogical analysis of teaching-educational activity. Analysis of the lessons. Preparation of a detailed report on pedagogical practice.
Learning / examination outcomes / control forms:	Report protection
Technical teaching aids:	Interactive whiteboard, handout
Literature:	1.Bezrukova V. S. Pedagogy : textbook / V. S. Bezrukova. – Rostov n/A : Phoenix, 2013. – 381 p. [Russian] 2. Tleuova S. S. Pedagogy of higher education.- Shymkent, 2013. [Kazakh] 3. Mynbayeva A. K., Sadvakasova Z. M. Innovative teaching methods or how interesting it is to teach.-Almaty. 2010. -174 p. [Kazakh] 4. Isaeva Z. A. and others. Active forms and methods of education at the University. –Almaty, 2015. [Kazakh] 5. Drescher Yu. N. Andragogy, Modern technologies in the preparation and conduct of the educational process, 2017. [Russian]

Module name:	**M 47.1 Processes and Apparatuses of Biotechnology**
Module level as required:	Bachelor's program
Abbreviation as required:	PAB
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	7 trimester
Person responsible for the module:	
Teacher:	Narymbaeva Z.K.
Language:	Kazakh, Russian
Connection with curriculum:	Relevant discipline, elective component
Form of teaching / weekly	Intramural / Lectures - 2hours, practical classes - 3 hours,

training load in a semester:	current SIW -4hours; SIWT -2hours. Total labor intensity – 11 hours.
Training load:	Lectures-30 hours; practical classes – 45 hours, current SIW-60 hours; intermediate SIW-15 hours; SIWT -30 hours. Total labor intensity – 180 hours.
Credit points:	6 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	- to be able to analyze the technological processes of obtaining biomass and products of fine microbiological synthesis; - have the ability to detail the methods of cultivation of microorganisms, the technological processes of obtaining biomass and products of fine microbiological synthesis; - to be able to justify the feasibility of microbiological synthesis in industrial conditions. - to be able to apply the acquired knowledge and skills for the implementation and management of biotechnological processes; - have to carry out technological process according to regulations and to use technical properties for measurement of the main parameters of biotechnological processes, properties of raw materials and production;
Content:	**Lectures.** Processes in biotechnology. The relationship of processes and biological objects. Technical armament of biotechnology industries. Biotechnological processes in connection with mass transfer. Biotechnological processes in connection with the peculiarities of cell metabolism. Hardware design of the processes of isolation and purification of some products of microbial synthesis. Mass-exchange processes with a fixed phase contact surface. Membrane processes in biotechnology. The main applications of membrane technology: water treatment, medicine, bioenergy, etc. Characteristics of membrane processes. The equipment fotobiotehnology productions The equipment zoobotanica industries. Methods of growing animal cells. Embryonic and other tissues for virus reproduction and production of viral preparations. **Practical classes.**
Learning / examination outcomes / control forms:	Report protection
Technical teaching aids:	Interactive whiteboard, handout
Literature:	1. Бирюков В.В. Основы промышленной биотехнологии. Учебн. пособие. М.: КолосС, 2004. - 296 с. 2. Егорова Т.А., Клунова С.М., Живухина Е.А. Основы биотехнологии. Учебн. пособие. М.: Издательский центр «Академия», 2008. - 208 с. 3.Сазыкин Ю.О., Орехов С.Н., Чакалева И.И., М.:Академия ,2007.-254с. 4.Безбородов А.М., Загустина Н.А,, Попов В.О. Ферментативные процессы в биотехнологии .-М.:Наука ,2008.335с. 5.Тимощенко Л.В. Чубик М.В. Основы биотехнологии .Томск

	,изд-во ТПУ ,2009.-196с 6.Аскарова,Ш.К. Биотехнология микроорганизмов : учебно-методическое пособие / Ш. К. Аскарова. - Алматы : Эпиграф, 2015. - 196 с.

Module Name:	**M 47.2 Equipment for biotechnological production**
Module level as necessity:	Baccalaureate
Abbreviation as necessity:	EBP
Subtitle as necessity:	
Type of lesson as necessity:	Lectures, practical
Semester:	8 trimester
Responsible person for the module:	PhD
Lecturer:	Dzhakasheva M.A.
Language:	Kazakh, Russian
Connection with the curriculum:	Profile discipline, a component of choice
Form of study / weekly workload per semester:	Intramural / Lectures - 2hours, practical classes - 3 hours, current SIW -4hours; SIWT -2hours. Total labor intensity – 11 hours.
Study load:	Lectures-30 hours; practical classes – 45 hours, current SIW- 60 hours; intermediate SIW-15 hours; SIWT -30 hours. Total labor intensity – 180 hours.
Credit points:	4 ECTS
Prerequisites for matching exam requirements:	Rating according to the results of current control is not lower than 25 points
Recommended prerequisites:	Objects of biotechnology, General technology of the industry, Equipment for biotechnological production, Industrial biotechnology, Applied aspects of biotechnology of microorganisms
Module objectives / expected learning results:	- own the basic principles of the organization of biotechnological production, - know the methods for evaluating production efficiency; be able to describe the concept of biotechnological production; · - know the processes occurring in the bioreactors and at the stages of processing associated with the isolation and purification of the target product; - have skills in the selection of criteria and equipment for the stages of cultivation, isolation and purification of biosynthesis products; · - to know the most important structural elements of machines and devices;
Content:	Lectures. Classification of equipment for biotechnological production. Formation of the structures of technological lines. Equipment for sterilization of nutrient media. Hydrolysis apparatus. Equipment for cultivation of microorganisms on solid nutrient media. Fermenters for deep cultivation. microorganisms on liquid nutrient media. Equipment for the separation of liquid and solid phases. Equipment for the concentration and purification of solutions of biologically active substances. Equipment for membrane separation of solutions of biologically active substances. Drying equipment.

	Practical. Classification of methods and equipment for sterilization of nutrient media. Constructive design sterilizers solid nutrient media Equipment for sterilization of liquid nutrient media Classification of equipment for the cultivation of microorganisms on solid nutrient media. fermenters for sterile cultivation of microorganisms. equipment for centrifuging suspensions. Ultrafiltration membranes. Drying equipment
study / examination results forms of control:	Current control: successful implementation and protection of practical work with a written report, tasks of the CDS and midterm control. Final control: exam
technical training tools:	nteractive board, handout
references	Bryukov V.V. Basics of industrial biotechnology. Educational allowance. M .: KolossS, 2004. - 296 p. 2. Egorova T.A., Klunova S.M., Zhivukhina E.A. Basics of biotechnology. Educational allowance. M .: Publishing Center "Academy", 2008. - 208 p. 3. Sazykin Yu.O., Orekhov S.N., Chakaleva I.I., M.: Akademiya, 2007.-254s. 4. Bezborodov A.M., Zagustin N.A., Popov V.O. Enzymatic processes in biotechnology. -M.: Science, 2008.335s. 5. Timoschenko L.V. Chubik M.V. Fundamentals of biotechnology. Tomsk, TPU publishing house, 2009.-196s 6. Askarova, Sh.K. Biotechnology of microorganisms: a teaching aid / Sh. K. Askarova. - Almaty: Epigraph, 2015. - 196 p.

Module name:	**M48.1 Bioengineering**
Module level as required:	Bachelor’s program
Abbreviation as required:	BI
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	8 trimester
Person responsible for the module:	
Teacher:	Esimova A.M.
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, optional component
Form of teaching / weekly training load in a semester:	Intramural / Lectures - 2hours, laboratory classes - 2 hours, current SIW -3.66hours; SIWT -1.5 hours. Total labor intensity – 9.16 hours.
Training load:	Lectures-30 hours; laboratory classes – 30 hours, current SIW-55 hours; intermediate SIW-12.5 hours; SIWT -22.5 hours. Total labor intensity – 150 hours.
Credit points:	5 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	
Module objectives / planned learning outcomes:	Objects of biotechnology, General technology of the industry, Equipment for biotechnological production, Industrial

	biotechnology, Applied aspects of biotechnology of microorganisms
Content:	Stoichiometry and energy of metabolic transformations. Breath and fermentation. The final products of metabolism. Stoichiometry of cell growth and the formation of metabolic products. Kinetics of substrate utilization, formation of metabolic products and biomass in cell cultures. Kinetics of balanced growth. Transfer processes in biotechnological systems. Mass transfer between gas and liquid phase in cellular systems. Management of biochemical technology processes. Sensors for determining the physical and chemical parameters of the environment and gases. Progressive methods of bioprocess management. Laboratory classes. Bioreactors with multiphase systems, other types of bioreactors, t.ch. with immobilized enzymes and for the cultivation of animal and plant cells. Determination of physical and chemical parameters of the environment and gases. Progressive methods of bioprocess management. The process of concentration of the culture fluid.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of practical work with a written report, tasks of the CDS and midterm control. Final control: exam
Technical teaching aids:	nteractive board, handout
Literature:	1. Prikhodko N.A., Esimova A.M., Nadirova Zh.K. Bioengineering / lecture notes, SKSU, 2007 –120 p. 2. Kalunyants K.A. Equipment of microbiological productions. - M .: Agropromizdat, 2003, -398 p. 3. Industrial Microbiology. / Ed. N. Egorova. M .: Higher. school., 2009 - 631s. 4. Gaponov K.P. Processes and devices of microbiological productions. -M.: Leg. And pishch. prom-t, 2008, -240s. 5. Gracheva I.M., Gavrilova N.N., Ivanova L.A. Technology of microbial protein preparations, amino acids and fats. - M .: Food industry, 2005. - 448c.

Module name:	**M48.2 Molecular Biology**
Module level as required:	Bachelor's program
Abbreviation as required:	MB
Subtitle as required:	
Lesson type as required:	Lectures, laboratory classes
Training semester:	8 trimester
Person responsible for the module:	Ysupov S.
Teacher:	candidate of agricultural Sciences, associate Professor
Language:	Kazakh, Russian
Connection with curriculum:	Basic discipline, component of choice
Form of teaching / weekly training load in a semester:	Full time / Lectures – 2h., laboratory classes – 2h., SIW – 3.66h., SIWT – 1.5h., Total labor coefficient – 9.16 hours
Training load:	Lectures – 30h., laboratory classes – 30h., LIW-55 hours; intermediate LIW-12.5 hours; LIWT -22.5 hours, The Total labor intensity-150 hours.
Credit points:	5 ECTS
Prior knowledge for compliance with the	Rating according to the results of current control – not lower 25 points

examination requirements:	
Recommended prior knowledge:	Inorganic and analytic chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Physics
Module objectives / planned learning outcomes:	
Content:	**Lectures.** Subject and methods of molecular biology. Characteristics of molecular biology as a science engaged in the study of molecular bases of cell life. The history of molecular biology. Works by W. Astbury and J. Kendrew on the x-ray diffraction of proteins. Identification of DNA as a carrier of genetic information. Viruses and phages as the first objects of molecular biology. Study of the processes of self-Assembly and the development cycles of viruses and phages; the discovery of genetic recombination in phages Structure and functions of nucleic acids. Creation of a bispiral model of DNA molecule. Decoding of structure of a number of proteins and revealing of connection between their structure and function. Nucleic acids as biopolymers of irregular structure. DNA as genetic material. Gene as polynucleotide. Principles of DNA structure. Nucleoside, nucleotide, oligonucleotide, **Laboratory.** DNA isolation by phenol-chloroform method Isolation of plasmid and phage DNA .Isolation and purification of proteins . Electrophoresis of nucleic acids .Restriction analysis of DNA . Biochemical basis of matrix synthesis . PCR amplification of DNA
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of practical work with a written report, tasks of the CDS and midterm control. Final control: exam
Technical teaching aids:	Interactive board, handouts.
Literature:	1 Konichev S. A., Sevast'yanova, G. A., Molecular biology. – M.: Academy, 2005,. 2. Belyasova N. Biochemistry and molecular biology. M.: Book house, 2004. 3. In The Bikes.A. Molecular biology. Practical guide [Electronic resource] : studies.-method. benefit. Sarat. state im UN-T. N. G. Chernyshevsky. - Saratov : Sarat. state UN-t, 2012. - 79 p.: Il., table. - Bibliogr.: p. 70. - B. C. b) additional literature: 1. Elliot, D. Elliot. Biochemistry and molecular biology. M.: MAIK "Nauka/ Interperiodica", 2002. – 446 p. 2. In The Bikes.A, P Kuznetsov.E. Workshop on molecular biology: bioengineering Techniques / Under the editorship of Professor V. V. Ignatov. 2006. – Saratov: Publishing house of SSU 2006, – 80 p. 3. Konichev A. S., Sevastyanova G. A Basic terms of molecular biology. Textbook. M.: Ear 2006,. 4. Konichev A. S. Biochemistry and molecular biology. Terms dictionary. M.:Bustard 2008,. 5. In Stepanov.M. Molecular biology. Structure and function of proteins, 3rd ed. M.: Publishing house of Moscow state University 2005,.

Module name:	**M49.1 Biophysics**

Module level as required:	Bachelor's program
Abbreviation as required:	BPh
Subtitle as required:	
Lesson type as required:	Lectures, laboratory lessons
Training semester:	8 semester
Person responsible for the module:	
Teacher:	Mutaliyeva B.Zh.
Language:	Kazakh, Russian
Connection with curriculum:	Profile discipline, optional component
Form of teaching / weekly training load in a semester:	Full time / Lectures – 2h., laboratory lessons – 2h., SIW – 3.66h., SIWT – 1.5h., Total labor coefficient – 9.16 hours
Training load:	Lectures – 30h., laboratory lessons – 30h., SIW – 55h., SIWT – 22.5h., Total labor coefficient – 150 hours
Credit points:	5 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Inorganic and analytic chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Physics
Module objectives / planned learning outcomes:	After completion of the module, students should be able to: - describe laws of general biophysics, dynamic and other features of biosystems; - independently formulate concepts with cognitive development and deepening of basic biophysical concepts in order to build a holistic picture of the organic world; - analyze patterns of flow of biophysical processes of vital activity in biological objects; - draw conclusions of natural science worldview obtained in biophysics; - independently compile the simplest physical and mathematical models for studying biological systems.
Content:	**Lectures.** History of formation of biophysics. Physics of elements of living objects. Main sections of biophysics. System representations of biological objects. General principles for describing the kinetic behavior of biological systems. Types of behavior of biological systems. Biological triggers. Oscillatory processes in biology. Self-organization processes in distributed biological systems. Kinetics of enzymatic processes. The simplest enzyme reactions. Multiplicity of stationary states in enzymatic systems. Spatial configuration of polymer molecules. Structural and functional organization of biological membranes. Electrochemical potential. **Laboratory works.** Determination of temperature coefficient and calculation of activation energy of a frog heart contraction. Temperature effect on the activity of catalase in yeast cells. Temperature effect on the activity of catalase in plant objects. Lead nitrate effect on the activity of catalase in yeast cells. Determination of time of 50% hemolysis caused by HCl. Determination of distribution coefficient of organic compounds by calculation methods. Determination of resistance of homogeneous cell suspensions. Determination of blood serum viscosity.
Learning / examination	Current control: successful implementation and defense of

outcomes / control forms:	laboratory works with written report, tasks of SIW and midterm control. Final control: exam.
Technical teaching aids:	Interactive board, handouts.
Literature:	1. Berman G.N. Biophysics: Teaching aid / G.N. Berman. – SPb.: Lan, 2012. – 240 p. 2. Walkenstain M.V. Biophysics / M.V. Walkenstain. – SPb.: Lan, 2012. – 608 p. 3. Jackson M.B. Molecular and cellular biophysics / M.B. Jackson – M.: Binom, 2015. – 551 p. 4. Kudryashov Yu.B. Radiation biophysics: ultra-low-frequency electromagnetic radiation. Textbook for universities / Yu.B. Kudryashov, A.B. Rubin. – M.: Fizmatlit, 2014. – 216 p. 5. Biophysics: Searching for Principles, Princeton University Press (28 October 2012) - by William Bialek – 640 p. ISBN-10: 9780691138916

Module name:	**M49.2 Bionanotechnology**
Module level as required:	Bachelor's program
Abbreviation as required:	BNT
Subtitle as required:	
Lesson type as required:	Lectures, laboratory lessons
Training semester:	8 semester
Person responsible for the module:	
Teacher:	Mutaliyeva B.Zh.
Language:	Kazakh, Russian
Connection with curriculum:	Profile discipline, optional component
Form of teaching / weekly training load in a semester:	Full time / Lectures – 2h., laboratory lessons – 2h., SIW – 3.66h., SIWT – 1.5h., Total labor coefficient – 9.16 hours
Training load:	Lectures – 30h., laboratory lessons – 30h., SIW – 55h., SIWT – 22.5h., Total labor coefficient – 150 hours
Credit points:	5 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of current control – not lower 25 points
Recommended prior knowledge:	Inorganic and analytic chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Physics
Module objectives / planned learning outcomes:	After completion of the module, students should be able to: - describe laws of general biophysics, dynamic and other features of biosystems; - independently formulate concepts with cognitive development and deepening of basic biophysical concepts in order to build a holistic picture of the organic world; - analyze patterns of flow of biophysical processes of vital activity in biological objects; - draw conclusions of natural science worldview obtained in biophysics; - independently compile the simplest physical and mathematical models for studying biological systems.
Content:	**Lectures.** History of formation of biophysics. Physics of elements of living objects. Main sections of biophysics. System representations of biological objects. General principles for describing the kinetic behavior of biological systems. Types of

	behavior of biological systems. Biological triggers. Oscillatory processes in biology. Self-organization processes in distributed biological systems. Kinetics of enzymatic processes. The simplest enzyme reactions. Multiplicity of stationary states in enzymatic systems. Spatial configuration of polymer molecules. Structural and functional organization of biological membranes. Electrochemical potential. **Laboratory works.** Determination of temperature coefficient and calculation of activation energy of a frog heart contraction. Temperature effect on the activity of catalase in yeast cells. Temperature effect on the activity of catalase in plant objects. Lead nitrate effect on the activity of catalase in yeast cells. Determination of time of 50% hemolysis caused by HCl. Determination of distribution coefficient of organic compounds by calculation methods. Determination of resistance of homogeneous cell suspensions. Determination of blood serum viscosity.
Learning / examination outcomes / control forms	Current control: successful implementation and defense of laboratory works with written report, tasks of SIW and midterm control. Final control: exam.
Technical teaching aids:	Interactive board, handouts.
Literature:	1. Berman G.N. Biophysics: Teaching aid / G.N. Berman. – SPb.: Lan, 2012. – 240 p. 2. Walkenstain M.V. Biophysics / M.V. Walkenstain. – SPb.: Lan, 2012. – 608 p. 3. Jackson M.B. Molecular and cellular biophysics / M.B. Jackson – M.: Binom, 2015. – 551 p. 4. Kudryashov Yu.B. Radiation biophysics: ultra-low-frequency electromagnetic radiation. Textbook for universities / Yu.B. Kudryashov, A.B. Rubin. – M.: Fizmatlit, 2014. – 216 p. 5. Biophysics: Searching for Principles, Princeton University Press (28 October 2012) - by William Bialek – 640 p. ISBN-10: 9780691138916

Module name:	**M50.1 Agricultural Biotechnology**
Module level as required:	Bachelor's program
Abbreviation as required:	AB
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	8
Person responsible for the module:	
Teacher:	Yelemanova Zh.R.
Language:	Kazakh, Russian
Connection with curriculum:	basic discipline, optional component
Form of teaching / weekly training load in a semester:	Full-time / Lectures - 2h., Practical classes - 1h., SIW -3.33h, SIWT -1h. Total complexity -7.33 hours
Training load:	Lectures - 30h., Practical classes - 15h., SIW - 50h, SIW - 10h SIWT - 15h. Total labor intensity - 120 hours
Credit points:	4 ECTS
Prior knowledge for	Rating according to the results of current control is not lower

compliance with the examination requirements:	than 25 points
Recommended prior knowledge:	Preliminary knowledge of the modules: Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Fundamentals of biotechnology, General and Molecular Genetics, Industrial Biotechnology
Module objectives / planned learning outcomes:	After completing the study, the module is able to: - know the technology of crop production in various environmental conditions; - apply the methods of biotechnology in breeding, seed production and crop cultivation technology; - be able to apply theoretical and practical skills to ensure the ecological usefulness of the production of agricultural products; - justify the choice of varieties of agricultural crops for the specific conditions of the region and the level of intensification of agriculture; - independently carry out microbiological synthesis of amino acids; - use antibiotics to stimulate plant growth.
Content:	Lectures: Introduction to agricultural biotechnology. Basics of molecular bioengineering. Genetic engineering of plants. Technology of molecular breeding of animals and birds. Transgenic and cloned animals. Soil biotechnology and fertilizer. Biological products for livestock. Feed protein. Agricultural waste recycling. Biological components of feed and premix. Practical classes: Genetic code - the principle of recording hereditary information. Interspecific embryo transfer and production of chimeric animals. Nuclear transplantation methods: micromanipulation method, nuclear transplantation using cytochalasins. Biocompatible materials and coatings. Microbiological synthesis of amino acids. Methods of classical selection and genetic engineering for the production of industrial strains of microorganisms - producers of amino acids. The effect of antibiotics on metabolism and plant development. Methods of using antibiotics to stimulate plant growth.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of practical work with a written report, tasks of the CDS and midterm control. Final control: exam
Technical teaching aids:	Interactive board, handout.
Literature:	1. Sidorenko, O. D. Bioconversion of Agro-Industrial Waste: Study Guide / OD. Sidorenko, V.N. Kutrovsky. - M .: SIC INFRA-M, 2013. - 160 p. 2. Freshny R.Ya. Culture of animal cells: a practical guide. - M.: BINOM. Lab-I knowledge, 2012. 3. Technical support of crop production: Textbook / A.V. Novikov, I.N. Shilo, T.A. Neparko; Ed. AV Novikova - M .: Infrastructure and Infrastructure-M; Mn .: New. knowledge, 2012. - 512 s. 4. Sidorenko, O. D. Bioconversion of Agro-industrial Waste: Study Guide / OD. Sidorenko, V.N. Kutrovsky. - M .: SIC INFRA-M, 2013. - 160 p. 5. Problem Solving Approach, Springer; 4th ed. 2018 edition (June 28, 2018) - by Harry L. Field (Author), John M. Long

	(Contributor) - 476 p. ISBN-10: 9783319696782

Module name:	**M 50.2 Biotechnological methods of animal reproduction**
Module level as required:	Bachelor's program
Abbreviation as required:	BMAR
Subtitle as required:	
Lesson type as required:	Lectures, practical classes
Training semester:	8 trimester
Person responsible for the module:	PhD
Teacher:	Abay G.
Language:	Kazakh, Russian
Connection with curriculum:	basic discipline, elective component
Form of teaching / weekly training load in a semester:	Intramural / Lectures - 2 hours, practical classes - 1 hours, current SIW -3.33 hours; SIWT -1 hours. Total labor intensity – 7.33 hours.
Training load:	Lectures-30 hours; practical classes – 15 hours, current SIW-50 hours; intermediate SIW-10 hours; SIWT -15 hours. Total labor intensity – 120 hours.
Credit points:	4 ECTS
Prior knowledge for compliance with the examination requirements:	Rating on the results of the current control is not less than 25 points
Recommended prior knowledge:	know the theoretical foundations of reproduction of laboratory animals; - to be able to freely navigate the market of commercial biotechnology products and, depending on the goals, to engage in the necessary research and biotechnological practices. - to acquire knowledge in various areas of biotechnology. Methods for quantitative biology in biotechnology superovulate and synchronization hunting. Artificial insemination. Evaluation of gametes and embryos of laboratory animals. Selection and selection of gametes and embryos of laboratory animals.
Module objectives / planned learning outcomes:	
Content:	**Lectures.** Biotechnology of animals in Kazakhstan. Fundamentals of animal reproduction biology. Breeding aspects of biotechnology. Biotechnology animal reserve selection of the female donor, female recipient. Superovulated folliculogenesis. **Practical classes**. Methods of embryo transplantation Evaluation, selection and selection of gametes Evaluation, selection and selection of embryos Fertilization and cultivation of gametes. Fertilization and embryo culture Theoretical aspects of freezing gametes and embryos.
Learning / examination outcomes / control forms:	Current control: successful implementation and protection of practical work with a written report, the tasks of the SIW and boundary control. Final control: exam.
Technical teaching aids:	Interactive whiteboard, handout
Literature:	1. Veterinary obstetrics and animal reproduction Biotechnics : textbook for universities on spec. "Veterinary", "Zootechnics", "Technology of agricultural production"; Rivers.s/x RF / N. I. Polyantsev, V. V. Podberesky. - Rostov n/A : Phoenix, 2001. -480 p.

	[In Russian] 2.Polyantsev N. So. Veterinary obstetrics and animal reproduction Biotechnics : textbook for universities on spec. "Veterinary", "Zootechnics", "Technology of agricultural production"; Rivers.s/x RF / N. I. Polyantsev, V. V. Podberesky. - Rostov n/A : Phoenix, 2001. - 480 p. [In Russian] 3.Doroshenko M. V. Diseases of sheep and goats : reference manual / M. V. Dorosh. - M. : Veche, 2007. - 160 p. [In Russian]

Module name:	**M54 Graduation bachelor's work**
Module level as required:	Bachelor's program
Abbreviation as required:	GBW
Subtitle as required:	
Lesson type as required:	
Training semester:	9 Trimester
Person responsible for the module:	"Technology and design of light industry products" chair
Teacher:	Regular teachers of the study program
Language:	Kazakh, Russian
Connection with curriculum:	Compulsory component
Form of teaching / weekly training load in a semester:	
Training load:	
Credit points:	12 ECTS
Prior knowledge for compliance with the examination requirements:	Rating according to the results of intermediate and midterm control – not lower 25 points
Recommended prior knowledge:	Positive results of the passed state examination in the specialty and decision on admission to the diploma work (project)
Module objectives / planned learning outcomes:	After completion of the course, students should be able to: - choose the research methodology, with own responsibility find a solution to the problems and questions that have arisen; - explain the methods used to develop patterns, methods for assembly processing, their difference from each other, advantages and disadvantages; - provide yourself with information, critically examine the task, identify the problem and set a specific task for the bachelor's work; - analyze technical and economic performance indicators and justify economic feasibility of the developed product; - independently carry out research work in order to analyze and select the optimal conditions formanufacturing the designed product; - organize yourself to achieve the goal; - assess the quality of raw materials and finished products; - describe the planning, organization and execution of experimental and production works; - show the ability to use scientific literature and system of standards for labor protection and life safety; - draw up own work in accordance with the requirements for

	scientific documents at the appointed time and bring to completion; - publicly present the work to specialists and be able to professionally present and defend the bachelor's work.
Content:	Abstract, content, introduction, scientific part (including analytical review, experimental part), design part, technological part, life safety, ecology and technical part, conclusion and findings, list of used sources, appendixes. Conclusions and reviews of the supervisor and independent reviewer in the specialty. Oral defense of the bachelor's work with graphic posters before the attestation commission with discussion. An independent State Commission consisting of managers and leading specialists of production is created for the defense. The evaluation is carried out by the independent State Attestation Commission of four people, taking into account the opinion and review of the reviewer.
Learning / examination outcomes / control forms:	Conclusions and reviews from managers and independent reviewers in the specialty. Oral defense of the graduation qualification bachelor's work with posters or slides before the attestation commission. It is adopted by the independent State Attestation Commission of five people with inclusion of leading experts in the clothing industry, estimated taking into account the conclusions and reviews of the reviewers. Final control: defense of the graduation bachelor's work.
Technical teaching aids:	Interactive board, presentation
Literature:	1. Teacher edition on the diploma project for students of the specialty 5B070100 –Biotehnology, Shymkent: SKSU, 2018. – 28 p. 2. State Compulsory Standard of Education of the Republic of Kazakhstan No. 1080 dated 23 August 2012 as amended as of 13 May 2016 No. 292 and standard curriculum for the specialty 5B070100 – Biotehnology of the Ministry of Education and Science of the Republic of Kazakhstan No. 270 dated 12 June 2017.

Module name:	**Regraduation practice**
Module level as required:	Bachelor's program
Abbreviation as required:	RP
Subtitle as required:	
Lesson type as required:	
Training semester:	8 semester
Person responsible for the module:	Department of «Biotechnology»
Teacher:	Candidate of biological Sciences, associate Professor Abildaeva R. A.
Language:	Kazakh, Russian, English
Connection with curriculum:	Obligatory component
Form of teaching / weekly training load in a semester:	
Training load:	450 hours'
Credit points:	15 ECTS - credit
Prior knowledge for compliance with the	

examination requirements:	
Recommended prior knowledge:	Inorganic and analytical chemistry, Objects of biotechnology, Introduction to the specialty, Biochemistry, Fundamentals of biotechnology, General and molecular genetics, Industrial biotechnology, Instruments and methods of research of biological systems, Production practice 1 Production practice 2
Module objectives / planned learning outcomes:	- After the students have completed the study of this course, they must be able to: - describe the studied production process, make the material and thermal balance of production; - propose measures to ensure environmental safety of production and life safety; - critically analyze with the production team the existing problematic issues in order to offer ways to address them in the bachelor's work; - discuss plans for the introduction of new equipment and technologies, as well as the possibility of improving the economic performance of production; - to summarize the results of independent research in relation to the problematic issues of the existing technology; - make a report with conclusions and suggestions and protect the results of pre-diploma practice.
Content:	A detailed study of the technology of obtaining or allocation of the target product in accordance with the theme of the diplome work. Identification of the limiting stage of production and the causes of its occurrence. Examination and study of the work of a separate stage of production and the equipment used according to the individual task for practice. Consideration of environmental problems of production and ways to solve them.Calculation of material and heat flows of production.Study of economic issues and production planning, introduction of new equipment and technology.Ensuring the safety of life and environmental cleanliness. Determination of economic efficiency of research and development of new technologies.
Learning / examination outcomes / control forms:	Evaluation of materials on the structure and content of the report. Preparation and protection of the report. Final control – offset.
Technical teaching aids:	Technological schemes, drawings of devices, calculation cost price.
Literature:	1. Elemanova Zh. R. plant Biotechnology: textbook for students majoring 5B070100 - "Biotechnology" / Zh. R. Elemanova. - Shymkent : SKSU, 2014. - 128 p. [Kazakh] 2. Modern methods in biotechnology : studies. benefits for students. universities / S. S. Kenzhebaeva. - Almaty : Publishing House "Bastau", 2013. - 272 p. [Kazakh] 3. Netrusov A. I., Kotova I. B. Microbiology. M.: Publishing center "Academy", 2012. – 384 p. [Russian] 4. Klonowa S. M., Egorova T. A., E. A. Sivukhina Biotechnology – Moscow, 2010. [Russian] 5. Downstream Industrial Biotechnology: Recovery and Purification, Wiley; 1 edition (March 12, 2013) – by Michael C. Flickinger – 872 p. ISBN-10: 9781118131244 [English]