

## **Module Handbook**

The BSc: 60812300 – Water Sector and Land Reclamation  
degree program

## 1-semester

<b>Module designation</b>	<b>XT1115- Foreign language</b>
Semester(s) in which the module is taught	1,2
Person responsible for the module	<i>English teacher: Ergashev Doniyor Davronovich, Baxitjavova Eleonora Makhmud kizi, Abdurakhimova Janar Akhmetovna, Begov Fayzullo Rakhmatulloevich</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Practical</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 450 hours. Contact hours: 180 hours: - Practical - 180 Private study including examination preparation, specified in hours<sup>1</sup>: 270 hours.</i>
Credit points	15
Required and recommended prerequisites for joining the module	<i>English (school program)</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>student-centred approach where main focus of the educational environment placed on a student;</i></li> <li>- <i>to participate in team work, especially cooperative learning, in order to develop social and affective skills;</i></li> <li>- <i>grammar structure and vocabulary during the lesson by giving pictures to describe and sentence completion tasks;</i></li> <li>- <i>normal speech patterns while presenting grammar;</i></li> <li>- <i>structure of given handouts for their completing exercise;</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>creates interesting learning environment;</i></li> <li>- <i>students comprehend and be able to share information;</i></li> <li>- <i>to express their opinions, improve their language skills, and gain confidence.;</i></li> <li>- <i>focusing on specific areas of a text and better comprehending it;</i></li> <li>- <i>students can comprehend words and commonly used terminology in areas of urgent importance (e.g. very basic personal and family information, shopping, local geography, employment);</i></li> <li>- <i>can communicate in easy and routine tasks that need a direct and straightforward flow of information on common and routine topics.</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>Using of jurisprudence terminology related to transboundary water relations;</i></li> <li>- <i>Comprehend the text about transboundary water corporation.</i></li> </ul>
Content: The discipline includes. The <i>level of difficulty</i> : (1 – low, 5 high):	Teaching non-philological education students the important aspects of language: grammar, lexicon and discourse analysis, and developing the skills of their correct use in communication.
Exams and assessment formats	<i>Two oral Midterm assessments (20 minutes each) and one final oral exam (40 minutes), short computer-based quizzes, take-home written assignments</i>
Study and examination requirements	<i>Requirements for successfully passing the module e.g. the final grade in the module is composed of 60% performance on exams, 10% quizzes, 10% take-home assignments, 10% in-class participation. Students must have a final grade of 60% or higher to pass</i>

Reading list	<ol style="list-style-type: none"><li>1. <i>“English vocabulary in use” Elementary (third edition).</i></li><li>2. <i>Soil Security. Volume 4. September 2021</i></li><li>3. <i>Oxford word skills (Basic)</i></li><li>4. <i>Atmospheric Environment. Part A. General Topics. Volume 27, Issues 17–18 December 2010.</i></li><li>5. <i>Renewable and Sustainable Energy Reviews. Latest issue Volume 154. 2021.</i></li><li>6. <i>Oxford English grammar course basis.</i></li><li>7. <i>Practical grammar Level 1.</i></li><li>8. <i>Tactics for listening Second edition</i></li></ol>
--------------	--

<b>Module designation</b>	<b>MAT1115 Higher Mathematics</b>
Semester(s) in which the module is taught	1, 2
Person responsible for the module	<i>Ergashev Tukhtasin ulyamovich, DSc, Professor</i> <i>Yuldashev Nurilla Nigmatovich, PhD, associate professor</i> <i>Komilova Kholidakhon, PhD, associate professor</i> <i>Abdullaev Akmaljon Abduljalilovich, PhD, associate professor</i> <i>Normuminov Bakhodir, senior Lecturer</i> <i>Djuvanov Kamariddin, assistant</i> <i>Shakhobiddinova Zardila, assistant</i> <i>Saparbaeva Dilbar, assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 420 hours.</i> <i>Contact hours: 180 hours:</i> <i>- lecture – 90 hours;</i> <i>- practical lessons – 90 hours;</i> <i>- self-learning - 270 hours.</i>
Credit points	15 (7+8)
Required and recommended prerequisites for joining the module	<i>“Basic Algebra”, “Geometry”, “Informatics”</i>

<p>Module objectives/intended learning outcomes</p>	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>elements of linear algebra;</i></li> <li>- <i>analytic geometry;</i></li> <li>- <i>Elementary problems of analytical geometry.</i></li> <li>- <i>The concept of a vector,</i></li> <li>- <i>the magnitude of a vectors,</i></li> <li>- <i>Properties of linear operations on vectors (multiplication by a number, addition and subtraction).</i></li> <li>- <i>Projection of vectors. Scalar, vector, mixed product and their properties. Vector applications</i></li> <li>- <i>General equation of curves of the second order.</i></li> <li>- <i>Plane equations, their special cases. Construction of planes. Angle between two planes.</i></li> <li>- <i>mathematic analysis;</i></li> <li>- <i>theory of complex numbers;</i></li> <li>- <i>derivative of functions, indefinite and definite integrals, multivariable functions and series in solving practical problems related to water sector and land reclamations</i></li> <li>- <i>Ordinary differential equations. Homogeneous, linear, Bernoulli equations.</i></li> <li>- <i>Differential equations with high order. Differential equations admitting order reductions. System of linear differential equations.</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>to choose convenient methods of solving differential equations and use them in process analysis, to know solutions to problems;</i></li> <li>- <i>using mathematical symbols to express quantitative and qualitative relations of objects;</i></li> <li>- <i>derivative of a function, indefinite and definite integral, use of multivariable functions and series in solving practical problems.</i></li> </ul> <p><b>Form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>deep practical and theoretical knowledge , application of mathematical concepts in practice;</i></li> <li>- <i>able to mathematically analyze statistical data;</i></li> <li>- <i>to be able to build a mathematical model problem of water sector and find its solution using mathematical research methods;</i></li> <li>- <i>solving optimization problems of water sector.</i></li> </ul>
---	--

Content: The discipline includes. The *level of difficulty*: (1 – low, 5 high):

Determinants of the second and third order. Methods for calculating determinants. Basic properties of determinants. Minor and algebraic additions. The concept of matrices and linear operations on them. Matrix multiplication, finding the inverse matrix. Application of matrices to practical problems. Systems of linear equations and their solution by Cramer, Gauss, inverse matrix methods. Applications of matrices and systems of equations to economic problems. *Level of difficulty: 2*

Concepts of the Cartesian coordinate system. The distance between two points on a plane. The division of the segment in this respect. The general equation of a straight line is an equation with a slope, an equation of a straight line in segments. Equations of the bisector of intersecting lines. Elementary problems of analytical geometry. *Level of difficulty: 3*

The concept of a vector, the length of a vector, collinearity and coplanarity of vectors. Properties of linear operations on vectors (multiplication by a number, addition and subtraction). Projection of vectors. Scalar product of vectors, vector product, mixed product and their properties. Vector applications. *Level of difficulty: 2*

General equation of curves of the second order. Circle, ellipse, hyperbola, parabola and their elements (center, radius, focus, eccentricity, directrix). Canonical representation of the general equation of curves of the second order. Applications of curves of the second order. *Level of difficulty: 2*

Plane equations, their special cases. Construction of planes. Angle between planes. Straight line in space, its equations. Angle between lines. Surfaces of the second order and their canonical equations. Applications of analytic geometry to constructive problems. *Level of difficulty: 3*

Function concepts. Methods for setting a function, domain of definition, its graph. Elementary function, complex function. Sequence and its limit. Function limit, one-sided limits. Basic properties of limits. Disclosure of uncertainty. The first and second wonderful limits. Application of the limit of a function to economic problems and approximate calculations. *Level of difficulty: 3*

The derivative of a function and its applications. The equation of the tangent and normal of the function reduced to the graph at a given point. Derivative of complex, parametric, inverse and implicit functions, rules for calculating the derivative, table of derivatives. Derivatives of elementary functions. First order derivatives, function differential. Application of the differential of functions to approximate calculations. Application of derivatives and differentials to economic problems. *Level of difficulty: 3*

Mathematical analysis. Differential calculus. Concept of indefinite integral. The main methods of integration. Definite integral and its applications. Calculating the definite integral. Applications of the definite integral to geometric and mechanical problems. *Level of difficulty: 4*

Theory of multivariable functions. Partial derivative, full differential. Application of full differentials in approximate calculations. Determining the extreme of a multivariable function. Determining tangent plane and normal to a curve in space. Directional derivative. Gradient. *Level of difficulty: 4*

Ordinary differential equations. Definition of a differential equation, its order, general and particular solutions. Cauchy problem. Differential Equations with Separable Variables. Homogeneous, linear, Bernoulli equations. Complete differential equations. Integrating factor. Differential equations with high order constant coefficients. Higher order differential equations. System of linear differential equations. *Level of difficulty: 5*

Number and functional series. Power series. Taylor and Maclaurin series and their applications. Expanding a function to a Fourier series. *Level of difficulty: 5*

Exams and assessment formats	One written midterm assessments (80 minutes), take-home written assignments and one final oral exam (40 minutes).
Study and examination requirements	Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass
Reading list	<ol style="list-style-type: none"> <li>1. B.Xudayarov "Matematikadan misollar va masalalar to'plami" Toshkent "O'zbekiston" 2018. 304 b.</li> <li>2. T.Ergashev "Differensial tenglamalar" Toshkent "O'zbekiston" 2023 yil. 320 b.</li> <li>3. Peter W. O'neil. Advanced engineering mathematics. 2010. Claudio Canuto, Anita Tabacco. Mathematical Analysis I, ( II ). Springer-Verlag, Italia, Milan, 2015.</li> <li>4. Sh.Alimov, R.Ashurov "Matematik analiz" I qism. Tashkent, "Mumtoz so'z", 2018. -583 b.</li> <li>5. А.Б.Соболев, А.Ф.Рыбалко Математика: учебное пособие. – Екатеринбург: ГОУ ВПО УГТУ-УПИ, 2004. – 180 с.</li> </ol>

<b>Module designation</b>	<b>FIZ1105-Physics</b>
Semester(s) in which the module is taught	1
The person responsible for the module	<i>Sapaev Ibrahim. Bayramdurdievich. Associate Professor Ph.D Khojiev Mardonbek Ulug'bekovich. Associate Professor Ph.D Joraev Khimmatali Nomozovich. Associate Professor Ph.D Urolov Shamsiddin Zayniddinovich, Associate Professor PhD Rakhimov Ozodbek Gulomovich, Associate Professor PhD</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, lab works.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours Contact hours: 60: -Lecture - 30 hours; -Practical lessons - 30 hours -Self-learning - 90 hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>"Mathematical analysis", "Analytical geometry".</i>



Module objectives/intended learning outcomes	After mastering the discipline, the student will:
	<p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>Distinguishing natural phenomena in physics, studying the properties of matter and space, their laws, and seeing the main fundamental laws in practice.</i></li> <li>- <i>General physics course to acquire knowledge from departments of mechanics, molecular physics, electricity and magnetism, optics, atomic and nuclear physics;</i></li> <li>- <i>Terminology in the field of physics and equipment (instruments) used in physics research, to know the difference between one-, two- and three-atom molecules and degrees of freedom;</i></li> <li>- <i>The basic phenomena of physics and sections of physics, The fundamental concept of mechanics is that of motion of a body with respect to other bodies;</i></li> <li>- <i>The subfield of physics, developed in classical mechanics, which describes the motion of points, bodies (objects), and systems of bodies;</i></li> <li>- <i>Mechanical Phenomenon, Electromagnetic Phenomenon, Optical and Atom nuclear, to see changes in the characteristics of processes in different environments;</i></li> <li>- <i>The to develop students' ability to apply physical formulas in the problems of specialization and general professional sciences in the curriculum of physics;</i></li> <li>- <i>The basics of physics knowledge, the patterns, and principles of physics, the dynamics and statics, formation, and interaction, and evolutionary development;</i></li> <li>- <i>The basics of math knowledge, and theoretical and practical analysis of physical problems.</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>To know the formulas for uniform motion and nonuniform motion, apply the rule of vectors in dynamics problems, and be able to apply Newton's laws and their problems.;</i></li> <li>- <i>Knowledge of magnetic fields created by permanent and artificial magnets in electromagnetic problems, forces in magnetic fields;</i></li> <li>- <i>Understand the different and similar aspects of variable and constant current sources, and use them in problems;</i></li> <li>- <i>To understand optical phenomena, to be able to distinguish optical devices, and to understand the principle of operation, to understand the working mechanism of lenses, and telescopes.</i></li> <li>- <i>To know the location of active and passive devices in electric circuits, to be able to apply the laws Krieghoff's laws to electric circuits, to understand the mechanism of electric current passing in different environments, ability to apply formulas and physical laws of capacitors and resistors in series and parallel.</i></li> <li>- <i>Know the different and similar aspects of metals, semiconductors, and dielectrics, and understand the current flow mechanisms in them, Graphical explanation of changes in electrical conductivity of metals, semiconductors, and dielectrics with temperature.</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>Mainly performing various physical processes and phenomena together with the teacher in laboratory classes.;</i></li> <li>- <i>Measuring the physical, the student independently measures and determines the density of various solid objects;</i></li> <li>- <i>Creating an electric circuit using small variable and constant and alternating current sources in laboratory conditions.;</i></li> <li>- <i>The student independently determines the focal length of converging and diverging lenses, thereby understanding the mechanism of operation of optical devices.;</i></li> <li>- <i>Implementing and using basics and features of statistics and dynamics in routine professional activities;</i></li> </ul> <p><i>Determining the processes by experiment and checking their</i></p>

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p>Topic1.Physical foundations of classical mechanics. Progress and kinematics of rotational motion, Newton's laws. Dimensions of physical quantities. Space and time. Kinematic definitions of movement. Equation of motion. Mass and momentum. Newton's 1st law and the concept of inertial calculus. Newton's 2nd law. The fundamental equation of forward motion dynamics. Newton's 3rd law. The law of conservation of momentum. Elastic properties of solids. Elastic deformation. Work and energy. The law of conservation of energy in mechanics. <i>Level of difficulty: 2.</i></p> <p>2nd topic. Dynamics of rotational motion of a solid body, Fluid mechanics, Vibrations. Moment of force and moment of inertia of a rigid body. Steiner's theorem. Impulse moment. The law of conservation of angular momentum. Hydrostatics of an incompressible fluid. Viscous fluid hydrodynamics. Harmonic vibrations. Equation of mechanical harmonic vibrations. Vibration is the energy of a moving body. Mathematical and physical pendulum. Damping and forced vibrations. <i>Level of difficulty: 3.</i></p> <p>3rd topic. Fundamentals of molecular - kinetic theory, Thermodynamics laws. Heat capacity of gases, Real gases Ideal gas law. Molecular-kinetic theory of gases. The basic equation of the molecular-kinetic theory. Molecular-kinetic meaning of temperature. The average kinetic energy of a molecule. Heat action. Macroscopic parameters. Equation of state. Internal energy. Amount of substance and its unit of measure. Equilibrium states and processes. Concept of ideal gas. Explanations. Ideal gas equation of state. Gas constant. Work performed on the change in gas volume. Laws of thermodynamics. Real gases. Van der Waals equation. <i>Level of difficulty: 3.</i></p> <p>Topic 4. Electric charge and electrostatic field, Static electricity so, the magnetic field. Electric charge. law of conservation of electric charge. Coulomb's law. Electric field. Electrical capacity. Capacitors. Electric field energy. <i>Level of difficulty: 4.</i></p> <p>The electric current in space. Superposition principle for magnetic fields. Bio-Savar-Laplace law. The magnetic field for DC and AC conductors, solenoids, and toroids. Full current law. The phenomenon of electromagnetic induction. Faraday's law. Lens rule. Inductance. Self-induction. Magnetic energy of current. Magnetic field energy density. <i>Level of difficulty: 3.</i></p> <p>Topic 5. Geometrical and interpretive optics, the structure of the atom and an atomic nucleus. Concept of optical medium. Calculation of the interference landscape. Interferometers. The phenomenon of light diffraction. Huygens-Fresnel rule. Simple examples of Fresnel diffraction. The principle of holography. Natural and polarized light. Internal and external photo effect. Einstein's equation. Methods of measuring radiation doses. Biological effects of radioactive radiation. <i>Level of difficulty: 5.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessment (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>

Reading list	<ol style="list-style-type: none"><li>1. Douglas S.G. "Processes a General Source"-USA: 2010 y. 712 p.</li><li>2. Abduraxmonov A. "Fizika kursi" T.: 2011. 1-qism-237 b, 2-qism,-316 b</li><li>3. O.Qodirov "Fizika kursi" T.: O'zbekiston Milliy kutubxonasi nashriyoti.2006.1- qism 210 bet, 2 - qism 260 bet, 3- qism 230 b.</li><li>4. Volkenshteyn V. S. "Umumiy fizika kursidan masalalar to'plami" T.: O'qituvchi. 2008. -437 b.</li><li>5. F.Rajabov va boshqalar. "Oliy matematika". 2007 y. Toshkent, "O'zbekiston". 400 b.</li><li>6. Z.F.Beknazarova "Fizika fanidan masalalar yechish" bo'yicha o'quv qullanma, TIKXMMI, 2019 yil, 205 b.</li><li>7. YO.Toshmurodov, Z.F.Beknazarova "Fizika fanidan laboratoriya ishlari"ni bajarish bo'yicha o'quv qullanma, (o'zbek) TIKXMMI, 2020 yil, 234 b.</li></ol>
--------------	--

<b>Module designation</b>	<b>OYTB 1104- The newest history of Uzbekistan</b>
Semester(s) in which the module is taught	1
Person responsible for the module	<i>Mamadaminova Bakhtigul Abdupattaevna - doctor of philosophy in historical sciences, PhD, associate professor;</i> <i>Botirova Halima Eshmamatovna - Doctor of Philosophy in historical sciences, PhD, associate professor.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, seminar</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 120 hours</i> <i>Contact hours: 60</i> <i>-Lecture - 40 hours;</i> <i>-Practical lessons - 20 hours</i> <i>-Self-learning - 60 hours</i>
Credit points	4
Required and recommended prerequisites for joining the module	« <i>History of Uzbekistan</i> »
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>the causes of the political, social, economic crisis situation in the former union,</i></li> <li>- <i>Gaining the independence of the state on the works carried out on the road,</i></li> <li>- <i>that a new period has begun in the history of Uzbekistan since the years of independence, the specific aspects of this period,</i></li> <li>- <i>about today's politics, place in the world community, heroes of the era, especially about the fact that he is also a participant in this process.</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>Analysis of historical processes;</i></li> <li><i>that social, economic, political processes are important in the new history of Uzbekistan;</i></li> <li>- <i>To study the latest historical problems of Uzbekistan;</i></li> <li>- <i>to be able to apply the idea of national independence in strengthening the worldview, to be able to express one's reaction to the processes taking place around them;</i></li> <li>- <i>to understand the place of history science in the development of society and human outlook and to know the connection of the events happening today with important events in history.</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>The essence of the historical path traveled by our country during the years of independence,</i></li> <li>- <i>the importance of the changes made in the latest history of Uzbekistan;</i></li> <li>- <i>integration of Uzbekistan with the world community in modern processes, ensuring security, interethnic harmony and religious tolerance,</i></li> <li>- <i>Knowing processes such as the increasing position and influence of the Republic of Uzbekistan in international rankings and indexes from the point of view of historicity and objectivity.</i></li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Theoretical and methodological principles of the modern history of Uzbekistan. Theoretical and methodological bases of learning science. Opinions of Sh.M.Mirziyoyev, The President of the Republic of Uzbekistan on the role and lessons of historical memory in educating a spiritually mature person. Level of difficulty: 2</i></p> <p><i>Formation and development stages of Uzbek statehood. The concept of statehood. Social, political and economic dependence of Uzbekistan on the center and its consequences. The policy of repression and violence of the Soviets and its essence. Level of difficulty: 3</i></p> <p><i>Socio-political processes in Uzbekistan on the eve of independence. The establishment of the independent Republic of Uzbekistan and its historical significance. Changes in the political system. Level of difficulty: 2</i></p> <p><i>Uzbekistan's unique path of independence and development. Uzbekistan's choice of a unique development path. "Uzbek model" of development and its specific features. Parliamentary system and reforms in Uzbekistan. Level of difficulty: 2</i></p> <p><i>The development of the Constitution of the Republic of Uzbekistan and the additional changes introduced. The purpose, tasks and methods of studying the Constitution of the Republic of Uzbekistan, the concept of the constitution. Economic reforms, formation of private ownership. Development of market relations in Uzbekistan. Social changes in the Republic of Uzbekistan. Level of difficulty: 4</i></p> <p><i>Reforms implemented in the field of education in the Republic of Uzbekistan. Development of science in the years of independence. The concept of development of the higher education system of the Republic of Uzbekistan until 2030. Level of difficulty: 3</i></p> <p><i>Reforms implemented in the field of irrigation in Uzbekistan during the years of independence. Quality changes in irrigation systems in Uzbekistan. Priorities identified in the concept of water management development of the Republic of Uzbekistan for 2020-2030. Level of difficulty: 4</i></p> <p><i>Spiritual and cultural development in Uzbekistan during the years of independence. Revival of national customs, values and traditions. State policy on ensuring stability in inter-ethnic and inter-religious relations in Uzbekistan. Level of difficulty: 3</i></p> <p><i>Reforms implemented in the socio-economic and political life of the Republic of Karakalpakstan during the years of independence. Changes in the field of agriculture in Karakalpakstan. To study the solution of ecological problem processes at the international level. Level of difficulty: 2</i></p> <p><i>Uzbekistan's international relations and its place in the world community. Uzbekistan's policy of ensuring peace and stability in the region. Level of difficulty: 5</i></p> <p><i>Reforms implemented in new Uzbekistan. Development strategy of new Uzbekistan for 2022-2026. Level of difficulty: 4</i></p> <p><i>Increasing the position and influence of the Republic of Uzbekistan in international rankings and indexes. Adoption of state policy, legal-normative documents on "Improving the position of the Republic of Uzbekistan in international rankings and indexes and introducing a new mechanism of systematic work with them in state bodies and organizations." Level of difficulty: 4</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessment (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>

Reading list	<ol style="list-style-type: none"><li>1. <i>Новейшая история Узбекистана. Руководитель проекта и редактор. М.А.Рахимов. - Toshkent: Adabiyot uchqunlari, 2018.</i></li><li>2. <i>Rasulova N. O'zbekistonning eng yangi tarixi. 1-qism. - Toshkent, 2021. - 186 bet.</i></li><li>3. <i>O'zbekistonning eng yangi tarixi. R.H.Murtazayeva, A.A.Ermetov, A.A.Odilov. - Toshkent, 2023.</i></li><li>4. <i>Mirziyoyev Sh.M. Milliy taraqqiyot yo'limizni qat'iyat bilan davom ettirib, yangi bosqichga ko'taramiz. T. 1. - Toshkent: O'zbekiston. 2017.</i></li><li>5. <i>Mirziyoyev Sh.M. Buyuk kelajagimizni mard va oliyjanob xalqimiz bilan birga quramiz. - Toshkent: O'zbekiston. 2017.</i></li><li>6. <i>Mirziyoyev Sh. Yangi O'zbekiston taraqqiyot strategiyasi. To'ldirilgan ikkinchi nashri. - Toshkent: "O'zbekiston" nashriyoti, 2022. - 416 bet.</i></li></ol>
--------------	---

<b>Module designation</b>	<b>TIL 1104- Russian language</b>
Semester(s) in which the module is taught	1
Person responsible for the module	<i>Allenova Irina Vladimirovna Batyrova Margarita Azizovna Kilicheva Feruza Beshimovna Musaeva Gulistan Koshbergenovna Tasheva Umida Temurovna Seitenova Venera Andreevna Ubbieva Sarvinoz Toirovna Yusupov Erkaboy Kurbonboevich</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 120 hours Contact hours: 60 -Practical lessons - 60 hours -Self-learning - 60 hours</i>
Credit points	4
Required and recommended prerequisites for joining the module	<i>Russian language (school program)</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <p><i>Students will learn how to construct a monologue statement in Russian on general language topics and on educational and professional topics;</i></p> <ul style="list-style-type: none"> <li><i>- build a monologue statement in Russian on general language topics and on educational and professional topics;</i></li> <li><i>- freely express their thoughts orally and in writing on professionally significant topics;</i></li> <li><i>- in the professional field of the chosen specialty, to master the language and speech norms of the modern Russian language.</i></li> <li><i>- conduct a dialogue, participate in a polylogue on a given topic.</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li><i>- correctly perceive by ear a text of general content in the amount of 18-20 sentences;</i></li> <li><i>- understand the content of an unfamiliar text in the specialty in the amount of 12-14 sentences;</i></li> <li><i>- clearly state your point of view on a scientific problem in Russian;</i></li> <li><i>- translate information messages (without a dictionary) and specialty texts (with a dictionary) from Russian into your native language.</i></li> </ul> <p><b>To form competences in:</b></p> <p><i>acquisition of language knowledge, development and improvement of speech skills and abilities in areas relevant to students: educational, scientific, professional, socio-cultural, taking into account the specifics of the specialty and the formation of some aspects of the cultural component of communicative competence.</i></p>

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p><i>Determining the starting level of knowledge of the Russian language. Introductory and corrective course.</i>  <i>Phonetic and orthoepic norms of the Russian language.</i>  <i>Simple sentence. Main and minor members of the sentence. Level of difficulty: 2.</i>  <i>Expression of subject-predicative relations in a simple sentence.</i>  <i>Coordination. Gender of nouns.</i>  <i>Number of nouns.</i>  <i>Cases. Nominative case.</i>  <i>Prepositional case.</i>  <i>Accusative case.</i>  <i>Genitive case.</i>  <i>Dative case.</i>  <i>Instrumental case. Level of difficulty: 4.</i>  <i>Verbs, their forms and control. Past, present, future tense of the verb.</i>  <i>Kind of verb. Perfect, imperfect form of the verb.</i>  <i>Verbs of movement: unidirectional and multidirectional. Level of difficulty: 3.</i>  <i>Complex sentences with coordinating and subordinating connections.</i>  <i>Expressing object relations in simple and complex sentences.</i>  <i>Expressing spatial relationships in a simple sentence.</i>  <i>Expressing spatial relationships in a complex sentence.</i>  <i>Synonymous replacement of a simple sentence with a complex one with a subordinate clause expressing spatial meaning.</i>  <i>Expressing attributive relations in simple and complex sentences</i>  <i>Expression of defining relations. Participial.</i>  <i>Synonymous replacement of a simple sentence with a complex one with an attributive clause.</i>  <i>Expressing conditional and concessional relations in simple and complex sentences</i>  <i>Synonymous replacement of a simple sentence with a complex one with a subordinate clause</i>  <i>Expressing cause-and-effect relationships in simple and complex sentences.</i>  <i>Synonymous replacement of a simple sentence with a complex one with a subordinate clause of reason.</i>  <i>Expressing temporary relations in simple and complex sentences.</i>  <i>Synonymous replacement of a simple sentence with a gerund or participial phrase with the meaning of time</i>  <i>Expressing target relationships in simple and complex sentences. Level of difficulty: 5.</i>  <i>Functional styles of speech (colloquial, official business, journalistic, artistic, scientific). Level of difficulty: 3.</i></p>
<p>Exams and assessment formats</p>	<p><i>Educational results are evaluated in a 100-point rating system. One midterm (60 points) and final oral exam (40 points)</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module</i>  <i>To pass the subject successfully, the student must score 60% or more of the allotted points.</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. <i>Ахмедова Л.Т., Лагай Е.А. Современные технологии преподавания русского языка и литературы. – Т.: 2016. – 296 с.</i></li> <li>2. <i>Батырова М.А., Апленова И.В. Учебно-методическое пособие по курсу “Русский язык” для студентов-первокурсников. – Т.: НИУ “ТИИИМСХ”, 2022. – 131 с.</i></li> <li>3. <i>Исакова Р.К. Электронное учебное пособие «Русский язык (для самообразования)». (лицензия № 394 от 02.05.2019 г.)</i></li> <li>4. <i>Келдиев Т.Т. Учебник русского языка.- Т.; 2011. – 219 с.</i></li> <li>5. <i>Киличева Ф.Б. Русский язык. Учебное пособие. – Т., 2020. – 189 с.</i></li> </ol>



<b>Module designation</b>	<b>JTS1102-Physical education and sports</b>
Semester(s) in which the module is taught	1
Person responsible for the module	<i>Norkobilov Mukhiddin, dotsent Khodjanov Aziz, dotsent Odilova Feruzahon, assestent Eshturdiyev Abbas , assestent Tursunqulov Mansur, assestent Mamatov Paxlavon, assestent</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 60 hours Contact hours: 30 -Practical lessons - 30 hours -Self-learning - 30 hours</i>
Credit points	2
Required and recommended prerequisites for joining the module	<i>Not available</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand•</b></p> <ul style="list-style-type: none"> <li>• educating and sports, various types of competition and increasing participation are likely to be succesfull;</li> <li>• <i>implementation og the latest achievements of the scientific and technical development in physical training;</i></li> <li>• <i>achievements of students in sport.</i></li> </ul> <p><b>To able to</b></p> <ul style="list-style-type: none"> <li>• <i>to know and take advantage of that it is possible to increase the effectiveness of education by giving students physical conditioning and the formation of practical skills about physiological health;</i></li> <li>• <i>the student must have the skills of continuous organization and implementation of labor activity with physical activity.</i></li> </ul>
Content: The discipline includes. The level of difficulty: (1 – low, 5 high):	<p>The purpose of physical education is to form a person's physical culture. Preparation of a person for social and professional activities. To follow a healthy lifestyle. Ensures regular physical fitness. To know the scientific and practical basis of physical culture and healthy lifestule. Self-discipline. Formation of the need to regularly engage in physical exercises. Maintenance and strengthening of health in the field of physical education. Spiritual perfection. Development and improvement student's abilities for the future profession. To gain experience in the creative use pof physical education and sports training to achieve and sports training to achieve life and professionalgoals.</p> <p>The goals and objectives of physical education of students are basic concepts in the field of physical education and sports, special theoretical knowledge, knowledge about physical development, training training, teaching the means and methods of helping to improve skills and abilities, self-physical perfection, Organization of mass wellness activities and their independent use.</p> <p>It is a science capable of initiatively and competently solving the issue of physical education of students in the comprehensive development of the main physical qualities of the movement (agility, strength, endurance, agility, agility) and promoting their physical maturation and growth.</p>

Exams and assessment formats	<i>To fully master the theoretical and methodological concepts related to science, be able to correctly reflect the results of the analysis, independently observe about the processes being studied and carry out tasks and tasks assigned in intermediate forms of control, submit a written work on final control.</i>
Study and examination requirements	<i>Students of successful transition from science The maximum points to be summed will consist of the final exam (40%), the interval control (60%), the sum of the points to be separated. In order to successfully pass the subject, the student must score 60% of the allocated points and collect a high score in it.</i>
Reading list	<ol style="list-style-type: none"> <li>1. Arne Güllich, Michael Krüger. /Sport: Das Lehrbuch für das Sportstudium (Bachelor) (German). edition. 26 Sept. 2013, (German).</li> <li>2. To'xtaboev N.T. Jismoniy tarbiya mutaxassislarining kasbiy mahoratini rivojlantirish. O'quv-uslubiy qo'llanma. – T.: 2010 y. – 71 b.</li> <li>3. Qudratov R., /Yengil atletika. darslik – T.: 2012 y.</li> <li>4. Rafiyev H.T., Yengil atletika va uni o'qitish metodikasi. Darslik – T.: 2012 y.</li> <li>5. Geyger A.I., Po'latxo'jayeva M.I. Suzish nazariyasi va uslubiyati T-2015</li> <li>6. Korbut V.M., Voljin V.I., Israilova R.G. Suzish O'zDJTI 2017</li> <li>7. Normurodov A.N., /Yengil atletika va uni o'qitish metodikasi, -T.: 2011 y.</li> </ol>

## 2-semester

<b>Name of the module/subject and code in the curriculum</b>	<b>ECG1105-Engineering and computer graphics</b>
Semester in which science is taught	2
Responsible teacher of the module/subject (Surname, Name), degree and title	<i>Nasritdinova Umida Akhmadjanovna, PhD, docent Urishev Adkhamjon Ergashaliyevich, senior lecture Ikramova Madinakhon Sunnatulla qizi, trainee teacher Jiyenbayeva Nag'ima Kayratdin qizi, trainee teacher</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Study load (by types of classroom hours and independent study hours)	<i>Total workload: 120 hours Contact hours: 60 -Lecture - 20 hours; -Practical lessons - 40 hours -Self-learning - 60 hours</i>
Number of credits allocated to science	4
Required and recommended prerequisites for joining the module	<i>«Higher Mathematics (Department of Analytical Geometry)»</i>

<p>Module objectives/intended learning outcomes</p>	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- general principles of “engineering and computer graphics” students’ worldview expansion, formation of them as specialists,</li> <li>- existing classifications of developing logical and spatial imagination and increasing intelligence;</li> <li>- The student learns about the laws and rules of general technical sciences in the science of drawing geometry, about the rules of problems that can be used a lot in engineering practice, in modeling natural processes, phenomena and devices.</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- reasonable analysis;</li> <li>- to teach students the theoretical basis of geometrical methods necessary for searching for optimal solutions of technical and economic problems and choosing the best ways of their implementation;</li> <li>- reasonable analysis;</li> <li>- to teach students the theoretical basis of geometrical methods necessary for searching for optimal solutions of technical and economic problems and choosing the best ways of their implementation.</li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- formation of skills to work in CAD and CAE programs necessary for a modern engineer;</li> <li>- to provide technical knowledge necessary for the reduction of compulsory and optional subjects related to general professional and specialization in educational plans;</li> <li>-To teach how to correctly describe technical ideas graphically</li> <li>- the student learns to create methods of creating images of figures in space on surfaces in general, or to solve and check related spatial problems based on the given image of figures;</li> <li>- It is necessary to have the skills of accurate solutions about the drawings of bodies on the plane based on the rules of the known law.</li> </ul> <p>“Engineering and computer graphics” subject expands the worldview of students, forms them as experts, develops logical and spatial imagination, increases intelligence; to teach students the theoretical foundations of geometric methods necessary for modeling natural processes, phenomena and devices, for reasonable analysis, for searching for optimal solutions to technical and economic issues, for choosing the best ways of their implementation, to form the skills to work in CAD and CAE programs necessary for a modern engineer, to provide technical knowledge necessary for the reduction of compulsory and elective subjects of the general professional and specialty curriculum, in particular, it teaches how to graphically describe technical ideas.</p>
<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p>The purpose of science and the basics of creating images-projections. Difficulty level: 2</p> <p>Plotting and reading a dot. Difficulty level: 2</p> <p>Methods of Projection of a Straight-Line Section Difficulty Level: 2</p> <p>Surfaces and its types. Difficulty level: 2</p> <p>Methods of drawing reconstruction. Difficulty level: 2</p> <p>Curves and surfaces. Difficulty level: 2</p> <p>Geometric drawing and projection drawing. Difficulty level: 2</p>
<p>Exams and assessment formats</p>	<p>One mid-term examination (80 minutes each) and a final written and oral exam (60 minutes), a short-computerized test and written homework</p>

Study and examination requirements	<p><i>Requirements for ready transition from science</i></p> <p><i>The total maximum marks will be the sum of the final exam (40%) and the Midterm (60%). To pass the subject, a student must score 60% or more of the allotted points</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. С.П.Буркова, Г.Ф.Винокурова, Р.Г.Долотова. "Инженерная графика" Текствук. – Томск: ТПУ Пресс, 2014, 174 стр.</li> <li>2. Qosimov J.A. "Muhandislik kompyuter grafikasi" Darslik. Shafoat Nur fayz, Toshkent-2023 y. 210 bet</li> <li>3. У.А.Насридинова "Инженерный компьютерный дизайн графика" Текствук. Шафоф Нур Файз, Ташкент. 2023. 240 стр.</li> <li>4. У.А.Насридинова, У.Д.Эдилбоев. Инженерная и компьютерная графика. Ўқув қўлланма. "ТИҚХММИ" Миллий тадқиқот университети. Ташкент-2022., 180 стр.</li> </ol>

<b>Module designation</b>	<b>IG1105- Engineering geodesy</b>
Semester(s) in which the module is taught	2
Person responsible for the module	<i>Jumanov Azamat Norbutaevich, technical sciences Doctor of Philosophy (PhD), associate professor, etc</i> <i>Abdiramanov Rashid Duschanovich, senior teacher</i> <i>Assistant Valieva Albina Robertovna</i> <i>Shavozov Temur Karimovich is a trainee teacher</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical training, Self-learning</i>
Workload (incl. contact hours, self-study hours)	<i>Total load: 150</i> <i>Auditorium hours: 60</i> <i>Lecture 30 hours;</i> <i>Practical training 30 hours</i> <i>Self-learning: 90 hour.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>"Higher mathematics", "Geography", "Informatics"</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>As a result of mastering the subject, the student:</b></p> <ul style="list-style-type: none"> <li><i>- the main types of engineering-geodetic works: understanding of plan and height engineering-geodetic networks, topographic-geodetic research works, geodetic planning works, geodetic works performed in the alignment and construction of linear structures, geodetic construction network, building search; should know the geodetic work performed in the design and construction of industrial, hydromeliorating and hydrotechnical structures, the geodetic work performed in determining the deformation of engineering structures, and the solution of engineering-geodetic problems;</i></li> <li><i>- determination of scales, conventional signs, topographic maps, their graph and nomenclature, measurement of location elements using geodetic measuring instruments;</i></li> <li><i>- geodetic equipment processing, measurement methods and results;</i></li> <li><i>- drawing up the project of the construction object, carrying out topographic photography, moving the designed buildings and structures to their place, carrying out geodetic control and measurement during their construction, observing their deformation during the use of the structures by geodetic methods;</i></li> <li><i>- should have the ability to make topographical plans and profiles of the place</i></li> </ul>

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p><i>To independently carry out geodetic measurements on the surface of the earth, Level of difficulty: 4</i>  <i>To create plans and profiles of the place, Level of difficulty: 4</i>  <i>As well as to study the theoretical foundations of geodetic measurements performed on the surface of the earth in solving engineering-geodesy issues in various fields, Level of difficulty: 5</i>  <i>National economy, arming students with the necessary knowledge to perform independent measurement work using geodetic instruments, Level of difficulty: 5</i>  <i>Study the methods of drawing up plans and profiles of the place and develop measurement results aimed at systematic improvement, Level of difficulty: 5</i>  <i>Measurement results and teaching the effective use of graphics. drawings in solving engineering-geodesy problems in various sectors of the national economy. Level of difficulty: 5</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:  The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li><i>1. H.J.Khaitov, A.N.Inamov. Engineering geodesy. "TIAME" National Research University, 2022. 495 p</i></li> <li><i>2. A.Suyunov Engineering geodesy. Tashkent. 2021.-359 p.</i></li> <li><i>3. Abdullaev T.M., Inamov A.N., Lapasov J.O. Engineering geodesy geodetic works in the construction of hydrotechnical facilities. TIAME, 2019. 152 p.</i></li> <li><i>4. Sh.K.Avchiev. Practical geodesy. Varis publishing house 2010. 350 p.</i></li> <li><i>5. G.G.Poklad. Workshop on geodesy. Academic project, Moscow, 2015, 486 p.</i></li> </ol>

<b>Module designation</b>	<b>CHEM1105 Chemistry</b>
Semester(s) in which the module is taught	2
Person responsible for the module	<i>Khadjibekov Sadriddin Nasriddinovich, DSc, associate professor Komilov Bakhrom Jamoldinovich, PhD, associate professor Shermatova Gulchehra Djumanazarovna, assistant Esanmuradova Nilufar Shakhobiddin qizi, trainee-teacher</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, lab works.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 90 hours. Contact hours: 30 hours: - lecture – 10 hours; - practical lessons – 10 hours; - laboratory – 10 hours. - self-learning - 60 hours.</i>
Credit points	3
Required and recommended prerequisites for joining the module	<i>“Mathematics”, “Physics”, “Biology”.</i>



<p>Module objectives/intended learning outcomes</p>	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- Study of Analytical and Physicocolloid Chemistry</li> <li>- Qualitative analysis</li> <li>- Theoretical issues</li> <li>- General characteristics of the first analytical group of cations</li> <li>- II analytical group cations</li> <li>- III analytical group cations</li> <li>- General description of group III</li> <li>- Hydrolysis of salts</li> <li>- Colloid systems</li> <li>- Complex compounds</li> <li>- Oxidation-reduction theory</li> <li>- Amphotericity</li> <li>- IV analytical group cations</li> <li>- Cations of analytical group V</li> <li>- Anions</li> <li>- Classification of anions</li> <li>- Quantitative analysis and its tasks</li> <li>- Drag analysis</li> <li>- Titrimetric analysis</li> <li>- Method of neutralization</li> <li>- Laboratory exercises on the method of neutralization</li> <li>- Oxidation-reduction methods (oxidimetry)</li> <li>- Methods based on precipitation and complex formation</li> </ul> <p><b>be able to:</b></p> <p>Necessary tools to carry out analytical and physicocolloid chemistry exercises:</p> <ul style="list-style-type: none"> <li>- Video slide for lecture, PPT.</li> <li>- Textbooks necessary for practical training,</li> <li>- Necessary reagents and accessories for the laboratory.</li> </ul> <p><b>form competences in:</b></p> <p>Proceedings in the study of analytical and physicocolloid chemistry.</p> <ul style="list-style-type: none"> <li>- Quality analysis</li> <li>- Qualitative reactions for group 1 cations and anions</li> <li>- Qualitative reactions for group 2 cations and anions</li> <li>- Qualitative reactions for group 3 cations and anions</li> <li>- Qualitative reactions for group 4 cations and anions</li> <li>- Putting redox reactions</li> <li>- Work on theoretical issues</li> <li>- Reactions on the hydrolysis of salts</li> <li>- Quantitative, drag, titrimetric analysis and training related to it</li> <li>- Using the neutralization method</li> <li>- Conducting laboratory training on the method of neutralization</li> <li>- Conduct oximetry</li> <li>- Application of methods based on precipitation and complex formation.</li> </ul>
---	--

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p>Analytical chemistry is a science that studies the theoretical foundations and methods of chemical analysis. The practical task of analytical chemistry is to determine the composition of substances or their mixtures.</p> <p>Qualitative analysis: Qualitative analysis and its methods. Analytical reaction methods. Quality reactions and their requirements. Specificity and sensitivity of analytical reactions. Chemical containers, tools and equipment used in quality analysis by semi-micro method. Work procedure in the laboratory of analytical chemistry. Safety technique. <i>Level of difficulty: 3.</i></p> <p>Theoretical issues: Law of mass action. Electrolytic solutions. Fundamentals of the theory of electrolytic dissociation. Chemical reactions in aqueous solutions. Ionic reactions. Ionization of water. Buffer solutions. Calculation of the pH of buffer solutions. Division (classification) of cations and anions into analytical groups. <i>Level of difficulty: 4.</i></p> <p>General characteristics of the first analytical group of cations: reactions of group I cations and their analysis procedure. Reactions of <math>K^+</math> cation. Reactions of <math>Na^+</math> cation. Reactions of <math>NH_4^+</math> cation. Reactions of <math>Mg^{2+}</math> cation. Analysis of the mixture of cations of analytical group I. Questions and exercises. <i>Level of difficulty: 3.</i></p> <p>II analytical group cations: Equilibrium in heterogeneous systems. Solubility multiple. Factors affecting sediment formation. Dissolution of the precipitate. General description of cations of analytical group II. Effect of group II reagent on second group cations. <math>Ba^{2+}</math> cation detection reactions. <math>Sr^{2+}</math> cation determination reactions. Reactions to determine the <math>Ca^{2+}</math> cation. Procedure for analyzing the mixture of group I-II cations. Questions and exercises. <i>Level of difficulty: 4.</i></p> <p>III analytical group cations: general description of group III. Hydrolysis of salts. Colloid systems. Complex compounds. Oxidation-reduction theory. Amphotericity. Reactions of <math>Fe^{3+}</math> and <math>Fe^{2+}</math> cations. Reactions of <math>Mn^{2+}</math> cation. Reactions of <math>So^{2+}</math> and <math>Ni^{2+}</math> cations. Reactions of <math>Al^{3+}</math> cations. Reactions of <math>Sr^{2+}</math> cations. Reactions of <math>Zn^{2+}</math> cations. Some cations from the mixture of group III cations (<math>Fe^{3+}</math>, <math>Fe^{2+}</math>, <math>Mn^{2+}</math>, <math>So^{2+}</math>, <math>Ni^{2+}</math>) determination. Analysis of the mixture of cations of analytical group I, II and III. Questions and exercises. <i>Level of difficulty: 4</i></p> <p>IV analytical group cations: Oxidation potential. General description of group IV cations. Reactions of the <math>Si^{2+}</math> cation. Effect of group IV cations common reagent (<math>H_2S</math>). Questions and exercises. <i>Level of difficulty: 3</i></p> <p>Cations of analytical group V: effect of general reagent of analytical group V cations. Reactions of <math>Ag^+</math> cation. Reactions of <math>Rb^{2+}</math> cation. Reactions of <math>Hg^{2+}</math> cation. Questions and exercises. <i>Level of difficulty: 3</i></p> <p>Anions: Classification of anions. II analytical group anions. Reactions specific to <math>Cl^-</math> anion. Reactions specific to the <math>J^-</math> anion. III analytical group anions. Questions and exercises. <i>Level of difficulty: 4</i></p> <p>Quantitative analysis and its tasks: Quantitative analysis and its tasks. Analytical scales. Damper scale weighing technique. <i>Level of difficulty: 2</i></p> <p>Drag analysis: Requirements for sediments. Precipitator selection. Requirements for the towable state. Conditions for the formation of crystal deposits. Conditions for the formation of amorphous deposits. Filter and wash the precipitate. Drying and heating of precipitates. Questions and exercises. <i>Level of difficulty: 3</i></p>
<p>Exams and assessment formats</p>	<p><i>To fully master the theoretical and methodological concepts related to science, be able to correctly reflect the results of the analysis, independently observe about the processes being studied and carry out tasks and tasks assigned in intermediate forms of control, submit a written work on final control.</i></p>

Study and examination requirements	<p><i>Students of successful transition from science</i></p> <p><i>The maximum points to be summed will consist of the final exam (40%), the interval control (60%), the sum of the points to be separated. In order to successfully pass the subject, the student must score 60% of the allocated points and collect a high score in it.</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. M. Миркомилова. Аналитик кимё. Олий ўқув юртлари талабалари учун дарслик. "Ўзбекистон". Тошкент, 2001, 416 б.</li> <li>2. M.T. Gulamova, Sh.Q. Norov, N.T. Turabov. Analitik kimyo. O'quv qo'llanma. "Voriz-nashriyot". Toshkent, 2009, 319 б.</li> <li>3. T. E. Brown, H.E. JR LeMay, B. Bursten, C. Murphy. Chemistry the Central Science. Textbook. "Prentice Hall". New York, 2002, pp 516.</li> <li>4. S.O. Akhmetova, S.O. Abilkasova. Physical and Colloid chemistry. Laboratory manual. "Zhaniya Poligraph". Almaty, 2019, pp 139.</li> <li>5. Seyda Bucak, Deniz Rende. Colloid and Surface Chemistry A Laboratory Guide for Exploration of the Nano World. "CRC Press". London &amp; New York, 2014, pp 230.</li> <li>6. Frederick Hutton Getman. Laboratory Exercises in Physical Chemistry. „BiblioLife". New York, 2008, pp 248.</li> <li>7. Sh.P. Nurullayev, A.J. Xoliqov, J.S. Qayumov. Analitik, Fizikaviy va Kolloid kimyo. "IQTISOD-MOLIYA". Toshkent, 2018, 269 б.</li> <li>8. Raymond Chang, John W. Thoman (Jr.). Physical Chemistry for the Chemical Sciences. "University Science Books". Dulles, 2014, pp 951.</li> <li>9. O. Fayzullayev. Analitik kimyo. Darslik. "Yangi asr avlodi". Toshkent, 2006, 478 б.</li> <li>10. O. Fayzullayev. Analitik kimyo. Amaliy-laboratoriya mashg'ulotlari uchun. "Yangi asr avlodi". Toshkent, 2006, 448 б.</li> <li>11. K.R. Rasulov. Analitik kimyo. Darslik. "G'afur G'ulom nomidagi nashriyot-matbaa ijodiy uyi". Toshkent, 2004, 570 б.</li> <li>12. O.M. Yoriyev. D.A. Karimova. Fizikaviy kimyo. O'quv qo'llanma. "Tafakkur bo'stoni". Toshkent, 2003, 240 б.</li> <li>13. T.M. Boboyev, H. Rahimov. Fizikaviy va kolloid kimyo. Darslik. "G'afur G'ulom nomidagi nashriyot-matbaa ijodiy uyi". Toshkent, 2004, 504 б.</li> </ol>

<b>Module designation</b>	<b>Internship (Engineering geodesy)</b>
Semester(s) in which the module is taught	3
Person responsible for the module	<i>Jumanov Azamat Norbutaevich (PhD), associate professor Abdiramanov Rashid Duschanovich, senior teacher Valieva Albina Robertovna, assistant Shavozov Temur Karimovich is a trainee teacher</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Field practice</i>
Workload (incl. contact hours, self-study hours)	<i>Total load: 150 Auditorium hours: 60 Lecture 30 hours; Practical training 30 hours Self-learning: 90 hours:</i>
Credit points ( <i>Field practice</i> )	2
Required and recommended prerequisites for joining the module	<i>“Higher mathematics”, «Geography”, «Informatics”.</i>
Module objectives/intended learning outcomes	<b><i>After mastering the discipline, the student will:</i></b>  <i>-Consolidation of the acquired theoretical knowledge on "Engineering geodesy"; - study of geodetic measurement methods in field conditions; -gaining experience in performing the main types of geodetic measurements and observations; - to have the ability to use modern geodetic tools and technical equipment; - organization of geodetic measurements and observations; - learning to process and analyze the obtained results; - drawing up a practical report based on the research work carried out and carried out in the field.</i>
Content: The discipline includes. The level of difficulty: (1 – low, 5 high):	<i>Understanding of the shape and dimensions of the Earth, the system of coordinates and heights used in Geodesy. State geodetic networks: plan and elevation networks. Methods of installing planned networks. Level of difficulty: 2 Understanding of card, plan and profile. Scales, numerical and graphical. Numerical and linear scales of topographic maps. Understanding of line orientation. True azimuth and bearings. Level of difficulty: 2 The main landforms. Ways of depicting the terrain on plans and maps. Depicting the terrain with horizontal. Level of difficulty: 2 Horizontal transfer in analytical and graphical methods. Level of difficulty: 2 Theodolite measurement and its essence, Level of difficulty: 3 Grids of technical leveling Large-scale (1:5000-1:500) topographic maps height grids. Development of level networks in cities and settlements. Level of difficulty: 3 Design and accuracy assessment of level grids. Perform reconnaissance. Types of leveling underground signs and their installation. Level of difficulty: 4 Types of levelers, inspection and testing of leveling rods, leveling errors. Level of difficulty: 4 Perform leveling and fill in the leveling log. Level of difficulty: 4 Tachometric surveying and its essence, GPS and GNSS surveying and its essence. Application of modern geodetic tools in geodesy. Level of difficulty: 4</i>
Exams and assessment formats	<i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i>

Study and examination requirements	<p><i>Requirements for successfully passing the module:</i>  <i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. <i>H.J.Khaitov, A.N.Inamov. Engineering geodesy. "TIAME" National Research University, 2022. 495 p</i></li> <li>2. <i>A. Suyunov Engineering geodesy. Tashkent. 2021.-359 p.</i></li> <li>3. <i>Abdullaev T.M., Inamov A. N., Lapasov J.O. Engineering geodesy geodetic works in the construction of hydrotechnical facilities. TIAME, 2019. 152 p.</i></li> <li>4. <i>Sh.K. Avchiev. Practical geodesy. Varis publishing house 2010. 350 p.</i></li> <li>5. <i>G.G. Poklad. Workshop on geodesy. Academic project, Moscow, 2015, 486 p.</i></li> </ol>

## 3-semester

<b>Module designation</b>	<b>GG2105 Geology and Hydrogeology</b>
Semester(s) in which the module is taught	3
Person responsible for the module	<i>Nurjanov Satbay Yeshjanovich PhD, senior lecturer Ruziyev Ilxom Maxmudovich PhD, senior lecturer Kattaqulov Farrux Sayfullayevich PhD, senior lecturer Yaxshiyev Shohzod Sheraliyevich assistant Nortayev Shavkat Gulom ugli assistant Baxronova Zulxummor Xikmatulla qizi assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, self-learning</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 40 hours; - practical lessons – 20 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Algebra”, “Physics”, “Geography”, “Chemistry”, “Biology”, “Geomorphology”, “Geodesy”.</i>

<p>Module objectives/intended learning outcomes</p>	<p><i>After mastering the discipline, the student will:</i></p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>about the shape and dimensions of the land,</i></li> <li>- <i>composition and structure of the earth's crust, geological processes and events,</i></li> <li>- <i>chemical composition, physical properties and laws of motion of underground waters;</i></li> <li>- <i>specificity of the regime and balance of underground water in irrigated lands;</i></li> <li>- <i>geological and engineering - geological phenomena and processes common in irrigated fields and construction sites</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>specificity of geological and hydrogeological conditions, quantitative methods of assessment of underground water flows,</i></li> <li>- <i>methods of predicting changes in hydrogeological conditions, geological and hydrogeological maps and research results,</i></li> <li>- <i>hydrogeological indicators of underground water flows and aquifers and their use in solving reclamation issues,</i></li> <li>- <i>negative events and processes related to the implementation of water management and reclamation measures, their prevention and prediction,</i></li> <li>- <i>basic physical and physical-mechanical parameters of soils necessary for calculating structural and hydraulic parameters of hydromelioration networks</i></li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>organization of observations on deformation and displacement of engineering structures;</i></li> <li>- <i>methods of creating maps and sections, conducting hydrogeological and engineering geological explorations;</i></li> <li>- <i>methods of processing and using search results, soil-hydrogeological ameliorative conditions of irrigated areas;</i></li> <li>- <i>work with soil, hydrogeological and engineering-geological tools to assess the melioration condition of land reclamation and water management facilities;</i></li> <li>- <i>geological and hydrogeological maps and research results;</i></li> <li>- <i>Hydrogeological indicators of underground water flows and aquifers and their use in solving reclamation issues;</i></li> <li>- <i>negative events and processes related to the implementation of melioration and water supply measures;</i></li> <li>- <i>basic physical and physical-mechanical parameters of soils, equipment of wells;</i></li> <li>- <i>opening of water horizons, water horizons, construction of wells, filters, preparation of filters, calculation of basic parameters.</i></li> </ul>
---	---

Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

*Contents and sections of geology, hydrogeology and engineering geology. Services and contributions of scientists of our country and scientists of the world in the development of these sciences, relations of geology and hydrogeology with other sciences: Level of difficulty: 1*

*The shape and size of the land. The structure of the earth. Geospheres, their composition, state and properties. Electric, magnetic properties, density and temperature regime of earth bodies: composition, structure and condition of minerals. Rock-forming minerals and their identification (study) methods. The concept of rocks and their formation. Structure and texture of rocks, genetic classes. Classification of igneous rocks. Sedimentary rocks. Metamorphic rocks: Level of difficulty: 2*

*Endogenous geological processes: Magmatism and its types. Tectonic movements. Tectonic structures-geosynclines, platforms, shields, synclises, anteklises, slope depressions. Earthquakes. Estimating the strength and power of earthquakes. Distribution of earthquakes in the territory of the Republic of Uzbekistan, their nature, consequences and importance in the construction and operation of hydrotechnical structures: Level of difficulty: 2*

*Exogenous (terrestrial) geological processes and phenomena: Weathering process. Importance of wind activity in human production activities. Geological activity of running water on the surface of the earth. Geological activity of rain and melted snow water. Flood flows and their consequences. Geological activity of permanent flowing waters-rivers. River valleys, tributaries and deltas. Alluvial deposits, their types, composition and characteristics. Karst and suffocation. The influence of human production activities on the direction and consequences of geological processes: Level of difficulty: 3*

*Main geological units and rock complexes. Eras (groups), periods (systems), epochs (systems), centuries (floors). The main types of relief and their relationship with the tectonic conditions, geological history and structure of the regions. The concept of geological map and sections. Types of geological maps by content and scale: Level of difficulty: 3*

*The science of hydrogeology and its tasks*

*Water circulation in nature, hydrosphere. Concept of aeration and water-saturated zones. Rock porosity and its quantitative assessment. Moisture capacity and types of rocks. Classification of rocks according to water permeability: Level of difficulty: 4*

*Classifications of underground water according to the condition of its bed. Aeration zone waters. Ground water and suspended seepage water. Level of difficulty: 4*

*Ground and suspended seepage waters. The connection of systolic waters with climate, surface and interlayer pressure waters. Feeding, spreading and consumption of systolic waters. Map of hydroisogypsum and its designation. Water level, mineralization, etc. Interstratified waters Bed conditions, conditions of formation and distribution. Interlayer water basins: Level of difficulty:4*

*Physical and other properties of underground water (color, taste, smell, density, clarity, electrical conductivity, radioactivity, etc.). The main components of groundwater. Assessment of Dissociated Compounds, Colloids, Gases, Microconstituents and Organic Compounds in Groundwater as Drinking Water for Water Supply and Irrigation Purposes: Level of difficulty: 5*



Exams and assessment formats	<i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i>
Study and examination requirements	<i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i>
Reading list	<ol style="list-style-type: none"> <li>1. T.Davie. <i>Fundamentals of hydrology</i>. Second edition. Madison Avenue, New York, 2008 y. 221 p</li> <li>2. Yusupov G.U., Xolbaev B.M. "Geologiya va gidrogeologiya asoslari". – T.: YAngi asr avlodi, 2003. – 301 bet.</li> <li>3. Irgashev Yu., Ergashev R. "Geologiya va geomorfologiya". Toshkent, Fan va texnologiyalar 2013.-189 bet.</li> <li>4. Ruziyev I.M., Nurjanov S.E., Gapparov F.A. "Injenerlik geologiyasi va gidrogeologiyasi" fanidan o`quv qullanma Toshkent-2021- 256 bet</li> <li>5. Рузиев И.М., Нуржанов С.Е., "Инженерная геология и гидрогеология" Учебник ташкент-2022.-220 стр.</li> <li>6. H.A.VILES Synergistic Weathering Processes Reference Module in Earth Systems and Environmental Sciences 2021 Journal / Available online 16 October 2021, 127065 In Press, Journal Pre-proof.</li> </ol>

<b>Module designation</b>	<b>NM2105 Theoretical mechanics.</b>
Semester(s) in which the module is taught	3
Person responsible for the module	<i>Mavlanov Tulkin, DSc, Professor Khusanov Qakhramon, DSc, associate professor Khudainazarov Sherzod Ochilovich, PhD, associate professor Rayimov Abdurakhmon, assistant Abdunabiev Jasur, assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 20 hours; - practical lessons – 40 hours; self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Higher mathematics», «Physics», «Drawing geometry and engineering graphics»</i>

Module objectives/intended learning outcomes

*After mastering the discipline, the student will:*

**To know and understand:**

- basic concepts of mechanics;
- axioms of statics;
- basic operations with systems of forces and conditions for the equivalence of a system of forces;
- equilibrium conditions of a solid body;
- kinematics of a point and a rigid body;
- laws of dynamics;
- general theorems of the dynamics of a material point;
- differential equations of a mechanical system;
- general principles of dynamics;
- potential and kinetic energy of the mechanical system;
- conditions and equations of equilibrium of a mechanical system and a solid body;
- d'Alembert's principle and kinetostatic equations.
- methods for solving practical problems.

**To be able to:**

- bring solids into a free state;
- check the equilibrium state of solids;
- determine the main vector and the main moment of rigid bodies under the action of an arbitrary system of forces;
- determine the basic kinematic characteristics of solids;
- determine the dynamic characteristics of solids;
- analyze the results obtained;
- be able to analyze mechanical processes;
- find optimal solutions for engineering structures;
- apply the acquired knowledge when creating new designs.

**To form competences in:**

- understand the physical meaning of balance and movement of material bodies and be able to analyze them;
- use of specialized software systems to solve practical problems;
- ability to use modern laboratory equipment and instruments;
- the ability to use knowledge of natural sciences, apply methods of mathematical analysis and modeling, theoretical and experimental research in problems of mechanics;

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p>Theoretical mechanics. The purpose and objectives of the subject. Statics. Axioms of statics. Connections and their reactions. <i>Level of difficulty: 2</i></p> <p>System of forces. Geometric method of adding forces. Analytical method of adding forces. Moment of force about the center. Moment of force about the axis. <i>Level of difficulty: 2</i></p> <p>Bringing the system of forces to its simplest form. Equilibrium of a system of converging forces. Equilibria of a plane system of forces. Equilibrium of the spatial system of forces. <i>Level of difficulty: 2</i></p> <p>Center of parallel forces. Center of gravity of a rigid body. Determination of the position of the center of gravity of solid bodies. <i>Level of difficulty: 2</i></p> <p>Kinematics of a point. Methods for specifying the movement of a point. Determination of the speed and acceleration of a point according to given laws of motion. <i>Level of difficulty: 3</i></p> <p>Kinematics of a rigid body. Translational motion of a rigid body. Rotational motion of a rigid body. Plane-parallel motion of a rigid body. Spherical motion of a rigid body. <i>Level of difficulty: 3</i></p> <p>Dynamics of a material point. Laws of dynamics. Differential equations of motion of a material point. General theorems for the motion of a material point. <i>Level of difficulty: 4</i></p> <p>Rectilinear oscillatory motion of a material point. Free vibrations. Forced vibrations. <i>Level of difficulty: 4</i></p> <p>Dynamics of a mechanical system. External and internal forces. Center of mass The amount of motion of a mechanical system. Kinetic energy of a mechanical system. <i>Level of difficulty: 4</i></p> <p>Analytical mechanics. D'Alembert's principle for a point and a mechanical system. Classification of connections. Degree of freedom of the system. The principle of possible movements. Lagrange equations of the second kind. <i>Level of difficulty: 5</i></p>
<p>Exams and assessment formats</p>	<p><i>Two written midterms (60 minutes each) and a final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Excellent - Ability to think creatively. Being able to apply the acquired knowledge in practice. Explain the essence. Have an imagination. Ability to independently solve a given problem and observe. Independent judgment and decision-making.</i></p> <p><i>Good - Ability to apply acquired knowledge in practice. To be able to solve the given problem using an example and observe. To know, to tell. Have an imagination.</i></p> <p><i>Satisfactory - General answers to the questions asked. Explain the essence. To know, to tell, to imagine.</i></p> <p><i>Unsatisfied - Failure to answer the questions. Not having a clear vision.</i></p>

Reading list	<ol style="list-style-type: none"> <li>1. Meriam J.L., Kraige L.G. <i>Engineering Mechanics. Statics. Kinematics. Dynamics.</i> 2012.</li> <li>2. Prof. Dr.ING.Vasile SZolga. <i>Theoretical Mechanics.</i> 2010.</li> <li>3. H.To'rayev "Nazariy mexanika", darslik, "Noshir", Toshkent-2012.</li> <li>4. Mirsaidov M., Sobirjonov T. "Nazariy mexanika". (Matematik dasturlashtirish asoslari bilan). <i>Farg'ona.</i> 2020 yil. 278 bet.</li> <li>5. Mirsaidov M.M., Mavlanov T.M., Xudaynazarov Sh.O., Donayev B.D. «Nazariy mexanika. Statika». O'quv qo'llanma : -T. :“Zamin nashr”, 2021. 270 b.</li> <li>6. Mirsaidov M.M., Donayev B.D., Xudaynazarov Sh.O., Alimardonov O.M. «Nazariy mexanika (misol va masalalar)». O'quv qo'llanma : -T. :“Adabiyot”, 2023. 292 b.</li> <li>7. Xusanov Q. <i>Nazariy mexanika (statika, kinematika, dinamika): Oliy o'quv yurtlari uchun darslik.</i> Toshkent. 2019 yil. 560 bet.</li> <li>8. Жуковский Н.Е. <i>Теоретическая механика. Учебник для вузов.</i> –М.: Издательство Юрайт, 2016. 404 с.</li> <li>9. Лукашевич Н.К. <i>Теоретическая механика. Учебник.</i> Издательство Юрайт, 2016. – 266 с.</li> <li>10. Доев В.С., Доронин Ф.А <i>Сборник заданий по теоретической механике на базе MATHCAD. Учебное пособие,</i> Издательство «Лань», 2010 г. 592 с.</li> </ol>
--------------	--

<b>Module designation</b>	<b>SXK2104 Introduction to water management and land reclamation</b>
Semester(s) in which the module is taught	3
Person responsible for the module	<i>Kasimbetova Saltanat, associate professor. Botirov Shavkat Chorievich, candidate of agricultural sciences, associate professor. Yulchiev Davronbek Gulamovich, assistant Urazbaev Ilkhom Kinesbaevich, PhD, senior lecturer</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 120 hours. Contact hours: 60 hours: - lecture – 20 hours; - practical lessons – 40 hours; - self-learning - 60 hours.</i>
Credit points	4
Required and recommended prerequisites for joining the module	<i>«The newest history of Uzbekistan», «Chemistry», «Physics», «Engineering geodesy»</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>the role of agriculture and water management,</i></li> <li>- <i>implementation of irrigation and drainage (drainage) in different countries in the world</i></li> <li>- <i>history and development stages of irrigation,</i></li> <li>- <i>understanding of the current state and prospects of irrigation and land reclamation.</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>to have an understanding of the role of agriculture and water management in the Republic of Uzbekistan,</i></li> <li>- <i>to know information about the countries with developed irrigation and irrigation works,</i></li> <li>- <i>to have an idea about the operation of ancient hydrotechnical structures,</i></li> <li>- <i>to have information about the natural conditions of the territories, land and water resources, land reclamation status of irrigated lands,</i></li> <li>- <i>to be able to understand the goals and tasks of the basin system of water resources management.</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>the importance of water sources in agriculture,</i></li> <li>- <i>the formation of water sources and their distribution across the regions,</i></li> <li>- <i>natural conditions of Uzbekistan,</i></li> <li>- <i>methods of improving the reclamation condition of irrigated lands,</i></li> <li>- <i>automated ways of distributing water resources in the republic,</i></li> <li>- <i>the ability to use and manage economical irrigation techniques in irrigation.</i></li> </ul>

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p>Area of irrigated and drained land in different countries in the world. Countries where the first irrigation works were carried out. Current and future development of irrigation and drainage. Understanding of the irrigated and drained land area of Uzbekistan. <i>Difficulty level: 2</i></p> <p>Ancient hydrotechnical structures built in Uzbekistan (Farming in Loyka. Beggar fields. Lock pond. Dams. Reservoir. Water separation bridges. Flowing underground river (Koriz). Spring whose water is measured with a jug. Ancient water lifting structures). <i>Difficulty level: 2</i></p> <p>The history of the emergence and development of irrigation in Central Asia in the periods before and after AD. <i>Difficulty level: 2</i></p> <p>The development of irrigation in Central Asia in the second half of the 19th century and the beginning of the 20th century (1853-1917). The state of irrigation and reclamation in Uzbekistan in the period after 1917. Irrigation works during the Second World War. Development of irrigation in post-war period in Uzbekistan. <i>Difficulty level: 2</i></p> <p>Central Asia's climate, geographic location, geological and hydrogeological conditions, soil conditions. Agricultural crops grown in the region. Water sources. The land fund of Uzbekistan, soil conditions, the area of irrigated land and land reclamation, saline land and the causes of salinity. <i>Difficulty level: 3</i></p> <p>Aral Sea basin, the total amount of water resources, its distribution among the countries of Central Asia. The tragedy of the island and its causes. <i>Difficulty level: 2</i></p> <p>Development of irrigated agriculture in the regions of Uzbekistan belonging to the Syrdarya and Amudarya basins. <i>Difficulty level: 4</i></p> <p>The current state of agriculture and water management in Uzbekistan, large hydrotechnical structures under construction, irrigation and land reclamation works. Prospects for the development of agriculture and water management. Normative documents on water management and reclamation. <i>Difficulty level: 4</i></p> <p>Basin system of water management in Uzbekistan, its difference and advantages from the old system. Existing irrigation systems in our republic are basin departments and irrigation systems, their management system. <i>Difficulty level: 5</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. Muxamedov A.K., Begmatov I.A. "Suv xo'jaligi va milloratsiyasiga kirish". Toshkent. TIMI bosmaxonasi. 2014. 155-b.</li> <li>2. Хамидов Ҳ., Мавлонов Ў., Назаров Қ. "Ўзбекистон ер-сув муносабатлари тарихидан". Тошкент. ТИҚХММИ bosmaxonasi. 2018. 102-б.</li> <li>3. Исакова М.С. ва бошқалар. "Ўзбекистон тарихининг долзарб масалалари (XIX аср иккинчи ярми-XX аср охири)" 1-умуммиллий илмий йиғини тўплами. Тошкент. Ўзбекистон Республикаси Фанлар академияси "Фан" нашриёти давлат корхонаси. 2022. 415-б.</li> <li>4. Ezzat Findi. <i>Introduction to irrigation principles a guideline manual. To Undergraduate students for Agriculture College. Duhok. 2012. - pp. 71.</i></li> <li>5. Бегматов И.А., Хамидов М.Х. Введение в водное хозяйство и мелиорацию. Учебник. "ТИИИМСХ", 2023. –176 стр.</li> </ol>

<b>Module designation</b>	<b>FAL 2105 Philosophy</b>
Semester(s) in which the module is taught	3
Person responsible for the module	<i>Nazarov Qiyamiddin Normirzaevich - Doctor of philosophy, professor; Alimukhamedova Nodira Yadgarovna – Doctor of Philosophy in philosophical sciences (PhD)</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, seminar</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 40 hours; - practical lessons – 20 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«History of Uzbekistan»</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>to have a comprehensive idea of the processes and events occurring in nature and society,</i></li> <li>- <i>interrelationship and difference between national cadres, culture and mass culture, interrelationship and difference between culture, mass culture and mass lack of culture,</i></li> <li>- <i>logical forms and rules of correct thinking,</i></li> <li>- <i>on the basis of the study of the history and rich spiritual heritage of views on morality, about the social and moral importance of modern manners - moral rules and their observance</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>introduction of legal and ethical norms regulating the attitude of a person to a person, society, environment in professional activity;</i></li> <li>- <i>making reasonable independent decisions in one's professional activity;</i></li> <li>- <i>to have a scientific vision and belief about a healthy lifestyle;</i></li> <li>- <i>to have the qualification of physical self-improvement;</i></li> <li>- <i>to be aware of the global problems of the world;</i></li> <li>- <i>to be able to distinguish fundamental globalization from other aspects of globalization;</i></li> <li>- <i>independent analysis of social problems and processes;</i></li> <li>- <i>to study private, national, regional problems, to be able to forecast social processes.</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>Being loyal to the motherland, believing in universal and national values,</i></li> <li>- <i>to feel connected to events, events and processes happening in the society and to actively participate in them,</i></li> <li>- <i>social adaptability, continuous self-development physically, spiritually, mentally, intellectually and creatively,</i></li> <li>- <i>striving for perfection, independent study and learning throughout life, regularly</i></li> </ul>



	<p><i>improving cognitive skills and life experience independently,</i>  <i>- refers to acquiring the skills of alternative assessment of one's own behavior and ability to make independent decisions.</i></p>
<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Philosophy and its role in society. Basic issues, structure, functions of philosophy. The emergence of philosophy and its importance in the development of society. Stages of development of philosophical thinking: Eastern philosophy. The emergence of mystical ideas and philosophical knowledge in the ancient East. Western philosophy. The role of ancient Western philosophy in human life. Difficulty level: 3</i></p> <p><i>Being (Ontology). Existence, existence and reality. The dialectic of existence and nonexistence. Classification of forms of existence. Development philosophy. The concept of law. Types of laws. Basic laws of philosophy. Difficulty level: 5</i></p> <p><i>Philosophy of knowledge (epistemology). The essence and main criteria of the cognitive process. Classification of approaches to the process of knowledge: essence of utopiamism, skepticism and agnosticism. Philosophy of society. The essence of the concept of society and the stages of its development. Views on the emergence of society. Difficulty level: 3</i></p> <p><i>Logic. Logical forms and laws of thought. Subject and structure of formal logic. Forms of thought: understanding, judgment and conclusion. A general logical description of inference. Structure of conclusion. Types of conclusions. A simple strict syllogism, its structure, axioms and general rules. Difficulty level: 5</i></p> <p><i>Proportion of culture and civilization. Importance of cultural communication. Human philosophy (Philosophical anthropology). Classification of views on the essence of man in the history of philosophy. Philosophy of values (axiology). The meaning of the concept of value and its general description. The history of the formation of the theory of value. Types of values. Difficulty level: 2</i></p> <p><i>Moral philosophy (Ethics). The essence and importance of ethics. The main areas of modern ethics. Professional ethics. Problems of professional ethics. Professional ethics and work ethics. Philosophy of sophistication (Esthetics). The essence of aesthetic perception of the world. Evolution of aesthetic views in the history of philosophy. Effect of aesthetic taste and aesthetic perception of the world on personality development. Philosophy of globalization and sustainable development. The essence of processes of globalization, globalism and sustainable development. Criteria and levels of global problems. Global crime and the need for international cooperation in its prevention. Level of difficulty: 3</i></p> <p><i>World experience of fight against corruption. The meaning of the concept of corruption and its historical roots. Classification of the state of corruption in the world. Anti-corruption policy of Uzbekistan. The need for a systematic approach in the fight against corruption. Level of difficulty: 2</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i>  <i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. Nazarov Q.N., Qalqonov E.T., Qandov B.M. va boshqalar. Falsafa asoslari. – T.: “O‘zbekiston faylasuflari milliy jamiyati” nashriyoti, 2018.</li> <li>2. Davronov Z., Shermuhamedova N, Qahharova M, Nurmatova M, Husanov B, Sultonova A. Falsafa. – Toshkent: TMU, 2019</li> <li>3. Shermuxamedova N.A. Falsafa. – T.: Noshir, 2012. – 1207 b</li> <li>4. Abdulla Sher. Axloqshunoslik. Darslik. –T.: O‘zbekiston faylasuflar milliy jamiyati, 2016.</li> <li>5. Abdulla Sher. Estetika (Nafosat falsafasi). Darslik. – Toshkent: O‘zbekiston, 2015.</li> </ol>

<b>Module designation</b>	<b>MQ2104 Strength of Materials</b>
Semester(s) in which the module is taught	3
Person responsible for the module	<i>MirsaidovMirziyod, DSc, Professor Abduvaliev Abdukahhor Abduxaevich, DSc, Professor Ishmatov Alisher Narkabilovich, associate professor Yuldashov Bahtiyar Shodmonovich, associate professor Xudoynazarov Sherzod Ochilovich, associate professor Toshmatov Elyor Sobirovich, associate professor Yarashev Javlon Adambaevich, associate professor Urinov Bahtiyar Xamidovich, senior lecturer</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, lab works</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 20 hours; - laboratory – 10 hours. - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	Higher mathematics, Physics, Theoretical mechanics, Descriptive geometry and engineering graphics.

<p>Module objectives/intended learning outcomes</p>	<p><i>After mastering the discipline, the student will:</i></p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>Main hypotheses and assumptions. Classification of loads and structural elements.</i></li> <li>- <i>Internal forces in supply and expansion. Diagrams of long forces</i></li> <li>- <i>Section method. Stress is total, normal and tangential.</i></li> <li>- <i>Geometric characteristics cross sections. Static moments of sections.</i></li> <li>- <i>Axial, centrifugal and polar moments of inertia.</i></li> <li>- <i>Stress state at a point of an elastic body.</i></li> <li>- <i>Types of tense states. Simplified plane stress state.</i></li> <li>- <i>Shift. Hooke's law under shear. Shear modulus.</i></li> <li>- <i>Torsion of a beam of circular cross-section. Twist angle.</i></li> <li>- <i>Bend. Basic concepts and definitions.</i></li> <li>- <i>Differential relationships between bending moment, shear force and intensity distributed load.</i></li> <li>- <i>Equivalent voltage. Calculation of a rod for strength under a combination of basic deformations.</i></li> <li>- <i>Complex resistance. Oblique bending. Bending with torsion.</i></li> <li>- <i>Critical strength, critical tension, flexibility.</i></li> <li>- <i>Euler's formula. Yasinsky's formula.</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>basic concepts of strength of materials, section method;</i></li> <li>- <i>basics of stress and deformation;</i></li> <li>- <i>methods of calculation for tension-compression, torsion and bending of rods;</i></li> <li>- <i>carry out calculations for the strength and rigidity of rods and rod systems under tension-compression, torsion, bending and complex loading;</i></li> <li>- <i>carry out calculations of rods for stability;</i></li> <li>- <i>determine stresses and deformations in rods;</i></li> <li>- <i>terminology of strength of materials;</i></li> <li>- <i>methods of constructing diagrams of internal force factors, stresses and displacements;</i></li> <li>- <i>methods of calculating strength, rigidity and stability.</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>carry out calculations for the strength and rigidity of rods and rod systems under tension-compression, torsion, bending and complex loading;</i></li> <li>- <i>carry out calculations of rods for stability;</i></li> <li>- <i>determine stresses and deformations in rods;</i></li> <li>- <i>general approach to assessment limit state;</i></li> <li>- <i>execution skills calculations using reference books and standards.</i></li> </ul>
---	---

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<ul style="list-style-type: none"> <li>- <i>Basic problems of strength of materials. Elastic and plastic deformations. Main hypotheses and assumptions. Classification of loads and structural elements. External and internal forces. Section method. Stress is total, normal and tangential. Level of difficulty: 2</i></li> <li>- <i>Internal forces in supply and expansion. Diagrams of long forces. Normal voltage. Diagrams of normal stresses. Longitudinal and transverse deformations. Hooke's law. Poisson's ratio. Determination of axial displacements of beam cross sections. Testing of materials for supply and compression. Under static loading. Diagrams of arrangement and compression of plastic and brittle materials. Voltages. limit, permissible and calculated. Safety factor. Strength condition, calculations for strength. Statically indeterminate systems. Level of difficulty: 2</i></li> <li>- <i>Static moments of sections. Axial, centrifugal and polar moments of inertia. Main axes and main central moments of inertia of a circle and a ring. Determination of the main central moments of inertia of components sections having an axis of symmetry. Level of difficulty: 2</i></li> <li>- <i>Stress state at a point of an elastic body. Main stresses. Maximum shear stress. Types of tense states. Simplified plane stress state. Purpose of strength hypotheses. The hypothesis of the highest tangential stresses. Hypothesis of energy of shape change. Level of difficulty: 2</i></li> <li>- <i>Pure shift. Hooke's law under shear. Shear modulus. Internal force factors during torsion. Diagrams torques. Torsion of a beam of circular cross-section. Twist angle. Strength calculations and torsional rigidity. Rational arrangement of wheels on the shaft. Calculations of cylindrical coil springs stretching and compression. Level of difficulty: 2</i></li> <li>- <i>Shear, basic design prerequisites, calculation formulas, strength conditions. Basic concepts and definitions. Classification of types of bending. Internal force factors with direct bend. Diagrams of shear forces and bending moments. Normal bending stress. Level of difficulty: 2</i></li> <li>- <i>Differential relationships between bending moment, shear force and intensity distributed load. Calculations for bending strength. Rational forms of cross sections of beams from plastic and brittle materials. The concept of tangential stresses during bending. Linear and angular bending movements, their determination. Stiffness calculations. Determination of support reactions statically indeterminate beam using the force method. Level of difficulty: 4</i></li> <li>- <i>Equivalent voltage. Calculation of a rod for strength under a combination of basic deformations. Level of difficulty: 4</i></li> <li>- <i>Critical strength, critical tension, flexibility. Euler's formula. Yasinsky's formula. Categories rods depending on their flexibility. Calculations for the stability of compressed rods. Level of difficulty: 3</i></li> </ul>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (60 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>

Reading list	<ol style="list-style-type: none"><li>1. Usmanqulov A.Q., Ismayilov K., Adilov O.K., Yaxshiboev Sh.R. <i>Materiallar qarshiligi [Matn] (o'quv qo'llanma I-qism) /– Samarqand. - 2018. – 344 bet.</i></li><li>2. Usmanqulov A.Q., Ismayilov K., Adilov O.K., Yaxshiboev Sh.R. <i>Materiallar qarshiligi [Matn] (o'quv qo'llanma II-qism) /– Samarqand. - 2019. – 320 bet.</i></li><li>3. Mirsaidov M., Xudaynazarov Sh, Abdimuminov E., Ashirov B. <i>Materiallar qarshiligidan misol va masalalar.[Matn] (o'quv qo'llanma I-qism) /– Toshkent. – 2023. – 335 bet/</i></li><li>4. Беляев Н.М. <i>Сопротивление материалов. Учебник. – Москва, - 2018 – 608 с.</i></li><li>5. "Mechanics of Materials" by Russell C. Hibbeler. – 2016, 896 pages.</li><li>6. "Mechanics of Materials" by Timothy A. Philpot – 2017, 880 pages.</li></ol>
--------------	--

<b>Module designation</b>	<b>INA2205 Economics theory</b>
Semester(s) in which the module is taught	3
Person responsible for the module	<i>Madina Saidova, Associate professor PhD; Bahodir Sultanov, professor, Dr.; Uchkun Nigmadjanov, professor, Dr. Orif Sattarov, Associate professor PhD; Azamat Ahmedov, Associate professor PhD; Shakir Mirzayev, Associate professor PhD.</i>
Language	<i>Uzbek/Russian</i>
Relation to curriculum	<i>selection</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Mathematics (school program)», «Geography (school program)», «History of Uzbekistan (school program)»</i>

<p>Module objectives/intended learning outcomes</p>	<p><i>After mastering the discipline, the student will:</i></p> <p style="text-align: center;"><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>within the framework of the discipline, the student must master the fundamental provisions and categories of modern economic theory in relation to the patterns of functioning of a market economy, the mechanisms of price formation, production volumes, the behaviour of the main economic entities in various types of markets, the fundamentals of consumer behaviour and the production process, the relationship and dynamics of the volume of national production, inflation, employment, the fundamentals of the world economy, features of the functioning of the economy of Uzbekistan in the conditions of modernization and structural adjustment;</i></li> <li>- <i>basic philosophical concepts and categories, patterns of economic development of society;</i></li> <li>- <i>basic concepts and models of microeconomic theory, macroeconomics and world economy.</i></li> </ul> <p style="text-align: center;"><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>the student will master economic thinking skills.</i></li> <li>- <i>the student acquires practical skills in studying economic processes.</i></li> <li>- <i>the student will expand his knowledge in the field of economic theory and form a scientific socio-economic worldview.</i></li> <li>- <i>the student develops the ability to assess the effectiveness and socio-economic consequences of specific government measures used in the implementation of state economic policy.</i></li> <li>- <i>the student will gain an understanding of the application of methods for analyzing the processes of economic development of the national economy and the economy of industrialized countries.</i></li> <li>- <i>the student independently makes economic decisions on economic problems.</i></li> </ul> <p style="text-align: center;"><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>basic methods of quantitative analysis and modeling, theoretical and experimental research;</i></li> <li>- <i>culture of thinking, ability to perceive, generalize and analyze information, setting a goal and choosing ways to achieve it;</i></li> <li>- <i>analytical skills in the field of applied aspects of economic theories;</i></li> <li>- <i>carry out professional communication and communication on issues of organization and managing one's own professional activities;</i></li> <li>- <i>the student must have the skills to think economically, conduct research on economic phenomena, identify patterns, establish correlations between individual phenomena, justify their point of view, check the reliability of research findings, and make decisions.</i></li> <li>- <i>apply the conceptual and categorical apparatus, basic economic laws in professional activities;</i></li> <li>- <i>must have the skills of a holistic approach to the analysis of economic phenomena; use the acquired knowledge to express your own assessment of economic phenomena and processes.</i></li> </ul>
---	---

Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

*Economic theory as a science. Subject and methods of research Subject and methods of economic science. Principles of Economics. Positive and normative analysis. Rational behavior. Free and economic benefits. Factors of production. Income of owners of production factors. Limited (scarce) factors of production and limitless needs: the problem of choice. Society's production possibilities frontier. Opportunity costs. Comparative advantage. Division of labor, specialization and exchange. Basic issues of economics and ways to solve them in various economic systems. Level of difficulty: 3.*

*Market, its structure and functions. Institutional foundations of a market economy. The essence of the market, its functions. Market structure. Market mechanism. Demand, supply, price. Explanations for changes in quantity demanded as a result of changes in price. Non-price determinants of demand. Normal and inferior goods. Interchangeable and complementary goods. Individual and market demand. Constructing a market demand curve. A change in the quantity supplied as a result of a change in price. Non-price determinants of supply. Shifts in the supply curve when non-price determinants change. Construction of the market supply curve. The concept of elasticity. Price elasticity of demand and its factors. Elastic and inelastic demand and revenue of sellers. Income elasticity of demand. Cross elasticity. Price elasticity of supply. Partial equilibrium in a perfectly competitive market in the short run. The effect of changes in supply and demand on equilibrium price and equilibrium quantity. The concept of general equilibrium. Level of difficulty: 4.*

*Marginal utility theory and consumer behavior. Consumer preferences. Rational consumer choice. Preference relations among consumption bundles. Examples of preferences: complements, substitutes, indifferent goods, anti-goods. Utility in economic theory and problems of its measurement. Total and marginal utility. Utility function. Law of diminishing marginal utility of a good. Consumer equilibrium from cardinalist positions. Consumer choice from an ordinalist position.*



*Indifference curves, their properties. Consumer's budget constraint and budget line. Substitution of a good with another good. Marginal rate of substitution. Consumer optimum as a model of rational consumer choice. Dynamic consumer equilibrium: "income – consumption" and "price – consumption" curves. Individual consumer demand: factors, curve. Level of difficulty: 5.*

*Production theory. The concept of a firm in economic theory. Constant and variable factors of production. Short and long term production periods. Production function. Total and average products of a variable factor of production. Marginal product of a variable factor. Economic approach to determining costs and profits. The role of opportunity costs in decision making. Costs in the short term. Fixed, variable and total costs. Average fixed, average variable and average costs. Marginal costs. The relationship between marginal cost and marginal product of a variable factor of production; average variable costs and average product. Revenue and profit of the company. Total, average and marginal revenue. Profit maximization and demand for factors of production in the short run. Level of difficulty: 4.*

*Theory of organization of market structures. Perfect and imperfect competition. Market structures: monopoly, oligopoly, monopolistic competition. Price-taker firm and price-maker firm. The concept of market power. The main features of a perfectly competitive market. Demand for the products of a firm operating in a perfectly competitive market. The condition for profit maximization by a firm under conditions of perfect competition. The firm's supply curve in the short run. The impact of taxes and subsidies of various types on a firm's supply. The main features of a pure monopoly market. Choice of a monopolist in the absence of discrimination. Price discrimination. Barriers to entry into the industry.*

*The concept of natural monopoly. Losses in social welfare under the existence of a monopoly. State policy regarding monopolies: restructuring and regulation. Taxation of a monopolist: comparison with a competitive market. Monopolistic competition. The role of differentiation. Oligopoly. Strategic interaction in the market. Level of difficulty: 4.*

*Market Model Efficiency: Market Failures and Income Inequality Market problems: injustice (income inequality) and market failures (externalities) (monopolization, externalities, public goods, information asymmetries). High degree of income differentiation and the problem of poverty. Lorenz curve and Gini coefficient. Redistribution of income by the state. Social Welfare Theory. The problem of market efficiency, fairness and equality. Market distribution and redistribution of wealth. Consumer gains, producer gains, and social welfare. Public goods. Properties of public goods: non-competitiveness and non-excludability in consumption. Free rider problem. The role of the state in providing public goods. Competition, its forms, methods, socio-economic consequences. Imperfect competition and the efficiency of the market model. Information asymmetry in goods markets, labor markets and capital markets. Antimonopoly policy of the state. The role of the state in the internalization of external effects. State failures. Regulation of externalities through quotas and taxes. Market infrastructure, its role in regulating economic processes. level of difficulty: 3.*

*Basic macroeconomic indicators and identities. Macroeconomics as a science about the national economy as a whole. The structure of the economic system and its features in the countries of the East (using the example of any country). Macroeconomic models: static and dynamic. The concept of exogenous and endogenous parameters. Macroeconomic agents and markets, their characteristics and the main connections between them. Entrepreneurship as an economic phenomenon and its specificity in Eastern countries. The content of transformation processes in the modern world and changes in the*

Exams and assessment formats	One written midterm assessments (60 minutes), take-home written assignments and one final oral exam (40 minutes).
Study and examination requirements	Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass
Reading list	<ol style="list-style-type: none"> <li>1. Xodiyev B.Yu., Shodmonov Sh. Iqtisodiyot nazariyasi. – T.: "Barkamol fayz media", 2017. – 784 b.</li> <li>2. Mc. Connell, Brue. Economics. 17th edition. Mcgraw-hill/Irwin, USA, 2014.</li> <li>3. N. Gregory Mankiw. Principles of Economics, 7th edition. Amazon, USA 2016.</li> <li>4. Paul A. Samuelson, William D. Nordhaus. Economics. 19th Edition. McGraw-Hill Companies. USA. 2015.</li> <li>5. Ўлмасов А., Ваҳобов А.В. Иқтисодиёт назарияси. Дарслик. – Т.: «Иқтисод-молия», 2014. – 480 бет.</li> <li>6. Шодмонов Ш.Ш., Ғофуров У.В. Иқтисодиёт назарияси. Дарслик. – Т.: Иқтисод-молия, 2010. – 728 бет.</li> <li>7. Самуэльсон Пол Э., Нордхаус Вильям Д. Экономика-Учебник. 18-е изд.:Пер с англ. - М.: ООО «И.Д.Вильямс», 2009. - 1360 стр.</li> <li>8. Макконкел К.Р., Брю С.Д. Экономика: принципы, проблемы и политика. Учебник. 17-изд. - М.: ИНФРА-М, 2009. - 916 стр.</li> <li>9. Носова С.С. Новичкова В.И. Экономическая теория для бакалавров. Учебное пособие. - М.: КНО РУС, 2009. - 368 стр.</li> </ol>

<b>Module designation</b>	<b>QUM2205- Construction materials</b>
Semester(s) in which the module is taught	3
Person responsible for the module	<i>Yunusova Farida Rakhmonberdiyevna, associate professor Radjabov Mirzokhid Zokirovich assistant</i>
Language	<i>Uzbek/Russian</i>
Relation to curriculum	<i>selection</i>
Teaching methods	<i>Lecture, practical training, laboratory work</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 900 hours: - lecture – 30 hours; - practical lessons – 10 hours; - laboratory – 20 hours. - self-learning - 60 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Physics”, “Chemistry”, “Mathematics”.</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p style="text-align: center;"><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li><i>- when choosing construction materials,</i></li> <li><i>- draw a conclusion knowing the conditions of their operation</i></li> <li><i>- know the acquisition, structure, properties</i></li> <li><i>- theoretical foundations of materials;</i></li> </ul> <p style="text-align: center;"><b>To be able to:</b></p> <ul style="list-style-type: none"> <li><i>- should have the skills of analytical reasoning and application</i></li> <li><i>- knowing the properties of construction materials</i></li> <li><i>- planning and changing the properties of materials to the required aspects</i></li> </ul> <p style="text-align: center;"><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li><i>- must be able to take into account dry and hot climate conditions and energy efficiency when transporting</i></li> <li><i>- storing and using materials while maintaining their physical and mechanical properties and quality, and should be able to know and use them.</i></li> </ul>

Content: The discipline includes. The *level of difficulty*: (1 – low, 5 high):

"Construction materials" for students choose raw materials, produce construction materials, have an idea of their use, improve raw materials and products in the production of construction materials in terms of energy efficiency according to the requirements of the present time, justify the possibility of using them for various purposes, while maintaining their technical properties, their mass. The tasks include teaching the theoretical foundations and technological processes of providing energy and resource-saving technologies in lightening and production.

Introduction to science. General information on building materials, their classification. Origin, types of building materials. The concept of the main physical and mechanical properties of building materials. Level of difficulty: 3.

Natural stone materials. origin, classification, properties. General understanding of natural stone materials. Level of difficulty: 3.

Artificial scorched materials and items. General understanding of pottery, raw materials, methods and properties of production. Level of difficulty: 4.

Mineral binders, grading, properties. Hardening binder in the Air-construction mortar, gypsum binder, raw materials, production technology, properties. Level of difficulty: 5.

Hydraulic binders. Hydraulic binder-portlandtsement, raw materials, production methods, technolo - Gia, properties. Level of difficulty: 5.

Properties of the minerological composition of Portland cement. Types of portlandtsement. Level of difficulty: 6.

General information on concrete paving, grading. Level of difficulty: 5.

Concretions: binder for heavy concrete, water in a fine and large filler bath, technical requirements for them. Level of difficulty: 5.

Types of concretions, water in the form of a hydraulic concrete sink, technical requirements for them. Level of difficulty: 5.

Construction mixtures, their classification, properties. Level of difficulty: 4.

General concept, grading, production process, properties, use of reinforced concrete products. Level of difficulty: 5.

Artificial stone materials, types. Silicate materials. Asbestos cement parts. Level of difficulty: 5.

Waterproofing materials, grader, properties, use. Level of difficulty: 5.

Modern building materials, grading. Level of difficulty: 5.

The following topics are recommended for practical classes:

1. Determination of the nominal content of heavy concrete. Level of difficulty: 4.

2. For the manufacture of heavy concrete, it is necessary to evaluate the composition. Level of difficulty: 4.

3. The nominal content of hydrotechnical concrete is determined. Level of difficulty: 5.

4. For the production of hydrotechnical concrete, the content of the composition is determined. Level of difficulty: 5.

5. Clay the composition of the complex construction mixture and make it work. Level of difficulty: 3.

The following topics are recommended for laboratory work:

1. For heavy concrete, a small filler is the determination of the moisture content of the sand, the hardness of the hookah and buckle, and the determination of the lead. Level of difficulty: 3.

2. Determination of the amount of dust and soil impurities and organic spoons in the sand to a small size of sand in the sand. Level of difficulty: 4.

3. Testing a large filler for heavy concrete – gravel (crushed stone) to determine its moisture content, the density of gravel grains, the density of the tissue, its small size and make a gap. Level of

Exams and assessment formats	<i>There are two mid-term tests (20 minutes each) and a final oral exam (40 minutes), as well as homework in the form of written or creative work.</i>
Study and examination requirements	<i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i>
Reading list	<ol style="list-style-type: none"> <li>1. M. Klara Gonkalves, Fernanda Margarido. Qurilish va qurilish muhandisligi uchun materiallar. Springer xalqaro nashriyoti, Shveysariya 2015.</li> <li>2. To'laganov A.A., Kamilov X.X., Vohidov M.M., Sultonov A.A., "Zamonaviy qurilish materiallari, buyumlari va texnologiyalari". O'quv qo'llanma, Toshkent, TAQI, 2014, 129b.</li> <li>3. Qosimov I.M. "Zamonaviy qurilish materiallari va texnologiyalari". Toshkent, Lesson press nashriyoti, 2020.</li> <li>4. Куликова Е.С. "Строительные материалы". учебное пособие, Хабаровск, из-во Тихоокеан, гос.ун -та, 2017. 162 с.</li> <li>5. В.С.Руднов и другие. "Строительные материалы и изделия". учебное пособие, . Екатеринбург, изд-во Урал.ун-та, 2018.</li> </ol>

<b>Module designation</b>	<b>EAM2205 - Ecology and environmental protection</b>
Semester(s) in which the module is taught	3
Person responsible for the module	<i>Associate professor, PhD Razzakov Ruslan, PhD Shipilova Kamila, Prof., Dr. Karimov Baxtiyar</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Selection</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 Contact hours: lecture - 30, practical lessons –30, self-learning – 90, hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>Biology and Microbiology, Analytical and Physcolloid Chemistry, Physics, Mathematics.</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- fundamentals of environmental science and nature protection.</li> <li>- ecosystem concepts and functioning, interaction between the human society and wildlife</li> <li>- Particularities of ecosystem functioning under conditions of arid climate;</li> <li>-sustainable use and protection of natural resources</li> <li>- non-living and living components, species, populations, , their evolutionary origin, development and mechanisms of interaction;</li> <li>-structure and functioning of biosphere and its components</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- select up-to-date methods and to be able to plan field research for the correct assessment of the impact of the agriculture and water economy sector development on natural ecosystems, the ecological state estimation of the environment,</li> <li>- to understand the pros and cons of anthropogenic impact on the surrounding environment, natural and agroecosystems, as well as on human society and to propose scientifically-based solutions to mitigate, reduce and eliminate negative effects.</li> <li>- to evaluate negative impacts on the natural environment and formulate conclusions and recommendations on the biodiversity and environmental protection.</li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>-natural and anthropogenic factors influencing surrounding environment, and their formation.</li> <li>-patterns of the circulation of matter and energy in the biosphere and its practical applications,</li> <li>-impact assessment on habitats of living and non-living ecosystem components of natural and artificial ecosystems.</li> </ul>

Content: The discipline includes the following topics. The *level of difficulty*: (1 – low, 5 high):

Introduction to the discipline "ecology " the science of ecology, its goals, objectives, history, significance, connection with other disciplines. A brief overview of the state of the environment Level of difficulty : 1

Basic ecological concepts. Basic ecological concepts: species and population, biotope, transport chains and complexes, ecological system, biocenosis, biogeocenosis. Level of difficulty : 2

Natural resources, their classification, use of natural resources. The concept and classification of natural resources. Renewable and non-renewable resources. Level of difficulty : 2

Ecology of the hydrosphere. The concept of the hydrosphere. Types and reserves of hydrosphere resources on earth, their territorial distribution and placement. The role and importance of water resources in the ecological system and human life. The influence of environmental factors on water resources and changes in them. Level of difficulty : 3

Environmental factors of the environment and features of their interaction. Abiotic factors – light, temperature, humidity, meteorological factors (pressure, wind, precipitation); biotic factors -competition, predation, parasitism, symbiosis, mutualism, cannibalism Level of difficulty : 3

Flora, biodiversity and ecological significance. General characteristics of the flora of Uzbekistan, the flora of Uzbekistan, the natural and ecological significance of flora, wild, ornamental and agricultural crops, cultural and weed relations, the influence of environmental and anthropogenic factors on the flora. Level of difficulty : 3

Wildlife (fauna), biodiversity and ecological significance. General characteristics of the animal world, biodiversity, resources, description of the fauna of Uzbekistan, the role of animals in ecosystems and for humanity, wild, domesticated and parasitic animals and the relationship between them, the influence of environmental and anthropogenic factors on the animal world. Level of difficulty : 3

The role of nature reserves, national parks, nature reserves and other specially protected natural areas in the preservation of natural landscapes and biological resources. Level of difficulty : 3

Biological balance and succession in natural ecosystems, its essence and causes of disturbance. The essence of biological equilibrium in natural ecosystems. Homeostasis and the state of succession. The main causes, consequences and ways to restore the biological imbalance. Level of difficulty : 4

The ecosystem of the Aral Sea, the problem of its ecological crisis, causes, present state and future. The history of the origin, ecological and economic significance of the Aral Sea for the territory of Central Asia. Level of difficulty : 4

International cooperation in the field of ecology, environmental protection and climate change. Directions of international cooperation in the field of ecology, environmental protection and climate change. Level of difficulty : 3

Responsibility in the field of ecology, environmental protection and climate change. Types of liability for violation of legislation in the field of ecology, environmental protection and climate change. Level of difficulty : 4

The following topics are recommended for practical classes:

1. Getting to know the nature and climate of Uzbekistan. Level of difficulty : 2
2. Environmental quality standards: familiarization with permissible standards, types, sizes of pollutants. Level of difficulty : 2
3. Study of the calculation of the amount of pollutants in the atmospheric air. Level of difficulty : 2
4. Acquaintance with the existing water resources of Uzbekistan. Level of difficulty : 3
5. Types of wastewater and water accounting. Level of difficulty : 4
6. Study of types of soil pollution. Level of difficulty : 4
7. The Red Book of Uzbekistan. Acquaintance with the plant world. Level of difficulty : 3
8. The Red Book of Uzbekistan. Acquaintance with the animal

Exams and assessment formats	One written midterm assessment (30 minutes), take-home written assignments and one final oral exam (40 minutes).
Study and examination requirements	Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass
Reading list	<ol style="list-style-type: none"> <li>1. Russell K. Monson. Ecology and the Environment. USA. 2014 – 675 p</li> <li>2. Sultonov P.S. Ahmedov B.P. Ekologiya va atrof muhitni muhofaza qilish asoslari. Toshkent 2007. – 235 b</li> <li>3. Рустамбаев М. и др. Экология Тошкент 2011.-345 б</li> <li>4. Russell K. Monson. Ecology and the Environment. USA. 2014 – 675 p</li> <li>5. Ergashev A., Ergashev T. «Ekologiya, biosfera va tabiatni muhofaza qilish», Toshkent, YAngi avlod, 2005y. 434 b</li> <li>6. O'zbekiston Respublikasi Qizil kitobi/Красная книга Республики Узбекистан, v 2-t. - Т.: "Chinor ENK",2019 y</li> </ol>



## 4-semester

<b>Module designation</b>	<b>GID 3110-Hydraulics</b>
Semester(s) in which the module is taught	4,5
Person responsible for the module	<i>Arifjanov Aybek Muxamedjanovich, Dsc, Professor Otakhanov Maqsud. Yusupovich, PhD, Associate professor Samiev Luqmon Naimovich, Dsc, Associate professor Atakulov Dinislam Yermaganbet ogli, PhD, Assistant Juraboev Ismoil Ilhomovich, MD, Assistant Ruziyev Dilmurod Kurbanaliyevich, MD, Assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, lab works</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload:300 hours Auditorium Hours:120 hours Lecture – 50 hours Practical training - 60 hours Laboratory training -10 hours Self-study – 180 hours</i>
Credit points	10 (5+5)
Required and recommended prerequisites for joining the module	<i>«Physics», «Mathematics», «Hydrometry», «Terrestrial Hydrology», «Theoretical Mechanics».</i>

<p>Module objectives/intended learning outcomes</p>	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>-Basic physical properties of liquids</li> <li>-Hydrostatics</li> <li>-Fluid kinematics;</li> <li>-Hydrodynamics</li> <li>-Regimes of fluid motion</li> <li>-Head losses in pipes</li> <li>-Hydraulic calculation of pipes</li> <li>-Output from holes and nozzles</li> <li>-Uniform water flow in open channels</li> <li>-Non-uniform water flow in open channels</li> <li>-Hydraulics of hydraulic structures</li> <li>-Biefs connection</li> <li>-Hydraulic jump</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- know about the basic physical properties of liquids theoretically,</li> <li>- calculate the hydrostatic pressure and the resulting force,</li> <li>- determine the hydraulic elements of flow,</li> <li>- distinguish between laminar and turbulent flow regimes of a fluid,</li> <li>- determine of head losses in pipes using Bernoulli's equation,</li> <li>- perform hydraulic pipes calculations,</li> <li>- determine fluid flow rate in holes and nozzles,</li> <li>-determine the normal depth of a channel,</li> <li>- determine the critical depth of a channel,</li> <li>- perform hydraulic calculations for water conduits.</li> <li>- solve hydraulic problems related to the connection of biefs</li> <li>- determine the elements of hydraulic jump.</li> </ul> <p><b>To form competencies in:</b></p> <ul style="list-style-type: none"> <li>- methods of determining the basic physical properties of liquids,</li> <li>- solving hydrostatic problems for students,</li> <li>- using appropriate expressions and equations when solving problems related to hydrodynamics and fluid kinematics,</li> <li>- calculating the head losses in pipeline hydraulic calculations, determining fluid flow rates in holes and nozzles, and applying suitable expressions to real-life projects,</li> <li>- performing hydraulic calculations for the movement of channels under conditions of uniform flow using Chezi's formula.</li> <li>- the implementation of hydraulic calculations for channels using the SHNQ method</li> <li>- determining the shape of the free curved water level line (FCWLL) by calculating the critical depth of the channel and other relevant parameters</li> <li>- understanding the principles of engineering water conduits from a hydraulic perspective</li> <li>- connecting biefs for different conditions, calculating hydraulic jump parameters and providing recommendations for flow energy dissipation.</li> </ul>
---	--

Content: The discipline includes the following topics. The *level of difficulty*: (1 – low, 5 high):

-Hydraulics and its components. A brief history and development of Hydraulics. Basic concepts and terms in the subject. Fluid and its physical properties. Ideal and real fluids. Forces affecting fluids. System of measurement units for physical quantities. *Level of difficulty: 2*

- Hydrostatic pressure and its properties. The basic equation of hydrostatics. Determination of hydrostatic pressure at any point. Manometric and vacuum pressure. Pascal's law and its practical applications. *Level of difficulty: 3*

- The effect of the hydrostatic pressure force on a flat surface. The Centre of the hydrostatic pressure. The effect of the liquid pressure on the bottom of the container. The Graphoanalytical method for determining the hydrostatic pressure force acting on a rectangular wall. The hydrostatic paradox. *Level of difficulty: 3*

- Fundamentals of hydrodynamics. Kinematics of fluid movement. The main analytical methods used in the study of fluid movement. Continuity equation of fluid flow. Uniform and Non-uniform movement of fluid flow. Movement with and without pressure in the pipeline. Hydraulic elements of fluid flow. *Level of difficulty: 3*

-D.Bernoulli's equation for an elementary flow tube of an ideal fluid. Analysis of the terms in Eq. Geometrical and energetic meanings of D.Bernoulli's equation. D.Bernoulli's equation for fluid flow. D.Bernoulli's equation for real flow. Piezometric and hydraulic gradients. Coriolis coefficient. General instructions on the meaning and shapes of piezometric and pressure lines. *Level of difficulty: 4*

- Two different regimes of fluid flow. Reynolds number and its critical quantity. Distribution of velocities over the cross-sectional area of a flow in laminar motion. Turbulent motion regime. Velocity distribution in pipes in the regime of turbulent motion. Mathematical models representing the regime of turbulent motion. Theoretical foundations of determining the coefficient of hydraulic friction. *Level of difficulty: 3*

- Hydraulic resistances in pipes. Nikuradze's experiments and graph, areas of hydraulic resistance. Methods of determining the coefficient of hydraulic friction in practical calculations. Average local velocity. Laminar motion layer. A hydraulically smooth and rough riverbed wall. *Level of difficulty: 4*

-Head losses in turbulent motion. Darcy-Weisbach equation.

Coefficient of hydraulic friction. Formulas of head losses for the area of square resistance. Head losses due to local resistance. Weisbach formula. Borda formula. *Level of difficulty: 4*

- Hydraulic calculation of short pipes. Pressurized movement of liquid flow in pipes. Formulas for calculating head losses during fluid movement in pressurized pipes. Adding all head losses. Total friction coefficient. The concept of short (short) pipes. Flow rate and velocity coefficients. Basic problems in the calculation of short pipes. Calculation formula for short pipes. Hydraulic calculation of siphon, ducker and pump suction pipe. *Level of difficulty: 5*

- Hydraulic calculation of long pipes. Simple and complex pipes. Hydraulic calculation of short and long pipes. Types of problems in the calculation of long pipes. Parallel and serial connection of long pipes. *Level of difficulty: 5*

- The movement of water flowing through small nozzles and holes in a thin wall. General concepts. The movement of fluids flowing out of a small nozzle in a thin wall and various shaped holes (nozzles) installed in it without changing the pressure. Types of flow compression. Values of compressibility, velocity, flow rate coefficients in the study of fluid movement flowing through small nozzles in a thin wall. Flow trajectory. *Level of difficulty: 3*

- Uniform motion of water flow in open channels. The most hydraulically

Exams and assessment formats	One midterm (30 minutes) and final oral exam (60 minutes), short computerized test, written homework and self- study
Study and examination requirements	Requirements for successfully passing the module The total maximum score will be the sum of the points allocated to the final exam (60%), Midterm (24%), homework (24%) and classroom activity (12%). In order to successfully pass the subject, a student must score 60% or more of the allotted points.
Reading list	<ol style="list-style-type: none"> <li>1. Зуйков А.Л. «Гидравлика», учебник, Москва, 2014 г., 517 с.</li> <li>2. Латипов Қ.Ш., Арифжанов А.М., Файзиев Х., «Гидравлика», Тошкент. ТАҚИ, 2015й. -388б</li> <li>3. А.Арифжанов, Т.Апакхужаева. Гидравлика. -Ташкент. Файласуф, 2019б. – 224б.</li> <li>4. А.Арифжанов, Қ.Рахимов, А.Ходжиев Гидравлика. Тошкент. ТИМИ 2016й. – 189б.</li> <li>5. Арифжанов А.М. Гидравлика (гидростатика). Тошкент. ТИҚХММИ 2022й. – 137б.</li> <li>6. А.М.Арифжанов, Х.Файзиев, А.У.Тошхожаев Гидравлика. Тошкент. ТАҚИ 2019й. – 157б.</li> <li>7. Латипов Қ.Ш., Арифжанов А.М., Файзиев Х., «Гидравлика», Тошкент. ТАҚИ, 2015й. – 121б.</li> <li>8. Philip M. Gerhart Andrew L. Gerhart John I. Hochstein Fundamentals of Fluid Mechanics. ISBN 978-1-119-08070-1 (Binder-Ready Version). USA 2016</li> <li>9. Philippe Gourbesville Jean Cunge Guy Caignaert Advances in Hydroinformatics. ISBN 978-981-10-7217-8. Springer Nature Singapore Pte Ltd. 2018</li> <li>10. T.Kaletova, A.Arifjanov “Hydromechanika”, Nitra, 2019y, -160 pages.</li> </ol>

<b>Module designation</b>	<b>AT2106 Information technologies</b>
Semester(s) in which the module is taught	4
Person responsible for the module	<i>Rakhmankulova Barna Oktamkhanovna, associate professor Zuyadullayev Davron Shamshievich, associate professor Aynakulov Sharofiddin Abduljalilovich, senior lecturer Ziyaeva Sholpan Kudaybergenovna, assistant; Raxmonova Maftuna, assistant;</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, lab works.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 180 hours. Contact hours: 80 hours: - lecture – 40 hours; - practical lessons – 30 hours; - laboratory – 10 hours. - self-learning - 100 hours.</i>
Credit points	6
Required and recommended prerequisites for joining the module	<i>«Higher mathematics», «Physics», «English», «Russian»</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>information, methods of its storage, retention and retrieval,</i></li> <li>- <i>information transmission technologies, computer networks and network technologies, information and their protection methods,</i></li> <li>- <i>advanced Internet and programming languages, databases, maintenance and programming technologies, computer networks, intranet services,</i></li> <li>- <i>functionality and problem solving methods and access to them,</i></li> <li>- <i>solving privacy issues and access to resources.</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>Use of programming and computing techniques and software capabilities;</i></li> <li>- <i>Application of practical programs in solving specialty issues;</i></li> <li>- <i>Searching and finding information on the specialty from the computer network;</i></li> <li>- <i>To build and program algorithms for solving practical problems and to solve them;</i></li> <li>- <i>Solving and applying specialty issues.</i></li> </ul> <p><b>Form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>knowledge, skills and abilities on the effective use of information technologies in solving water management and land reclamation issues</i></li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Technical and software support of information technologies. Basic concepts of "Information technologies" science. Data encoding. Technical and software support of information processes. Subject, purpose and tasks of "Information technologies" science. Information processing, information input-output devices. Communication tools. Information carriers and storage devices. Software of information processes. Types of software: system, practical and hardware programs. Level of difficulty:2. Application of information technologies in solving specialty issues. Text and presentation editors. Technology of forming information in the form of a document. Creation of electronic documents using word processors, use of optimal methods. Information security in electronic documents. The technology of forming information in the form of presentations. Optimal use of constructors, layouts and templates in creating presentations. Placing various objects in the presentation. Animation issues: ensure harmony of sound, image, text and movements. Presentation management. Level of difficulty:2. Application of information technologies in solving specialty issues. Electronic tables and database. Creating and decorating graphs and charts. Using templates. Grouping, sorting, sorting and filtering tabular data related to the specialty, graphical representation of data. Level of difficulty:3. Database. Hierarchical, relational and network models of the database. Database management systems (MBBT). Creating the main objects of MBBT. Actions on data. Creation of a database of specialties and data processing. Level of difficulty:4. Algorithmization and programming. Properties of the algorithm. Methods of describing algorithms. Properties of the algorithm. Algorithm expression methods and types. Linear, branching, iterative algorithms. Algorithms for solving specialization problems. Steps to solve computer problems. Level of difficulty: 3. Programming languages. Integrated processing environments. Programming problems using linear algorithms. Modern programming languages. Compiler and interpreters. Dev C++, NetBeans, Visual Studio integrated processing environments. C++ programming language alphabet, identifier, standard types, variable, constant, standard functions, operations. Program structure. Programming of specialization problems using linear algorithms. Level of difficulty: 3. Programming problems using branching algorithms. Branching algorithms. Create programs to solve specialization problems using conditional transitions, unconditional transitions, and selection operators. Level of difficulty: 3. Programming problems using recursive algorithms. Iterative algorithms. (arithmetic) algorithms with a known number of iterations. Iterative algorithms with an unknown number of iterations. Using for, while, do while operators, creating programs to solve problems related to specialization. Level of difficulty: 4. Using arrays in programming problems. Arrays and their description. Creating programs for solving special problems using arrays. Level of difficulty: 5.</i></p>
<p>Exams and assessment formats</p>	<p><i>25% of the points allocated to the assessment of students' knowledge for IC are allocated to the assessment of students' independent work (out of the total 60 points for IC, 45 points are given for theoretical and practical knowledge, 15 points are given for independent work). Also, questions on subjects listed in the subject syllabus on student independent education are also included in FC assignments.</i></p>
<p>Study and examination requirements</p>	<p><i>In order to successfully pass the subject, the student must score 60% or more of the allotted points.</i></p>

Reading list	<ol style="list-style-type: none"> <li>1. Z.S. Abdullaev, M. Yusupov, B.O.Raxmankulova, Sh.A. Aynakulov. <i>Applied information technologies. (Study guide)</i> Tashkent, TIAME, 2018. - 317 p</li> <li>2. Raxmankulova B.O., Ziyaeva Sh.K., Kubyashev K.E. <i>Information technologies and Mathematical modeling of processes. T.:</i> 2021</li> <li>3. The President of the Republic of Uzbekistan "On measures to improve the quality of education in the field of mathematics and develop scientific research" Decision No. PD-4708 of May 7, 2020. <i>lex.uz</i></li> <li>4. Sh.M.Mirziyoyev "Strategy of actions on the five priority areas of Uzbekistan's development" Tashkent, "Uzbekistan", 2017. "Gazeta.uz".</li> <li>5. Yuldashev U.Y., Bakiev R.R., Zokirova F.M. <i>Informatics and information technologies. Electronic textbook.</i></li> <li>6. B.Raxmankulova <i>Methodical guide for conducting practical and laboratory training in information technology and mathematical modeling of processes TIAME, 2021. - 114p</i></li> <li>7. B.Raxmankulova <i>Methodical guide for conducting practical training in information technology and mathematical modeling of processes TIAME, 2022</i></li> <li>8. B.Raxmankulova <i>Methodical manual for laboratory training in information technology and mathematical modeling of processes TIAME, 2022</i></li> </ol>
--------------	---

<b>Module designation</b>	<b>TD2104 - Soil Science and Agriculture</b>
Semester(s) in which the module is taught	4
Person responsible for the module	<i>Candidate of Agricultural Sciences, Associate Professor. Egamberdiev Ramish Rabbimovich. Candidate of Biological Sciences, Associate Professor .Khakberdiev Obid Eshniyozovich.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, lesson, lab works, private study.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload:150 Contact hour: lecture-40, practical lesson 20, self-learning-90 hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>General chemistry, higher mathematics, physics</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- the essence of the soil formation process, the general scheme,</li> <li>- the structure, morphology, biology, living conditions and farming laws of plants,</li> <li>- have ideas and knowledge about soil properties, cultivated types of crops,</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- the main factors and conditions affecting soil formation,</li> <li>- the organic part of the soil, chemical composition, soil structure, soil properties, ways of their moderation,</li> <li>- soil fertility, soil classification, soil water regime,</li> <li>-scientific basis of crop rotation and organization procedure,</li> <li>- basic soil treatment, before and after planting,</li> <li>- to have skills about the main agricultural crops</li> </ul> <p><b>To form competences in</b></p> <ul style="list-style-type: none"> <li>- placement of plants, use of water-saving irrigation methods and techniques,</li> <li>- to be able to use the achievements of modern farming in all areas of agriculture,</li> <li>- use of modern resource-saving techniques and devices, taking into account the characteristics of the soil, to obtain a high and high-quality harvest from agricultural crops</li> </ul>



<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p>Morphological signs and structure of the soil. Soil layer structure, genetic layers and main morphological features. Soil color, inclusions and structure. Stages of soil profile development. Difficulty level: 2</p> <p>Physical and chemical properties of soil. Soil density, solids density, chemical, radioactivity properties. Soil compaction, subsidence, viscosity, ductility, plasticity and hardness. Importance of physical and chemical properties of soil. Difficulty level: 2</p> <p>Soil organic matter and fertility. The organic part of the soil, soil humus, chemical changes that occur outside the cells of living organisms, the processes of changing organic residues with the participation of soil animals, the functions of soil organic matter. Difficulty level: 3</p> <p>Organic and mineral fertilizers. The importance of fertilization. Importance, composition, types of organic fertilizers, period of application to the soil, procedure and norms. Siderate fertilizers, their use. Importance, composition, types of mineral fertilizers, period of application to the soil, procedure and standards. Difficulty level: 4</p> <p>Watering plants. Water requirements of plants. Biological basis of irrigation. Irrigation and seasonal irrigation norms. Irrigation procedures and methods. Modern irrigation methods. Difficulty level: 5</p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. O. E.Khakberdiev, R.R.Egamberdiev, J.U.Khaitbaeva "Asas of Soil Science and Plant Science" Tashkent 2022.</li> <li>2. O. Ramazanov, S. Bouriev "Melioration soil science" Tashkent 2019.</li> <li>3. Sh.Kholikulov, P.Farov, I. Bobokhojaev "Soil Science" Tashkent 2011.</li> <li>4. Ramazanova A., Bouriev S "Soil Science and farming" - harmonious Faiz media, T. 2018.</li> <li>5. Egamberdiev R.R. Educational guide" fundamentals of Crop Science " Tashkent 2022.</li> <li>6. O.E.Khakberdiev, Dadakhojaev A. Educational guide "soil science" Tashkent 2023.</li> </ol>

<b>Module designation</b>	<b>QGI2105-Hydrology</b>
Semester(s) in which the module is taught	4
Person responsible for the module	<i>Nazaraliyev Dilshod Validjanovich, PhD, Professor</i> <i>Mansurov Safar Raxmankulovich PhD, senior lecturer</i> <i>Kodirov Sobirjon Mamadiyarovich, senior lecturer</i> <i>Jumabayeva Gulnara Usmanbayevna, assistant</i> <i>Hamroqulov Jasurjon Sayli ugli, assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, lab works.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours.</i> <i>Contact hours: 60 hours:</i> <ul style="list-style-type: none"> <li>- <i>lecture – 30 hours;</i></li> <li>- <i>practical lessons – 20 hours;</i></li> <li>- <i>laboratory – 10 hours.</i></li> <li>- <i>self-learning - 90 hours.</i></li> </ul>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Algebra”, “Physics”, “Geography”, “Chemistry”, “Biology”, “Geomorphology”, “Geodesy”.</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>regulations of river flow formation</i></li> <li>- <i>hydrological research methods</i></li> <li>- <i>water reservoirs, their distribution and balance</i></li> <li>- <i>natural and chemical properties of terrestrial waters</i></li> <li>- <i>river basin and network</i></li> <li>- <i>formation of river basin and network</i></li> <li>- <i>river basin and network knowledge of influencing factors</i></li> <li>- <i>sources and flow of saturation and hydrological regimes.</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>to determine and analyze the data on the form and size parameters of rivers</i></li> <li>- <i>the factors influencing the formation of river flow volume</i></li> <li>- <i>the methods of expressing the river flow</i></li> <li>- <i>the classification of river saturation from the climatic point of view and according to the sources of saturation</i></li> <li>- <i>to acquire the skills of types, equipment, structure of water gauging stations</i></li> <li>- <i>water level observations</i></li> <li>- <i>water flow rate measurement</i></li> <li>- <i>water and turbidity discharge and volume determination</i></li> <li>- <i>current and modern hydrometric tools</i></li> </ul> <p><b>Form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>organization of hydrological studies and observations</i></li> <li>- <i>analysis and assessment of water sources shape and size indicators</i></li> <li>- <i>analysis and assessment of the hydrological regime of water bodies</i></li> <li>- <i>assessment of factors affecting water bodies</i></li> <li>- <i>modern hydrological instruments and to have the competencies to use devices</i></li> <li>- <i>apply hydrological methods</i></li> <li>- <i>perform water management calculations</i></li> <li>- <i>solve problems of efficient use of water resources</i></li> </ul>

Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

*Basics of hydrology. Growing demand for water on Earth. Methods of hydrological research. Water cycle in nature. Level of difficulty: 1*

*River basin and system. Natural-geographic descriptions of the river basin. The main shape and size indicators of the river system. Shape and size indicators of the river basin. Saturation of rivers. Formation of river flow and factors affecting it. Sources of saturation of rivers. Classification of rivers by sources of saturation. Classification of rivers of Central Asia by sources of saturation. Quantitative assessment of the contribution of river saturation sources. Basic characteristics of river flow. Ways of expressing river flow. Difficulty level: 2*

*Basics of hydrometry. Elements of the water regime of rivers. Practical use of water level monitoring data. Water level, its monitoring and processing methods. Water level regime of rivers. Cycles of the water regime of rivers. Classification of rivers according to water periods. Water level. Hydrological monitoring site. Water level. Methods and means of measuring water levels at the water measurement site. Water level recording devices. Instruments and devices for increasing the accuracy of water level monitoring. Flow depth. Composition, content and tasks of work performed in depth measurement. Depth measurement methods and tools. Processing of measured data. Calculation of morphometric characteristics of the river based on depth measurement data. Difficulty level: 2*

*Flow velocity. General information about water movement. Turbulent and laminar flows. Types of flow velocities. Distribution of velocities according to the depth and width of the river and channel. Speed chart. Methods and tools for measuring flow rate. Modern devices that measure the rate of water flow. Water consumption. Water consumption and the structure of work performed in its determination. Classification of methods for determining water consumption. Consumption model and its characteristics. Velocity-field. Calculation of water consumption. Consumption (flow) meters. The essence of the mixing method. Instruments and devices for measuring water consumption by mixing method. Measurement of water flow using the ultrasound measurement method. Standard water consumption measuring devices. Methods and means of determining water consumption in hydro melioration networks. Water consumption control, measuring devices and devices in hydro melioration networks. Level of difficulty: 3*

*Study of stream discharges and sediments. An overview of solid water runoff. Sediments and their movement in streams. The main characteristics of solid water flow. Suspended sediment discharges. Tools for taking samples of suspended sediment water. Calculation of suspended sediment flow consumption. Riverbed bottom sediments. Calculating flow rate of river bottom sediments. Difficulty level: 3*

*Hydrological calculations. Hydrological descriptions. Justification of the use of statistical methods in hydrology. Estimated hydrological descriptions. Distribution curves of hydrological characteristics. Availability of hydrological characteristics. Supply curves. Parameters of distribution and supply curves and methods of their determination. Empirical and theoretical curves of supply. Probability grid. Correlation. The regression equation. Difficulty level: 4*

*Adjusting the flow rate. Distribution of river flow during the year. Types of flow adjustment. Demand of water users and water consumers. Water management balance. Reservoirs. Types of reservoirs. Main indicators of reservoirs. Location and elements of reservoirs. Hydrological regime of reservoirs. Water level mode. Water balance. Temperature mode. Hydro chemical mode. Dynamics of reservoirs. Sedimentation balance of reservoirs. Calculation of the amount of turbidity settled in the reservoir. Turbidity of the reservoir press Measures to prevent and reduce water reservoir siltation. Water waste. Types of waste from the water reservoir, methods of calculation. Advantages and disadvantages of existing methods. Measures to reduce water wastage. Difficulty level: 5*

Exams and assessment formats	One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).
Study and examination requirements	Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass
Reading list	<p>1. Tim Davie. <i>Fundamentals Hydrology</i>. London and New York 2008-<u>398</u> <u>peq</u></p> <p>2. Nazaraliev D.V, Akmalov Sh.B “QURUQLIKGIDROLOGIYASI” fanidan o’quv qo’llanma Toshkent-2019.-112 bet.</p> <p>3. Фатхуллоев А.М, Назаралиев Д.В, Мханна А.И.Н, Хамрокулов Ж.С, “ЭКСПЛУАТАЦИОННАЯ ГИДРОМЕТРИЯ” Учебное пособие Ташкент-2022.-165 стр.</p> <p>4. Akbarov A, Nazaraliyev D, Hikmatov F, “GIDROMETRIYA”- Toshkent, GMITI nashriyot bo’limi 2015.-129 bet.</p>

<b>Module designation</b>	<b>QM2103-Construction mechanics</b>
Semester(s) in which the module is taught	4
Person responsible for the module	<i>Abduvaliyev Abduqaxxor Abdulxaiyevich, DSc, Professor Sultanov Takhirjon Zakirovich, DSc, Professor Ishmatov Alisher Norqobilovich, PhD, associate professor Toshmatov Elyor Sobirovich, PhD, associate professor Yarashov Javlon Adamboyevich, PhD, associate professor B.Urinov, Senior Lecturer</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total load: 90 hours Auditorium Hours: - lecture - 20 hours; - practical lessons - 20 hours; - self-learning - 50 hours.</i>
Credit points	3
Required and recommended prerequisites for joining the module	<i>"Higher mathematics", "Physics", "Theoretical mechanics", "Material resistance".</i>

<p>Module objectives/intended learning outcomes</p>	<p><i>After mastering the discipline, the student will:</i></p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>Basic concepts and terms of construction mechanics, basic laws of natural sciences, basic approaches in modeling mechanical systems;</i></li> <li>- <i>About the availability of modern universal and specialized software systems for building and construction calculations;</i></li> <li>- <i>About the advantages and disadvantages of modern universal and specialized software systems used in the calculation of buildings and structures;</i></li> <li>- <i>About the main directions, current problems and priority issues of construction mechanics.</i></li> </ul> <p><b>be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>To understand the physical meaning of the calculation of structures and constructions and to be able to analyze them;</i></li> <li>- <i>Analysis of the results obtained from the calculation of construction structures, including the use of specialized software systems;</i></li> <li>- <i>To be able to correctly formulate issues related to construction mechanics, to determine effective methods and algorithms for solving them;</i></li> <li>- <i>To be able to correctly choose the methods for calculating the strength, uniformity and priority of construction structures and structures under external force, temperature and other influences;</i></li> <li>- <i>Ability to work with literature related to the field of construction mechanics in Uzbekistan and foreign printed and electronic sources.</i></li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>To know the methods of conducting kinematic analysis of calculation schemes of structures, determination of internal forces, stresses and displacements caused by various effects on elements of statically definite and statically indeterminate systems;</i></li> <li>- <i>Mastering the method of theoretical and experimental research in the field of construction mechanics;</i></li> <li>- <i>Ability to use modern research, laboratory equipment and devices;</i></li> <li>- <i>To know the methods for calculating the strength, integrity and priority of structures and constructions under external force, temperature and other influences, to have the ability to use universal and specialized software-algorithmic complexes and automated design systems;</i></li> </ul>
---	--

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p><i>Subject and tasks of science. A brief history of science. The place of construction mechanics among modern science and other technical sciences. Basic hypothesis and concepts accepted in science. The concept of calculation scheme. Creating a calculation scheme. Types of calculation scheme. Types of external forces and influences, their placement in the calculation scheme. Level of difficulty: 2.</i></p> <p><i>The concept of kinematic analysis and its purpose. Stages of kinematic analysis. Procedure for kinematic analysis. Basic concepts used in kinematic analysis. Determination of the degree of freedom of the structure. Level of difficulty: 2.</i></p> <p><i>Understanding of moving loads and action lines. Construction of action lines of base reaction forces and internal stresses (bending moment, transverse force) in simple beams. Determination of the actual values of base reaction forces and internal stresses (bending moment, transverse force) using action lines. Level of difficulty: 2.</i></p> <p><i>Conditions and kinematic analysis of the formation of multi-span static concrete hinged hammers. Analytical calculation of multi-span static concrete hinged beams. Calculation procedure of multi-span static concrete hinged hammers by the method of G. Semikolenov. Construction of bending moment and transverse force curves for multi-span static concrete articulated beams. Level of difficulty: 2.</i></p> <p><i>General concepts about farms. Classification of farms. Kinematic analysis of trusses. Advantages and scope of farms. Methods of calculation of static concrete trusses. Methods of determining farm zero sturgeons. Determination of stresses generated in truss elements under the influence of fixed load. Level of difficulty: 3.</i></p> <p><i>Migrations and their types. Universal formula for determining displacements (Mohr's formula). Special cases of the universal formula. Determining displacements by the graphical method (Vereshchagin's method). The limit of using the Vereshchagin method. Level of difficulty: 4.</i></p> <p><i>Static uncertain (uncertain) systems. their characteristics. Static uncertainty level. Calculation methods of static uncertain systems. The essence of the force method. The main system of the force method. Canonical equations. The general procedure for calculating static indeterminate frames by the force method. Level of difficulty: 5.</i></p>
<p>Exams and assessment formats</p>	<p>Two written midterms (60 minutes each) and a final oral exam (40 minutes).</p>
<p>Study and examination requirements</p>	<p><i>Excellent - Ability to think creatively. Being able to apply the acquired knowledge in practice. Explain the essence. Have an imagination. Ability to independently solve a given problem and observe. Independent judgment and decision-making.</i></p> <p><i>Good - Ability to apply acquired knowledge in practice. To be able to solve the given problem using an example and observe. To know, to tell. Have an imagination.</i></p> <p><i>Satisfactory - General answers to the questions asked. Explain the essence. To know, to tell, to imagine.</i></p> <p><i>Unsatisfied - Failure to answer the questions. Not having a clear vision.</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. A.A. Abduvaliev, <i>Qurilish mexikasi (Darslik)</i>, Toshkent, "Fan va texnika" nashriyoti, 2022, 584 bet.</li> <li>2. Н.Н.Шапошников, Р.Н.Кристалинский, А.В.Дарков, <i>Строительная механика</i>, Издательства «Лань», 2018, 692 стр.</li> <li>3. Jerome J. Connor, Susan Farage. <i>Fundamentals of Structural Engineering. Second Edition. Springer International Publishing Switzerland</i> 2013, 2016</li> <li>4. Nilson AH. <i>Design of concrete structures. 14th ed. New York: McGraw Hill; 2013.</i></li> </ol>

<b>Module designation</b>	<b>GME 2205-Hydrometry</b>
<i>Semester(s) in which the module is taught</i>	4
<i>Person responsible for the module</i>	Gapparov Furkat Akhmatovich, DSc, Professor Mansurov Safar Rakhmankulovich PhD, senior lecturer Nazaraliyev Dilshod Validjanovich, PhD, Professor Kodirov Sobirjon Mamadiyarovich, senior lecturer
<i>Language</i>	Uzbek, Russian
<i>Relation to curriculum</i>	Elective
<i>Teaching methods</i>	Lecture, practical lesson, lab works
<i>Workload (incl. contact hours, self-study hours)</i>	Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 20 hours; - lab works -10hours - self-learning - 90 hours.
<i>Credit points</i>	5
<i>Required and recommended prerequisites for joining the module</i>	“Higher mathematics”, “Physics”, “Chemistr” “Engineering geodesy”, “Theoretical mechanics”, “Hydraulics”, “Hydrology”, “Hydrometry”.



<p><i>Module objectives/intended learning outcomes</i></p>	<p><i>After mastering the discipline, the student will:</i></p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>-accounting for water reserves in irrigation sources</li> <li>-correct distribution of water to consumers</li> <li>-measurement and management of water consumption in canals</li> <li>-correct technical use of devices</li> <li>-waste of water in canals and collecting system and to have an idea about the analysis</li> <li>- initial hydrometric data to determine the work coefficient</li> <li>-regulations of river flow formation, hydrological research methods</li> <li>-water reservoirs, their distribution and balance</li> <li>-natural and chemical properties of terrestrial waters</li> <li>- river basin and network</li> <li>-formation of river basin and network</li> <li>-river basin and network knowledge of influencing factors</li> <li>- sources and flow of saturation and hydrological regimes;</li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- tools and types of water meters,</li> <li>-the main requirements for water meters,</li> <li>-the choice of water meters,</li> <li>-their modern constructions and the theoretical basis of calculation in their use, and the ability to use them;</li> <li>-to determine and analyze the data on the form and size parameters of rivers</li> <li>-the factors influencing the formation of river flow volume</li> <li>-the methods of expressing the river flow</li> <li>-the classification of river saturation from the climatic point of view and according to the sources of saturation</li> <li>-to acquire the skills of types, equipment, structure of water gauging stations</li> <li>-water level observations</li> <li>-water flow rate measurement</li> <li>- water and turbidity discharge and volume determination</li> <li>- current and modern hydrometric tools</li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- assessment of the hydrological condition of the territory</li> <li>- solving various hydrological and water management issues</li> <li>- determining the amount of water sources</li> <li>- Analysis and evaluation.</li> </ul>
--	--

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p>Basics of hydrometry. Types of hydrometry. Role and importance of science in the hydrological system. Hydrometeorological network. Classification of hydrometeorological network. Basic conditions for the organization and placement of a network of hydrometeorological stations and posts. Hydrometric research methods. Hydrometric monitoring network. Principles of organization of water measuring stations. Choosing a place for the construction of water measuring stations and the work to be there. Water metering stations. Types of water metering stations and their structure. Level of difficulty: 2</p> <p>Hydrological regime. Water regime of rivers and canals. Water regime periods. Water regime elements Water level. Processing of water level monitoring materials. Instruments and devices that monitor and measure the water level. Instruments and devices to increase the accuracy of monitoring the water level. Safety measures when performing hydrometric work. Depth measurement work. Concept of water depth. Depth measurement tools and methods. Simple and mechanical tools. Ultrasonic tools. Processing of depth measurement data. Level of difficulty: 3</p> <p>Water flow rate and consumption. Fundamentals of hydrometric measurement of water flow rate. General information about water movement. Turbulent and laminar flows. Distribution of water flow rate. Velocity graph. Vertical speed distribution. Methods of measuring water flow rate. Level of difficulty: 4</p> <p>Water consumption. General conditions for determining water consumption. Features of consumption model <math>v</math> au. Classification of methods for determining water consumption. Calculation of water consumption. Determination of water consumption according to live cross-sectional area and average flow rate using empirical expressions. Determination of water consumption using hydrometric rods or drops. Consumption (flow) meters. Measurement of water flow using the ultrasonic measurement method. Level of difficulty:: 5</p> <p>Water consumption curve. Basic concepts. Determining the relationship between water consumption and water level and calculating water flow. Draw a water consumption curve. Calculation of water flow. Level of difficulty: 4</p> <p>Study of stream discharges and sediments. An overview of solid water runoff. Sediments and their movement in currents. The main characteristics of solid water flow. Suspended sediment discharges. Tools for taking samples of suspended sediment water. Calculation of suspended sediment flow consumption. Riverbed bottom sediments. Calculating flow rate of river bottom sediments. Level of difficulty: 3</p>
<p>Exams and assessment formats</p>	<p>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</p>
<p>Study and examination requirements</p>	<p>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</p>

<i>Reading list</i>	<ol style="list-style-type: none"><li>1. Tim Davie. <i>Fundamentals Hydrology</i>. London and New York 2008. 289 peg.</li><li>2. Nazaraliev D.V, Akmalov Sh.B “QURUQLIKGIDROLOGIYASI” fanidan o’quv qo’llanma Toshkent-2019.-112 bet.</li><li>3. Фатхуллоев А.М, Назаралиев Д.В, Мханна А.И.Н, Хамрокулов Ж.С, “ЭКСПЛУАТАЦИОННАЯ ГИДРОМЕТРИЯ” Учебное пособие Ташкент-2022.-165 стр.</li><li>4. Akbarov A, Nazaraliyev D, Hikmatov F, “GIDROMETRIYA”- Toshkent, GMITI nashriyot bo’limi 2015.-129 bet.</li></ol>
---------------------	--

<b>Module designation</b>	<b>MG 2105 Ameliorativ hydrogeology. Drilling work</b>
Semester(s) in which the module is taught	4
Person responsible for the module	<i>Ph.D., Associate Professor PhD Satbay Nurjanov Ph.D. associate Professor PhD Ilkhom Ruziev Ph.D. associate Okhunov Farrukh Assistant Abdullaev Bakhrom Assistant Shavkat Nortaev Assistant Yakhshiyev Shakhzot Assistant Bakhronova Zulkhumor</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning – 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>Physics, Chemistry, Hydrology</i>

<p>Module objectives/intended learning outcomes</p>	<p><i>After mastering the discipline, the student will:</i></p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>to analyze the hydrogeological conditions of the irrigated areas;</i></li> <li>- <i>to calculate the regime and balance of seepage waters;</i></li> <li>- <i>assessment of geological and hydrogeological conditions of land, underground water flows, their prediction;</i></li> <li>- <i>making hydrogeological maps;</i></li> <li>- <i>drilling techniques and technologies, drilling equipment, drilling methods used in geological and hydrogeological research/</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>use in hydrogeological-ameliorative maps;</i></li> <li>- <i>knowledge of negative processes and events that occur during the implementation of meliorative measures, and their prediction; - to prevent possible negative processes; assessment of hydrogeological improvement conditions of irrigated lands, results of geological and hydrogeological maps and studies;</i></li> <li>- <i>hydrogeological indicators of underground water flows and aquifers and their use in solving reclamation issues;</i></li> <li>- <i>negative events and processes related to the implementation of melioration and water supply measures,</i></li> <li>- <i>basic physical and physical-mechanical parameters of soils, equipment of wells;</i></li> <li>- <i>opening of aquifers, aquifers, well construction, filters, preparation of filters, calculation of basic parameters/</i></li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>specific aspects of geological and hydrogeological conditions;</i></li> <li>- <i>drilling methods, several methods of groundwater flow estimation;</i></li> <li>- <i>prediction of changes in hydrogeological conditions,</i></li> <li>- <i>geological and hydrogeological maps and research results, hydrogeological dimensions of aquifers and underground water flows;</i></li> <li>- <i>methods of establishing the water balance of the region, hydrogeological data of observations, conducting hydrogeological and engineering, geological researches;</i></li> <li>- <i>able to clearly state their opinions and conclusions regarding the analysis of research results and their use;</i></li> <li>- <i>assessment of hydrogeological-ameliorative conditions;</i></li> </ul>
---	--

Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

*Tasks and content of reclamation hydrogeology in the reclamation of agricultural lands, urban and industrial areas. General information about irrigation and drainage. Elements of hydromelioration systems. Irrigation methods and water injection technology. Tasks of studying the hydrogeological-ameliorative conditions. Factors of hydrogeological-ameliorative conditions Level of difficulty: 2*

*- General concepts and definition of hydrogeological process stages. Development laws of hydrogeological processes and their analysis in land reclamation. Factors determining hydrogeological processes (climate, relief, geomorphological, geological factors) and their description. Hydrogeological regions and their hydrodynamic description, regions of feeding and transit, consumption, re-reduction and spread of streams Level of difficulty: 2*

*- Mode types. Natural and disturbed modes. Syzot water regime genetic types. Characteristics of seepage water regime distributed in different natural regions and irrigation areas. Regime of mineralization and chemical composition of Sizot waters. Principles of management of the regime of seepage waters. Water balance in land under reclamation. Balance types. Total water balance, aeration zone balance, seepage water balance. Balance components. Studying the balance and researching the balance plots. Analysis of the balance sheet Level of difficulty: 2*

*- Factors of formation of irrigation nutrition during irrigation and salt washing. Specificity of irrigation nutrition in different climatic regions. Basing irrigation nutrition on the basis of modeling moisture transport in the aeration zone. Damping of seepage water in newly irrigated lands Level of difficulty: 3*

*- Hydrodynamic indicators and boundary conditions necessary for land reclamation assessment, forecasting, and the design of reclamation structures. Hydrodynamic indicators - definition of their concepts. Methods of determining hydrodynamic parameters. Division into hydrogeological - reclamation districts. Definition of concepts; division into regional and local districts, taking into account the specificity of the hydrogeological process in the arid climate region and the distribution of stormwater in the regions. Geofiltration schemes of reclamation lands, general concepts about filtration schemes, a brief history of the issue. Geofiltration sections Level of difficulty: 3*

*The role and importance of boreholes in irrigation and water supply systems. Concepts of drilling wells and their main elements. A brief history of drilling techniques and technology in Uzbekistan and abroad. Development of drilling science. The connection of this science with other sciences. Basic requirements for a drilling well. Types of rocks by drilling, sedimentary, igneous, metamorphic rocks and their properties. Types of damage to rocks during drilling Level of difficulty: 4*

*The main factors determining the design of the borehole. The elements of the construction of the borehole: wellhead, conductor, diverter, technical, operational and strainer pipelines. Justification of the choice of water-absorbing operational layer. Basic information on the hydrogeological calculation of the Burgi well. Determination of borehole indicators based on experimental water withdrawal results. Taking into account the interaction of drill wells Level of difficulty: 4*

*- Strainers of boreholes. The main elements of strainer strings. Reasons for strainer failure. Perforated filters for catching small particles: perforated, various, wire, gravel, etc. Filter selection and their calculation. Structure of salniks. Strainer wells. Conditions of use, specific features of the device. Perforated filters for catching small particles: perforated, various, wire, gravel, etc. Filter selection and their calculation. Structure of salniks. Strainer wells. Conditions of use, specific features of the device: Level of difficulty: 2.*

Exams and assessment formats	One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).
Study and examination requirements	Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass
Reading list	<ol style="list-style-type: none"> <li>1. <u>F.G.Bell – Engineering Geology 2<sup>nd</sup> edition, 2007-398 peg</u></li> <li>2. Yusupov G.U., Quvvatov D.A. «Meliorativ gidrogeologiya». O`quv qo`llanma. Toshkent. TIMI-2008-200 bet.</li> <li>3. Yusupov G.U. «Meliorativ gidrogeologiya» fanidan ma`ruzalar kursi. Toshkent, TIMI-2007-189 bet.</li> <li>4. Ruziyev I.M., Nurjanov S.E., Gapparov F.A. "Injenerlik geologiyasi va gidrogeologiyasi" fanidan o`quv qullanma Toshkent-2021- 256 bet.</li> <li>5. Рузиев И.М., Нуржанов С.Е., "Инженерная геология и гидрогеология"учебник ташкент Ташкент-2022.-220 стр.</li> </ol>

<b>Module designation</b>	<b>SS2101-Soil Science</b>
Semester(s) in which the module is taught	4
Person responsible for the module	<i>Egamberdiev Ramish Rabbimovich. Candidate of Agricultural Sciences, Associate Professor. Khakberdiev Obid Eshniyozovich. Candidate of Biological Sciences, Associate Professor.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Internship</i>
Teaching methods	<i>Field practice</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload:30</i>
Credit points	1
Required and recommended prerequisites for joining the module	<i>General chemistry, higher mathematics, physics</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <ul style="list-style-type: none"> <li>- <i>The goal of the educational practice is to acquaint future specialists with the soil, its structure, properties and methods of management, which is the main means of agricultural production, to acquaint them with agrotechnical processes used in growing products from plants in the cotton complex in field conditions.</i></li> <li>- <i>During the internship, students get acquainted with the following types of work under the guidance of the internship leader and participate in some of them:</i> <ul style="list-style-type: none"> <li>- <i>Acquaintance with specific characteristics of certain soil types and soils distributed in the farm territory;</i></li> <li>- <i>The procedure for placing crops grown on the farm in the fields and organization of production;</i></li> <li>- <i>Acquaintance with the method of crop rotation used in the farm area and drawing up a rotation table;</i></li> <li>- <i>Applied agrotechnological processes: familiarization with feeding, inter-row processing procedures;</i></li> <li>- <i>Determination of seedling thickness in the field where agricultural crops are grown;</i></li> <li>- <i>Acquaintance with modern irrigation (drip, sprinkler, etc.) methods and techniques in experimental fields;</i></li> <li>- <i>Study of types of weeds in the field and determination of weed infestation by the method of A.I. Maltsev.</i></li> </ul> </li> </ul>



<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<ul style="list-style-type: none"> <li>- Knowledge of the biological, physical and chemical processes that occur in the formation of soils, the structure and mechanical composition of the soil, its general physical and physical-mechanical properties;</li> <li>- Study of soil organic part, fertility;</li> <li>- Soils distributed in the Republic, knowledge of their classification;</li> <li>- To know the content of activities aimed at restoring the fertility of saline soils;</li> <li>- To have an idea about the creation of soil maps and cartograms, their quality, value assessment;</li> <li>- Knowledge of living conditions of plants;</li> <li>- Farming systems and their components;</li> <li>- Importance of crop rotation in increasing soil fertility, schemes;</li> <li>- Organic and mineral fertilizers, their type, application period, rate;</li> <li>- Composition, classification of weeds spread on cultivated land and measures to combat them;</li> <li>- Methods and periods of tillage;</li> <li>- To know and be able to use irrigation methods, periods, and standards of plants grown on irrigated land;</li> <li>- Must have skills related to biology and agrotechnics of the main plants grown in Uzbekistan.</li> </ul>
<p>Exams and assessment formats</p>	<p>Preparing a report on the result of the operation and making a report</p>
<p>Study and examination requirements</p>	<p>Students must have a final grade of 60% or higher to pass</p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. O.E.Khakberdiev, R.R.Egamberdiev, J.U.Khaitbaeva "Asas of Soil Science and Plant Science" Tashkent 2022.</li> <li>2. O.Ramazanov, S.Bouriev "Melioration soil science" Tashkent 2019.</li> <li>3. Sh.Kholikulov, P.Farov, I. Bobokhojaev "Soil Science" Tashkent 2011.</li> <li>4. Ramazanoa A., Bouriev S. "Soil Science and farming" - harmonious Faiz media, T. 2018.</li> <li>5. Egamberdiev R.R. Educational guide" fundamentals of Crop Science " Tashkent 2022.</li> <li>6. O.E.Khakberdiev, Dadakhojaev A. Educational guide "soil science" Tashkent 2023.</li> </ol>

<b>Module designation</b>	<b>Hydrogeology (Intership)</b>
Semester(s) in which the module is taught	<i>4 semesters (1 week)</i>
Person responsible for the module	<i>Ph.D., Associate Professor PhD Satbay Nurjanov Ph.D. associate Professor PhD Ilkhom Ruziev Ph.D. associate Okhunov Farrukh Assistant Abdullaev Bakhrom Assistant Shavkat Nortaeв Assistant Yakhshiyev Shakhzot Assistant Bakhronova Zulkhumor</i>
Language	<i>Uzbek, russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>field practice</i>
Workload (incl. contact hours, self-study hours)	<i>Workload:60</i>
Credit points	<i>2</i>
Required and recommended prerequisites for joining the module	<i>«Physics», «Engineering Geodesy», «Chemistry», «Geology and Hydrogeology», «Higher Mathematics», «Engineering and Computer Graphics», «Hydrology»</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> <li>- <i>Formation of necessary practical skills for the training of qualified specialists in the field of "Water management and land reclamation".</i></li> <li>- <i>Consolidation of theoretical knowledge on "Hydrogeology".</i></li> <li>- <i>study of methods of hydrogeological measurement in field conditions.</i></li> <li>- <i>Mode tracking log and graphs. gain experience in performing the main types.</i></li> <li>- <i>Drilling wells, ditches, natural and artificial openings, Description and explanatory notes.</i></li> <li>- <i>Symbols used in maps, clippings and other drawing applications</i></li> <li>- <i>learning to process and analyze the obtained results.</i></li> <li>- <i>drawing up a practical report based on the research work carried out and carried out in the field.</i></li> </ul>
Content: The discipline includes. The level of difficulty: (1 – low, 5 high):	<p><i>Students - study of geomorphological conditions. The goal of geomorphological research and observations is to acquire the skills to distinguish the shapes and sizes of the reliefs that have been formed as a result of various processes in natural conditions. Therefore, when writing the relief forms of the river valley, studying the ravines or slopes, the following should be indicated. Level of difficulty: 2</i></p> <p><i>To provide students with theoretical knowledge, practical skills to study geological and engineering-geological processes and phenomena. Level of difficulty: 3</i></p> <p><i>Geological and engineering-geological events and processes occurring in the territory during the field work are recorded in the field diary in the following order. Level of difficulty: 4</i></p> <p><i>The place where every process and event is observed is shown on the map, its magnitude is measured, the rocks where the event is occurring are described, the consumption of groundwater is measured, the uniqueness of the events is emphasized, the main factors causing the events the reasons are determined, illuminated and, if possible, their speed is taken and a conditional image is formed. Level of difficulty: 4</i></p>

Exams and assessment formats	<p><i>The report and its drawing applications are created with the team of the group. Each member of the group writes a separate chapter of the report, draws drawings and participates in the creation of applications.</i></p> <p><i>The finished report, drawing and attachments are reviewed and discussed together with the group members, each group member signs the report, and then submits it to the head of practice for verification.</i></p> <p><i>The defense of the report by group is carried out before the members of the committee. Each member of the group, according to the instructions of the jury members, will give a speech about some parts of the report, and will answer questions about the whole report. The student is evaluated according to the results of the defense and the quality of the report.</i></p>
Study and examination requirements	<p><i>A student must score at least 60% out of 100% of the total allocated marks to successfully pass the internship</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. <i>F.G.Bell – Engineering Geology 2<sup>nd</sup> edition, 2007-398 peg</i></li> <li>2. <i>Yusupov G.U., Quvvatov D.A. «Meliorativ gidrogeologiya». O`quv qo`llanma. Toshkent. TIMI-2008-200 bet.</i></li> <li>3. <i>Yusupov G.U. «Meliorativ gidrogeologiya» fanidan ma`ruzalar kursi. Toshkent. TIMI-2007-189 bet.</i></li> <li>4. <i>Ruziyev I.M., Nurjanov S.E., Gapparov F.A. “Injenerlik geologiyasi va gidrogeologiyasi” fanidan o`quv qullanma Toshkent. -2021- 256 bet.</i></li> <li>5. <i>Рузиев И.М., Нуржанов С.Е., “Инженерная геология и гидрогеология” Учебник. Ташкент. -2022.-227.</i></li> </ol>

Module designation	<i>Hydrometrics (internship)</i>
Semester(s) in which the module is taught	<i>4 semester (1 week)</i>
Person responsible for the module	<i>Gapparov Furkat Akhmatovich, DSc, Professor Mansurov Safar Rakhmankulovich PhD, senior lecturer Nazaraliyev Dilshod Validjanovich, PhD, Professor Kodirov Sobirjon Mamadiyarovich, senior lecturer</i>
Language	<i>Uzbek and russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lab works, field trip</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:30</i>
Credit points	<i>1 credits</i>
Required and recommended prerequisites for joining the module	<i>«Physics», «Engineering Geodesy», «Chemistry», «Hydrology and hydrogeology», «Algebra», «Computer graphics and engineering», «Hydrometrics»</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <ul style="list-style-type: none"> <li><i>- Formation of necessary practical skills for training qualified specialists in the field of "water management and land reclamation".</i></li> <li><i>- Consolidation of theoretical knowledge on "Hygrometry".</i></li> <li><i>- Study of methods of hydrometric measurement in field conditions.</i></li> <li><i>- gaining experience in performing the main types of hydrometric and meteorological work.</i></li> <li><i>-To have the ability to use hydrometric and meteorological technical equipment.</i></li> <li><i>- Organization of hydrological observations.</i></li> <li><i>- learning to process and analyse the obtained results.</i></li> <li><i>- drawing up a practical report based on the research work carried out and carried out in the field.</i></li> </ul>
Content: The discipline includes. The <i>level of difficulty</i> : (1 – low, 5 high):	<p><i>Students must understand the methodology and technology of measuring the main parameters of water resources, the geographical location and condition of water resources on the planet Earth, the assessment and analysis of the factors affecting them, and the ability to apply them in practice. Level of difficulty: 2</i></p> <p><i>To provide students with theoretical knowledge, practical skills, necessary knowledge on terrestrial water sources, proper accounting and efficient use of water resources, study (observation) of the distribution of water on our planet, and analysis of measurement materials. Level of difficulty: 2</i></p> <p><i>Water flow rate and consumption. Fundamentals of hydrometric measurement of water flow rate. General information about water movement. Turbulent and laminar flows. Distribution of water flow rate. Velocity graph. Vertical speed distribution. Methods of measuring water flow rate. Level of difficulty: 3</i></p> <p><i>Water consumption curve. Basic concepts. Determining the relationship between water consumption and water level and calculating water flow. Draw a water consumption curve. Calculation of water flow. Level of difficulty: 4</i></p> <p><i>To master, as well as to have ideas about them, the elements of the hydrological regime of water sources, a methodical approach to events and processes, and the formation of a scientific outlook. Level of difficulty: 4</i></p>

Exams and assessment formats	<p><i>The report and its drawing applications created with the group team. Each member of the group writes a separate chapter of the report and participates in drawing applications.</i></p> <p><i>The completed report and drawing applications reviewed and discussed together with the group members; each group member signs the report, and then submits it to the head of practice for verification.</i></p> <p><i>The group defence of the report carried out in front of the members of the committee. Each member of the group will give a report on some parts of the report according to the instructions of the committee, and will answer questions about the whole report. The student evaluated according to the results of the defence and the quality of the report.</i></p>
Study and examination requirements	<p><i>A student must score at least 60% out of 100% of the total allocated marks as successfully pass the internship.</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. Tim Davie. <i>Fundamentals Hydrology</i>. London and New York 2008. 289 peg.</li> <li>2. Nazaraliev D.V, Akmalov Sh.B “<i>QURUQLIKGIDROLOGIYASI</i>” fanidan o’quv qo’llanma Toshkent-2019.-112 bet.</li> <li>3. Фатхуллоев А.М, Назаралиев Д.В, Мханна А.И., Хамрокулов Ж.С., “<i>ЭКСПЛУАТАЦИОННАЯ ГИДРОМЕТРИЯ</i>” Учебное пособие. Ташкент. - 2022.-165 стр.</li> <li>4. Akbarov A, Nazaraliyev D, Hikmatov F, “<i>GIDROMETRIYA</i>”- Toshkent, GMITI nashriyot bo’limi 2015.-129 bet.</li> </ol>

Module designation	<i>Hydrogeology (Intership)</i>
Semester(s) in which the module is taught	<i>4 semesters (1 week)</i>
Person responsible for the module	<i>Ph.D., Associate Professor PhD Satbay Nurjanov Ph.D. associate Professor PhD Ilkhom Ruziev Ph.D. associate Okhunov Farrukh Assistant Abdullaev Bakhrom Assistant Shavkat Nortaev Assistant Yakhshiyev Shakhzot Assistant Bakhronova Zulkhumor</i>
Language	<i>Uzbek, russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>field practice</i>
Workload (incl. contact hours, self-study hours)	<i>Workload:60</i>
Credit points	<i>2</i>
Required and recommended prerequisites for joining the module	<i>Physics, Engineering Geodesy, Chemistry, Geology and Hydrogeology, Higher Mathematics, Engineering and Computer Graphics, Hydrology</i>
Module objectives/intended learning outcomes	<ul style="list-style-type: none"> <li>- <i>Formation of necessary practical skills for the training of qualified specialists in the field of "Water management and land reclamation".</i></li> <li>- <i>Consolidation of theoretical knowledge on "Hydrogeology".</i></li> <li>- <i>study of methods of hydrogeological measurement in field conditions.</i></li> <li>- <i>Mode tracking log and graphs. gain experience in performing the main types.</i></li> <li>- <i>Drilling wells, ditches, natural and artificial openings, Description and explanatory notes.</i></li> <li>- <i>Symbols used in maps, clippings and other drawing applications</i></li> <li>- <i>learning to process and analyze the obtained results.</i></li> <li>- <i>drawing up a practical report based on the research work carried out and carried out in the field.</i></li> </ul>
Content: The discipline includes. The level of difficulty: (1 – low, 5 high):	<p><i>Students - study of geomorphological conditions. The goal of geomorphological research and observations is to acquire the skills to distinguish the shapes and sizes of the reliefs that have been formed as a result of various processes in natural conditions. Therefore, when writing the relief forms of the river valley, studying the ravines or slopes, the following should be indicated. Level of difficulty: 2</i></p> <p><i>To provide students with theoretical knowledge, practical skills to study geological and engineering-geological processes and phenomena. Level of difficulty: 3</i></p> <p><i>Geological and engineering-geological events and processes occurring in the territory during the field work are recorded in the field diary in the following order. Level of difficulty: 4</i></p> <p><i>The place where every process and event is observed is shown on the map, its magnitude is measured, the rocks where the event is occurring are described, the consumption of groundwater is measured, the uniqueness of the events is emphasized, the main factors causing the events the reasons are determined, illuminated and, if possible, their speed is taken and a conditional image is formed. Level of difficulty: 4</i></p>

Exams and assessment formats	<p><i>The report and its drawing applications are created with the team of the group. Each member of the group writes a separate chapter of the report, draws drawings and participates in the creation of applications.</i></p> <p><i>The finished report, drawing and attachments are reviewed and discussed together with the group members, each group member signs the report, and then submits it to the head of practice for verification.</i></p> <p><i>The defense of the report by group is carried out before the members of the committee. Each member of the group, according to the instructions of the jury members, will give a speech about some parts of the report, and will answer questions about the whole report. The student is evaluated according to the results of the defense and the quality of the report.</i></p>
Study and examination requirements	<p><i>A student must score at least 60% out of 100% of the total allocated marks to successfully pass the internship</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. F.G.Bell – Engineering Geology 2<sup>nd</sup> edition, 2007-398 peg</li> <li>2. Yusupov G.U., Quvvatov D.A. «Meliorativ gidrogeologiya». O`quv qo`llanma. Toshkent. TIMI-2008-200 bet.</li> <li>3. Yusupov G.U. «Meliorativ gidrogeologiya» fanidan ma`ruzalar kursi. Toshkent, TIMI-2007-189 bet.</li> <li>4. Ruziyev I.M., Nurjanov S.E., Gapparov F.A. “Injenerlik geologiyasi va gidrogeologiyasi” fanidan o`quv qullanma Toshkent-2021- 256 bet.</li> <li>5. Рузиев И.М., Нуржанов С.Е., “Инженерная геология и гидрогеология”учебник ташкент Ташкент-2022.-22</li> </ol>

**5-semester**

<b>Module designation</b>	<b>IK3104-Engineering structures</b>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Muslimov To'rovoy Senior Lecturer MalleM Nuriddin doctor of technical sciences, assistant professor Vafoeva Ozoda Safoevna, doctor of philosophy of technical sciences</i>
Language	<i>Uzbek, russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 120 hours. Contact hours: 60 hours: - lecture – 20 hours; - practical lessons – 40 hours; - self-learning - 60 hours.</i>
Credit points	4
Required and recommended prerequisites for joining the module	<i>«Construction materials», «Soil mechanics», «Soil and foundations», «Theoretical mechanics», «Resistance of materials», «Construction mechanics».</i>



<p>Module objectives/intended learning outcomes</p>	<p>After mastering the discipline, the student will:</p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- calculation methods of engineering constructions; basic requirements for engineering constructions;</li> <li>- rational use of current regulatory documents in the design, construction and use of engineering structures;</li> <li>- various engineering constructions and their fields of application;</li> <li>- physical-mechanical properties of the main materials used in the construction of engineering constructions and their stress states under the influence of external loads of structural elements.</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- to be able to choose the right materials for the construction of engineering structures; methods of connecting construction elements;</li> <li>- design and calculation of metal, wood, reinforced concrete and other constructions;</li> <li>- analysis of constructions of buildings and structures and determination of their optimal solutions;</li> <li>- determination of technical and economic indicators of constructions.</li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- formation of the ability to construct water management buildings and structures;</li> <li>- application of progressive design methods in the design of water management buildings and structures and improvement of their constructive solutions;</li> <li>- use of modern construction materials in the construction and reconstruction of water management buildings and facilities;</li> <li>- application of innovative structural solutions in the construction of water management buildings and facilities;</li> <li>- use of cost-effective structural solutions in the construction of water management buildings and structures;</li> <li>- practical application of scientific and technical achievements in the design of water management buildings and structures;</li> <li>- EXM programs in the construction of modern water management buildings and facilities.</li> </ul>
---	---

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Engineering structures and the main materials used in their construction. Girder and beam construction. Types of steel columns and their constructions. Types, construction and basis of calculation of steel trusses. General information about reinforced concrete structures. Difficulty level: 2.</i></p> <p><i>Calculation of metal structural elements. Loads affecting structures and their types. Methods of attaching metal structural elements. Welding. Types, construction and basis of calculation of steel trusses. General information about construction timber. Their physical and mechanical properties. Difficulty level: 3.</i></p> <p><i>Water barriers (barriers) of hydraulic engineering structures. Types of steel columns and their constructions. General information about water barriers, constructions and basis of calculation. Fundamentals of the theory of tension of reinforced concrete elements and the basis of their calculation. General information about reinforced concrete frame buildings and structures. One-story frame buildings. Difficulty level: 4.</i></p> <p><i>Construction of reinforced concrete elements working in bending and calculation of their strength Construction of reinforced concrete elements working in compression and calculation of their strength. Construction of tensile reinforced concrete elements and calculation of their strength. Level of difficulty: 5.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. Bakiyev M., Muslimov T. "Engineering constructions", T. 2013, 215 pages.</li> <li>2. Saydullaev Q. Shukurova K. Metal constructions. T. "Science and technology", 2010, 270 pages.</li> <li>3. Vafoyev ST, Vafoyeva OS "Engineering constructions" Training manual for the department of metal constructions Tashkent 2018</li> <li>4. V.S. Fyodorov, Ya.I. Shvidko, V.E. Levitsky "Stroitelnye konstruktsii" uchebnik Moscow 2018g</li> <li>5. NAWY "Concrete Construction Engineering" Handbook Two Volume Set, 2016</li> <li>6. Muslimov TJ, Methodical instructions for completing course projects in the subject "Engineering constructions", T. 2018.</li> </ol>

<b>Name of the module/subject and code</b>	<b>CRM 3105-Construction and reclamation machinery</b>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Babajanov Lazizbek Qabilovich-Doctor of Philosophy in Technical Sciences, PhD, Associate Professor; Usmanov Nail Kayumovich - candidate of technical sciences, associate professor</i>
language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours Contact hours: 60 hours: Lecture - 20 hours; Practical lessons - 40 hours Self-learning- 90 hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Hydraulics“, “Engineering structures“</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>Know and understanding:</b></p> <ul style="list-style-type: none"> <li>- tasks and classes of reclamation and construction machines used in water management,</li> <li>- earth-moving machines, their constructions, working processes, canal digger and canal cleaning machines - their classes, structure and working processes, application, their technical indicators,</li> <li>- about closed horizontal drainage construction machines, structure and working processes, technical indicators</li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- structure of reclamation and construction machines,</li> <li>-working and walking equipment of land reclamation and construction machines, fields of application in production processes of land reclamation and construction machines,</li> <li>- calculation of productivity of land reclamation and construction machines and methods of increasing it,</li> <li>- the achievements of modern techniques used in the construction and operation of irrigation networks,</li> <li>- methods of determining, evaluating and forming conclusions on the work quality indicators of land reclamation and construction machines, increasing production efficiency;</li> </ul> <p><b>form of competences in:</b></p> <ul style="list-style-type: none"> <li>- accurate knowledge and analysis of the structure and operation of reclamation and construction machines,</li> <li>- to determine the operation of machine parts and the methods of use by comparing the development directions of modern machines with the optimal ones;</li> <li>- determination of indicators of reclamation and construction machines</li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p>Reclamation and construction machinery used in the field of irrigation and reclamation. They understand about the machine, mechanism, assembly units, the main structural elements of the machine. The main indicators of the car. Work productivity. Power plants and equipment of machines. Basic elements of transport. Tractors and cars. - Wheeled tractors, trailers. -The main types of pneumatic tractors and their classification. Difficulty level: 2.</p> <p>Types of land works. General information about working equipment and their interaction with the soil. Single-bucket and multi-bucket excavators. Bulldozers. Scrapers. Graders. Classification of earth moving machines. -Work processes, applications. Difficulty level: 3.</p> <p>Salt grinding and sorting machines. Constructions. Classification. Work together basics. Work productivity. Breakdowns of sorters. Classification. Constructions. Basics of cooperation. Basic information about washing machines. Mobile crushing and screening equipment. Work equipment. Concrete and mixing machines. Difficulty level: 3.</p> <p>Reclamation machines. Machines for digging irrigation and drainage canals. Classification, duties, principles of work. Machines for the installation of anti-skid linings in water channels. Types of sewer cleaning machines and classification of machines. Difficulty level: 2.</p> <p>Hydromechanization instruments. Anti-fog shells. Closed horizontal drainage machines. Prospects of construction of closed horizontal drainage in the conditions of Uzbekistan. Drainage pipe servicing and repair machinery. Agricultural irrigation machines and equipment. Innovative technologies used in irrigation systems. Difficulty level: 4</p>
<p>Exams and assessment format</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and exam requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. Vafoyev S.T. <i>Qurilish mashinalari.</i>-T. (Darslik), TIMI nashriyoti, 2014. 316 b.</li> <li>2. Vafoyev S.T. <i>Meliorativ mashinalar.</i>-T. (Darslik), “Fan va texnologiya”, 2013. 299 b.</li> <li>3. S.T.Vafoyev. <i>Melioratsiya va qurilish mashinalari. T., Fan va texnologiyalar</i>, 2014. 495 b.</li> <li>4. Усманов Н.К., Худаев И.Д. <i>Мелиоративные строительные машины. Учебник. Типография НИУ "ТИИИМСХ". 2023. -270 с.</i></li> <li>5. В.Балабанов, А.Ли, Н.Мартынова, И.Худаев, Х.Абдулмаджидов, О.Куйчиев. <i>Теория и методика расчета параметров строительных и мелиоративных машин. Т. Типография ТИИМСХ. 2020. -172 с.</i></li> <li>6. <i>Drainage Principles and Applications. H.P. Ritzema (Editor-in-Chief). Netherlands, 2011. pp. 1107.</i></li> </ol>

<b>Module designation</b>	<b>GI3105-Hyrotechnical constructions</b>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Kadirova Muqaddas Gauhar Abdurakhmanovna candidate of technical sciences associate professor Azat Bayrambaevich Halimbetov, PhD, associate professor</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 40 hours; - practical lessons – 20 hours; - self-learning – 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Construction materials”, “Soil mechanics”, “Soils and foundations”, “Hydrometry”, “Engineering geodesy”, “Engineering geology”, “Hydrogeology”, “Hydrology”, “Hydraulics”, “Construction mechanics”, “Engineering construction”.</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- to know the basics of designing all types of hydrotechnical structures;</li> <li>- knowledge of the development history of water management construction in Uzbekistan and the world;</li> <li>- correct understanding of the issues faced by experts during the operation, construction, design and research of hydrotechnical structures;</li> <li>- knowledge of hydrotechnical structures, their working conditions;</li> <li>- should know about control and measuring equipment (NO'A) to control and monitor the operation and condition of hydrotechnical facilities</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- knowledge of the main directions of scientific and technical development in the field of hydrotechnical structures;</li> <li>- to be able to choose the optimal option in the design and construction of hydrotechnical structures, water reservoirs;</li> <li>- there should be an assessment of the methods of designing and building hydrotechnical structures, water reservoirs.</li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- the design stages of hydrotechnical structures and the level of foundation depth of hydrotechnical structures constructed at each stage;</li> <li>- modern methods of filtration calculations, calculation of strength and stability of structures, calculation of water carrying capacity, prediction of riverbed connection, deformation of the riverbed and washing of hydrotechnical structures in the lower basin;</li> </ul>

Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

*Water management and its branches. A brief history of the construction of hydraulic structures. Hydraulic facilities and their classification. Classes of hydraulic structures. Features and working conditions of hydraulic facilities.*

*Level of difficulty: 2*

*Water treatment facilities in the canal. Classification of canal water treatment facilities, their characteristics and working conditions in the irrigation system. Types of water treatment structures - open, diaphragm, pipe and their - integral, prefabricated block constructions. Choosing the type of water treatment facility.*

*Level of difficulty: 2*

*Water heating facilities in canals. Characteristics of their operation in channels with a small slope. Constructions of advanced water heating facilities. Joints of water treatment facilities and their facilities located close to each other and far from each other and operating conditions. Level of difficulty: 2*

*Filtration of water under and on the side of hydraulic structures. Filtration events. Classification of soils on the ground of the structure. Filtration water flow theory of movement. Filtration calculation issues and execution methods. Approximate methods of filtration calculations and their types. Straight contour line method. Extended contour line method, Springs (resistance coefficients) method, etc*

*Level of difficulty: 3*

*Tasks of connection facilities. Requirements for the design of connection facilities. Classification of connection facilities. Selection of the type of connection facilities. They are quick. Concrete shed construction. The components of the boiler: inlet, pipe, outlet parts, drainage of boilers. Countermeasures against tidal events and dangerous bottom buffet washes. Waterfalls. Their types. Constructions of stepped waterfalls. Drainage on the side walls of the waterfall. Waterfalls. Hydraulic conditions of waterfall operation, basic calculations. Cantilevered waterfalls. Measures to limit washout downstream of cantilevered waterfalls. The cantilevered waterfall is the last part of the device constructions.*

*Level of difficulty: 4*

*Structures for water transfer through barriers. Their function and types. Water transfer facilities from the hill. Water transfer facilities from lowland and transport roads. Aqueducts, their types, use and structural features. Schemes of arched, arched, girder and frame aqueducts on rock and non-rock foundations, connecting them with embankments. Romli aqueduct construction. Channel, channel inlet and channel outlet, supporting parts, seams, shore drainage devices structures. Solid and prefabricated constructions. Fundamentals of aqueduct calculation. Duckers. Their types: integrated, assembled, buried in the ground and not buried in the ground constructions. Types and constructions of their inlet and outlet parts and pipes. Their constructive elements. Terms of use. Prevent duckers from becoming clogged with sediment. Duker's Fundamentals of Hydraulic and Static Calculations. Level of difficulty: 5*

*General information about mechanical equipment of hydrotechnical structures. Classification of mechanical devices. Types of traps and their classification. Hazards are general operating conditions and forces acting on them. Surface-mounted shutters. Simple shutters - shandors, spits, flat shutters. Shutters made of flat metals. General information. Interval devices. Pre-fixed support parts and fixed support parts on the column side walls. Level of difficulty: 4*

*Water intake facilities from the river. Task and classification. Schemes of water intake structures according to hydrological conditions: without a dam, with a spur, with a dam, with a reservoir and by a mechanical method. Terms of use of schemes. Taking water from the river without a dam. Disadvantages and advantages. Terms of use. Uncontrolled and controlled schemes of single and multi-head water intake. The reason for their use. Level of difficulty: 4*

*Water reservoirs. Their importance, location, method of adjustment, classification according to the underlying soils. Dams built from soil and other materials. Their types. General information on earthen dams. Their cross-sectional design and constructive elements. Level of difficulty: 4*

Exams and assessment formats	<i>To fully master the theoretical and methodological concepts related to science, be able to correctly reflect the results of the analysis, independently observe about the processes being studied and carry out tasks and tasks assigned in intermediate forms of control, submit a written work on final control.</i>
Study and examination requirements	<i>Students of successful transition from science The maximum points to be summed will consist of the final exam (40%), the interval control (60%), the sum of the points to be separated. In order to successfully pass the subject, the student must score 60% of the allocated points and collect a high score in it.</i>
Reading list	<p><i>Bakiev M.R, Majidov J., Nosirov B., Khojakulov R., Rahmatov M, Yangiev A Textbook of hydraulic structures (Volumes 1, 2, 3, 2nd edition filled in) KARSHI "INTELLECT" Publishing House 2013, - 506 p.</i></p> <p><i>L.N.Rasskazov, V.G.Orekhov, N.A.Aniskin, V.V.Malakhanov, A.S.Bestujeva, M.P.Sainov, P.V.Soldatov, V.V.Tolstikov Gidrotekhnicheskie sooruzheniya v dvux chastyakh part 1 and 2. Moscow 2008 god. 576 st.</i></p> <p><i>Bakiev M.R, Kadirova M.-G.A, Ibraymov A. Hydraulic constructions. Part 1. A joint of structures on the channel. Study guide. Tashkent: "Main Library of the Academy of Sciences of the Republic of Uzbekistan" publishing house, 2020. - 101 p.</i></p> <p><i>Bakiev M.R, M.-G.A.Kadirova, Ibraymov A. Instructional manual for the design of structures in a ground dam reservoir. Tashkent: "UzR Academy of Sciences Main Library" printing house. 2021. - 224.</i></p> <p><i>Bakiev M.R, Majidov J., Nosirov B., Khojakulov R., Saidov I. Design of hydraulic facilities. Study guide, T.: "Science and technology" 2013, - 432 p.</i></p> <p><i>Kadirova M.-G.A. Methodical guide for practical training in "Hydraulic structures" for undergraduate students of "Water management and land reclamation" department. Tashkent. TIAME. 2016, - 107 p.</i></p> <p><i>Kadirova M.-G.A. Metodicheskoe posobie po vypolneniyu prakticheskikh zanyatiy po predmetu "Hydrotekhnicheskie sooruzheniya". Tashkent.TIAME. 2018, - 123p.</i></p> <p><i>Kadirova M.-G.A. Metodicheskoe posobie po vypolneniyu kursovogo proekta na temu "Uzel hydrotechnical constructions in canales" subject" Hydrotechnical constructions ". Tashkent.TIAME. 2019, - 127p.</i></p>

<b>Module designation</b>	<b>TSY 3205-Improving natural conditions</b>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Isaev Sabirdjan Khusanbaevich, doctor of agricultural sciences, professor; Urazbaev Ilkhom Kenesbaevich, doctor of philosophy of agriculture, senior teacher, Kasimbetova Saltanat Abdullaevna, candidate of technical sciences, associate professor, Tadjiev Sunnat Saydalievich, doctor of philosophy of technical science, assistant teacher, Azizov Shokhrukh Numanjanovich, doctor of philosophy of technical science, assistant teacher, Mardiev Shakhboz Khusan ugli, assistant teacher.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Agriculture and Soil Science”, “Introduction to Water Reclamation”, “Chemical Reclamation”, “Rangeland Reclamation”.</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- components of nature;</li> <li>- increasing the consumer value of nature;</li> <li>- restoration of damaged components of nature;</li> <li>- air pollutants.</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- development of interrelated components of nature;</li> <li>- the natural structure of landscapes in the geosystem;</li> <li>- circulation of water and substances in nature;</li> <li>- creation of natural man-made complexes, cultural landscapes;</li> <li>- protection of nature from negative consequences.</li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- environmentally safe operation of water use systems in agriculture;</li> <li>- protection of water resources from pollution;</li> <li>- the importance of trees in improving natural conditions;</li> <li>- ecologically protected areas.</li> </ul>
Content: The discipline includes. The level of difficulty: (1 – low, 5 high):	<p><i>Man-made effects on nature and the geosystem in the improvement of natural conditions. Creation of natural man-made complexes, cultural landscapes. Level of difficulty: 2</i></p> <p><i>Cycle of water and substances in nature. Geochemical and biotic cycle of substances. Level of difficulty: 2</i></p> <p><i>Energy flows in the geosystem, objects of improvement of natural conditions. Level of difficulty: 3</i></p> <p><i>Land monitoring and cadastre. Land reclamation and land reclamation. Level of difficulty: 4</i></p> <p><i>Ecologically protected areas. Concept of water use and environmentally safe operation of water use systems in agriculture. Level of difficulty: 5</i></p>
Exams and assessment formats	<i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i>



Study and examination requirements	<p><i>Requirements for successfully passing the module:</i>  <i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. Хамидов М.Х., Мухамедов А.К., Бегматов И.А. "Табиий шароитларни яхшилаш". Укув кулланма. Ташкент. ТИМИ. 2011. 184 бет.</li> <li>2. Хамидов М.Х., Мухамедов А.К., Бегматов И.А. «Природообстройство». Учебное пособие Ташкент. ТИМИ. 2011. 172 стр.</li> <li>3. Isayev S.X., Abduraimova D.A., Hayitova M.S., "Tabiiy sharoitlarni yaxshilash". O'quv qo'llanma. Toshkent. TIKXMMI MTU. 2021 yil. 168 bet</li> <li>4. Sulaymanov I.J., Batoshov A.R., Egamberdiyev M.Kh., "Soil science and agrochemistry" "UZKITOBSAVDONASHRIYOTI" 2021 y,- 428 p</li> <li>5. A.Allbed, L.Kumar. Soil salinity mapping and monitoring in arid and semi-arid regions using remote sensing technology: a review. <i>Adv. Remote Sens.</i>, 2 (2013), pp. 373-385, 10.4236/ars.2013.24040</li> <li>6. S.S.Rao, S.D.Kumar, S.N.Das, M.S.S Nagaraju, M.V.Venugopal, P.Rajankar, P.Laghate, M.S.Reddy, A.K.Joshi, J.R.Sharma. Modified Dubois model for estimating soil moisture with dual polarized SAR data <i>J. Indian Soc. Remote Sens.</i>, 41 (2013), pp. 865-872, 10.1007/s12524-013-0274-3</li> <li>7. J.E.Ayars, C.J.Phene, R.B.Hutmacher, K.R.Davis, R.A.Schoneman, S.S.Vail, M.Mead. Subsurface drip irrigation of row crops: a review of 15 years of research at the water management research laboratory. <i>Agric. Water Manage.</i>, 42 (1999), pp. 1-27</li> <li>8. W.Min, H.J.Guo, G.W.Zhou, W Zhang, L.J.Ma, J.Ye, Z.N.Hou. Root distribution and growth of cotton as affected by drip irrigation with saline water. <i>Field Crops Res.</i>, 169 (2014), pp. 1-10</li> </ol>

<b>Module designation</b>	<b>EG3205 Operational Hydrometry</b>
Semester(s) in which the module is taught	5 (15 weeks)
Person responsible for the module	1. <i>Fatkholloyev Alisher Mirzatilloevich, (doctor of technical sciences) professor</i> 2. <i>Gapparov Furkat Akhmatovich, (doctor of technical sciences) professor</i> 3. <i>Mansurov Safar Rakhmankulovich (PhD) (doctor of philosophy in technical sciences), senior teacher.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>Lecture and practical training</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 Contact hours: lecture - 30, practical lessons – 30, self-learning – 90, hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Higher mathematics», «Physics», «Engineering geodesy», «Theoretical mechanics», «Hydraulics», «Hydrology», «Hydrometry»</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li><i>-accounting for water reserves in irrigation sources,</i></li> <li><i>-correct distribution of water to consumers,</i></li> <li><i>-measurement and management of water consumption in canals,</i></li> <li><i>-correct technical use of devices,</i></li> <li><i>-waste of water in canals and collecting system and to have an idea about the analysis. initial hydrometric data to determine the work coefficient;</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li><i>- tools and types of water meters,</i></li> <li><i>-the main requirements for water meters,</i></li> <li><i>-the choice of water meters,</i></li> <li><i>-their modern constructions and the theoretical basis of calculation in their use, and the ability to use them;</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li><i>-the student should have the skills to apply the methods of analysis of the processes of correct use of water in the water industry,</i></li> <li><i>-to accept the solutions to the problems of use and to evaluate the technical and economic indicators.</i></li> </ul>

Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

*"Operational hydrometry" science, subject, object of research, purpose, tasks, brief history of development. The importance of studying the science of "operational hydrometry". Difficulty level: 2*

*Water accounting service in the hydromelioration system and its tasks, conditions for classification and installation of water accounting and water measurement sites, methods of performing hydrometric work in the hydromelioration system and measuring water consumption. Difficulty level: 3*

*Water meters and types, basic requirements for water measuring devices, selection of water measuring devices, their use. Difficulty level: 3*

*Water accounting in irrigation networks. The invariable Uzan method, the essence of the invariable Uzan method and the basic rules of construction. Conditions for choosing a location for hydropost. Drawing up a graph of the relationship between water consumption and water level in hydroposts of the fixed channel type. Assessing the representativeness of the curve. Difficulty level: 3*

*Methods and means of determining water consumption in hydromelioration networks. Description of standard water measuring devices. Advantages and disadvantages. Standard water measuring devices. Thin-walled aqueducts and conditions for their use. Calculation formulas. Difficulty level: 4*

*Aqueducts-vodoslyv and calculation of water consumption in them, thin-walled rectangular, triangular, trapezoidal aqueducts. Requirements for Thomson, Chipoletti, Ivanov and other water heaters, water heaters. Determining the consumption coefficient of standard water measuring devices. Reynold's number. Froude number. Weber number. Difficulty level: 5*

*Rods used in irrigation systems. Types of gutters and conditions of use. Types of water accounting in parabolic troughs. Flow rate measurement and water consumption calculation. SANIIRI water measurement limit and channel, basic requirements for construction and use of water measurement limit and channel, Parshal, Venturi channels and their requirements. Difficulty level: 5*

*Types of water measuring nozzles and their use, measuring water consumption with nozzles. Construction of water measuring nozzles and their requirements. Difficulty level: 4*

*Types of water meter-rectifiers and their use. Measuring water consumption with water meters. Construction of water meter-correction devices and requirements for them. Layered hydrotechnical structures, narrowing methods. Difficulty level: 3*

*Measurement of water consumption using hydrotechnical structures. Theoretical and experimental studies and practical results. Determination of the flow rate of water flowing through flat sluices under different hydraulic conditions. Difficulty level: 5*

*Classification of hydraulic structures. Preparatory work. Hydraulic and hydrometric measurement and calculation works. Water accounting in connected structures. Difficulty level: 5*

*The essence and basic rules of construction of thin-walled water pipes, installation requirements of Thomson, Chipoletti, Ivanov and other water pipes. Difficulty level: 4*

*The procedure for combing and certification of fixed level and standard water measuring devices. Difficulty level: 3*

*Determination of FIK of hydromelioration networks. Hydrometric method. Hydraulic method. Hydrogeological method. Determination of FIK dependence on water level. Difficulty level: 4*

*Use of digital technologies in the process of water accounting in standard water measuring devices. Water measuring and remote transmission devices and the advantages of their use. Difficulty level: 4*

Exams and assessment formats	<i>To fully master the theoretical and methodological concepts related to science, be able to correctly reflect the results of the analysis, independently observe about the processes being studied and carry out tasks and tasks assigned in intermediate forms of control, submit a written work on final control.</i>
Study and examination requirements	<i>Students of successful transition from science The maximum points to be summed will consist of the final exam (40%), the interval control (60%), the sum of the points to be separated. In order to successfully pass the subject, the student must score 60% of the allocated points and collect a high score in it.</i>
Reading list	<ol style="list-style-type: none"> <li>1. Akbarov A.A., Nazaraliyev D.V., Hikmatov F.Kh. "Hydrometry" study guide, Tashkent, 2015. 154 pages.</li> <li>2. A.M. Fatkhulloyev., F.A. Gapparov., D.V. Nazaraliye., S.R. Mansurov. Operational hydrometry. textbook on science, Tashkent, 2020. 100 pages.</li> <li>3. A.M. Fatkhulloyev., D.V. Nazaraliye., A.I.N. Mkhanna J.S. Cooperative operational hydrometry. science textbook, (pyc) Tashkent, 2022. 120 pages.</li> </ol>

<b>Module designation</b>	<b>YAM3205-Reclamation of pastures</b>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Isaev Sabirdjan Khusanbaevich, doctor of agricultural sciences, professor; Urazbaev Ilkhom Kenesbaevich, doctor of philosophy of agriculture, senior teacher Kasimbetova Saltanat Abdullaevna, candidate of technical sciences, associate professor Tadjiev Sunnat Saydalievich, doctor of philosophy of technical science, assistant teacher Azizov Shokhrukh Numanjanovich, doctor of philosophy of technical science, assistant teacher Mardiev Shakhboz Khusan ugli, assistant teacher</i>
Language	<i>Uzbek, russsian</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 Contact hours: lecture - 30, practical lessons – 30, self-learning – 90, hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Agriculture and Soil Science», «Introduction to Water Reclamation», «Irrigation and Reclamation», «Chemical Reclamation», «Improvement of Natural Conditions».</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>use of pasture lands in agriculture;</i></li> <li>- <i>relationship with pasture lands in agriculture;</i></li> <li>- <i>preservation of grassland ecosystems;</i></li> <li>- <i>pasture infrastructures;</i></li> <li>- <i>sources of water supply.</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>use of pasture lands in agriculture;</i></li> <li>- <i>melioration of pastures;</i></li> <li>- <i>water supply systems;</i></li> <li>- <i>ecological requirements for the use of pastures;</i></li> <li>- <i>elimination of pasture degradation.</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>the ability to increase the efficiency of pastures;</i></li> <li>- <i>cultivation of drought-resistant crops in pastures;</i></li> <li>- <i>restoration and preservation of pasture plants;</i></li> <li>- <i>increase the productivity of pastures;</i></li> <li>- <i>restoration of pastures.</i></li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Relationships with the use of pasture land in agriculture. Conservation of grassland ecosystems. Level of difficulty: 2</i>  <i>Boreholes and their construction. Features of irrigation networks in pastures. Level of difficulty: 2</i>  <i>Reclamation of pastures: establishment of local water supply systems. Sources of water supply. Groundwater. Local stream waters. Ports. Level of difficulty: 3</i>  <i>Meadow plants. Restoration and preservation of pasture plants. Increase the productivity of pastures based on the organization of phytomelioration and pasture rotation. Level of difficulty: 4</i>  <i>Management of pasture use. Use of pastures and restoration of its productivity. Improving pasture efficiency and eliminating pasture degradation. Level of difficulty: 5</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:  The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li><i>1. Isaev S.X. va boshqalar. Yaylovlar melioratsiyasi, O'quv qo'llanma. Toshkent, TIMI. 2020. 186 bet.</i></li> <li><i>2. O'zbekistondagi madaniy yaylovlarda oziqa yetishtirishni jadallashtirishga doir tavsiyalar. Toshkent, 2015. 23 bet.</i></li> <li><i>3. Norqulov U., Allanov X. "Yaylovlar melioratsiyasi fanidan ma'ruza materiallari" T. 2011. 142 bet.</i></li> <li><i>4. Peter Waller Muluneh Yitayew Irrigation and Drainage Engineering, Handbook. Springer International Publishing Switzerland 2016, 747 p.</i></li> <li><i>5. Самаров В.М. Мелиорация земель: Учебное пособие. Кузбасская государственная сельскохозяйственная академия. 2014. 112 стр.</i></li> </ol>

<b>Module designation</b>	<b>GTT-3205-Geoinformation Systems and Technologies</b>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Pulatov Alim Salimovich, Professor Pirmatov Khabibullo Rakhmatullayevich, Associate Professor Mamadaliyev Bunyod Shaxobidin o'g'li, Assistant Nasirova Maxliyo Rustamovna, Assistant</i>
Language	<i>English</i>
Relation to curriculum	<i>Selective</i>
Teaching methods	<i>Lecture, seminars</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	«Geography», «Cartography».
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- geoinformation systems, data model and their systems, vector and raster data, creation of new data collection;</li> <li>- ArcGIS software, metadata, spatial data infrastructure, data movement models</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- Working with the ArcGIS computer program, geometric correction and geolinking of images, performing vector and raster operations and explaining and describing them;</li> <li>- execution of requests from spatial and attributive data, data transformation and data processing, creation and analysis of digital models of relief, creation of data movement models</li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- map projection and geolinking, visualization of geographic data, projection of unprojected data collection, data re-projection, effect of various projections on geometric features;</li> <li>- global positioning systems, spatial data infrastructure, adding text and graphics to the map, selecting objects, using graphic symbols and attributes, presenting the map</li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Introduction to GIS, concepts and tasks of GIS. Concepts and history of science. Scientific questions and tasks of science. Geoinformation circulation. Fields of application of the geoinformation system. Main components of GIS. Level of difficulty:2.</i></p> <p><i>Introduction of ArcCatalog and ArcMap. ArcGIS computer software. ArcCatalog program. ArcMap program. Level of difficulty:2.</i></p> <p><i>Data model. Vector model. Raster model. Level of difficulty:2.</i></p> <p><i>Data storage, digitization and information system. Creating point, line and polygon objects in ArcGIS software. Level of difficulty:2</i>Datums and Georeferencing. Geographic coordinate system. Dates and their types. The concept of geofencing. Level of difficulty:3.</p> <p><i>Map projection. Cartographic projection. Projection methods. Errors in cartographic projection. Level of difficulty:3.</i></p> <p><i>Visualization of geographic data. The concept of geovisualization, its purpose and tasks. History of geovisualization. Geographic symbols and attributes. Data scale. Level of difficulty. 3.</i></p> <p><i>Global positioning systems. GPS history and principle of operation. Level of difficulty: 2.</i></p> <p><i>Spatial Data Infrastructure (SDI), its concept, relevance, components. Level of difficulty: 3.</i></p> <p><i>Remote Sensing. The concept of remote sensing of the earth. Fields of application. Remote Earth Sensing System. Primary editing of images. Level of difficulty: 3.</i></p>
<p>Exams and assessment formats</p>	<p><i>Two Midterm assessments (80 minutes each) and one final exam (80 minutes), take-home written assignments</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module</i>  <i>The final grade in the module is composed of 60% performance on exams, 20% take-home assignments, 20% in-class participation. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li><i>1. Chang K.T., 2011. Introduction to Geographic Information Systems. Fourth Edition. McGRAW – HILL International Edition.</i></li> <li><i>2. Трифонова Т.А., Мищенко Н.В, Краснощеников А.Н. Геоинформационные системы и дистанционное зондирование в экологических исследованиях. Учебное пособие для вузов. – М.: Академический проект, 2005. – 352 с.</i></li> <li><i>3. Пулатов А.С., Герц Ж.В., Джалилова Г.А. «Дистанционное зондирование» Учебное пособие. Т.: Национальный исследовательский университет «ТИИМСХ», 2021. 119 с.</i></li> <li><i>4. Gulyamova L.X. Geoaxborot tizimlari va texnologiyalari. - Toshkent: Universitet, 2018. 188 b.</i></li> <li><i>5. Boltayev T.X., Raxmonov Q., Akbarov M.S. “Geoaxborot tizimining ilmiy asoslari” O’quv qo’llanma., 2015. 235 b.</i></li> </ol>



<b>Module designation</b>	<b>IGO3205 Engineering hydrology,</b>
Semester(s) in which the module is taught	5 semester (15 weeks)
Person responsible for the module	Nazaraliyev Dilshod Validjanovich, a candidate of agricultural sciences, docent. Mansurov Safar Raxmankulovich PhD for technical sciences, senior teacher
Language	Uzbek, Russian
Relation to curriculum	Elective
Teaching methods	Lecture, practical lesson.
Workload (incl. contact hours, self-study hours)	Total workload: 150 Contact hours: lecture - 30, practical lessons – 30, self-learning – 90, hours
Credit points	5
Required and recommended prerequisites for joining the module	«Hydrology and hydrogeology», «Hydraulics», «Hydrology», «Hydrometry», «Ameliorative hydrogeology», «Exploitation hydrometry».
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- about methods of calculation and research of river flow, availability of hydrological descriptions, distribution curves and their parameters, maximum and minimum water consumption, sources and flow of saturation and hydrological regimes;</li> <li>- the use of mathematical modeling and statistical methods in the analysis of hydrological data, the availability of hydrological quantities, the determination of estimated water consumption, distribution curves and their parameters, the annual flow maximum and minimum water in the presence of hydrological data, when insufficient to know and have the skills to calculate expenses;</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- student should have the competence to perform hydrological and water management calculations at various stages, to perform water management calculations, to solve the problems of effective use of water resources in the provision of water to water consumers and water users at the specified times and periods.</li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- Consist and competence of the subject of hydrology is to give students a scientific-practical worldview, to properly imagine the regulations of engineering hydrology, also to be able to use the main hydrological measuring equipment; to be able to analysis of the obtained results from an engineering point of view; a contributions of Uzbek scientists to the development of hydrology as a subject; to develop students' independent work skills, ability to think analytically, as well as the ability to use basic and additional skills of knowledge.</li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Natural-geographical factors forming the river flow. Flow forming factors. Methods of analysis of river flow characteristics. Methods of hydrological data analysis. Methods of summarizing hydrological characteristics. Curve graph of the flow. Zoning of territories. Zoning rules. Graphic processing of hydrological data. Graphic links. Difficulty level: 2</i></p> <p><i>Annual flow rate. Error in determining the annual flow rate. Calculation of the flow rate when hydrological data is sufficient. Statistical analysis of hydrological data. Calculating the flow rate. Determining the annual flow rate when hydrological data are available in different amounts. Graphical method. Calculation of the annual flow rate in the absence of hydrological data. Difficulty level: 2</i></p> <p><i>Availability of hydrological descriptions. Annual flow availability and distribution curves. Distribution curves and their parameters. Probability grid. Determining the consumption of water in the calculated supply. Types of distribution curves. Determining the parameters of the annual flow supply curve with sufficient and insufficient hydrological data and their accuracy. Determination of coefficients of variation and asymmetry in the absence of hydrological data. Difficulty level: 3</i></p> <p><i>Distribution of river flow during the year. Natural-geographical factors affecting the seasonal distribution of the river flow. Determining the distribution of river flow during the year when hydrological data is sufficient. Calculation scheme of distribution of flow during the year. Calculation of the distribution of river flow during the year when hydrological data is insufficient. Maximum flow of rivers. Calculation of maximum flow of rivers. Difficulty level: 4</i></p> <p><i>Classification and classification principles of hydrological forecasts. Types of preparation of hydrological forecasts and organization of hydrological forecasting service in Uzbekistan. Classification principles of hydrological forecasts. Grouping of hydrological forecasts. Grouping of hydrological forecasts depending on the type of events. Grouping of hydrological forecasts depending on the laws on which they based. Grouping of hydrological forecasts depending on their duration. Local (local) and regional hydrological forecasts. Grouping of hydrological forecasts according to their purpose. Hydro synoptic predictions and their natural essence. Regional and global hydrological forecasts. Difficulty level: 4</i></p> <p><i>Information system necessary for preparation of hydrological forecasts. Types of hydrological forecasts depending on hydrological phenomena and their requirements. Short-term forecasting of river volume elements and flow amounts. Long-term forecasting of plain river flows. Long-term forecasting of mountain river flows. Difficulty level: 5</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li><i>1. Fathullojev A.M. Engineering hydrology: tutorial book - Tashkent 2021. 186 pages.</i></li> <li><i>2. Melnikova T.N. workbook of hydrology. Maykop - 2012. 153 p.</i></li> <li><i>3. A.V.Savkin, S.V.Fedorov. Hydrology. Study tutorial book. - St. Petersburg.: 2010.-102 p.</i></li> <li><i>4. Nazaraliev D.V., Akmalov Sh.B. Textbook of "Arid zone Hydrology", Tashkent, 2019, 111 pages.</i></li> </ol>

<b>Module designation</b>	<b>TDE2105 Soil Degradation</b>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Candidate of Agricultural Sciences, Associate Professor. Egamberdiev Ramish Rabbimovich. Candidate of Biological Sciences, Associate Professor .Khakberdiev Obid Eshniyozovich.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 Contact hours: lecture - 30, practical lessons – 30, self-learning – 90, hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Soil science and agriculture», «Plant science», «Ecology», «Land cadastre».</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li><i>- factors of desertification, deforestation, secondary salinization and irrigation, water and irrigation erosion in mountain and sub-mountain areas; - deflation, as well as degression of pastures in areas where cattle breeding is intensively developed,</i></li> <li><i>- causes of man-made desertification as a result of land development in agriculture and industry;</i></li> <li><i>- excessive use of agrochemicals, disposal of industrial and household waste, reduction of soil fertility and pollution as a result of planting the same crops;</i></li> <li><i>- about factors of degradation processes, such as soil salinization as a result of drying up of the Aral sea and deposition of salty dust aerosols on the soil surface</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li><i>- Current state of soils and land resources of the Republic of Uzbekistan,</i></li> <li><i>- about soil degradation factors and types;</i></li> <li><i>physical, chemical and microbiological factors and processes of soil degradation;</i></li> <li><i>- their evaluation methods;</i></li> <li><i>- ways to protect soils from degradation;</i></li> </ul> <p><b>To from competences in:</b></p> <ul style="list-style-type: none"> <li><i>- student soil agronomic zoning and soil inspection and evaluation methods;</i></li> <li><i>- procedures for using land cadastre data;</i></li> <li><i>- use of soil maps;</i></li> <li><i>- soil protection and their efficient use,</i></li> <li><i>- assessment of state land cadastre landscapes,</i></li> <li><i>- methods of monitoring degradation processes.</i></li> <li><i>- consequences of irregular grazing of livestock and changes in soil cover,</i></li> <li><i>- Effects of soil erosion processes on its properties,</i></li> <li><i>- Regional climate change of Uzbekistan and its consequences,</i></li> <li><i>- Study of saline soils and measures for their reclamation.</i></li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Soils and land resources of Uzbekistan. Classification of soils of Uzbekistan. Mechanical degradation of soils. Physical and chemical degradation of soils. Soil pollution and detoxification and their biological activity. Climate change and soil degradation. Soil protection. Regional distribution and description of soils of the Republic of Uzbekistan. Types and factors of soil degradation. Types of soil degradation and factors affecting it. The main causes of soil degradation. Level of difficulty: 1</i></p> <p><i>Soil salinization, desertification processes and soil degradation. Saline soils and brines. The main factors of soil salinity. Effects of soil salts on soil properties, plant growth and productivity. Reclamation of saline soils, brines and brines. Secondary salinization of irrigated soils and its prevention. The main types of the desertification process and the indicators determining it. Factors causing the process of desertification. Effects of land desertification on soil properties and measures to prevent it. Difficulty level: 2</i></p> <p><i>Identification, monitoring and creation of electronic maps of degraded lands based on GAT technologies. Methods of monitoring degradation processes. Method of monitoring soil salinity level and type. Ground observations. Remote monitoring of soil salinity. Monitoring of plant cover. Remote monitoring. Periodicity of monitoring. Difficulty level: 3</i></p> <p><i>Soil protection. Areas of soil erosion spread abroad and in our republic. Soil erosion and land reclamation. Soils contaminated with technogenic products. Difficulty level: 3</i></p> <p><i>Factors causing soil erosion and measures to combat them. Problems of land degradation as a result of erosion processes. Soil formation processes of a certain region. Specific regional characteristics of soils. Unreasonable use of land without accounting. Change of natural soil cover due to destruction of forests, irregular grazing of livestock. Difficulty level: 4</i></p> <p><i>Reclamation of saline soils, brines and brines. Secondary salinization of irrigated soils and its prevention. Preparing the soil for washing. Duration and methods of saline washing. Development of salt marshes. Improvement of waterlogged soils. Secondary salinization of irrigated soils and its prevention. Saline soils. Difficulty level: 54</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>

Reading list	<ol style="list-style-type: none"><li>1. <i>Overview of the state of the environment - Uzbekistan. Second comment. UN, Economic Commission for Europe. Committee on Environmental Policy. UN. New York and Geneva, 2010. 253 p.</i></li><li>2. <i>Atlas of soil covers of the Republic of Uzbekistan. State Committee for Land Resources, Geodesy, Cartography and State Cadastre of the Republic of Uzbekistan. T.: 2010. - 44 p.</i></li><li>3. <i>National Report on the State of Land Resources of the Republic of Uzbekistan. T.: 2020. – 105 p.</i></li><li>4. <i>Laws and regulations on land use in the Republic of Uzbekistan. Initiative of Central Asian countries on land resources management (ERBМОМТ). Collection of the United Nations Development Program. T. 2012. – 131 p.</i></li><li>5. <i>О.Э.Хакбердиев. Деградация почв. Учебник. Ташкент. Изд. «ТИИИМСХ» Национальный исследовательский университета. 2023 -. 286 стр.</i></li></ol>
--------------	---

## 6-semester

<b>Module designation</b>	<b>IM3111-Irrigation and land reclamation</b>
Semester(s) in which the module is taught	6,7
Person responsible for the module	<i>Khamidov Mukhamadkhan Khamidovich, DSc, Professor Begmatov Ilkhom Abduraimovich, PhD, Professor Mamataliev Adham Boymirzaevich,, associate professor Yulchiev Davronbek Gulamovich, assistant Urazbaev Ilkhom Kinesbaevich, PhD, senior lecturer</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, lab works.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 330 hours. Contact hours: 150 hours: - lecture – 70 hours; - practical lessons – 70 hours; - laboratory – 10 hours. - self-learning - 180 hours. Course projects: 2.</i>
Credit points	<i>11 (5+6)</i>
Required and recommended prerequisites for joining the module	<i>“Engineering Geodesy”, “Physics”, “Chemistry”, “Soil Science and farming”, “Geology and hydrogeology”, “Hydrology”, “Hydraulic”.</i>

<p>Module objectives/intended learning outcomes</p>	<p><i>After mastering the discipline, the student will:</i></p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>Impact of irrigation on soil and plants</i></li> <li>- <i>Irrigation system and its elements</i></li> <li>- <i>Water consumption of agricultural crops</i></li> <li>- <i>Hydromodule zoning of the area</i></li> <li>- <i>Irrigation regime of agricultural crops</i></li> <li>- <i>Main Irrigation methods</i></li> <li>- <i>Operating mode of the irrigation network and and design flow rates.</i></li> <li>- <i>Water losses in canals and their efficiency coefficient</i></li> <li>- <i>Methods to control water losses from the irrigation network</i></li> <li>- <i>Principles of design and establishment of parameters of irrigation canals</i></li> <li>- <i>Methods and techniques for draining agricultural land.</i></li> <li>- <i>Causes of soil salinity</i></li> <li>- <i>Composition of salts in soil. Degree and type of soil salinization</i></li> <li>- <i>Justification of the type of drainage</i></li> <li>- <i>Types and elements of drainage systems</i></li> <li>- <i>Design of drainage systems</i></li> <li>- <i>Factors influencing the intensity of water and wind erosion</i></li> <li>- <i>Causes of soil degradation</i></li> <li>- <i>Stages of land reclamation</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>To determine the need for irrigation of lands</i></li> <li>- <i>To analyze the water source and irrigation regime</i></li> <li>- <i>To determine the irrigation capacity of the water source and ways to increase it</i></li> <li>- <i>To select irrigation types and irrigation techniques</i></li> <li>- <i>To analyze the quality of irrigation water.</i></li> <li>- <i>to select the irrigation regime for agricultural crops</i></li> <li>- <i>To select methods and techniques for draining agricultural lands</i></li> <li>- <i>To analyze the effects of salts on plants and the causes of the harmful effects of salts</i></li> <li>- <i>To assess water balance of drained lands</i></li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>Use water sources for irrigation purposes</i></li> <li>- <i>To establish norms of water for one irrigation and for vegetation period of agricultural crops</i></li> <li>- <i>to implement selected water use plans</i></li> <li>- <i>to apply different irrigation methods and techniques effectively</i></li> <li>- <i>To conduct automation and improve irrigation system operation.</i></li> <li>- <i>To organize a saline soil leaching operations.</i></li> </ul>
---	--

Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

*Irrigation. Basic information on irrigation and irrigation systems. The essence of irrigation. Types of irrigation and their difference. Influence of irrigation on soil and plants. Quality of irrigation water. Irrigation system and its elements. Level of difficulty: 2.*

*Irrigation regime of agricultural crops. Optimal conditions for the development of crops. Water consumption of agricultural crops. Irrigation rate. Irrigation regime of rice. Irrigation regime of the unit of water use and its zoning. Hydromodule zoning of irrigated territory. Level of difficulty: 3.*

*Irrigation methods and techniques of agricultural crops. Basic irrigation methods. Basic irrigation methods. Surface irrigation. Planning of irrigated land. Sprinkler irrigation. Impulse sprinkling. Subsurface irrigation. Drip irrigation. Sub-irrigation. Aerosol irrigation. Level of difficulty: 4.*

*The irrigation network. Irrigation network on an irrigated plot. Elements of irrigation network. The operating mode and the calculation of water consumption for irrigation. Water losses in canals. Ways to combat water losses from the irrigation network. Design and calculation of irrigation canals. Open irrigation network. Piped irrigation network. Combined irrigation network. Structures on an open irrigation network. Spillway network. Roads and forest belts on irrigated lands. Level of difficulty: 4.*

*The irrigation system. Basic elements and classification of irrigation systems. Irrigation systems structure. Rice irrigation system. Irrigation systems design. Level of difficulty: 4.*

*Sources of water for irrigation. Main types of sources of irrigation water and the requirements for them. Machine Irrigation Systems. Groundwater use for irrigation. Local runoff for irrigation. Waste water use irrigation. Irrigation of cultivated pastures. Irrigation with drainage and waste waters. Level of difficulty: 4.*

*Drainage on irrigated land. The need for drainage. Types of drained lands and their water regime. Types and tasks of drainage. Requirements of crops for water regime. Methods and ways of draining agricultural lands. Level of difficulty: 4.*

*Prevention and control of salinization and waterlogging of irrigated land. The reasons for salinization of soils. The effect of salts on plants. Causes of the harmful effects of salts. Composition of salts in the soil. Degree and type of salinity. Groundwater regime. Level of difficulty: 4.*

*Meliorative measures combating salinization of the land. Saline land reclamation methods. Flushing of land. Level of difficulty: 3.*

*Drainage on irrigated land. Types of drainage. Justification of the drainage type. Types and elements of drainage systems. Level of difficulty: 3.*

*Drainage network management. Purpose and types of the regulatory network. Water balance of drained lands. Establishing the depth of the drains and the distance between them. Horizontal drain structures and filters. Drainage location. Combined drainage. Vertical drainage. Other types of drainage. Level of difficulty: 5.*

*Conducting and protective drainage network. Layout of conductive channels and closed collectors. Water inlets of drainage systems and their regulation. Hydraulic calculations and sizing of conductive collectors. Road network. Structures on drainage systems. Level of difficulty: 4.*

*Special directions of land reclamation. Irrigation of draining land. The need and efficiency of moistening draining lands. Methods and techniques for moistening drainage lands. Regime of subsoil irrigation. Sources of moisture. Level of difficulty: 4.*

*Soil erosion. The concept of erosion. Water erosion. Wind erosion. Factors affecting the intensity of water erosion. Factors affecting the intensity of wind erosion. The negative effects of erosion. Soil erosion protection. Level of difficulty: 4.*

*Forestry amelioration. Basic concepts and patterns that reveal the need for agroforestry. Influence of forest belts on the microclimate of fields.*



Exams and assessment formats.	One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).
Study and examination requirements.	Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass
Reading list.	<ol style="list-style-type: none"> <li>1. Ritzema H.P. (Editor-in-Chief), 2006. <i>Drainage Principles and Applications</i>. Wageningen, Alterra, ILRI Publication no. 16, pp. 1125.</li> <li>2. Xamidov M.X., Mamataliyev A.B. <i>Irrigatsiya va melioratsiya. O'quv qo'llanma</i>. Toshkent. TIQXMMI. 2019. –210 bet.</li> <li>3. Xamidov M.X., Shukurlayev X.I., Mamataliyev A.B. <i>Qishloq xo'jaligi gidrotexnika melioratsiyasi. Darslik</i>. –Toshkent: Sharq, 2009. –380 bet.</li> <li>4. Бегматов И.А., Шукурлаев Х.И., Маматалиев А.Б. <i>Ирригация и мелиорация. Учебник</i>. –Ташкент: “Илм-зиё-заковат”, 2021. –476 стр.</li> <li>5. Xamidov M.X., Shukurlaev X.I., Lapasov X.O. “Qishloq xo'jalik gidrotexnik melioratsiyasi” fanidan amaliy mashg'ulotlarni bajarish bo'yicha o'quv qo'llanma. –Toshkent: TIMI, 2014. –320 bet.</li> <li>5. Морозов А.Н. “Просто о мелиорации”, ISBN 978-9943-4814-9-7 – Ташкент: “Baktria press”, 2016. –152 стр.</li> <li>6. Mamataliyev A.B., Mardiyev Sh.H. “SIU hududidagi sug'orish tizimini namunaviy fermer xo'jaligining sug'oriladigan maydoni misolida loyihalash” mavzusidagi kurs loyahasini bajarishga oid uslubiy qo'llanma. Toshkent. TIQXMMI. 2019. –62 bet.</li> <li>7. Mamataliyev A.B., Mardiyev Sh.H. “SIU hududidagi zax qochirish tizimini namunaviy fermer xo'jaligining sug'oriladigan maydoni misolida loyihalash” mavzusidagi kurs loyahasini bajarishga oid uslubiy qo'llanma. Toshkent. TIQXMMI. 2019. –45 bet.</li> </ol>

<b>Module designation</b>	<b>NNS3105, Pump and pumping stations</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Uralov Bakhtiyor Rahmatullayevich, DSc, Professor Kan Eduard Klimentievich, Candidate of technical sciences, Associate professor, Norkulov Behzod Eshmirzaevich, PhD, Associate professor, Vohidov Oybek Farhodjon o'g'li, assistant Mahfuz Axmadii, assistant Lyudmila Alekseevna Maksudova, assistant Shodiyev Bobur Nurmaxamat o'g'li, assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, lesson, lab works, self-learning</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – hours; - lab works-10 hours; - self-learning – 90 hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Knowledge and skills acquired in “Physics”, “Higher mathematics”, “Hydraulics”, “Drawing geometry”, “Engineering constructions”, “Construction mechanics”.</i>

<p>Module objectives/intended learning outcomes</p>	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>Understanding of basic concepts about pumps and pumping stations. Awareness of their importance and future prospects in the Republic of Uzbekistan;</i></li> <li>- <i>Basic concepts about pumps and pumping devices</i></li> <li>- <i>Classification of pumps and pumping stations and areas of application</i></li> <li>- <i>The main operating parameters of the pump device</i></li> <li>- <i>Classification and marking of vane pumps</i></li> <li>- <i>Centrifugal pumps</i></li> <li>- <i>Centrifugal pumps of the console type</i></li> <li>- <i>Double type pumps</i></li> <li>- <i>Multistage centrifugal pumps</i></li> <li>- <i>Centrifugal vertical pumps</i></li> <li>- <i>Special centrifugal pumps</i></li> <li>- <i>Centrifugal well pumps</i></li> <li>- <i>Axial pumps</i></li> <li>- <i>Diagonal pumps</i></li> <li>- <b>Be able to:</b></li> <li>- <i>Theory of vane pumps</i></li> <li>- <i>Parallel operation of pumps</i></li> <li>- <i>Consecutively working of pumps</i></li> <li>- <i>Cavitation and hydro abrasive erosion of pumps</i></li> <li>- <i>Selection of the number and type of working pumps</i></li> <li>- <i>Selection of electric motors</i></li> <li>- <i>Operation of a pumping station and determination of their technical and economic indicators</i></li> <li>- <i>Design and construction of pumping stations</i></li> <li>- <i>Knowledge of construction, repair, and reconstruction of pumping stations and the ability to use them</i></li> <li>- <i>Determine the geometrical and initial monomeric uplifting height of the pumping station.</i></li> <li>- <i>Select the number of units and determine the parameters for choosing a pump from the catalogue</i></li> <li>- <i>Construct pump characteristics and scheme.</i></li> <li>- <i>Calculate the suction system of the pump</i></li> <li>- <i>Determine the suction height of the pump</i></li> <li>- <i>Choose the type, scheme, and dimensions of the electric motor</i></li> <li>- <i>Design the advance chamber and thrust chamber of pumping stations</i></li> <li>- <b>form competences in:</b></li> <li>- <i>principles of operation of pumping devices and stations</i></li> <li>- <i>pumping pipe communication</i></li> <li>- <i>pumping station buildings</i></li> <li>- <i>types of hydro technical units for uplifting water by machine</i></li> <li>- <i>understanding how to choose the right pump for specific irrigation needs</i></li> <li>- <i>knowledge of how to operate and control pumps effectively to ensure optimal water delivery</i></li> <li>- <i>understanding of how to operate pumps in the most energy-efficient manner, which can significantly reduce operating costs</i></li> <li>- <i>knowledge of how to read and interpret pump performance curves, which are essential for selecting the right pump</i></li> <li>- <i>integrating pumps into the overall irrigation system</i></li> <li>- <i>understanding of safety procedures related to pump operation and maintenance</i></li> <li>- <i>familiarity with different types of pumps</i></li> </ul>
---	---

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<ul style="list-style-type: none"> <li>- The purpose of teaching science is to provide students with knowledge, skills and competences in the methods of studying the types, structures and constructions of pumps and pumping stations used in various areas of water management.</li> <li>- Introduction to pumping stations. Pump types and their applications. Design and layout of pumping stations. Operation and maintenance of pumps. Electric motors in pumping stations. Discussion on the importance of energy efficiency in pumping stations. Level of difficulty:3</li> <li>- Selection of the structure and layout of irrigation pumping station facilities. Designing canals for water delivery and machine of pumping stations in science education. Structure and purpose of the facilities. Determination of the main parameters of irrigation pumping station. Hydraulic calculation of canals. Level of difficulty:3</li> <li>- Determination of the geometrical and initial monomeric uplifting height of the pumping station. Selecting the number of units, determining the parameters for choosing a pump from the catalogue. Construction of pump characteristics and scheme. Calculation of the suction system of the pump. Determination of the suction height of the pump. Choosing the type, scheme and dimensions of the electric motor. Design of advance chamber and thrust chamber of pumping stations. Level of diff difficulty:2</li> <li>- Design of pump station buildings, Pumping station cross section design. Conditions for positioning the building of the pumping station in the horizontal plane. Determination of technical and economic indicators. Conditions for the location of the pump station building in the vertical plane. Table of selection of the number and composition of operational personnel of melioration pumping stations. Level of difficulty:4</li> <li>- Design of suction and high-pressure pipes and water supply facility. Determination of the number, material, laying method and diameter of pressure pipes. Choosing the type of water discharge facility and determining its main dimensions. Determining the actual monomeric pressure of the pumping station. Level of difficulty:3</li> </ul>
<p>Exams and assessment formats</p>	<p>There are two midterm exams, each lasting 20 minutes. There is a final exam which could be either oral or written, and it lasts for 40 minutes.</p>
<p>Study and examination requirements</p>	<p>Requirements for successfully passing the module          “The final grade for the module is calculated as follows: 40% is based on exam performance, 20% on independent work, 20% on practical work, and 20% on mid-term control tests. To pass, students must achieve a final grade of 60% or higher.”</p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. Michael Volk, <i>Pump Characteristics and Applications</i>, third edition, © 2014 by Taylor &amp; Francis Group, LLC CRC Press is an imprint of Taylor &amp; Francis Group, an Informal business, pp. 502.</li> <li>2. ROBERT L. SANKS, Ph.D., <i>Pumping Station Design, Second Edition</i> Editor-in-Chief, PE, Consulting Engineer, and Professor Emeritus, Montana State Universit, pp.1067.</li> <li>3. D.Bazarov, M.Mamajonov B.Uralov, E.Kan, S.Xidirov, F.Artikbekova. <i>Nasos stansiyalari. Darslik. Toshkent. 2021.</i></li> <li>4. D.R.Bazarov, B.R.Uralov, Kan E.K., S.Q.Xidirov, F.K.Artikbekova. <i>Gidromashinalar. O'quv qo'llanma. Toshkent, 2021, TIQXMMI, 566 b.</i></li> <li>5. D.Bazarov, M.Mamajonov, T.Tursunov, B.Uralov, S.Xidirov, B.Norqulov <i>“Nasos stansiyalaridan foydalanish va diagnostikasi” Darslik. Toshkent, 2019, “Navro'z” nashriyoti, 348 b.</i></li> </ol>

<b>Module designation</b>	<b>RPW 3104-Rural and pasture water supply</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Malokhat Abdukodirova-Associate professor, PhD</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, self-learning</i>
Workload (incl. contact hours, self-study hours)	Total workload: 120 hours Contact hours:120 hours - lecture - 30, - practical lessons – 30, - self-learning – 60,
Credit points	4
Required and recommended prerequisites for joining the module	«Geology and hydrogeology», «Geodesy», «Hydraulics», «Pumping and pumping stations»
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- methods for assessing and analyzing the quality of natural water and the basic methods of its preparation for domestic drinking water supply, technological and livestock needs;</li> <li>- the essence of the processes of clarification and discoloration of water, the types and designs of structures used, the basis for their calculation;</li> <li>- methods of water disinfection, removal of odors and tastes;</li> <li>- basic requirements and principles for the layout of water clarification, decolorization and disinfection stations;</li> <li>- the main directions of scientific research work on the development and modernization of natural and wastewater treatment systems.</li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- assess the quality of natural waters, determine the required degree of purification, select the optimal treatment technology and consist of facilities;</li> <li>- evaluate the efficiency of the water treatment plant as a whole and its individual facilities;</li> <li>- use regulatory, reference, scientific and technical literature and relevant computer software;</li> <li>- analyze the economic efficiency of engineering projects and enterprise activities.</li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- basic modern methods of calculation and design of structures, carry out technical drawings using modern computer programs;</li> <li>- skills in performing verification calculations of existing structures;</li> <li>- modern requirements and methods of carrying out necessary water protection measures;</li> <li>- methods for calculating economic indicators of environmental management and water use projects;</li> <li>- the main tools for quality management at all stages of the product life cycle.</li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>The importance of water. Surface water consumption and quality. Requirements for water quality of surface and underground natural waters of various types of consumers. CSR requirements for drinking water quality. Level of difficulty: 3</i></p> <p><i>Improving the quality of natural waters and special water treatment. Water purification methods. Level of difficulty: 4</i></p> <p><i>Water clarification. Law of sedimentation of floating particles. Coagulation process. Strainers, their types, selection conditions. Level of difficulty: 3</i></p> <p><i>Water filtration and disinfection. Fast and slow filters, their structure, calculation, working cycles. Two layer fast filters. Level of difficulty: 3</i></p> <p><i>Basic methods of water disinfection. Chlorination, ozonation and disinfection in bactericidal devices. Level of difficulty: 5</i></p> <p><i>Composition and characteristics of wastewater. Composition and amount of impurities in wastewater. Level of difficulty: 3</i></p> <p><i>Determining the pollution concentration of wastewater by suspended substances and biochemical oxygen demand. Level of difficulty: 3</i></p> <p><i>Wastewater treatment methods. Sanitary and chemical analysis of wastewater. Level of difficulty: 4</i></p> <p><i>Selection of the technological scheme of wastewater treatment. Technological scheme of mechanical wastewater treatment. Level of difficulty: 4</i></p> <p><i>Sedimentation tanks. Their types and construction. Primary and secondary sedimentation tanks. Level of difficulty: 4</i></p> <p><i>Biological treatment of waste water in biofilters. Types of biofilters, structure. Level of difficulty: 3</i></p> <p><i>Peculiarities of industrial wastewater treatment. Cleaning of industrial wastewater by mechanical and physico-chemical methods. Level of difficulty: 4</i></p> <p><i>Biological treatment of wastewater under natural conditions. Irrigation fields and filtration fields. Biorepositories. Level of difficulty: 4</i></p> <p><i>Sewerage of small settlements and individual objects. Simple ways to improve the quality of wastewater. Level of difficulty: 3</i></p> <p><i>Sewerage scheme of livestock farms. The composition of livestock wastewater. Treatment of wastewater from livestock and poultry farms and its use in agriculture. Level of difficulty: 3</i></p>
<p>Exams and assessment formats</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 60% performance on exams, 20% take-home assignments, 20% in-class participation. Students must have a final grade of 60% or higher to pass</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>

Reading list	<ol style="list-style-type: none"><li>1. Maxmudova I.M., Salohiddinov A.T. "Rural and pasture water supply", Textbook. T.: CHINOR ENK, 2013. - 151b.</li><li>2. Maxmudova I.M., Salohiddinov A.T. "Rural and pasture water supply", Textbook. T.: Khorazm, 2002. - 136b.</li><li>3. Maxmudova I.M. « Improving the quality of natural waters » T. 2015. – 160 s.</li><li>4. Maxmudova I.M. « Drinking water supply » T.: Cholpan, 2019. – 264 c.</li><li>5. Mahmudova I.M., Ahmedova T.A. "Fundamentals of natural and wastewater quality assessment and treatment". Handbook. Tashkent: 2015 - 146 p.</li><li>6. Maxmudova I.M., Abdulkadirova M.N. "Improving the quality of natural waters" Methodical Instruction for course projects. Tashkent. 2015. 36p.</li><li>7. Water supply. External networks and facilities. RDU 2.04.02-2019</li></ol>
--------------	---

<b>Module designation</b>	<b>HFX3104 Safety of life activity</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Rajabov Nurmamat Kudratovich – (PhD) associate professor. Mirkhosilova Zulfiya Kuchkarovna – (PhD) associate professor.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 120 hours. Contact hours: 60 hours: - lecture – 40 hours; - practical lessons – 20 hours; - self-learning - 60 hours.</i>
Credit points	4
Required and recommended prerequisites for joining the module	<i>«Chemistry», «Physics», «Mechanics», «Geography»</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- the system of regulatory and legal documents adopted in the field of life-activity safety;</li> <li>- general principles, methods and means of ensuring safety in water management,</li> <li>- means of ensuring safety in water management,</li> <li>- requirements and basics of sanitation and labor hygiene in production,</li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- analysis of industrial injuries and occupational diseases,</li> <li>- basic technical safety requirements for technical maintenance when using machines and mechanisms,</li> <li>- types of emergencies;</li> <li>- technical means of fire prevention;</li> </ul> <p><b>Form competences in:</b></p> <ul style="list-style-type: none"> <li>- dangerous and harmful production factors in the water industry;</li> <li>- use of personal protective equipment;</li> <li>- organizational and technical means of fire prevention and elimination;</li> <li>- quick decision-making in emergency situations;</li> <li>- rules for providing primary medical aid to victims;</li> <li>- emergency rescue methods.</li> </ul>
Content: The discipline includes. The level of difficulty: (1 – low, 5 high):	<p><i>The purpose and tasks of safety of life activity science. Basic concepts of safety of life activity, their content. Hazards, their classification. The human factor in the “Humanity – environment” system. Basics of ergonomics to ensure safety of life activity. Legal basis of safety of life activities. Level of difficulty. Level of difficulty: 2.</i></p> <p><i>Accidents and occupational diseases occurring in production. Checking and training employees’ knowledge in the organization of safety of life activities. Standards of sanitation and hygiene of production, content. Ventilation and lighting system of production enterprises. Noise and vibration in production. Ways to protect against them. Harmful radiations in production, their characteristics and effects on the human body. Safety of equipment in production. Level of difficulty: 3.</i></p> <p><i>Safety techniques for irrigation. Safety techniques in the use of hydromelioration systems. Fundamentals of electrical safety in production. Emergency situations, their types and characteristics. The purpose and tasks of civil protection. Measures for protection against various emergency situations. Fire safety measures. Basics of primary medical care. Level of difficulty: 4.</i></p>



Exams and assessment formats	<i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i>
Study and examination requirements	<i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i>
Reading list	<ol style="list-style-type: none"> <li>1. T.Haydarov, A.Xojiev, N.Saidho'jaeva. <i>Hayot faoliyati xavfsizligi. –“Fidokor yosh avlod”, Darslik, 2022.– 322 b.</i></li> <li>2. Nigmatov I., Tojiev M. <i>Favqulodda vaziyatlar va fuqaro muhofazasi. Darslik–T.:Iqtisod-Moliya, 2011, 260 b.</i></li> <li>3.E.I.Ibragimov, S.Gazinazarova, O.R.YUldashev. <i>Mehnat muhofazasi maxsus kursi. Darslik.-T.: TIMI, 2014.-536 b.</i></li> <li>4. H.G'oyipov. <i>Hayot faoliyati xavfsizligi. –T.: “Yangi asr avlodi”, 2007 yil. – 264 b.</i></li> <li>5. Белов А.В. и др. <i>Безопасность жизнедеятельности. М.: Высшая школа, 2007.-616 с.</i></li> </ol>

Elective subject 5

<b>Module designation</b>	<b>IMG3205 Computer programs in irrigation and land reclamation</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Rakhmankulova Barna Oktamkhanovna candidate of economic sciences., associate professor Aynakulov Sharafidin Abdujalilovich, senior teacher</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Higher mathematics», «Physics», «English», «Russian»</i>
Module objectives/intended learning outcomes	<i>Science fulfills the tasks of teaching students how to effectively use information technologies in solving special problems.</i>
Content: The discipline includes. The level of difficulty: (1 – low, 5 high):	<i>Charts and functions in MS Excel. Creating charts in MS Excel. Sorting. Perform filtering. Level of difficulty: 2 MathCad program structure, use of text, numerical quantities and functions in MathCad. Creating diagrams in the MathCad program. Algorithmization in MathCad. Level of difficulty: 3 Methods and types of creating algorithms. Methods of describing algorithms. Steps to solve computer problems. Linear algorithms. Branching algorithms. Iterative algorithms. (arithmetic) algorithms with a known number of iterations. Iterative algorithms with an unknown number of iterations. Algorithms for solving problems related to agriculture and water management. Level of difficulty: 3 Programming languages. Basic elements of programming languages. Work with standard functions. Programming language operators, arrays, variables, constants, functions. Structural structure of programs. Execution of programs by computers. Translators and interpreters. Algorithms for working with matrices. Programming issues related to agriculture and water management. Level of difficulty: 3 Basic elements of the C++ programming language. The structure of the program in the C++ programming language, declaration of variables, types of given ones. Programming linear algorithms in the C++ programming language. Programming linear algorithms in the C++ programming language, using the Mathematics standard library. Level of difficulty: 3 Programming branching algorithms in the C++ programming language. Syntactic structure of branching algorithms, conditional if(), if() else and unconditional goto transition operators, selection operators switch(), continue and break operators in the C++ programming language and their use in programs. Programming recursive algorithms in the C++ programming language. Creating programs using the for(), while(), do while() operators in the C++ programming language. Level of difficulty: 4</i>
Exams and assessment formats	<i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i>
Study and examination requirements	<i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i>

Reading list	<ol style="list-style-type: none"> <li>1. Djamalov K., Aynakulov Sh. A., Xafizov O. <i>Mathematical modeling of information technologies and processes</i>. Tashkent, TIIAME, 2019. -332 b.</li> <li>2. Abdullayev Z.S., Mirzayev S.S., Shodmonova G., Shamsiddinov N.B. <i>Informatics and information technologies</i>. – T.: Publishing House of the National Library of Uzbekistan named after A. Navoi, 2012. – 444 b.</li> <li>3. Shadmanova G., Karimova Kh.Kh., Kenzhaeva D. <i>Information technologies and mathematical modeling of processes</i>. T., TIIAME, 2020.</li> <li>4. Z.S.Abdullaev, M.Yusupov, B.O.Raxmankulova, Sh.A.Aynakulov. <i>Applied information technologies. (Study guide)</i> Tashkent, TIIAME, 2018 -317 p</li> <li>5. Raxmankulova B.O., Ziyaeva Sh.K., Kubyashev K.E. <i>Information technologies and Mathematical modeling of processes</i>. T.: 2021</li> <li>6. The President of the Republic of Uzbekistan "On measures to improve the quality of education in the field of mathematics and develop scientific research" Decision No. PD-4708 of May 7, 2020. Lex.uz</li> <li>7. Sh.M.Mirziyoev "Strategy of actions on the five priority areas of Uzbekistan's development" Tashkent, "Uzbekistan", 2017. "Gazeta.uz".</li> <li>8. Yuldashev U.Yu., Bakiev R.R., Zokirova F.M. <i>Informatics and information technologies. Electronic textbook</i>.</li> <li>9. B.Raxmankulova <i>Methodical guide for conducting practical and laboratory training in information technology and mathematical modeling of processes</i> TIIAME, 2021 -114 p</li> <li>10. B.Raxmankulova <i>Methodical guide for conducting practical training in information technology and mathematical modeling of processes</i> TIIAME, 2022</li> <li>11. B.Raxmankulova <i>Methodical manual for laboratory training in information technology and mathematical modeling of processes</i> TIIAME, 2022</li> </ol>
--------------	---

<b>Module designation</b>	<b>QSF3205-Technologies for the effective of water in agriculture</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Matyakubov Bakhtiyar, DSc, Professor</i> <i>Isabaev Kasymbek Tagabaevich, PhD, associate professor</i> <i>Tadzhiev Sunnat, PhD, assistant</i> <i>Yulchiev Davronbek Gulamovich, assistant</i>
Language	<i>Uzbek, russsian</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours.</i> <i>Contact hours: 60 hours:</i> <ul style="list-style-type: none"> <li>- <i>lecture – 30 hours;</i></li> <li>- <i>practical lessons – 30 hours;</i></li> <li>- <i>laboratory – 10 hours.</i></li> <li>- <i>self-learning - 90 hours.</i></li> </ul>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Mathematics», «Soil science», «Mathematical modeling», «Hydraulics», «Agricultural hydrotechnical reclamation», «Irrigation and reclamation».</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>technologies of efficient use of water in agriculture;</i></li> <li>- <i>to have fundamental knowledge that helps to use water;</i></li> <li>- <i>establishment of support in the production of technologies for efficient use of water;</i></li> <li>- <i>development of water-saving irrigation methods and systems, production tasks;</i></li> <li>- <i>knowing the two types of irrigation;</i></li> <li>- <i>to have a relationship with the unfavorable natural conditions of the external environment related to the normal development and growth of cultural crops</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>being able to determine the constructions of irrigation networks used in agriculture;</i></li> <li>- <i>determining the hydraulic calculation of irrigation equipment;</i></li> <li>- <i>improvement of irrigation procedures, irrigation technologies and methods;</i></li> <li>- <i>to be able to distinguish the methods of technologies of efficient use of water in agriculture, etc.</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>choosing to use technologies of efficient use of water;</i></li> <li>- <i>planning of efficient water use technologies depending on the type of crop;</i></li> <li>- <i>comparison and conclusion of efficient water use technologies;</i></li> <li>- <i>determination of optimal crop irrigation periods and irrigation rate;</i></li> <li>- <i>to give recommendations on the normal development and growth of crops, taking into account natural conditions.</i></li> <li>- <i>to know the efficient use of water in the application of water-saving irrigation technologies;</i></li> <li>- <i>economic calculation on the efficient and rational use of water in crop irrigation - should have the qualification of accepting book solutions.</i></li> </ul>

<p>Content: The discipline includes the following topics. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Introduction to the science of "Technologies of efficient use of water in agriculture". The purpose, task, subject of the science of technologies of efficient use of water in agriculture. The connection of the science of technologies of efficient use of water in agriculture with other sciences. Climate of Uzbekistan. Level of difficulty: 4.</i></p> <p><i>"Classification of irrigated soils in Uzbekistan". Classification of irrigated soils in Uzbekistan, Soil water. Soil water properties: moisture content. Amounts of humus in the soil and agrochemical indicators. Level of difficulty: 3.</i></p> <p><i>"Basic procedures and rules of water use in agriculture". Basic procedures and rules of water use in agriculture. Water use management in basin irrigation systems. Limited system of water use. Contractual relations for obtaining water and delivering it to consumers. Level of difficulty: 5.</i></p> <p><i>"The order of watering crops, water balance, total water consumption". The order of watering crops, water balance, total water consumption. Determining the norms of crop irrigation and seasonal irrigation. Watering rate, time. determination of irrigation numbers. Level of difficulty: 5.</i></p> <p><i>"Impact of irrigation on soil and external environment". Irrigation: to the water-physical properties of the soil; to the level and mineralization of seepage waters; influence of the soil on the salt regime. GAT technologies in hydromodule zoning of irrigated lands. Requirements for the quality of irrigation water. Law of absorption of water into the soil. Type and mechanical composition of soils. Level of difficulty: 3.</i></p> <p><i>"Water-saving irrigation systems and scientific researches used in the republic". Water-saving above-ground irrigation technologies: discrete (pulsar), sprinkler, sprinkler from the opposite side, sprinkler with variable water consumption, black film on sprinkler, zig-zag sprinkler, contour, humidifier-block, with hydrogel and polymer screen egates and other irrigations. Comparison of modern water-saving irrigation methods with traditional irrigation methods. Level of difficulty: 5.</i></p> <p><i>"The main principles of designing a water-saving irrigation system". The main principles of designing a water-saving irrigation system. Methodology for determining irrigation periods and norms of agricultural crops in the design of water-saving irrigation systems. Hydromodule zoning. Level of difficulty: 4.</i></p> <p><i>"The need for water-saving irrigation technologies". Resource efficiency of drip irrigation. Higher labor productivity and land use efficiency in drip irrigation. Effectiveness of using drip irrigation in small plots of land and homesteads. Level of difficulty: 4.</i></p> <p><i>"Principles of sprinkler irrigation and its design". Efficiency of sprinkler irrigation technology. Designation of the sprinkler irrigation system scheme and hydraulic calculation. Recommendations for the use of sprinkler irrigation systems. The results achieved by using the sprinkler irrigation system.. Level of difficulty: 5.</i></p> <p><i>"Irrigation planning based on local and foreign irrigation system program". Methods of organizing irrigation based on domestic and foreign irrigation system programs. Accuracy level. Irrigation time, duration. Types of irrigated crops. Level of difficulty: 5.</i></p>
<p>Exams and assessment formats</p>	<p>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</p>

Study and examination requirements	<p><i>Requirements for successfully passing the module:</i>  <i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. Mamatov S.A., Khamrayev Sh., Karshiyev R.J., Zaks I.A., Burkhanjonov B. Sh. "Suvni tejamkor sug'orish texnologiyasi asoslari" // Tashkent-2022, Info Capital Books. - 382 p.</li> <li>2. Ragab Ragab, Ashwin B. Pandya. "Water-Saving in Agriculture - 2020" // International Commission on Irrigation and Drainage (ICID). E-mail: <a href="mailto:icid@icid.org">icid@icid.org</a>, Website: <a href="http://www.icid.org">www.icid.org</a></li> <li>3. Dionisio Pérez-Blanco, Adam Loch, Frank Ward, Chris Perry and David Adamson. "Agricultural water saving through technologies: a zombie idea" // Published by IOP Publishing Ltd. Environmental Research Letters, Volume 16, Number (2021)114032</li> <li>4. Juan F. Velasco-MuñozORCID, José A. Aznar-Sánchez, J. Belmonte-UreñaORCID, María J. López-Serrano "Advances in Water Use Efficiency in Agriculture: A Bibliometric Analysis" // Water 2018, 10(4), 377; <a href="https://doi.org/10.3390/w10040377">https://doi.org/10.3390/w10040377</a></li> <li>5. Khamidov M.Kh., Begmatov I.A, Isaev S.Kh., Mamatov S.A. "Suvni tejamkor sug'orish texnologiyalari" // O'quv qo'llanma. T.: TIMI, 2015, - 232 p.</li> <li>6. Mamatov S.A. "Tomchilatib sug'orish tizimi". Qo'llanma. T. Mehridaryo, 2012, - 80 p.</li> </ol>

<b>Module designation</b>	<b>EX3205 Environmental safety</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Mirkhosilova Zulfiya Kuchkarovna - doctor of philosophy (PhD) in technical sciences, associate professor. Kurbanov Azimjon Zhuraboy ugli - assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	«Biology», «Geography», «Chemistry», «soil science»
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- Information about safety in the biosphere</li> <li>- Negative effects on the biosphere</li> <li>- Information on safety in biotic factors</li> <li>- Safety information on abiotic factors</li> <li>- Biosphere security issues</li> <li>- Problems of lithosphere and hydrosphere safety</li> <li>- Negative consequences of natural dangerous processes and protection from them</li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- Legislation and other regulatory legal documents adopted in the field of environmental safety</li> <li>- Methods of preventing the occurrence of dangerous and harmful production factors</li> <li>- Standards for determining the boundaries of the sanitary protection zone</li> <li>- Pipes that emit harmful dust and gases</li> <li>- Calculation of residual dust in the air discharged from the dust collector equipment into the atmosphere</li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- An understanding of environmental expertise</li> <li>- The composition of water structures, the purpose of their use. To study the negative processes associated with water structures</li> <li>- Economical use of underground and surface resources in industry</li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Basic concepts of environmental safety science. The purpose and tasks of the science of ecological safety. Level of difficulty: 2.</i></p> <p><i>Environmental problems of the biosphere. Information about the biosphere, biotic factors, abiotic factors. Actual problems of the biosphere. Atmosphere. Environmental problems of the atmosphere and their protection. Environmental problems in the lithosphere and hydrosphere and their protection. Level of difficulty: 3.</i></p> <p><i>Pollution of the environment with various wastes. Indicators of the air environment in the technosphere, their impact on the environment, waste in production. Waste thrown into rivers. The problem of plastic waste. Economical use of underground and surface resources in industry. Composition of underground resources. Groundwater. Level of difficulty: 4.</i></p> <p><i>Mineral resources. Renewable resources. Non-renewable resources. Composition of terrestrial resources. Use of underground resources. The problem of underground and surface resources. Level of difficulty: 5.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. J.Kadri. Community-Based Environmental. A Resource Book For Protecting Ecosystems and Communitie. 1997 pp. 34-89</li> <li>2. Мельников В.М, Мельников В. П. Экологическая безопасность. Учебник. Издательство: Кнорус, 2021 г.</li> <li>3. А.А.Музалевский. Экологическая безопасность и методы ее обеспечения. Учебное пособие. Москва 2021.</li> <li>4. В.Панин, А.Сечин, В.Федосова. Экология. Томск. 2014</li> <li>5. Т.Найдаров, Z.Mirxasilova. Ekologik xavfsizlik. O'quv qo'llanma, T.: -2021. 155 b.</li> <li>6. S.Gazinazarova, I.Axmedov, A.Xojjiyev. Ekologik xavfsizlik. O'quv qo'llanma, T.: -2015. 214 b.</li> <li>7. S.Mustafojev, S.Artikov, R.Suvanov. Umumiy ekologiya. T.: "Ilm", 2010, 294 b.4</li> </ol>



<b>Name of the module/subject and password in the curriculum</b>	<b>SI3205-Artificial Intelligence</b>
Semester in which science is taught	6
Responsible teacher of the module/subject F.I.Sh, degree and title	<i>Bekmuratov Dilshod Kasimovich, associate professor, PhD</i> <i>Sobitov Ruzimboy Atabekovich, assistant</i> <i>Xamidov Elnur Xamidovich, assistant</i> <i>Toirov Shuxrat Abduganievich, associate professor, PhD</i> <i>Pulatov Giyos Gofurjonovich, assistant</i>
In which language to be taught	<i>Uzbek, Russian</i>
Its place in the curriculum	<i>elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Study load (by types of classroom hours and independent study hours)	<i>Total workload: 150 hours.</i> <i>Contact hours: 60 hours:</i> <i>- lecture – 30 hours;</i> <i>- practical lessons – 30 hours;</i> <i>- self-learning - 90 hours.</i>
Number of credits allocated to science	5
This is a list of prerequisite subjects	<i>“Linear Algebra”, “Programming”, “Data Structures and Algorithms”, “Algorithm Design”.</i>
Expected Learning Objectives	<p>After mastering the discipline, the student will:</p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>to provide students with systematic knowledge of the main models, methods, tools and languages used in the development of artificial intelligence systems;</i></li> <li>- <i>introduce students to the main methods of finding solutions used in artificial intelligence systems;</i></li> <li>- <i>development of analytical skills that allow students to consciously choose the methods, tools and languages being studied in solving problems in the problem area they specialize in.</i></li> </ul> <p><b>Having the skills to:</b></p> <ul style="list-style-type: none"> <li>- <i>basic models and means of knowledge representation.</i></li> <li>- <i>the syntax and semantics of the main artificial intelligence languages and the basic programming techniques in them.</i></li> <li>- <i>new methods for solving traditional problems developed in the framework of the constraint programming paradigm, as well as evolutionary and neural network approaches.</i></li> </ul> <p><b>Formation of competences:</b></p> <ul style="list-style-type: none"> <li>- <i>justifying the choice of models and means of comparative analysis and knowledge representation;</i></li> <li>- <i>building a model of a certain field of science using means of expressing the studied knowledge;</i></li> <li>- <i>use of new methods of solving problems in the problem area;</i></li> <li>- <i>do a comparative analysis and justify the choice of an artificial intelligence language to solve your problem.</i></li> <li>- <i>use of learned methods and tools;</i></li> <li>- <i>use of methods of finding solutions used in artificial intelligence systems; -</i></li> <li>- <i>use of new methods and approaches in solving traditional problems developed within the framework of artificial intelligence.</i></li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Artificial intelligence concept, problems and solutions. Basic concepts and definitions, directions. The purpose, task and subject of the course. Stages of development of artificial intelligence. Practical systems of artificial intelligence. The main directions of artificial intelligence modeling. Neurobionic direction. Information direction. Examples of different classification of artificial intelligence systems. Difficulty level: 2</i></p> <p><i>Knowledge and its organization. Information and knowledge . Main concepts . Types of knowledge and classification of knowledge. Of knowledge features . Levels of knowledge understanding. Methods and aspects of knowledge acquisition. Knowledge extraction methods from the database. Knowledge representation models. Knowledge representation models. Formal models of knowledge representation. Informal (semantic) models of knowledge representation. Difficulty level: 2</i></p> <p><i>Expert systems and their organization technologies. Historical information. Features and benefits of expert systems. Types of knowledge in expert systems. Composition of expert systems. Aspects of knowledge organization problems. Work with the knowledge base. Stages of creating an expert system. Classification of expert systems. Difficulties in creating expert systems. Examples of expert systems. <b>Ошибка! Закладка не определена.</b>Difficulty level: 2</i></p> <p><i>Neural networks. Neuron and its models. Single and multilayer perceptrons. Backpropagation Algorithm. Difficulty level: 3</i></p> <p><i>Training neural networks. Methods of solving industry problems with the help of artificial intelligence. A recurrent method of training neural networks. Learning algorithms. Artificial Intelligence Tools: Software Tools and Programming Languages. Biometric systems. Robotics in the field. Smart programming. Python programming language. Difficulty level: 4</i></p> <p><i>Application of artificial intelligence in the field. Field issues. Methods of solving industry problems with the help of artificial intelligence. Artificial intelligence systems in the field. Software in the field Prospects for the development of artificial intelligence. Artificial intelligence. Current and Future Fields of Artificial Intelligence. Emotional calculations. Artificial intelligence evolution and development prospects. Artificial intelligence. Fields of application and issues. Models and methods of solving field problems. Classification, design, planning, monitoring and control of artificial intelligence. Emotional calculations. Difficulty level: 5</i></p>
<p>Exams and assessment format</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Students who will study and take the exam</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>

Reading list	<ol style="list-style-type: none"> <li>1. Stuart Russell and Peter Norvig, (2002), <i>Artificial Intelligence: A Modern Approach</i>//Prentice Hall, Chapter 1-27, page 1-1057.</li> <li>2. Nilsson, NJ (2009). <i>The Quest for Artificial Intelligence: A History of Ideas and Achievements</i> . Cambridge University Press, Cambridge, England.</li> <li>3. Bashmakov A.I., Bashmakov I.A. <i>Intellectual information technology: Ucheb. posobie</i>. - M.: Izd-vo MGTU im. N.E. Bauman, 2005. - 304 p. - (Informatics and technical university). ISBN 5-7038-2544-X.</li> <li>4. <i>Iskusstvennyy intellect: v 3 kn.</i> / pod ed. D. A. Popova. -M.: Radioi svyaz, 1990. -Kn. 1: Systemic public and expert system. -461 p.</li> <li>5. Pavlov S. N. <i>Sistemy iskusstvennogo intellecta: ucheb.posobie. V 2-x chastyakh.</i> / S. N. Pavlov. - Tomsk: El Content, 2011. - Ch. 1. - 176 c. ISBN 978-5-4332-0013-5.</li> <li>6. Bekmuratov QA <i>Artificial intelligence and neural networks. Study guide for graduate students of a higher educational institution.</i> - Samarkand.: "Published in the editorial-publishing department of SamDU, 2021.-352 p. UDK : 004.8. ISBN 978-9943-7276-0-1.</li> <li>7. Bekmuratov QA <i>Artificial intelligence. Study guide.</i> -T.: "Alokachi, 2019.-312 p. UOK:004.8. KBK:32.973.2. ISBN 978-9943-5804-8-0.</li> </ol>
--------------	---

<b>Module designation</b>	<b>KPS 3205 Professional psychology</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Ismailova Zuhra Karabayevna DsC professor, Mukumov Dilrabo Inatovna associate professor, Sadikova Firuza Makhmudovna, associate professor Mustafayeva Dudrona Asilovna, associate professor Jumanov Alisher Asatullayevich PhD, senior teacher</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours Contact hours: -lecture – 30 hours -practical lessons – 30 hours self-learning – 90 hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Management psychology”, “Engineering psychology”.</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>at the request of the period, the assessment of professional competencies and, according to the results, the choice of a suitable profession.</i></li> <li>- <i>profconsultation assistance to job seekers and began to be widely used on Labor exchanges,;</i></li> <li>- <i>the concept of professions, the reserve of theoretical information related to imagination.</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>the practical use of basic knowledge in the methods of Labor, pedagogy, Engineering, Applied Psychology;</i></li> <li>- <i>psychological understanding in the field of science on professional orientation, having visions of professions;</i></li> <li>- <i>practical analysis of scientific research methods.</i></li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>analysis of labor activity</i></li> <li>- <i>practical application of Engineering-Psychological Assessment Systems</i></li> <li>- <i>ergonomic design of operator jobs</i></li> </ul>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p>The purpose and objectives of the subject of the science of Professional Psychology. The emergence of psychological knowledge in students, formation as a scientific science and in the system of Sciences to give theoretical knowledge about the role and to form practical skills in the use of their own areas of practical and practical psychology in them. <i>Level of difficulty: 2.</i></p> <p>Scientific and methodological: the history of the formation of the science of Professional Psychology. The relationship of Professional Psychology with other disciplines. Practical areas of Professional Psychology. <i>Level of difficulty: 2.</i></p> <p>Practical and applied areas of Professional Psychology. In our society, there is a great need to put psychological knowledge into direct practice. Who receives the national training program only in Uzbekistan, the intervention of psychology is necessary for its implementation and successful implementation. Based on the development trends, it is necessary to organize educational activities, coordinate the work of specialists, and provide scientific and methodological support. These actions ultimately have a real impact. <i>Level of difficulty: 2.</i></p> <p>Basic concepts and study of the professional formation of personality Principles of iactivity, justification of methods; Professional expert, personal developer psychological features of professional education, certification, professional qualification development psychotechnics, professional correction and rehabilitation, leaving the profession. with knowledge of psychological training, from curatorial to. <i>Level of difficulty: 3.</i></p> <p>Students ' knowledge in the form of conversation is meaningful activated by questions, answers are addressed. In order to strengthen the topic, test questions are distributed to students. The task of writing the main sections of psychology is distributed. <i>Level of difficulty: 4.</i></p> <p>An assignment is given to write forms of manifestation of the psyche. Distributed to students to complete a mission on the relationship of psychology and science. Cluster concepts on the topic. the technique is given wrist work, and the rules of cluster technique are introduced to students. Reminds, directs, explains the rule of working in groups to students. <i>Level of difficulty: 5.</i></p>
<p>Exams and assessment format</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Students who will study and take the exam</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li><i>1. F.R.Abdurakhmonov, Z.E.Abdurakhmonova. Professional psychology - Tashkent: 2018.</i></li> <li><i>2. Z.Nishonova, Z.Qurbonova, S.Abdfiyev. Psychodiagnostics and experimental psychology. - Tashkent:, 2011</i></li> <li><i>3. P.I.Ivanov, M.E.Zufarova. General psychology. Tashkent: 2008</i></li> <li><i>4. Goziev E.G Psychological methodology. Tashkent. 2012.</i></li> <li><i>5. Goziev E.G. Social psychology. Tashkent. 2013.</i></li> <li><i>6. Goziev E. Professional psychology: textbook for psychology major; Republic of Uzbekistan Ministry of Higher and Secondary Special Education, National University of Uzbekistan named after Mirzo Ulugbek. - T.: "National Society of Philosophers of Uzbekistan" publishing house. 2008. 213 p.</i></li> <li><i>7. Ismailova Z.K., Raupova SH.A., Madazizova D.R. Professional psychology. Study guide, Tashkent, 2020</i></li> </ol>

<b>Module designation</b>	<b>TJA 3205 Automation of technological processes</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Gazieva Rano Teshabayevna, candidate of technical sciences, professor Usmanov Aziz Magdalievich, candidate of technical sciences, professor Kalandarov Palvan Iskandarovich, doctor of technical sciences, professor Ozodov Ezoz Oybekovich, PhD, senior teacher Bozorov Elmurod Ostonovich, PhD, associate professor Nigmatov Aziz Mahkamovich, senior teacher</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours Contact hours: -lecture – 30 hours -practical lessons – 30 hours self-learning – 90 hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Physics», «Information technology and mathematical modeling of progress»</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b></p> <p><b>1. Knowledge and Understanding:</b></p> <ul style="list-style-type: none"> <li>- Gain a comprehensive understanding of the principles and concepts related to the Automation of technology process;</li> <li>- Acquire knowledge about the various stages involved in the technology process, from ideation to implementation;</li> <li>- Understand the impact of technology on society, economy, and culture;</li> <li>- Familiarize oneself with the ethical, legal, and social implications associated with the technology process.</li> </ul> <p><b>2. Students be able to:</b></p> <ul style="list-style-type: none"> <li>- Develop the ability to critically analyze and evaluate different technology processes;</li> <li>- Apply problem-solving skills to identify challenges and propose effective solutions in the technology process;</li> <li>- Evaluate the feasibility and sustainability of technology projects.</li> </ul> <p><b>3. Form competences in:</b></p> <ul style="list-style-type: none"> <li>- Develop the capacity to adapt to rapidly evolving technological advancements;</li> <li>- Foster innovative thinking and creativity in the context of the technology process;</li> <li>- Explore emerging technologies and their potential applications.</li> </ul>

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p><i>During the lectures, the student is recommended to define the main theoretical rules of the studied sections of the subject and keep a brief synopsis</i></p> <p><i>In lectures and practical sessions, the classification of automation systems, typical schemes of open and closed digital control systems, basic definitions of technological objects, tasks and applications, issues of automation of typical technological processes are studied.</i></p> <p><i>They learn information about modern automation tools and non-standard technological processes, their structure and operation.</i></p> <p><i>Introduction. Concept of development of water resources in Uzbekistan until 2030. Development issues of water management automation in Uzbekistan. Basic concepts of automation systems of production processes in hydromelioration systems. Level of difficulty: 1.</i></p> <p><i>Technological devices - as an object of automation. The main tasks of automation of technological processes. Functional, structural, principle and assembly schemes of automation of technological processes. Level of difficulty: 2.</i></p> <p><i>Structure of automatic control systems of technological processes (TJABT). TJABT steps and technical tools used in them. Level of difficulty: 3.</i></p> <p><i>Control devices used in automation Level of difficulty: 2.</i></p> <p><i>Adjustment devices used in automation Level of difficulty: 2.</i></p> <p><i>Control devices used in automation Level of difficulty: 2.</i></p> <p><i>Execution mechanisms of automation Level of difficulty: 2.</i></p> <p><i>Controllers in automated systems. Types of programmable logic controllers. Level of difficulty: 3.</i></p> <p><i>Automation objects. Level of difficulty: 3.</i></p> <p><i>Description of the objects of modern water industry production as an object of automation Level of difficulty: 3.</i></p> <p><i>Automation of exemplary technological processes in GM systems. Organizational requirements - conditions of automation of production processes. Features of automation of production processes, main issues of automation of production processes</i></p> <p><i>Automation of hydraulic construction. Hydraulic equipment as an object of automation. Valves and lifting devices in the hydraulic facility. Automation schemes of hydraulic devices Level of difficulty: 4.</i></p> <p><i>Barrier automatic control scheme. GTI's shutter automatic protection. Characteristics of automatic water level adjustment systems in hydraulic facilities. Microprocessor tools in the GTI. GTI computer control. Level of difficulty: 4.</i></p> <p><i>13. Automation of pumping stations. Pump stations as an object of automation. Technological processes of production at pumping stations and issues of their automation. Automatic adjustment of consumption of pumping stations Level of difficulty: 5.</i></p> <p><i>4. Study of the fastening fittings of pumping stations. Automation of water wells. Features of automation of sedimentation pumps and aggregates, automatic control systems Level of difficulty: 5.</i></p> <p><i>15, Automated control systems of technological processes of water management. Architecture of ATP. One input and output device of ATP. Level of difficulty: 5.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>

Reading list	<ol style="list-style-type: none"><li>1. Yusufbekov N.R., Muhamedov B.Ye., G'ulomov Sh.M. <i>Texnologik jarayonlarni boshqarish sistemalari. Texnika oliy o'quv yurtlari uchun darslik.</i> Toshkent, «O'qituvchi», 2011</li><li>2. Gazieva R.T., Abdullaeva D.A., To'xtamishev B.. <i>Avtomatikaning texnik vositalari va raqamli avtomatika.</i> T., 2014., 180 b.</li><li>3. Gaziyeva R.T. <i>Suv xo'jaligidagi texnologik jarayonlarni avtomatlashtirish.</i> Toshkent, «O'qituvchi», 2007</li><li>4. А.Арифжанов. <i>Автоматизированные системы управления технологическими процессами в водном хозяйстве.</i> Т.ТИИМ, 2016, 184 с.</li><li>5. Втюрин В.А. <i>Автоматизированные системы управления технологическими процессами. Основы АСУТП.</i> Санкт-Петербург. 2006</li><li>6. Dorf R., Bishop N. <i>Modern control systems.</i> M: 2002 - 832s.</li></ol>
--------------	--



<b>Module designation</b>	<b>PR1108 Internship (Production)</b>
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Begmatov I.A. Ph.D., professor, Isabaev K.T. Ph.D., associate professor, Botirov Sh. Ph.D., associate professor, Yulchiev D.G. assistant, Urazbaev I.K. Ph.D., senior researcher, Tadjiev S.S. Ph.D., assistant, Mardiev Sh.H. assistant, Azizov Sh.N. Ph.D., assistant.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>In production enterprises, in the field.</i>
Workload (incl. contact hours, self-study hours)	240
Credit points	8
Required and recommended prerequisites for joining the module	<i>"Engineering Geodesy", "Irrigation and Reclamation", "Hydraulics", "Hydrology and Hydrogeology".</i>
Module objectives/intended learning outcomes	<i>The purpose of industrial practice is to connect students' theoretical knowledge with practical or productive work, and to form skills and competencies in them.</i>
Content	<i>The student can carry out production practice in the following enterprises and organizations: facilities of the Ministry of Water Management of the Republic of Uzbekistan, regional and district agricultural administrations, irrigation system basin administrations, irrigation system administrations, main canals, project institutes, farms and other organizations belonging to the agro-industrial complex.</i>
Exams and assessment formats	<i>A report on production practices is prepared. The report is formalized in accordance with the requirements of the "Methodical instruction on production practice" prepared by the "Irrigation and melioration" department. Familiarization with hydrotechnical structures, canals and collectors, as well as the water demand of agricultural crops and irrigation methods in the irrigation and drainage networks. Excursion to water management facilities, photo and video information. Final report and review of responsible experts of the production enterprise, defense of work.</i>
Study and examination requirements	<i>A student must score at least 60% out of 100% of the total allocated marks to successfully complete the internship.</i>
Reading list	<ol style="list-style-type: none"> <li>1. Khamidov M.Kh., Mamataliyev A.B. Irrigation and reclamation. Study guide. Tashkent. IS IT CLOSED. 2019. -210 pages.</li> <li>2. Begmatov I.A., Shukurlaev X.I., Mamataliev A.B. Irrigation and reclamation. Textbook. - Tashkent: Ilm-ziyo-zakovat, 2022. - 472 str.</li> <li>3. M.K.Khamidov, H.Shukurlaev, K.O.Lapasov Instruction manual on practical training in "Agricultural hydrotechnical melioration". -Tashkent: TIMI, 2014. -320 pages.</li> </ol>

## 7-semester

<b>Module designation</b>	<b>SRF-4106 Multi purposes water resources use</b>
Semester(s) in which the module is taught	7
Person responsible for the module	<i>Ravshan Boyirov Qutbidinovich – Phd, Associate Professor Sobit Mamatov Alimjanovich - Senior lecturer</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 180 Contact hours: 180</i> <ul style="list-style-type: none"> <li>• <i>lecture - 40,</i></li> <li>• <i>practical lessons – 50,</i></li> <li>• <i>self-learning – 90,</i></li> </ul>
Credit points	6
Required and recommended prerequisites for joining the module	<i>To master the course, Bachelor Students must have basic knowledge in chemistry, physics, ecology and environment, engineering Geodesy, geology and hydrogeology.</i>

Module objectives/intended learning outcomes

After mastering the discipline, the student will:

**know and understand:**

- *Understanding of the hydrological cycle;*
- *Knowledge of precipitation, evaporation, and runoff processes;*
- *Familiarity with surface water and groundwater interactions;*
- *Understanding water quality parameters;*
- *Knowledge of pollutants and their impact on water resources;*
- *Ability to assess and monitor water quality;*
- *Understanding of water-related policies and regulations;*
- *Knowledge of water rights and allocation;*
- *Awareness of global and regional water management frameworks;*
- *Understanding of the interconnectedness of water systems;*
- *Ability to balance competing water uses;*
- *Awareness of climate change impacts on water resources;*
- *Knowledge of adaptation and mitigation strategies;*
- *Understanding of sustainable water management in changing climates.*

**Be able to:**

- *Proficiency in hydrological modeling tools;*
- *Ability to simulate water flow, groundwater recharge, and water quality;*
- *Skills in using Geographic Information Systems for water resource mapping;*
- *Ability to analyze satellite imagery for water-related applications;*
- *Data Analysis and Interpretation;*
- *Analytical skills for interpreting hydrological and water quality data;*
- *Ability to make data-driven decisions for water resource management;*
- *Communication skills to engage with diverse stakeholders;*
- *Ability to facilitate meetings and negotiate water use agreements;*
- *Skills in planning and executing water resource projects;*
- *Ability to manage resources, budgets, and timelines.*

**form competences in:**

- *Ability to adapt strategies to changing water availability and demand;*
- *Flexibility in implementing solutions based on evolving conditions;*
- *Critical thinking to address complex water resource challenges;*
- *Innovative problem-solving to optimize water use efficiency;*
- *Collaboration with interdisciplinary teams for holistic water management;*
- *Working with communities and stakeholders to achieve common water goals;*
- *Making decisions based on environmental sustainability and social equity;*
- *Upholding ethical standards in water resource management practices;*
- *Commitment to staying updated on emerging technologies and research;*
- *Pursuit of professional development opportunities in the water resources field.*

<p>Content: The discipline includes the following topics. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Hydrosphere, its components. The movement of water in it, water reserves and resources. Level of difficulty: 3</i></p> <p><i>The water resources of the globe, their distribution by continent. Quantitative descriptions of water. Level of difficulty: 2</i></p> <p><i>The water requirements of the participants of the aquatic complex and the turn of their water supply. Level of difficulty: 4</i></p> <p><i>Municipal, industrial enterprises, energy, agricultural and livestock water farm complex: Level of difficulty: 1</i></p> <p><i>Measures for the effective use of Water Resources in irrigated agriculture and their implementation: Level of difficulty: 4</i></p> <p><i>Water economy balance. Drawing up and analyzing the balance of the water economy of the river basin: Level of difficulty: 4</i></p> <p><i>The current basis for the management and use of Water Resources. Water Resources Management and use system in Uzbekistan: Level of difficulty: 5</i></p> <p><i>Global climate change. Impact of climate change on water resources and water use: Level of difficulty: 5</i></p> <p><i>Water resources of Uzbekistan - their current use and problems. Water Resources Planning: Level of difficulty: 3</i></p> <p><i>Basin water management. Basin institutions and their responsibilities. Basin water organizations (BVOs). Examples: Level of difficulty: 4</i></p> <p><i>Water in 2050, 2100. Water resources in 2050, 2100. Water demand in 2050, 2100. Roadmap: Level of difficulty: 5</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li><i>1. Valiev X.I., Murodov Sh.O., Xolboev B. "Suv resurslaridan mukammal foydalanish va muxofaza qilish", Darslik. T. Fan va texnologiya, 2010. - 167 b.</i></li> <li><i>2. Mamatov S.A. va boshqalar. Kichik daryolar suv resurslarini mukammal boshqarish va ulardan oqilona foydalanish. Toshkent, 2014 - 76 b.</i></li> <li><i>3. A.T.Salohiddinov, O.A. Ashrova "Suv resurslarini havzaviy rejalashtirish va boshqarish", Darslik.T.: 2020.-216b.</i></li> <li><i>4. A.T.Salohiddinov, R.Q.Boirov, K.Milov, R.Taha, D.Zigler "Suv resurslarini havzaviy boshqarish va rejalashtirish"(ingliz, rus va o'zbek tillarida), O'quv qo'llanma.T.; 2020-162b.</i></li> <li><i>5. R.Quentin Grafton, Karen Hussey "Water resources planning and management", London 2011, Cambridge University Press p. 423</i></li> <li><i>6. Diane Arjoon, Amory Tillmant and Markus Herrmann. Sharing water and benefits in transboundary river basins. hydrol. Earth Syst. Nauk, 20, 2135–2150, 2016.</i></li> <li><i>7. Grafton R.K., Hussey K. Planning and management of water resources. The Cambridge University Express. 2011.</i></li> </ol>

<b>Module designation</b>	<b>GET4105-Organization and technology of hydromelioration work</b>
Semester(s) in which the module is taught	7
Person responsible for the module	<i>Irmukhamedova Lyudmila Khasanovna, associate professor Firlina Galina Lvovna senior teacher Radjabov Mirzokhid Zokirovich assistant Nazarova SHokhida Murodboevna assistant</i>
Language	<i>uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical training, Independent Education.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 330 hours. Contact hours: 150 hours: - lecture – 70 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	“Melioration and construction machinery”, “Hydraulic structures”, “Engineering structures”, “Irrigation and melioration”.
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p style="text-align: center;"><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- On the tasks and work performed in the construction and repair of hydromelioration facilities</li> <li>- irrigation networks</li> <li>- on material and technical resources ensuring the quality and efficiency of work performed during the construction process</li> <li>- to have an idea of the water management system</li> <li>- the construction organizations in it and their activities</li> </ul> <p style="text-align: center;"><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- to know the technologies of work performed in the construction of hydromelioration facilities</li> <li>- irrigation networks; to know the requirements for building materials</li> <li>- conditions and quality of use of machine-mechanisms and equipment in the performance of works</li> <li>- to know and be able to use technical literature, educational documents in the field</li> <li>- to apply the achievements of advanced technologies</li> <li>- science and technology in;</li> </ul> <p style="text-align: center;"><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- to determine the composition and procedure for the work carried out in the construction of structures and facilities</li> <li>- to carry out technological calculations on the selection of machine mechanisms</li> <li>- equipment for their implementation</li> <li>- to determine the acceptance, quality of the work performed</li> <li>- to effectively organize the water farm construction process</li> <li>- taking into account market principles</li> <li>- to carry out Management in modern ways</li> </ul>

Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

Introduction, general information. Technical normalization in construction. Scientific and technical progress in construction. The main requirements for the production of hydromelioration construction, the main directions of increasing labor productivity, reducing the duration and cost of construction. Ensuring the quality of work. Tasks of technical normalization. Methods of technical normalization. Organization of technical normalization in construction. The main types of regulatory documents, their designation and procedure for their use. Foreign experience in technical and descriptive moderation. Level of difficulty: 3.

Grunts and their building properties. Doing land work. Taking into account the quality of the grunts when performing construction and repair work. The main types and elements of Grunt structures. Balance of Grunt volumes, working volumes. Basic construction processes. methods of execution during the construction, repair and restoration and operation of irrigation and melioration facilities. Level of difficulty: 3

Performing ground work with excavators with one and many sinks. Digging the grunts using excavators with one and many sinks. The main working parameters and conditions of selection of excavators. Methods of digging a grunt with an excavator. Calculation of the work productivity of the excavator and factors affecting productivity. Level of difficulty: 4.

Digging land-carrying out land work with Transport Machines. Suspension, trailer reclamation machines, their use, scope of application and job descriptions. Organizational and technological ways of increasing the productivity of mechanisms. Organization of the transportation of grunts in construction. Special vehicles with periodic and continuous movement. Job descriptions of vehicles, conditions of application and technical economic indicators. Compaction of grunt in quality lifts. Organization and technologies of grunt compaction work. Methods and means of compaction, conditions for their enslavement. Ways to calculate and increase the productivity of compaction machines. Control of grunt laying work and the quality of compaction. Level of difficulty: 4.

Hydromechanization. Technologies and technical means of performing land work in the method of hydromechanization in the construction and operation of irrigation and melioration systems. Placement of the grunt using water. Extraction of the grunt by mechanical means, disposal by water, transportation works. Drilling is the performance of blasting work. To the means of blasting, the requirements for it. Calculation of the amount of explosives. Safety measures when performing earthworks. Level of difficulty: 4.

Application of monolithic concrete and reinforced concrete in construction. The role of concrete and reinforced concrete in the construction and reconstruction of hydraulic structures and irrigation systems. Hydraulic concrete. Requirements for hydraulic concrete. Experience and future of using polymerbeton, polymer additive and lightweight concretions in hydromeliorative construction. Primary objects (materials) in concrete works and the requirements for them. Technological processes of mining, transportation mechanisms and processing of fillers. The composition of the concrete mixture. Level of difficulty: 3.

Technologies for the preparation of concrete mixture. Technologies, devices and types of preparation of concrete mixture. Rheological indicators of the concrete mixture and their provision in the process of preparation of the mixture. Packaging of materials that are part of the concrete mixture. Selection of concealers and calculation of work productivity. Schemes for the placement of concretions in concrete mixing devices. One-and two-step concrete plants technological work schemes. Calculation of warehouse capacity. Automated equipment for the preparation of concrete mixture. Level of difficulty: 4.

Perform fittings and mold work. The composition of technological systems and processes of fitting work. Methods for preparing pre-reinforced fittings. Fitting work quality control shrinkage.

Exams and assessment formats	One intermediate control (30 minutes will be given a vacancy) and a final oral examination (40 minutes will be given) are provided
Study and examination requirements	Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass
Reading list	<ol style="list-style-type: none"> <li>1. B.B.Hasanov, L.X.Irmuhamedova, G.L.Firlina. <i>Gidromelioratsiya ishlarini tashkil qilish va texnologiyasi. Darslik. "TIQXMMI" MTU bosmaxonasi. T. 2022. 268 b.</i></li> <li>2. Xusanxodjaev O`, Davranov G`, Axmedov I. – <i>Gidrotexnika ishlarini bajarish. Toshkent. Mubina Holigraf Servis. 2014.369 b.</i></li> <li>3. Б.Б.Хасанов, Л.Х.Ирмухамедова, Г.Л.Фырлина «Производство гидротехнических работ». Издательство. «ТИИМСХ», 2020. 136 с.</li> <li>4. Г.Л.Фырлина, Л.Х.Ирмухамедова, Ш.Назарова. "Организация и технология гидромелиоративных работ". Учебное пособие. Издательство. «ТИИМСХ», 2023. 118 с.</li> <li>5. R.L.Pevrifooy, S.J.Sshexnayder, A.Shapira – <i>Sonstrustion, planning, equipment and methods. MsGraw Hill, 2006, 756p.</i></li> </ol>

<b>Module designation</b>	<b>KME4205 Chemical melioration</b>
Semester(s) in which the module is taught	7
Person responsible for the module	<i>Kasimbetova Saltanat, PhD, associate professor Urazbaev Ilkhom Kinesbaevich, PhD, senior lecturer Tadjiyev Sunnat Saydaliyevich, PhD, assistant Azizov Shohruh Nu`monjon ug`li, PhD, assistant</i>
Language	<i>Uzbek, Russian.</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Chemistry”, “Soil Science”, “Hydrogeology”, “Geology”, “Ecology”, “Irrigation and land melioration”, “Improvement of natural conditions”.</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>the causes of soil salinity, the methods of determining the type and salt content, the composition of salts in the soil, determining the level of harm to plants, the fight against soil salinity, the effective methods of developing chemical measures against salinity in saline areas;</i></li> <li>- <i>determination of harmful salts for crops and their degree of harm, measures to reduce the effects of harmful salts, sand dunes and their fortification.</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>assessment of the melioration status of irrigated lands,</i></li> <li>- <i>use of chemical measures in brackish and brackish lands,</i></li> <li>- <i>adoption of solutions for melioration of saline soils.</i></li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>measures to reduce the effects of harmful salts and harmful salts;</i></li> <li>- <i>adjustment of water and salt regimes of the soil;</i></li> <li>- <i>soil - planning of melioration activities;</i></li> <li>- <i>to be able to determine the composition of salts in the soil, their types and the degree of harm to plants;</i></li> <li>- <i>organization of effective ways of developing measures against salinity in saline areas.</i></li> </ul>



<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Subject, method and tasks of chemical melioration. Types of agricultural melioration. Causes of agricultural soil salinity. Water physical properties of soil. Causes of soil salinity and salt composition. Difficulty level: 2</i></p> <p><i>The content of salts in the soil and their degree of harm to the plant. Saline soils, their types, classification and their properties. Distribution of saline soils in hilly, semi-desert and desert zones. Importance of determination of soil salinity in agricultural chemical melioration. Sodium salt in saline and saline soils. Salt washing of soils. Salt washing method, time and salt washing rate. Difficulty level: 2</i></p> <p><i>Diversity of water-soluble salts in saline and saline soils. Liming of saline and saline soils. Barren soils. The amount of humus in barren soils, their chemical and physical properties, water permeability. Difficulty level: 3</i></p> <p><i>Salinity tolerance of agricultural crops. Differences in salinity tolerance of different crops in different soil conditions, biological characteristics, depending on plant type and age. The effect of saline soils on the yield and quality of agricultural crops. Level of difficulty: 4</i></p> <p><i>The effect of water on salt and its harmfulness. Water purification methods. Types of salts harmful and harmless to plants. Determination of soil salinity. Its alkalinity and hydrogen (RN) indicator of the soil mixture. Saline and salty soils and the salts in them. Determination of the area of saline lands in our republic and the composition of salts. Difficulty level: 5</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li><i>1. Chhabra R.P., Shankar V. "Coulson and Richardson's" Chemical Engineering". Volume 1A: Fluid Flow: Fundamentals and Applications. India. 2017.- 621 p.</i></li> <li><i>2. Хамидов М.Х., Бобожонов П.Х. "Химическая мелиорация". Учебное пособие. Ташкент. ТИИМ. 2006. – 132 с.</i></li> <li><i>3. "Агрохимия": Учебник. М: изд. Агропромиздание. 1989. - 639 с.</i></li> <li><i>4. Уразкелдиев А.Б. "Кимёвий мелиорация". Ўқув қўлланма. Тошкент. 2015. – 141 бет.</i></li> </ol>

<b>Module designation</b>	<b>RBT 4205 Digital control systems</b>
Semester(s) in which the module is taught	7
Person responsible for the module	<i>Kalandarov Palvan Iskandarovich, doctor of technical sciences, professor Gazieva Rano Teshabayevna, candidate of technical sciences, professor Usmanov Aziz Magdalievich, candidate of technical sciences, professor Ozodov Ezoz Oybekovich, PhD, <b>senior teacher</b> Bozorov Elmurod Ostonovich, PhD, associate professor Nigmatov Aziz Mahkamovich, <b>senior teacher</b></i>
Language	<i>Uzbek, Russian.</i>
Relation to curriculum	<i>elective</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Physics», «Information technology and mathematical modeling of progress»</i>
Module objectives/intended learning outcomes	<i>After mastering the discipline, the student will: - Knows and understands the principle of operation of automated block schemes, the structure of automatic control schemes, the principle of operation of the microprocessor system and the calculation of the parameters of the elements; - Understands the basic principles of conditional designation of microprocessor elements, their structure and operation principles, as well as connections of sensors and other auxiliary elements; - Is able to draw up an automatic control scheme, a working classification of microcircuits and determine the parameters of microprocessors and express thoughts: - It is able to express its views by having the competencies of designing, implementing and recommending modern control systems to amaliet. - Knows how to apply the principles and methods of building digital models, methods of analysis and synthesis in the design and research of digital systems and controls. - Knows how to explain the mathematical description of linear discrete systems in the form of algorithms.</i>

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Introduction. Basic concepts, terms and applications of digital control systems. Level of difficulty: 1</i></p> <p><i>The structure of digital devices, their elements and devices. Level of difficulty: 1</i></p> <p><i>The basic rules and theorems of the algebra of logic. Level of difficulty: 2.</i></p> <p><i>Logical functions, logical elements, their manufacturing technologies and principles of operation. Level of difficulty: 2.</i></p> <p><i>Fundamentals of digital device design. Combination devices. Level of difficulty: 3.</i></p> <p><i>Memory elements. Level of difficulty: 2.</i></p> <p><i>Registers. Registers operating on a parallel and sequential principle. Level of difficulty: 3.</i></p> <p><i>Counting devices (counters), Their basic schemes and principles of operation. Level of difficulty: 3.</i></p> <p><i>Digital-to-analog and analog-to-digital converters. Level of difficulty: 3.</i></p> <p><i>Clock pulse generators. Pulse generators, generators of rectangular, sawtooth and triangular signals-circuits and their applications. Level of difficulty: 3.</i></p> <p><i>Integrated circuits. Fundamentals of PCB design. Level of difficulty: 3.</i></p> <p><i>The general concept of microprocessors (MP) and microcontrollers (MC). Classification of microprocessors. Level of difficulty: 2.</i></p> <p><i>Internal structure and operating principle of a single crystal microprocessor. Level of difficulty: 2.</i></p> <p><i>The programming language of the microprocessor is a system of microassembler commands. Level of difficulty: 2.</i></p> <p><i>Basics of building and configuring programs in the Microassembler language. Level of difficulty: 2.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. Газиева П.Т. и др. Цифровое управление. Учебное пособие. Ташкент. 2020. – 178 с.</li> <li>2. Digital Design and Computer Architecture, by <u>David Harris</u> (Author), <u>Sarah Harris</u> (Author) 2013. ISBN-13: 978-0123944245</li> <li>3. Abdullayev M.M. Pisoblash texnikasi va boshqarish sistemalarining elementlari va qurilmalari. Elektron o'quv qo'llanma. Toshkent 2013.</li> <li>4. М.В.Виноградов, Е.М.Самойлова. Цифровые системы управления.- Саратов: Ай Пи Ар Медиа. -2019.-115 с.</li> <li>5. Григорьев В.В., Быстров С.В., Бойков В.И., Болтунов Г.И., Мансурова О.К. Цифровые системы управления: Учебное пособие. - Санкт-Петербург: Университет ИТМО, 2019. - 133 с. .</li> </ol> <p><i>Гуров, С.И. Булевы алгебры, упорядочные множества, решетки: Определения, свойства, примеры./С.И. Гуров. – М.: Либроком. 2023. – 352 с.</i></p>

<b>Module designation</b>	<b>SHB4205 Forecasting crop yields based on water use</b>
Semester(s) in which the module is taught	7
Person responsible for the module	<i>PhD Gadoyev Nodir Nosirjonovich, Phd Khamidov Shaxnoza, ass. Gafforova Aziza</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: Auditorium hours: lecture - 30 hour; Practical training - 30 hour; Self-learning - 90 hour</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>Irrigation and land reclamation, Technologies for the effective of water in agriculture</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>Management of irrigation networks;</i></li> <li>- <i>implementation of water measurement and distribution, irrigation techniques and their use;</i></li> <li>- <i>mathematic calculation (school program)</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>students should be able to know and use the theory of predicting the productivity of agricultural crops grown on irrigated lands, their types and structure, as well as the appropriate methods of watering and fertilizing them for certain climatic and soil-meliorating conditions;</i></li> <li>- <i>should be able to determine the hydromodule of irrigation in irrigation systems, determine the order of irrigation of agricultural crops, determine the elements of irrigation technology and techniques, know how to use irrigation and melioration systems rationally, draw up water use plans and find technical and economic options.</i></li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>identify crop yield in big areas regarding climate and land condition on farmer land;</i></li> <li>- <i>managing farmers land up to 100 hectares and choosing appropriate crop for that or next year;</i></li> <li>- <i>choosing best irrigation system for crop, calculation of amount of water and other fertilizers for one year;</i></li> <li>- <i>use of agromeliorative and agro technologies in field work;</i></li> <li>- <i>working as a farmer assistant to identify best market productive product for coming year.</i></li> </ul>
Content: The discipline includes. The <i>level of difficulty</i> : (1 – low, 5 high):	<p><i>Effective use of land, soil fertility, productivity and productivity of agricultural crops on the basis of the water use plan and irrigation regime, also implementation of high-performance agrotechnical measures. Level of difficulty: 2.</i></p> <p><i>Development of a model for determining plant productivity using higher mathematics, statistical analysis and other methods. the theory of predicting the productivity of agricultural crops grown on irrigated lands, their types and structure, as well as the appropriate methods of irrigation and fertilizing them for certain climatic and soil-meliorating conditions. Level of difficulty: 4.</i></p> <p><i>Selection and cultivation of marketable products in the future depending on market conditions. Level of difficulty: 3.</i></p>

Exams and assessment formats	<i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i>
Study and examination requirements	<i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i>
Reading list	<ol style="list-style-type: none"> <li>1. <i>A.Sherov, N.Gadaev “Suvdan foydalanish rejasi asosida ekinlarning hosildorligini bashorati”. O’quv qo’llanma, Tashkent - 2022.</i></li> <li>2. <i>Petter Wallaer. Irrigation and Drainage Engineering. Textbook. 2014 year.</i></li> <li>3. <i>Ikramov R.K. Principles of water-salt regime in the Middle east and the deficit of water resources / tr. NUMBER. - Tashkent: GIDROINGEO, 2001. -191 p.</i></li> <li>4. <i>Bezborodov G.A. “Egatlab sug’orishda suv tejankor texnologiyalari”. 1993.</i></li> <li>5. <i>Isashov A., Sobitov A. Tuproq unumdorligini oshirishning zamonaviy agrotexnologik usullarini qo’llash (suvni tejaydigan va tomchilatib sug’orish, lazer bilan tekislash, chuqur haydash bilan tuproqni yumshatish va boshqalar). Study guide. Alisher Navoi nashriyot uyi, 2016, 54 bet</i></li> </ol>

<b>Module designation</b>	<b>SYT4205 Soil leaching technology</b>
Semester(s) in which the module is taught	7
Person responsible for the module	<i>Khamidov Mukhamadkhan Khamidovich, DSc, Professor Begmatov Ilkhom Abduraimovich, PhD, Professor Urazbaev Ilkhom Kinesbaevich, PhD, senior lecturer Tadjiyev Sunnat Saydaliyevich, PhD, assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, practical lesson, lab works.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>"Engineering Geodesy", "Chemistry", "Soil Science and farming", "Geology and hydrogeology", "Irrigation and land reclamation"</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>Know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>about the areas of saline soils in Uzbekistan;</i></li> <li>- <i>salts and their antagonism.</i></li> <li>- <i>the influence of soil salts on soil properties, plant growth and productivity;</i></li> <li>- <i>reclamation cadastre;</i></li> <li>- <i>phytomeliorates.</i></li> <li>- <i>methods of leaching salts from the soil.</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>apply land reclamation cadastre;</i></li> <li>- <i>control the reclamation state of lands.</i></li> <li>- <i>carry out flushing irrigation.</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>determine the influence of soil salts on the properties of the soil, plant growth and productivity;</i></li> <li>- <i>carry out leaching of saline soils;</i></li> <li>- <i>justify the salt washing technology.</i></li> </ul>
Content: The discipline includes. The level of difficulty: (1 – low, 5 high):	<p><i>Area of saline soils in Uzbekistan. Salts and their antagonism. Effects of soil salts on soil properties, plant growth and productivity. Level of difficulty: 2.</i></p> <p><i>Actions against soil salinization. Control of land reclamation conditions. Ameliorative cadastre. Level of difficulty: 3.</i></p> <p><i>Irrigation and agrotechnologies that reduce the restoration of salts in the soil. "Saline Wash" Crop Irrigation Procedures. Level of difficulty: 4.</i></p> <p><i>Phytomeliorative measures. Natural and artificial ditches. Level of difficulty: 4.</i></p> <p><i>Soil leaching theory. Methods of leaching salt from the soil. Level of difficulty: 4.3.</i></p> <p><i>Water-efficient brine washing technologies. Washing and absorption of saline stains. Environmental justification of brine washing technologies. Level of difficulty: 3.</i></p>
Exams and assessment formats	<i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i>

Study and examination requirements	<p><i>Requirements for successfully passing the module:</i>  <i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. <i>Khamidov M.Kh., Begmatov I.A., Mamataliev A.B. Sho'r yuvish texnologiyalari. "TIQXMMI" MTU bosmaxona. Tashkent 2022. 217 bet.</i></li> <li>2. <i>Хамидов М.Х., Бегматов И.А., Маматалиев А.Б. Технологии промывки засоленных земель. Учебник. Ташкент. Типография НИУ «ТИИИМСХ» 2023. 230 стр.</i></li> <li>3. <i>С.Е.Никулин. Основы гидромелиорации. – Х.: ХНАГХ, 2012. – 120 с.</i></li> <li>4. <i>Бегматов И.А. «Улучшение мелиоративного состояния орошаемых земель» Пособие. Ташкент. 2021. 138 стр.</i></li> </ol>

<b>Module designation</b>	<b>MMR 4205 Ameliorative monitoring</b>
Semester(s) in which the module is taught	7
Person responsible for the module	Ph.D., Associate Professor PhD Satbay Nurjanov Ph.D. associate Professor PhD Ilkhom Ruziev Ph.D. associate Okhunov Farrukh Assistant Abdullaev Bakhrom Assistant Shavkat Nortaev Assistant Yakhshiyev Shakhzot Assistant Bakhronova Zulkhumor
Language	Uzbek, Russian
Relation to curriculum	Elective
Teaching methods	Lecture, practical lesson, self-learning
Workload (incl. contact hours, self-study hours)	Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning – 90 hours. .
Credit points	5
Required and recommended prerequisites for joining the module	Physics, Chemistry, Hydrology
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- to analyze the hydrogeological conditions of the irrigated areas;</li> <li>- to calculate the regime and balance of seepage waters;</li> <li>- assessment of geological and hydrogeological conditions of land, underground water flows, their prediction;</li> <li>- making hydrogeological maps;</li> <li>- drilling techniques and technologies, drilling equipment, drilling methods used in geological and hydrogeological research.</li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- use in hydrogeological-ameliorative maps;</li> <li>- knowledge of negative processes and events that occur during the implementation of meliorative measures, and their prediction; - to prevent possible negative processes; assessment of hydrogeological improvement conditions of irrigated lands, results of geological and hydrogeological maps and studies;</li> <li>-hydrogeological indicators of underground water flows and aquifers and their use in solving reclamation issues;</li> <li>- negative events and processes related to the implementation of melioration and water supply measures;</li> <li>- basic physical and physical-mechanical parameters of soils, equipment of wells;</li> <li>- opening of aquifers, aquifers, well construction, filters, preparation of filters, calculation of basic parameters;</li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- drilling methods, several methods of groundwater flow estimation;</li> <li>- prediction of changes in hydrogeological conditions;</li> <li>- geological and hydrogeological maps and research; results, hydrogeological dimensions of aquifers and underground water flows;</li> <li>- methods of establishing the water balance of the region, hydrogeological data of observations, conducting hydrogeological and engineering, geological researches;</li> <li>- able to clearly state their opinions and conclusions regarding the analysis of research results and their use;</li> <li>- assessment of hydrogeological-ameliorative conditions;</li> </ul>



Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

- Tasks and content of reclamation hydrogeology in the reclamation of agricultural lands, urban and industrial areas. General information about irrigation and drainage. Elements of hydromelioration systems. Irrigation methods and water injection technology. Tasks of studying the hydrogeological-ameliorative conditions. Factors of hydrogeological-ameliorative conditions: Level of difficulty 2

- General concepts and definition of hydrogeological process stages. Development laws of hydrogeological processes and their analysis in land reclamation. Factors determining hydrogeological processes (climate, relief, geomorphological, geological factors) and their description. Hydrogeological regions and their hydrodynamic description, regions of feeding and transit, consumption, re-reduction and spread of streams: Level of difficulty 2

- Mode types. Natural and disturbed modes. Syzot water regime genetic types. Characteristics of seepage water regime distributed in different natural regions and irrigation areas. Regime of mineralization and chemical composition of seepage waters. Principles of management of the regime of seepage waters. Water balance in land under reclamation. Balance types. Total water balance, aeration zone balance, seepage water balance. Balance components. Studying the balance and researching the balance plots. Analysis of the balance sheet: Level of difficulty 2

- Factors of formation of irrigation nutrition during irrigation and salt washing. Specificity of irrigation nutrition in different climatic regions. Basing irrigation nutrition on the basis of modeling moisture transport in the aeration zone. Damping of seepage water in newly irrigated lands: Level of difficulty 3

- Hydrodynamic indicators and boundary conditions necessary for land reclamation assessment, forecasting, and the design of reclamation structures. Hydrodynamic indicators - definition of their concepts. Methods of determining hydrodynamic parameters. Division into hydrogeological - reclamation districts. Definition of concepts; division into regional and local districts, taking into account the specificity of the hydrogeological process in the arid climate region and the distribution of stormwater in the regions. Geofiltration schemes of reclamation lands, general concepts about filtration schemes, a brief history of the issue. Geofiltration sections: Level of difficulty 3

- The role and importance of boreholes in irrigation and water supply systems. Concepts of drilling wells and their main elements. A brief history of drilling techniques and technology in Uzbekistan and abroad. Development of drilling science. The connection of this science with other sciences. Basic requirements for a drilling well. Types of rocks by drilling, sedimentary, igneous, metamorphic rocks and their properties. Types of damage to rocks during drilling: Level of difficulty 4

-The main factors determining the design of the borehole. The elements of the construction of the borehole: wellhead, conductor, diverter, technical, operational and strainer pipelines. Justification of the choice of water-absorbing operational layer. Basic information on the hydrogeological calculation of the Burgi well. Determination of borehole indicators based on experimental water withdrawal results. Taking into account the interaction of drill wells: Level of difficulty 4

- Strainers of boreholes. The main elements of strainer strings. Reasons for strainer failure. Perforated filters for catching small particles: perforated, various, wire, gravel, etc. Filter selection and their calculation. Structure of salniks. Strainer wells. Conditions of use, specific features of the device. Perforated filters for catching small particles: perforated, various, wire, gravel, etc. Filter selection and their calculation. Structure of salniks. Strainer wells. Conditions of use, specific features of the device: Level of difficulty 5

Exams and assessment formats	<i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i>
Study and examination requirements	<i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i>
Reading list	<ol style="list-style-type: none"> <li>1. <i>F.G.Bell – Engineering Geology 2<sup>nd</sup> edition, 2007-398 peg</i></li> <li>2. <i>Yusupov G.U., Quvvatov D.A. «Meliorativ gidrogeologiya». O`quv qo`llanma. Toshkent. TIMI. -2008.-200 bet.</i></li> <li>3. <i>Yusupov G.U. «Meliorativ gidrogeologiya» fanidan ma`ruzalar kursi. Toshkent. TIMI. -2007.-189 bet.</i></li> <li>4. <i>Ruziyev I.M., Nurjanov S.E., Gapparov F.A. "Injenerlik geologiyasi va gidrogeologiyasi" fanidan o`quv qullanma. Toshkent. -2021.- 256 bet.</i></li> <li>5. <i>Рузиев И.М., Нуржанов С.Е., "Инженерная геология и гидрогеология" Учебник. Ташкент. -2022.-220 стр.</i></li> </ol>

<b>Module designation</b>	<b>YHM4205 Land melioration and protection</b>
Semester(s) in which the module is taught	7
Person responsible for the module	<i>Kasimbetova Saltanat, PhD, associate professor Abduraimova Dilbar Aybekovna, PhD, associate professor Urazbaev Ilkhom Kinesbaevich, PhD, senior lecturer Tadjiyev Sunnat Saydaliyevich, PhD, assistant</i>
Language	<i>Uzbek, Russian.</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Contact hours: 150 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Chemistry”, “Soil Science and farming”, “Geology and hydrogeology”, “Hydrology”, “Hydraulic”, “Natural Science”, “Ecology”, “Irrigation and melioration”.</i>

Module objectives/intended learning outcomes

*After mastering the discipline, the student will:*

**know and understand:**

- water, wind and soil erosion;
- causes of erosion;
- the meaning of the word recultivation, the concept of land recultivation;
- stages of recultivation;
  - the impact of water and wind erosion on the soil;
- recultivation of land that has become unusable;
- formation of ravines, ways of their melioration;
- sources of soil pollution;
- measures to protect the soil from pollution;
- harmful consequences of floods and landslides;
- flood plains and low plains;
- waste waters their characteristics;
- properties of saline, saline and saline soils.

**Be able to:**

- elimination of the harmful effects of water, wind and soil erosion;
- implementation of recultivation stages;
- measures to combat wind and water erosion;
- application of reclamation measures against floods and landslides;
- protection of soils from pollution;
- melioration of barren lands and flood plains;
- methods of applying waste water to irrigation;
- adoption of solutions for reclamation of saline, saline and saline soils.

**form competences in:**

- determination of areas to be recultivated;
- step by step implementation of recultivation works;
- planning measures against water and wind erosion;
- prevention of floods and landslides and implementation of reclamation measures against their harmful consequences;
- calculation of the parameters of protective earth walls protecting cliffs;
- design of dikes to protect the banks from flood inundation;
- determination of the distance between protective dams;
- design of soil pollution protection measures;
- assessing the quality of waste water according to its composition;
- irrigation with livestock waste water;
- liming and plastering of soupy and soupy soils.

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>The purpose, task, necessity and essence of the science of land reclamation and conservation. Stages of reclamation (preparatory, technical and biological). Methods of leveling irrigated lands. Level of difficulty: 2.</i></p> <p><i>Concept of erosion. Types of erosion (anthropogenic, zoogenic, wind, water, soil erosion). Water erosion, types and consequences. Selection of hydrotechnical structures used against water erosion and their type. Level of difficulty: 2.</i></p> <p><i>Wind erosion, erosion. Wind erosion control measures. Irrigation erosion, causes of formation. The area of lands affected by irrigation erosion in Uzbekistan, measures used against irrigation erosion. Level of difficulty: 3.</i></p> <p><i>Measures to prevent the formation of ravines and ravines. Reclamation of ravines. Melioration measures against floods and floods. Landslide and warning measures. Level of difficulty: 3. Sources of soil pollution and ways to protect soil from pollution. Methods of chemical melioration of wet soils (soil liming and plastering). Level of difficulty: 4.</i></p> <p><i>Reclamation of floodplains and floodplains. Protection of land from flooding. Determination of the distance between protective dams. Agromelioration requirements for the quality of waste water. Irrigation with waste water. Level of difficulty: 4.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li><i>1. Бегматов И.А., Касимбетова С.А., Юлчиев Д.Г. "Рекультивация и охрана земель". Ўқув қулланма. "ТИКХММИ" МТУ. 2022 й.- 286 bet.</i></li> <li><i>2. Shukurlayev X., Shukurlayeva R., Mamataliyev A. "Yerlar rekultivatsiyasi va muhofazasi" Toshkent. TIMI. 2009-142 bet.</i></li> <li><i>3. В.И. Желязко, Т. Д. Лагун. «Мелиорация, рекультивация и охрана земель». Учебное пособие. Горки. БГСХА, 2016. – 276 с. ISBN 978-985-467-617-3.</i></li> <li><i>4. Голованов А. И., Зимин Ф. М., Сметанин В. И. «Рекультивация нарушенных земель» Учебник. СПб. Издательство «Лань», 2015. – 336 с.</i></li> <li><i>5. А.В.Кравчук. «Мелиорация, рекультивация и охрана земель». ВГБОУ ВПО «Саратовский ГАУ».-Саратов, 2014.-67 с.</i></li> </ol>

### 8-semester

<b>Module designation</b>	<b>GTF4104 Use of hydromelioration systems</b>
Semester(s) in which the module is taught	8
Person responsible for the module	<i>Professor Sherov Anvar G'ulyamovich, Phd Khamidova Shaxnoza, Phd Gadaev Nodir, ass. Jalilov Sirojiddin, ass. Rakhmonov Dilshod, ass. Gaffarova Aziza.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, practical lesson, lab works.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 20 hours; - practical lessons – 40 hours; - self-learning - 60 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Hydraulics”, “Use of pumping stations”, “Hydrotechnical construction”, “Agricultural hydrotechnical melioration”, “Organization and management of hydromelioration works”.</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p style="text-align: center;"><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>general principles of calculation and design of irrigation facilities;</i></li> <li>- <i>existing classification of building types;</i></li> <li>- <i>to know identifying soil type and infiltration speed;</i></li> <li>- <i>calculation of open channels and reservoirs</i></li> </ul> <p style="text-align: center;"><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>management of irrigation networks, implementation of water measurement and distribution, irrigation techniques and their use;</i></li> <li>- <i>use the methods of implementation of irrigation works by choosing the most economical irrigation method based on the preparation of a water use plan for the cultivation of agricultural crops grown on irrigated lands;</i></li> <li>- <i>determine the hydromodule of irrigation in irrigation systems, determine the procedure for watering agricultural crops,</i></li> <li>- <i>to determine the elements of irrigation technology and techniques, know how to use irrigation and melioration systems rationally, draw up water use plans and have the skills to find feasible technical and economic options.</i></li> </ul> <p style="text-align: center;"><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>Obtaining planned amount of water consumption from the irrigation source during the intended period of time with the help of hydrotechnical facilities, delivering it to consumers through irrigation networks without wasting it, drawing up and implementing water use plans, cleaning the channels of irrigation and drainage networks from waste and weeds, a special comprehensive measure against water wastage - development of activities in a scientifically based manner and their implementation.</i></li> </ul>

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p><i>Content, history, status and duties of use of hydromelioration systems, requirements for technical devices in the use of hydromelioration systems. Equipment of irrigation systems, using on special points of rivers and canals. Level of difficulty: 2.</i></p> <p><i>Organizing and improving hydromelioration systems, duties and functions of managing staff, duties and functions of the general administration, organizing activities of the general administration, information sharing thought hydromelioration organization. Level of difficulty: 2.</i></p> <p><i>Operational hydrometry and water accounting of irrigation systems. Introduction of automation, mechanization, computerization systems, development of modern irrigation techniques and technologies, and its reconstruction. All types of Measurement control devices. Level of difficulty: 3.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i>  <i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. Sherov A., Serikbayev B.S. “Gidromeliorativ tizimlarni modernizatsiyalash”. Textbook. Tashkent, TIIAME 2018. 380 bet.</li> <li>2. Sherov A. “Gidromeliorativ tizimlarni modernizatsiyalash” Tashkent, TIIAME, 2020. 230 bet.</li> <li>3. Sherov A, Gadayev N. <i>Gidromelioratsiya tizimlarini modernizatsiya qilish fani bo'yicha uslubiy ko'rsatma</i>. Tashken. 2020, 70 bet.</li> <li>4. Barayev F.A., Serikbayev B.S., Bazarov R.Kh., “Gidromeliorativ tizimlardan foydalanish”, Textbook. “TIIM”, 2012. 260 bet.</li> <li>5. Baraev F.A., Serikbaev B.S. “Gidromeliorativ tizimlardan foydalanish. Textbook. Tashkent. “TIIM”, 2013. 270 bet.</li> <li>6. Peter Waller, Mulunech Yitayew, “Irrigation and drainage engoneering” Agricultural and Biosystems engineering university of Arizona (Tucson), total pages 496 pp.</li> </ol>

<b>Module designation</b>	<b>SXI 4205 Economics and management in water sector</b>
Semester(s) in which the module is taught	8
Person responsible for the module	<i>Sattorov Orifjon Boymurodovich, PhD, associated prof, Madina Saidova; PhD, Associate professor, Dusmuratov G'anibay Davlitbaevich, Associate professor, Muradov SHerzod Muradovich, PhD, Associate professor, Yunusov Iskandar Orifovich, PhD, Associate professor.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 90 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Economic theory», «Integrated water resources management», «Water resources planning and management».</i>



<p>Module objectives/intended learning outcomes</p>	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>Understanding the economic principles and concepts related to water resources, including supply and demand dynamics, pricing, and market structures;</i></li> <li>- <i>Familiarity with the economic valuation of environmental impacts and ecosystem services related to water management, such as the cost-benefit analysis of water-related projects;</i></li> <li>- <i>Knowledge of water-related policies, regulations, and legal frameworks, both at the national and international levels;</i></li> <li>- <i>Understanding the economics of water infrastructure development, including the financing mechanisms, project appraisal, and infrastructure asset management;</i></li> <li>- <i>Proficiency in using economic models to analyze water-related issues, such as economic impact assessments, resource allocation, and investment decisions;</i></li> <li>- <i>Knowledge of sustainable water management practices and strategies, including water conservation, integrated water resource management, and adaptive management approaches;</i></li> <li>- <i>Ability to analyze water markets, including water trading, water rights, and the impact of market forces on water allocation and pricing.</i></li> </ul> <p><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>Proficiency in collecting, analyzing, and interpreting data related to water resources, economic variables, and environmental factors;</i></li> <li>- <i>Ability to conduct cost-benefit analyses of water projects, taking into account economic, social, and environmental factors;</i></li> <li>- <i>Skill in applying statistical and econometric methods to analyze water-related data and make informed decisions;</i></li> <li>- <i>Capability to assess the economic implications of water policies and regulations and provide policy recommendations;</i></li> <li>- <i>Competence in financial modeling and assessing the financial viability of water infrastructure investments;</i></li> <li>- <i>Effective communication skills to convey complex economic concepts and findings to diverse stakeholders, including policymakers, communities, and industry professionals.</i></li> </ul> <p><b>form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>The ability to identify and address complex economic challenges and trade-offs in water management, such as balancing economic development with environmental conservation;</i></li> <li>- <i>Competence in working collaboratively with experts from various fields, including hydrology, ecology, engineering, and sociology, to develop holistic water management solutions;</i></li> <li>- <i>Understanding and adherence to ethical principles in economic analysis, especially concerning equitable access to water resources and environmental stewardship;</i></li> <li>- <i>The capacity to adapt to changing economic conditions, climate variability, and evolving water management paradigms;</i></li> <li>- <i>The ability to lead and influence stakeholders in the development and implementation of economically sound water management strategies;</i></li> <li>- <i>A commitment to staying updated with the latest research, policy developments, and innovations in the field of economics of water management.</i></li> </ul>
---	--

Content: The discipline includes. The level of difficulty: (1 – low, 5 high):

*Content, Goals, and Tasks of Water Economy: The water economy encompasses the management and utilization of water resources, including surface and groundwater, for various sectors such as agriculture, industry, and domestic use. Its goals include efficient water resource management, water conservation, and sustainable development. Tasks involve the allocation of water resources, infrastructure development, and ensuring water quality. Level of difficulty: 4;*

*Water Resources and Their Use in the National Economy: Water resources are essential for agriculture, industry, energy production, and urban areas. Efficient use involves allocation, conservation, and treatment of water to meet the needs of these sectors while preserving the environment. Level of difficulty: 5;*

*Structural Changes Implemented in the Water Management System and Its Effectiveness: Structural changes may include the reorganization of water management agencies, decentralization, or privatization to improve efficiency and accountability. The effectiveness of these changes is assessed based on factors like water resource management, service delivery, and environmental impact. Level of difficulty: 4;*

*Personnel, Labor Productivity, and Wages in the Water Industry: Personnel management, labor productivity, and wage levels are crucial aspects of the water industry. Adequate training, fair wages, and efficient labor practices are necessary to ensure the sustainable operation of water facilities. Level of difficulty: 5;*

*Fixed Assets and Working Capital of Basin Management Organizations and Water Management: Basin management organizations require fixed assets for infrastructure and working capital to cover operational costs. Proper financing is crucial to maintain and upgrade water infrastructure. Level of difficulty: 4;*

*The Role of Leasing in Water Management Development: Leasing can be a financial mechanism for water infrastructure development. It allows organizations to access assets without large upfront investments, which can aid in expanding water management capabilities. Level of difficulty: 5;*

*Prices, Profits, and Production Profitability: Pricing policies in water management influence profits and production profitability. Balancing affordability for users with the need for infrastructure maintenance and investment is a critical challenge. Level of difficulty: 4;*

*Economic Efficiency of Capital Investments in Water Management Activities: Assessing the economic efficiency of capital investments involves analyzing the returns on investments in water infrastructure projects and their long-term benefits for the economy and society. Level of difficulty: 5;*

*Economy of Using Techniques in Water Management: Employing advanced techniques, such as water-saving technologies and sustainable practices, can lead to cost savings and resource conservation in water management. Level of difficulty: 4;*

*Organizational Structure of Management: The organizational structure of water management agencies and institutions can impact their efficiency and effectiveness in delivering water services and managing resources. Level of difficulty: 5;*

*Economic Efficiency of Water-Saving Technologies: Evaluating the economic efficiency of water-saving technologies involves assessing their cost-effectiveness in reducing water use while maintaining or improving productivity in various sectors. Level of difficulty: 5.*

Exams and assessment formats

*One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).*

Study and examination requirements	<p><i>Requirements for successfully passing the module:</i>  <i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. Umurzoqov O'.P., Abduraximov I.L. Suvxo'jaligimenejmenti. Toshkent. O'quvqo'llanma. Iqtisod - moliya, 2008 y.</li> <li>2. David L. Debertin, A.Agricultural Production Economics. Second Edition, Amazon Createspace 2012. 242 p.</li> <li>3. Umurzoqov O'.P., Sultonov A.S. Rashidov J.X. Suv xo'jaligi iqtisodiyoti va menejmenti. Darslik. TIMI. 2016y.</li> <li>4. U.Sangirova, Kh.Yakubova, U.Kholiyorov, G.Kholmurodova "Economics and Management" Textbook TIIAME – 2021.</li> <li>5. Sangirova U.R., Sattorov O.B., Economics and management of water management. Textbook. "TIIAME" MTU. 2022.</li> <li>6. Sultonov A.S., Xudoyberganov Z.Y., Sattorov O.B., Suv xo'jaligi iqtisodiyoti "TIIAME" MTU. 2023.</li> </ol>

<b>Module designation</b>	<b>RI4205-Digital economy</b>
Semester(s) in which the module is taught	8
Person responsible for the module	<i>Sultanov Bahadir Fayzullayevych, Doctor of Economics, Senior Researcher Nosirova Sanobar, assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Informatics and information technologies», «Business management», «Economic theory», «Microeconomics», «Tatistics», «Econometrics».</i>
Credit points	5

<p>Module objectives/intended learning outcomes</p>	<p>After mastering the discipline, the student will:</p> <p style="text-align: center;"><b>know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>basic approaches to the analysis of various economic situations at the level of digital economy sectors and other sectors;</i></li> <li>- <i>correct modeling of situations taking into account the technological, situational, organizational-legal and institutional characteristics of the digital economy;</i></li> <li>- <i>understanding the essence of digital economy and modern information technologies, effective use of global information resource bases;</i></li> <li>- <i>development of digital economy under the conditions of public-private partnership;</i></li> <li>- <i>identification of information security problems, effective organization of electronic business processes;</i></li> <li>- <i>making effective decisions regarding the effective use of e-commerce models.</i></li> </ul> <p style="text-align: center;"><b>Be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>correct modeling of situations taking into account the technological state, organizational, legal and institutional characteristics of the digital economy;</i></li> <li>- <i>organization of digital economy infrastructure; understand the essence of "blockchain" technologies;</i></li> <li>- <i>to know and be able to use methods and ways of effective use of global information resource bases;</i></li> <li>- <i>studying, evaluating, analyzing the organization of crypto-exchanges, implementing the most promising and strategically important projects.</i></li> </ul> <p style="text-align: center;"><b>Form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>to summarize the knowledge gained in the process of studying this subject;</i></li> <li>- <i>analysis of digital economy and digital technologies;</i></li> <li>- <i>draw correct conclusions from suggestions for problems and use them in practice in the future;</i></li> <li>- <i>to determine the positive and negative consequences of digital transformation, the factors affecting them;</i></li> <li>- <i>assessment of the impact of the digital economy on macro- and micro-level indicators; evaluation of the effectiveness of digital transformation;</i></li> <li>- <i>creation of platforms for the development of the digital economy;</i></li> <li>- <i>to identify and evaluate the factors hindering the effective organization of business processes, to apply e-commerce methods in practice;</i></li> <li>- <i>development of international standard requirements for ensuring the quality of digital services.</i></li> </ul>
---	---

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p>Introduction to the science of "Digital Economy". Information is the basis of the development of society. Features of the digital economy. The concept, purpose and tasks of the digital economy. Digital economy and economic growth. Digital Economy: Fundamentals of Electronic Business Management. The nature and development features of e-business. Features of creating a business on the Internet. Characteristics and legal basis of digital economy development in Uzbekistan. <i>Level of difficulty 2.</i></p> <p>Characteristics of the development of electronic trade (internet trade). Electronic trade (e-commerce) and electronic trade (e-trade) special features and differences. Electronic business models. Social, economic and legal foundations of the formation and development of e-commerce service. Features of business management in the digital economy. Features of techniques and technologies in the digital economy, future technologies. Big data (Bigdata) and analytics, database organization. Cloud technologies: their features, opportunities and disadvantages. <i>Level of difficulty 3.</i></p> <p>Mobile technologies. Mobile technologies in the digital economy. Introduction of mobile devices to the market of Uzbekistan and stages of development. Mobile technologies and digital transformation of business. Neurotechnologies and artificial intelligence. The history of the development of artificial intelligence. Properties of the neural network. Intellectual capital in socio-economic development of the country. Problems of formation and use of intellectual resources. <i>Level of difficulty 3.</i></p> <p>Peculiarities of the legal status of foreign investors. Rights and obligations of foreign investors in the Republic of Uzbekistan. Regulatory and legal frameworks developed in our country for attracting foreign investments. Investment contracts. Provision of state guarantees to foreign investors. Legislation of the Republic of Uzbekistan and CIS countries on foreign investments. <i>Level of difficulty 4.</i></p> <p>Design Thinking in Business. Features of design thinking in business process management. Design thinking is the development of user-oriented products, services and services. Stages of design thinking. Virtual and augmented reality technologies. Virtual and augmented reality technologies. Development problems of virtual and augmented reality technologies. Features of the world market of virtual and augmented reality technologies. <i>Level of difficulty 4.</i></p> <p>Development of e-learning platforms. Development of e-learning market and types of educational platforms. Formation of the educational environment of the digital economy. Ways to develop distance education, the essence and development of the "Industry-4.0" concept. Blockchain technology Bitcoin payment system. Directions for effective use of blockchain technologies. Models of sustainable development of the banking system in the digital economy. Bank innovation development strategies. Development of banking infrastructure in the digital economy. <i>Level of difficulty 5.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>

Reading list	<ol style="list-style-type: none"><li>1. Лapidус Л.В. Цифровая экономика. Управление электронным бизнесом и электронной коммерцией. Учебник. М.: Инфра - М. 2020. - 479 стр</li><li>2. Хусаншин И.А., Кудряшов А.А., Кузьмин Е.В., Крюкова А.А. Цифровая экономика. Учебник для высших учебных заведений. М.: Горячая линия-Телеком. 2020, - 288 стр.</li><li>3. Gulyamov S.S., Ergashev R.X., Xamrayeva S.N. Raqamli iqtisodiyot. O'quv qo'llanma. – T.: Iqtisodiyot, 2020. – 466 b</li><li>4. S.S.G'ulomov, O.M.Abdullayev, R.Ayupov. Raqamli iqtisodiyot (kriptovalyuta va blokcheyn). O'quv qo'llanma. T.: Moliya, 2020. - 354 b.</li><li>5. Зубарев А.Е. Цифровая экономика как форма проявления закономерностей. // Вестник ТОГУ, 2017. № 4.</li></ol>
--------------	--

<b>Module designation</b>	<b>YIQ4205 Green economy,</b>
Semester(s) in which the module is taught	8
Person responsible for the module	<i>Sultanov Bahadir Fayzullayevych, Doctor of Economics, Senior Researcher, Murodov Sherzod, PhD, associate professor, Maksumkhanova Azizakhan, Ph.D., associate professor Nosirova Sanobar, assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>selection</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Theory of economy», «Irrigation and reclamation», «Soil science», «Environment protection», «Geoinformation systems and technologies».</i>



<p>Module objectives/intended learning outcomes</p>	<p>After mastering the discipline, the student will:</p> <p><b>To know and understand:</b></p> <p><i>Students will learn about different concepts and facets of the green economy, as well as global, national and sector-specific challenges and opportunities to advance low-carbon, resource efficient and socially inclusive development. Additionally, students will begin to develop basic skills for applying the green economy concept in a real local economic, policy context.</i></p> <p><b>To be able to:</b></p> <p><i>Describe the rationale and core concepts for realizing an inclusive green economy against business-as-usual practices; Identify enabling conditions for greening national economies; Outline principal opportunities and challenges in key sectors; Provide examples of national strategies and planning to advance an inclusive green economy; Distinguish international frameworks and initiatives in support of an inclusive green economy.</i></p> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li><i>- basic methods of quantitative analysis and modeling, theoretical and experimental research;</i></li> <li><i>-culture of thinking, ability to perceive, generalize and analyze information, setting a goal and choosing ways to achieve it;</i></li> <li><i>- analytical skills in the field of applied aspects of green economy;</i></li> <li><i>- carry out professional communication and communication on issues of organization and managing one's own professional activities;</i></li> <li><i>- the student must have the skills to think economically, conduct research on economic phenomena, identify patterns, establish correlations between individual phenomena, justify their point of view, check the reliability of research findings, and make decisions.</i></li> <li><i>- apply the conceptual and categorical apparatus, basic economic laws in professional activities;</i></li> <li><i>- must have the skills of a holistic approach to the analysis of economic phenomena; use the acquired knowledge to express your own assessment of economic phenomena and processes.</i></li> </ul>
---	--

<p>Content: The discipline includes. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p><i>Introduction to a Green Economy: Rationale and Concepts. Green Economy in a Nutshell. Traditional Development Patterns and its Limitations. Rationale for a Balanced and Inclusive Green Economy. Origins, Definitions and Priority Areas of a Green Economy. Key Concepts Related to a Green Economy. Green Economy and Sustainable Development. Level of difficulty: 3.</i></p> <p><i>Enabling Conditions for Advancing a Green Economy. Identify diverse policy tools to foster a green economy; indicate green investments; Describe international regulatory mechanisms relevant for a green transition; Analyse the role of individual and institutional capacities in advancing a green economy; Promoting Investment and Spending in Areas that Stimulate a Green Economy. Level of difficulty: 4.</i></p> <p><i>Greening the Economy in Key Sectors. Investing in Sectors with Natural Capital. Investing in Sectors with Manufactured Capital. Integrated Scenarios to Project Green Investment Impacts. Level of difficulty: 4.</i></p> <p><i>Strategies for Developing a Balanced and Inclusive Green Economy. Integrating Green Considerations in Development Planning. Engaging Key National Stakeholders in a Green Transformation. Strategic Approaches to a Green Transformation. Social and Pro-Poor Considerations. Measuring the Green Economy. Level of difficulty: 5.</i></p> <p><i>International Developments and Support to Advance a Green Economy. Overview of International Initiatives Relevant to the Green Economy. International and Local Support Programmes and Services. Level of difficulty: 4.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:</i></p> <p><i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li><i>1. A.V.Vaxabov, Sh.X.Xajibakiyev va boshqalar. Yashil iqtisodiyot Darslik. / T.: "Universitet", 2020. – 262 b.</i></li> <li><i>2. Вацалова Т.В. Экологические основы природопользования. Устойчивое развитие: учебное пособие. – М.: Юрайт, 2020. – 186 с.</i></li> <li><i>3. Иминов Т.К., Вахабов А.В., Тешабойев Т.З., Бутабойев М.Т. "Зелёная экономика" как основа устойчивого развития. Монография. – Т.: "Алоқачи", 2019. – 480 с.</i></li> <li><i>4. Adrian C. Newton. An Introduction to the Green Economy: 1st Edition. Routledge, 2014. – 382 p.</i></li> <li><i>5. Greening the Global Economy (Boston Review Originals) Hardcover – November 13, 2015. – 176 p.</i></li> </ol>

<b>Module designation</b>	<b>STA-4205-Statistics</b>
Semester(s) in which the module is taught	5
Person responsible for the module	<i>Bakhramova Dilbar Bakhramovna, Phd</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>selection</i>
Teaching methods	<i>Lecture, practical lesson.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 hours. Contact hours: 60 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>«Mathematics», «Physics», «English», «Russian».</i>
Module objectives/intended learning outcomes	<p><i>After mastering the discipline, the student will:</i></p> <p><b>To know and understand:</b></p> <ul style="list-style-type: none"> <li>- <i>principles of organizing experiments;</i></li> <li>- <i>peculiarities of experimental research in the field of environmental protection;</i></li> <li>- <i>technologies of construction of methods of selection of the main factors of the experiment and factor plans;</i></li> <li>- <i>principles of analysis in natural science research;</i></li> <li>- <i>basic types of regression analysis and level 2 plans, as well as basic methods of processing experimental results;</i></li> </ul> <p><b>To be able to:</b></p> <ul style="list-style-type: none"> <li>- <i>select the necessary factors and make factor plans for different types of experiments;</i></li> <li>- <i>determine the necessary sample size;</i></li> <li>- <i>analyze the properties of regression model parameters;</i></li> <li>- <i>process experimental results using mathematical statistics and the application of computer programs;</i></li> </ul> <p><b>To form competences in:</b></p> <ul style="list-style-type: none"> <li>- <i>independently planning and conducting scientific research;</i></li> <li>- <i>choosing an experiment design according to the optimum criterion;</i></li> <li>- <i>estimating the coefficients of the regression model of the experiment;</i></li> <li>- <i>making optimal plans of scientific and technical experiments and processing the results of the experiment with the help of applied computer programs.</i></li> </ul>

<p>Content: The discipline includes the following topics. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p>Research methods in modern science. Basic concepts. Brief information on probability theory and mathematical statistics. Random variables and parameters of their distribution. The law of normal distribution. Statistical approach to the analysis of natural phenomena. Identification of cause-and-effect relationships in active and passive experiments. Use of meta-analysis method for statistically efficient generalisation of results of unrelated studies. General methods of extremum search. The method of elimination. <i>Level of difficulty</i>: 4.</p> <p>Experiment planning in the study of natural systems. Experiment planning in the works of foreign scientists. Planning of experiment as a component of scientific research. Selection of the experiment scheme using the optimum criterion. Dependence of the breadth and realism of conclusions on the accuracy of the results obtained. Purpose and objectives of the research. Main problems. <i>Level of difficulty</i>: 3.</p> <p>Basic principles of experiment organizing. Classification of experiments. Structural scheme of the experiment. Experimental unit and measured units. Statistical unrelatedness and structure of the experiment plan. Selection of a representative object. Prevention of errors in controlled experiments. Choice of control method in an active experiment setting. Randomization in an active experiment setting. Spatial placement of experimental units under active experiment conditions. Selection of experimental units under passive experimental conditions. Elements of error theory. Interval estimation of measurement errors. Exclusion of gross errors. Smirnov's and Dixon's criteria. Methods of increasing the accuracy of the experiment. <i>Level of difficulty</i>: 4.</p> <p>Formulating hypotheses and preparing them for experimental verification. Development of observations and hypotheses. Principles of forming hypotheses and their statistical testing. The view of natural scientists on hypothesis testing. Two types of errors that occur in hypothesis testing. Responsibility for society and accounting for small probabilities. The use of sequential statistical analysis. <i>Level of difficulty</i>: 3.</p> <p>Determining sample size. The amount of information required to estimate the parameter under study with a given precision. The amount of information needed to find a rare object. Amount of information required for statistical testing of hypotheses about correlation coefficients. Amounts of information required for statistical testing of hypotheses about mean values of normally distributed features. <i>Level of difficulty</i>: 4.</p> <p>Planning an experiment. The main problems that can be solved with the help of planning. Stages of research. Preliminary study of the object. Separation experiments. Method of graded correlation. First order plans. Making a plan of experiment. Plans for a full factorial experiment. <i>Level of difficulty</i>: 4.</p> <p>Conducting social surveys in ecological research. The axiom of social survey. Selection of criteria. Determining the sample size. Planning the survey. Creating sample questionnaires. <i>Level of difficulty</i>: 3.</p> <p>Plan an experiment to find the optimum conditions. General issues of finding an extremum from experience. The concept of extreme experiment and its scope of application. Plan extreme experiments. "Step-by-step" methods of experimental optimization. Sequence of extremum finding using methods of "steepest ascent" and interrelated gradients. Simplex method of planning. <i>Level of difficulty</i>: 4.</p> <p>Planning of experiment for studying complex systems. Planning an experiment in the presence of unrelated and quantitatively variable values. Planning an experiment taking into account qualitative factors in the presence of unrelated and quantitatively changing values. Planning an experiment to study complex systems Given their heterogeneous resources. Planning an experiment at the initial stage of studying complex systems. <i>Level of difficulty</i>: 4.</p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>

Study and examination requirements	<p><i>Requirements for successfully passing the module:</i>  <i>The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>
Reading list	<ol style="list-style-type: none"> <li>1. Shodiyev H. <i>Statistics (textbook)</i> - T.: 2019</li> <li>2. Soatov N.M., Nabiev H., Nabiev D.Kh., Tillakhojhaeva G.N.. <i>Statistics. Textbook.</i> - T.: TDIU, 2019. - 548 pages.</li> <li>3. James T. McClave, Terry Sincic. <i>Statistics /</i>—12th ed. 2018. – 814 p.</li> <li>4. M. Rakhmataliyev. <i>Methodical guide for practical training in "Statistics".</i> TIKXMMI printing house. Tashkent-2021, 156 pages.</li> <li>5. M. Rakhmataliyev. A. Akhmedov. G. Toshkhodjaeva. <i>Mobile application of the textbook "Statistics of agriculture and water management" - all devices running on the Android operating system Android OS Java.</i> Tashkent-2021, 29.2 mb.</li> <li>6. Akhmedov A.K., Rakhmataliyev M.E., Tashkhodjayeva G.S. <i>Agriculture and water economy statistics.</i> - T.: TIQXMMI publishing house, 2021. - 205 pages.</li> <li>1. 7. Soatov N.M. <i>Statistics. Textbook.</i> - T.: Abu Ali ibn Sina, 2019. - 743 pages.</li> </ol>

<b>Module designation</b>	<b>SIB4205 Integrated water resources management</b>
Semester(s) in which the module is taught	8
Person responsible for the module	<i>Ravshan Boyirov Qutbidinovich – Phd, Associate Professor Sobit Mamatov Alimjanovich - Senior lecturer</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Selection</i>
Teaching methods	<i>Lecture, practical lesson, self-learning</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload: 150 Contact hours: - lecture - 30, - practical lessons –30, - self-learning – 90, hours</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>To master the course, Bachelor Students must have basic knowledge in geology and hydrogeology, hydraulics, irrigation and reclamation, Multi purposes water resources use.</i>
Module objectives/intended learning outcomes	<p>After mastering the discipline, the student will:</p> <p><b>know and understand:</b>  <i>water resource accounting systems, water facilities in the world and Central Asia - the distribution of rivers, lakes, reservoirs and glaciers, surface and groundwater reserves and resources, operational water resources, hydrometric network designed to take into account River Water Resources, the use of local streams and the protection of water facilities, the foundations of Integrated Water Resource Management, international problems in the management of cross-border Water Resources.</i></p> <p><b>Be able to:</b>  <b>Skills:</b> <i>forecasts for the return of succulent and low periods in water sources, short and long-term predictions of river flow, monthly information about the amount of precipitation in the winter period and estimates of the wateriness of its rivers for the growing season, images of the study of winter precipitation, snow reserves, methodological foundations for the assessment of annual renewable aquaculture resources, public participation in.</i></p> <p><b>form competences in:</b>  <i>calculation of water balance in natural and artificial water bodies, assessment of hydrologic - quality of collected river waters by hydrochemical indicators, assessment of potential exploitation resources of groundwater by Trunk river basins, prediction of changes in river flow due to human economic activity, drawing up a water use plan.</i></p>

<p>Content: The discipline includes the following topics. The <i>level of difficulty</i>: (1 – low, 5 high):</p>	<p>Important issues of Integrated Water Resource Management. Level of <i>difficulty</i>: 2  Implementation of Integrated Water Resource Management. Level of <i>difficulty</i>: 3  Development of a strategic vision in the integral management of Water Resources. Level of <i>difficulty</i>: 4  Water resource management planning: Level of <i>difficulty</i>: 1  Development of an integrated water resource management work plan: Level of <i>difficulty</i>: 4  Stakeholder participation in the development of an integrated water resource management work plan: Level of <i>difficulty</i>: 4  Water resource status analysis in the water resource management planning process. Water resources management strategies and options: Level of <i>difficulty</i>: 5  Preparation and approval of an Integrated Water Resources Management Plan: Level of <i>difficulty</i>: 5  Public participation in the integral management of Water Resources. Management of Water Resources in agriculture: Level of <i>difficulty</i>: 3  Water resource monitoring and their assessment: Level of <i>difficulty</i>: 4  Managed aquifer recharge. Benefits and challenges: Level of <i>difficulty</i>: 5</p>
<p>Exams and assessment formats</p>	<p><i>Two written midterm assessments (30 minutes each), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module:  The final grade in the module is composed of 60% performance on exams, 20% take-home assignments, 20% in-class participation. Students must have a final grade of 60% or higher to pass</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. R. Quentin Grafton, Karen Hussey <i>Water Resources Planning and Management</i> Cambridge University Press Cambridge, UK, 2011. 249 p.</li> <li>2. <i>Tool Box IWRM. GWP, second version, email: <a href="http://www.gwpcacena.net">www.gwpcacena.net</a></i></li> <li>3. Салоҳиддинов А.Т., Икромов Р.К., Темирова М.Н. <i>Управление водными ресурсами. Учебное пособие. Тошкент, 2015 - 246 стр.</i></li> <li>4. Saloxiddinov A.T., Raximov N.R. <i>Suv resurslarini integrallashgan boshqarish asoslari. 2018 y. 136 b.</i></li> <li>5. A.T.Salohiddinov, O.A. Ashrova “<i>Suv resurslarini havzaviy rejalashtirish va boshqarish</i>”, Darslik.T.: 2020.-216b.</li> <li>6. Духовный В.А. <i>Управление водными ресурсами Центральной Азии – на пути водно-энергетическому согласию Т. НИЦ МКВК 2010 – 41 стр.</i></li> <li>7. Мирзаев Н.Н. <i>Руководство по внедрению интегрированного управления водными ресурсами. Том 1. Институциональные аспекты Ташкент-2012 г. 152 с</i></li> </ol>

<b>Module designation</b>	<b>SHM4205-Reclamation of cities</b>
Semester(s) in which the module is taught	8
Person responsible for the module	<i>Kasimbetova Saltanat, PhD, associate professor Urazbaev Ilkhom Kinesbaevich, PhD, senior lecturer Tadjiyev Sunnat Saydaliyevich, PhD, assistant Azizov Shohruh Nu`monjon ug`li, PhD, assistant</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Selection</i>
Teaching methods	<i>Lecture, practical lesson</i>
Workload (incl. contact hours, self-study hours)	<i>Contact hours: 150 hours: - lecture – 30 hours; - practical lessons – 30 hours; - self-learning - 90 hours.</i>
Credit points	5
Required and recommended prerequisites for joining the module	<i>“Chemistry”, “Soil Science and farming”, “Geology and hydrogeology”, “Hydrology”, “Hydraulic”, “Natural Science”, “Ecology”, “Irrigation and melioration”.</i>



Module objectives/intended learning outcomes

*After mastering the discipline, the student will:*

**know and understand:**

- *monitoring of land reclamation conditions of the city territory,*
- *optimal irrigation mode of lawns and trees in the city area;*
- *methods of supplying water to plants in urban areas;*
- *to choose water-saving irrigation techniques and technology;*
- *choosing an irrigation system for urban afforestation, creating its optimal scheme;*
- *the effect of watering lawns in the urban area on the soil and atmosphere;*
- *choosing and using water-saving methods for watering plants;*
- *the goals and tasks of waste management networks and systems in the city area;*
- *characteristics of networks and systems of land disposal in urban areas;*
- *ways to protect buildings, structures and roads from flooding in the urban area;*
- *calculation of costs related to water supply to land in the urban area and protection from flooding.*

**Be able to:**

- *to determine the water consumption of lawns and trees in the city;*
- *to determine the optimal watering regime of lawns and trees in the city;*
- *to use water-saving irrigation methods in supplying water to plants in the urban area;*
- *design of irrigation and drainage systems in the urban area;*
- *implementation of measures to prevent salinization of urban land;*
- *introduction of solutions for efficient use of water in urban areas;*
- *carrying out melioration monitoring of the operation of irrigation and drainage systems of the city territory.*

**form competences in:**

- *use of irrigation source in the urban area;*
- *use of irrigation methods in the urban area;*
- *protection of city buildings from flooding;*
- *organization of efficient use of water in the urban area;*
- *implementation of measures to prevent salinization of urban land;*
- *design of suction and drainage systems;*
- *carrying out remedial monitoring of the operation of the irrigation and drainage systems.*

<p>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</p>	<p><i>Monitoring of the study of the natural reclamation conditions of cities. Determination and control of the amount of underground water and seepage water reserves, their use for irrigation purposes in the national economy, detailed study of the hydro-ecological environment, the impact of seepage water on cities and villages, their hydrodynamic and hydrochemical condition, regulation of melioration conditions of city and district centers, introduction of excellent methods. Level of difficulty: 2.</i></p> <p><i>Irrigation of urban gardens with low-level rain. use in protection from the effects of sudden changes, and in the prevention of the decay of tree leaves. Application of sprinkler irrigation method in the urban area. Advantage, nature and necessity of sprinkler irrigation method. Calculation of sprinkler irrigation method and used technical devices. Bringing irrigation water to the state of water mist, scheme and operation of mist generating devices. Level of difficulty: 2.</i></p> <p><i>Measures to prevent rising flood waters and flooding in cities. During the reconstruction of city and district centers, the burial of natural drainage ditches, water supply, water loss from sewage pipes, technical failures. Level of difficulty: 3.</i></p> <p><i>Design of systematic, linear and field ditches in the city area. Schemes of placement of animals in the urban area. Determination of infiltration of irrigation water, flow rate of household wastewater, ditch modulus and water table. Parallel arrangement of gardens, implementation of design schemes in squares, parks of the city. Level of difficulty: 3.</i></p> <p><i>Methods of water seepage from the river into ditches and protection of city buildings. Design of main ditches at the top boundary of city buildings, according to the contours of buildings and grounds. Level of difficulty: 3.</i></p> <p><i>Protection of city buildings from infiltration of atmospheric precipitation and household water. Infiltration of atmospheric precipitation and inflow of household water into Zovur. Designing ditches next to the wall according to the contour of buildings and structures. Ditches used in complex hydrogeological conditions. Designing and placement of layer-area, tape ditches along the contour of buildings and structures and under them in complex hydrogeological and engineering geological conditions. Level of difficulty: 4.</i></p> <p><i>Placement of animals along city roads. In the conditions of mixed water supply, the arrangement of road ditches on the side of the water flow along the roads, two-lane road ditches on wide roads. Design methods of beam trench structure. A vertical wellbore (perfect) trench with a horizontal radial beam exiting one well. To justify the fact that a single beam ditch can be used to effectively lower the water level, for additional technical water supply in the city, to replace several vertical ditches. Use of such structures to prevent pollution of urban areas. Level of difficulty: 4.</i></p> <p><i>Conditions for use of vertical ditches, their components and vertical ditches. Placement of regular vertical ditches according to the composition of the lithological cut and the type of water supply, in individual or linear scheme. Design schemes of vertical and composite ditches to reduce the flow of seepage water in the urban area. Level of difficulty: 4.</i></p>
<p>Exams and assessment formats</p>	<p><i>One written midterm assessments (30 minutes), take-home written assignments and one final oral exam (40 minutes).</i></p>
<p>Study and examination requirements</p>	<p><i>Requirements for successfully passing the module: The final grade in the module is composed of 40% performance on exams, 20 % independent work, 20 % practical work, 20 % mid-term control tests. Students must have a final grade of 60% or higher to pass</i></p>

Reading list	<ol style="list-style-type: none"><li>1. Butler, D. and J.W. Davies. 2004. <i>Urban Drainage</i>. Taylor &amp; Francis, Inc. New York. 568 pages.</li><li>2. Денисов В.В., Курбатова А.С. и др. «Экология города». Учебное пособие. - М.: ИКЦ. Издательский центр «МарТ», 2008. – 832 с.</li><li>3. Базавлук В.А. “Мелиоративное обустройство территорий”. Учебное пособие. Томск. Издательство Томского политехнического университета. 2014. – 184 с.</li><li>4. Fangmeier, D.D., W.J. Elliot, S.R. Workman, R.L. Huffman, and G.O. Schwab. 2006. <i>Soil and Water Conservation Engineering, Fifth Edition</i>. Thomson Delmar Learning. Clifton Park, NY. 552 pages.</li><li>5. S. Bureau of Reclamation. 2005. <i>Drainage Manual: A Guide to Integrating Plant, Soil, and Water Relationships for Drainage of Irrigated Lands</i>. University Press of the Pacific. Honolulu, HI. 308 pages.</li></ol>
--------------	---

<b>Module designation</b>	<b>Internship (before graduation)</b>
Semester(s) in which the module is taught	8
Person responsible for the module	<i>Isabaev K.T. Ph.D, associate professor, Botirov Sh.Ch. Ph.D, Yulchiev D.G. assistant, Urazbaev I.K. Ph.D., senior researcher, Tadjiev S.S. Ph.D, assistant, Mardiev Sh.H. assistant, Azizov Sh.N. Ph.D, assistant.</i>
Language	<i>Uzbek, Russian</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>In manufacturing enterprises.</i>
Workload (incl. contact hours, self-study hours)	150
Credit points	5
Required and recommended prerequisites for joining the module	“Engineering Geodesy”, “Physics”, “Chemistry”, “Soil Science and farming”, “Geology and hydrogeology”, “Hydrology”, “Hydraulic”, “Irrigation and Reclamation”.
Module objectives/intended learning outcomes	The main task of the practice is a logical continuation of the production practice of the students in the 3rd stage, and it consists in collecting economic and other additional information necessary for the quality writing of the graduate qualification work.
Content	Before the internship, the academic supervisor gives the student a written assignment on completing the graduation qualification. The assignment will be the basis for collecting, analyzing and preparing a report on natural, climatic, technical and other data on the selected topic.
Exams and assessment formats	A report is prepared on the practice before graduation. The report is formalized in accordance with the requirements of the "Methodical instruction on conducting pre-graduate work practice" prepared by the department of "Irrigation and land reclamation". It must have a written assignment of the scientific leader and a daily workbook.
Study and examination requirements	<i>A student must score at least 60% out of 100% of the total allocated marks as successfully pass the internship.</i>
Reading list	<ol style="list-style-type: none"> <li>1. Ritzema H.P. (Editor-in-Chief), 2006. <i>Drainage Principles and Applications</i>. Wageningen, Alterra, ILRI Publication no. 16, pp. 1125.</li> <li>2. Xamidov M.X., Mamataliyev A.B. <i>Irrigatsiya va melioratsiya. O'quv qo'llanma</i>. Toshkent. TIQXMMI. 2019. –210 bet.</li> <li>3. Xamidov M.X., Shukurlayev X.I., Mamataliyev A.B. <i>Qishloq xo'jaligi gidrotexnika melioratsiyasi. Darslik</i>. –Toshkent: Sharq, 2009. –380 bet.</li> <li>4. Бегматов И.А., Шукурлаев Х.И., Маматалиев А.Б. <i>Ирригация и мелиорация. Учебник</i>. –Ташкент: “Илм-зиё-заковат”, 2021. –476 стр.</li> <li>5. Xamidov M.X., Shukurlaev X.I., Lapasov X.O. “Qishloq xo'jalik gidrotexnik melioratsiyasi” fanidan amaliy mashg'ulotlarni bajarish bo'yicha o'quv qo'llanma. –Toshkent: TIMI, 2014. –320 bet.</li> <li>5. Морозов А.Н. “Просто о мелиорации”, ISBN 978-9943-4814-9-7 – Ташкент: “Baktria press”, 2016. –152 стр.</li> <li>6. Mamataliyev A.B., Mardiyev Sh.H. “SIU hududidagi sug'orish tizimini namunaviy fermer xo'jaligining sug'oriladigan maydoni misolida loyihalash” mavzusidagi kurs loyihagini bajarishga oid uslubiy qo'llanma. Toshkent. TIQXMMI. 2019. –62 bet.</li> <li>7. Mamataliyev A.B., Mardiyev Sh.H. “SIU hududidagi zax qochirish tizimini namunaviy fermer xo'jaligining sug'oriladigan maydoni misolida loyihalash” mavzusidagi kurs loyihagini bajarishga oid uslubiy qo'llanma. Toshkent. TIQXMMI. 2019. –45 bet.</li> </ol>

<b>Module designation</b>	<b>DA4105-State attestation</b>
<i>Semester(s) in which the module is taught</i>	8
<i>Person responsible for the module</i>	<i>Begmatov I.A. candidate of technical sciences. Professor Isayev S.Kh, Doctor of Agricultural Sciences, Professor Mamataliyev A.B. associate professor</i>
<i>Language</i>	<i>Uzbek, Russian</i>
<i>Relation to curriculum</i>	<i>Compulsory</i>
<i>Teaching methods</i>	<i>Written and spoken</i>
<i>Workload (incl. contact hours, self-study hours)</i>	<i>Total load:150</i>
<i>Credit points</i>	<i>5 credit</i>
<i>Required and recommended prerequisites for joining the module</i>	<i>«Irrigation and melioration», «Water-saving irrigation technologies», «Use of hydromelioration systems», «Integrated water resources and managemen»», «Safety of life activities», «Economy», «The organization of hydromelioration works and their technology».</i>
<i>Module objectives/intended learning outcomes</i>	<i>The student must have mastered the subjects taught for 8 semesters and have sufficient skills and knowledge in his specialty; Graduates of water management and land reclamation education should be familiar with the activities of production enterprises and have skills; Students who have chosen graduate work should have skills such as searching for new technologies and researches in the scientific field and recommending them for practice;</i>
<i>Content: The discipline includes. The level of difficulty: (1 – low, 5 high):</i>	<i>Students can complete the Graduation Qualification work or submit State Certification. The student chooses it himself. -The graduate thesis is written by the student together with the scientific supervisor - The subject of graduation qualification work is approved by the dean's office, and its completion is monitored once every two weeks. - A total of 200 questions from 4 subjects were given to the student in the state attestation, and 4 of these questions must be answered by the student during the attestation.</i>
<i>Exams and assessment formats</i>	<i>Four questions (15 minutes each) and each question is answered orally, Presents graduation qualification work (Presentation) 20 minutes is provided for each student</i>
<i>Study and examination requirements</i>	<i>A total score above 60% indicates that the student has passed the module.</i>

<p>Reading list</p>	<ol style="list-style-type: none"> <li>1. Ritzema H.P. (Editor-in-Chief), 2006. <i>Drainage Principles and Applications</i>. Wageningen, Alterra, ILRI Publication no. 16, pp. 1125.</li> <li>2. Xamidov M.X., Mamataliyev A.B. <i>Irrigatsiya va melioratsiya. O'quv qo'llanma</i>. Toshkent. TIQXMMI. 2019. –210 bet.</li> <li>3. Xamidov M.X., Shukurlayev X.I., Mamataliyev A.B. <i>Qishloq xo'jaligi gidrotexnika melioratsiyasi. Darslik</i>. –Toshkent: Sharq, 2009. –380 bet.</li> <li>4. Бегматов И.А., Шукурлаев Х.И., Маматалиев А.Б. <i>Ирригация и мелиорация. Учебник</i>. –Ташкент: “Илм-зиё-заковат”, 2021. –476 стр.</li> <li>5. Xamidov M.X., Shukurlaev X.I., Lapasov X.O. “Qishloq xo'jalik gidrotexnik melioratsiyasi” fanidan amaliy mashg'ulotlarni bajarish bo'yicha o'quv qo'llanma. –Toshkent: TIMI, 2014. –320 bet.</li> <li>5. Морозов А.Н. “Просто о мелиорации”, ISBN 978-9943-4814-9-7 – Ташкент: “Baktria press”, 2016. –152 стр.</li> <li>6. Mamataliyev A.B., Mardiyev Sh.H. “SIU hududidagi sug'orish tizimini namunaviy fermer xo'jaligining sug'oriladigan maydoni misolida loyihalash” mavzusidagi kurs loyihasini bajarishga oid uslubiy qo'llanma. Toshkent. TIQXMMI. 2019. –62 bet.</li> <li>7. Mamataliyev A.B., Mardiyev Sh.H. “SIU hududidagi zax qochirish tizimini namunaviy fermer xo'jaligining sug'oriladigan maydoni misolida loyihalash” mavzusidagi kurs loyihasini bajarishga oid uslubiy qo'llanma. Toshkent. TIQXMMI. 2019. –45 bet.</li> </ol>
---------------------	--