Satbayev Kazakh National Research Technical University

Petroleum Engineering Department

The educational program 6B07204 – “Petroleum Engineering”

HANDBOOK

Module designation	***LNG 108 English***
Semester(s) in which the module is taught	*1,2 semester*
Person responsible for the module	*Bukabayeva Bakytgul Erdesbayena*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	*Practical classes*
Workload (incl. contact hours, self-study hours)	*General workload:* *Contact hours:3*
Credit points	*5 ECTS*
Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*The purpose of the course is to further develop and consolidate students'knowledge and awareness of academic discourse, language structures, and lexis.It is focused on further developing reading, writing, listening and speaking skills, as well as encouraging learners to apply various approaches to deal with new vocabulary, improve grammatical skills, critical thinking and independent study* *Upon successful completion of the course, students will be able to:* *In Listening:* *- Understand the key information and language of academic lectures and presentations* *- Understand how the lecture material is organized* *- Listen for the main points* *- Recognize signposting language* *- Identify supporting arguments* *- Take notes while listening* *In Reading:* *- Skim a text to understand its main idea, style, and purpose* *- Predict the content of a text* *- Scan a text for particular information* *- Evaluating different sources* *- Taking notes and using them to write a summary* *- Recognize definitions, explanations and examples* *In Writing:* *- Analyze paragraph structure* *- Recognize cohesion in a paragraph* *- Organize information in a logical way* *- Write topic, supporting and concluding sentences* *- Plan and write an essay* *- Understand references* *- Avoid plagiarism* *In Speaking:* *- Structure and signpost a short presentation* *- Give a short presentation and provide peer feedback* *- Offer and respond to opinions*

Content	*Free trade and fair trade. Distinguishing between facts, speculation and reported opinions. Expressing certainty, uncertainty and caution. Recognizing what information is important. Identifying a point of view.* *Conserving the past. Establishing criteria. Dealing with longer texts. Indicating reason or result.* *Wonders of the modern world. Making inferences. How to make reading easier* *Olympic business. Recognizing the structure of an interview. Making notes.* *Communication and technology. Interpreting and translating*
Examination forms	*Multivariate test*
Tuition and Exam Requirements	*Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within 24 hours and explain the plan for independent study of the lesson:* *- mandatory reading of the presented materials before class;* *-submitting assignments on time.* *- 20% non-participation in classrooms (for a good reason with supporting documents) - grade "F (Fail)";* *- plagiarism and cheating when completing a task are not allowed;* *- mandatory use of electronic gadgets in the classroom, which is welcome, but use in the exam is unacceptable.*
Reference	*Required* *1. Philpot Sarah. Headway Academic Skills: Reading, Writing, and Study Skills [Текст] : level 3: student`s b. / Philpot Sarah, Curnick Lesley. - Oxford : Oxford University Press, 2011. - 96 p. - ISBN 978- 0-19-474161-3 http://e-lib.satbayev.university/MegaPro/Download/MObject/102*  *2. Harrison Richard. Headway Academic Skills: Listening, Speaking, and Study Skills [Текст] : level 3: student`s b. / Harrison Richard; ed. Lis and John Soars. - Oxford : Oxford University Press, 2015. – 104 p. : ill. - ISBN 978-0-19-474158-3 http://elib.satbayev.university/MegaPro/Download/MObject/50* *Supplementary* *Chazal Edward de. Oxford EAP: a course in English for Academic Purposes: Intermediate / B1+ [Текст] : student's b. / Chazal Edward de, Rogers Louis. - Oxford : Oxford University Press, 2013. - 224 p. : ill. + DVD-ROM. - ISBN 978-0-19-400201-1. http://e-lib.satbayev.university/MegaPro/Download/MObject/12* *2. Zemach E Dorothy. Academic Writing from paragraph to essay [Электронный ресурс] / Zemach E Dorothy, Rumisek A Lisa. - Oxford : Macmillan, 2005. - 133 p. : ill. - ISBN 1-4050-8606-8. http://e-lib.satbayev.university/MegaPro/Download/MObject/141* *3. Dummett Paul. Oxford EAP. A course in English for Academic Purposes: Pre-Intermediate / B1. : textb. / Dummett Paul, Hird Jon. - Oxford : Oxford University Press, 2015. - 176 p. : ill. + CD-ROM. - ISBN 978-0-19- 400208-0* *http://e lib.satbayev.university/MegaPro/Download/MObject/11*

Module designation	***LNG104 Kazakh (russian) language***
Semester(s) in which the module is taught	*1,2*
Person responsible for the module	*Koyanbekova S., Nurmukhan A'*

Language	*Kazakh, russian*
Relation to curriculum	*Compulsory*
Teaching methods	*practical classes, IWS, IWST*
Workload	*Contact hours:3 : practical classes – 3 times per week (2-offline, 1-online). Additionally, contact hours are held for 30 minutes per group.*
Credit points	*5 ECTS*
Required and recommended prerequisites for joining the module	*The student passed the diagnostic test.*
Module objectives / intended learning outcomes	*As a result of mastering the discipline '**Basic Kazakh language (A2)**' the student **must**:* *- to master the practical use of the skills of reading, writing and understanding sounding speech based on the simultaneous development of the basics of grammar (phonetics, morphology and syntax) and word usage in the course of constant repeated repetition with a gradual complication of tasks;* *- demonstrate the ability to analyze, synthesize and design skills and abilities corresponding to the all-European level B1 (Threshold according to the ALTE classification), that is, it is on the threshold of the level of independent language proficiency;* *- have a conversation on everyday topics; describe your experiences; tell your opinion; retell and evaluate the content of a book read, a film seen;* *- create simple texts on well-known topics, including those related to professional activities.*
Content	*The language material of the course is selected in such a way that the student, learning the lexical and grammatical minimum, has the opportunity to get acquainted with typical communicative situations and find himself in such situations, be able to correctly assess them and choose the appropriate model (strategy) of speech behavior.* *In this case, the main emphasis of learning is transferred from the process of transferring knowledge to learning the ability to use the target language in the course of various types of speech activity, which are reading (subject to reading comprehension), listening (under the same condition) and the production of texts of a certain complexity with a certain degree of grammatical and lexical correctness.*
Examination forms	*Exam tickets, test questions.*
Study and examination requirements	*- Availability of a computer and computer equipment;* *- Availability of an Internet channel with a speed of at least 0.5 Mbps;* *- Personal account with a photo of the face on the avatar and corporate mail on the Microsoft 365 platform;* *- Attendance at scheduled classes.*
Reading list	*1. Kazakh tili. Bazalyk money / Authors: G.K. Dosmambetova, A.K. Balabekov, A.T. Bozbayeva-Hung, A.Zh. Khazimova, B.O. Salykhova. Astana: Ulttyk testileu ortalygy, 2016 – 320 p. Қ 17 ISBN 978-601-7504-37-3 Silteme electrodes: https://tilqural.kz/assets/books/0b2a5801ac721ebac75358f351c0dd33.pdf* *2. Kuzekova, G. Masakova. Kazakh style: Bazalyk money (A2): Oku kuraly. - Astana: 2018. – 224 p. Silteme electrodes: https://tilqural.kz/assets/books/d76b6b1027365e54f79e08d1acbe3fd8.pdf* *3. Tanymger - 2. Learning Kazakh is easy! – Almaty: Mektep, 2011. – 192 p. vAK 80/81 66K 81.2 Kas-9* *4. Z.S. Kuzekova, T.T. Ayapova, F.Sh. Orazbayeva, M.K. Mamaeva Kazakh tilin bazalyk dengeyde mengerudin deңgeylik takyryptyk lexical minima / Ekinshi basylym. - Astana: "Ulttyk testileu ortalygy" RMKK, 2017. – 72 p.*

Module designation	***PET103 «Introduction to Major (Petroleum engineering)»***
Semester(s) in which the module is taught	*1 Semester*
Person responsible for the module	*Imansakipova N.B.*
Language	*Russian, Kazakh*
Attitude towards the curriculum	*profile*
Teaching methods	*lectures, laboratory classes, practical classes*
Workload (including contact hours, self-employment hours)	*General workload: 3 hours* *Contact hours: 1/1/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 ECTS*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT 103 Mathematics, PHY111 Physics* *The ability to analyze, synthesize and know information about the current state of the oil and gas industry.*
Module objectives/intended learning outcomes	*The student should know:* *- basic properties of oil and gas;* *- the basis of the geology of oil and gas;* *- drilling of oil and gas wells;* *- development of oil and gas wells;* *- transportation and storage of oil, petroleum products and gas;* *The student should be able to:* *- determine the physical properties of oil and gas* *- analyze the main characteristics of oil and gas fields;* *- understand the structures of the well;* *- navigate the schemes of pumping oil and gas through the pipeline;* *After completing the course, the student must demonstrate the ability to analyze, synthesize and know information about the current state of the oil and gas industry.*
Content	*As part of the course, the student will master:* *- the basis of the oil and gas business;* *- the main technological processes at oil and gas producing enterprises.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*

References	1. Якушев В.С. Основы нефтегазового дела. – М: РГУ нефти и газа (НИУ) имени И.М. Губкина, 2021, 2.Коршак А.А., Шаммазов А.М. Основы нефтегазового дела. Уфа, 2001, 536с. 3.Середа Н.Г., Муравьев В.М.. Основы нефтяного и газового дела. – М.: Недра, 1980, 287с. 4.Гиматудинов Ш.К. Дунюшкин И.И., Зайцев В.М., Коротаев Ю.П., Левыкин Е.В., Сахаров В.А. Разработка и эксплуатация нефтяных, газовых и газоконденсатных месторождений. – М.: Недра, 1988, 302с. 5.Гиматудинов Ш.К. Физика нефтяного и газового пласта. –М.: Недра, 1971, 302с

Module designation	***PHY 111 «Physics 1»***
Semester(s) in which the module is taught	*1 semester*
Person responsible for the module	*Duametuly Bakhyt*
Language	*kazakh*
Relation to curriculum	*Demanding*
Teaching methods	*lecture, practice, laboratory work*
Workload (incl. contact hours, self-study hours)	*Total workload:* *Contact hours:1 hour lecture,1 hour practice, 1 hour laboratory* *Private tuition, including exam preparation, specified in hours* ^{24} ** 90 hours*
Credit points	*5 ECTS*
Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*At the end of the course, the student should know:* *-modern ideas about the state of matter (matter and fields), achievements of science of the 20th-21st centuries in the field of fundamental physics;* *- fundamentals of conducting experimental studies with modern measuring equipment and processing their results;*
Content	*The PHY1111 course is designed for students of all educational programs.* *As part of the course, the student will master the practical use of the fundamental laws of physics.* *Basic knowledge and skills in the field of mechanics, molecular physics and electrostatics will be presented.* *1 The final stage of the course is the passing of a written exam.* *2 The student must be able to:* *- to use knowledge of physical laws and theories to explain the structure of matter, forces and interactions in nature, the origin of fields and apply them in solving practical problems;* *- explain the applied significance of the most important achievements in the field of physics for the development of energy, transport, communications, medicine, environmental protection;* *- to assess the degree of reliability of the results obtained using experimental or theoretical research methods;*

Examination forms	*Problem solving*
Study and examination requirements	*Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within a day and explain the plan for self-study of the lesson:* *- - mandatory reading of the submitted materials before the lesson;* *- - delivery of tasks on time. There are penalties of -10% for late delivery;* *- 20% non-participation in the audience (for a good reason with supporting documents) - rating "F (Fail)";* *- plagiarism and cheating during the execution of the task are not allowed;* *- mandatory use of electronic gadgets in the classroom, which is welcome, but it is unacceptable to use them in the exam.*
Reading list	*[1] Трофимова Т.И. Курс физики: Учеб. пособие для вузов. М.: Академия, 2004.- 560с.* *(учебник в pdf-формате: https://fktpm.ru/file/45-kurs-fiziki-trofimova-taisija-ivanovna-ucheb-posobie.pdf)* *[2] Савельев И.В. Курс общей физики. Т.1. Механика, колебания и волны, молекулярная физи-ка. –М.: Наука, Гл.ред.физ.-мат., 2005.-508с. (http://mat.net.ua/mat/biblioteka-fizika/Savelyev-fizika-t1.pdf)* *[3] Савельев И.В. Курс общей физики. Т.2. Электричество. –М.: Наука, Гл.ред.физ.-мат., 2005.-426с. (http://mat.net.ua/mat/biblioteka-fizika/Savelyev-fizika-t2.pdf)* *[4] Сулеева Л.Б. Электронный учебник. Механика и молекулярная физика. Изд. КазНТУ, 2004г.* *[5] Сулеева Л.Б. Механика и молекулярная физика. Физический практикум. Изд-во КазНТУ, 2003.* *[6] Волькенштейн В.С. Сборник задач по общему курсу физики для студентов технических вузов Изд. доп., перераб. - 327 с. {Специалист} СПб: СпецЛит, 2002 г.*

Module designation	**MAT101 Mathematics I**
Semester(s) in which the module is taught	*autumn semester (1 semester)*
Person responsible for the module	*Keltenova Raushan Turlybekova*
Language	*russian*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, practical classes, SRO*
Workload (incl. contact hours, self-study hours)	*5/1/0/2/2* *Lecture – 15 credits* *Practical classes – 30 credits*
Credit points	*Lecture – 15 credits* *Practical classes – 30 credits*

Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*The key question is: what learning outcomes should students achieve within the module?* *As a result of mastering the discipline "Mathematics I", the student must:* ***know:*** *-laws of operating with matrices and their application for solving systems of linear equations;* *-definitions of the basic concepts: limit, derivative, differentials of various orders and be able to apply them to the study of functions;* *-methods of finding extremums of functions, methods of studying their qualitative properties;* *-Taylor's formula and the basic forms of residual terms;* *-elements of analytical geometry: various equations of straight lines, equations of curves of the second order.* ***be able to:*** *- operate with matrices: perform arithmetic operations on them, search for inverse matrices;* *- to find derivatives, differentials, extremes of functions of one variable, areas of monotony and areas of convexity and concavity, inflection points, build asymptotes; to find complete, partial derivatives and differentials, extremes of functions of several variables;* *- apply Taylor's formula to approximate calculations;* *- write out various types of equations of straight lines, second-order curves, find the angle between straight lines on the plane.*
Content	*Module "Mathematics I" sections: Linear algebra and analytical geometry; Introduction to analysis; Differential calculus of a function of one variable; Differential calculus of a function of several variables.*
Examination forms	*Exam tickets, test questions*
Study and examination requirements	*- Availability of a computer and computer equipment;* *- Availability of an Internet channel with a speed of at least 0.5 Mbit/sec;* *- Personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform;* *- Attendance of classes according to the schedule.*
Reading list	*[1] Bugrov Ya.S., Nikolsky S.M. Higher Mathematics. M. Bustard. 2018 Vol.1-2.* *[2] Kudryavtsev V.A., Demidovich V.P. A short course of higher mathematics – M.: AST, Astrel, 2001- 656 p* *. [3] Berman G. N.B. Collection of problems on the course of mathematical analysis - St. Petersburg: Publishing House "Lan", 2017. - 492 p* *.[4] Ryabushko A.P. Collection of individual tasks in higher mathematics. Ch. 1, 2, 3- Minsk.:Higher School, 2014* *[5] Lungu K.N., Written D.T. Collection of problems in higher mathematics. - M.: Iris-press, 2020.*

Module designation	**GEN177 Engineering and computer graphics**
Semester(s) in which the module is taught	*1*

Person responsible for the module	*Karazhanova Dariga Dyusenovna*
Language	*russian*
Relation to curriculum	*Basic discipline, university component*
Teaching methods	*lectures, practical classes*
Workload (incl. contact hours, self-study hours)	*Total workload:* *Contact hours: lectures – 15, practical classes – 30* *Independent work with a teacher:105 hours*
Credit points	*5 ECTS*
Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*After completing the course, the student must demonstrate the ability to analyze, synthesize and design, as well as use the methods of projection drawing, geometric modeling, and drawing in axonometry. The student must* *be able to:* *- solve various positional and metric problems on complex drawing, axonometry;* *- be able to solve problems in the design of surfaces;* *- work with various drawing and measuring tools, instruments.* *To know:* *- basic principles of discipline, basic requirements for the design process in practice; regulatory documents;* *- information computer technologies (ICT) used in the work;* *own:* *- geometric techniques for solving positional and metric problems;* *- methods of image of spatial forms on the plane;* *-methods of graphical solution of various geometric problems related to the original;* *- skills to read and execute projection drawings of an object;* *- skills to create different geometric designs.*
Content	*The course "IiKG" is intended for students of the OP technical direction and is aimed at the formation and development of spatial and logical thinking in students.* *As part of the course, the student will master the practical use of the AutoCAD graphics program, the solution of positional and metric problems using models of lines and surfaces in parallel axonometry and the Monge plot.* *This discipline will present basic knowledge and skills in the field of descriptive geometry, engineering and computer graphics, as well as methods for solving problems related to spatial forms and their relationships using graphical models.*
Examination forms	*Written exam*

Study and examination requirements	*Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within a day and explain the plan for self-study of the lesson:* *- mandatory reading of the submitted materials before the lesson;* *- - delivery of tasks on time. There are penalties of -10% for late delivery;* *- 20% non-participation in the audience (for a good reason with supporting documents) - rating "F (Fail)";* *- plagiarism and cheating during the execution of the task are not allowed;* *- mandatory use of electronic gadgets in the classroom, which is welcome, but it is unacceptable to use them in the exam.*
Reading list	*Main:* *[1] ESCD. General rules for the execution of drawings. – M.: Gosstandart, 1980.* *[2] Esmukhan Zh.M. A brief summary of lectures on descriptive geometry. – Almaty: KazNTU, 1994.* *[3] Chekmarev A.A. Engineering graphics. M; 2000.* *[4] Frolov S.A. Descriptive geometry. M. INFRA-M.2013.* *[5] Nurmakhanov B.N., Abildabekova D.D. Computer graphics. Almaty. 2004.* *Additional:* *[6] Handbook of machine–building drawing - M.* *[7] Koroev Yu.I. Descriptive geometry. M.: 2004* *[8] Poleshchuk N. Tutorial AUTOCAD 2002. St. Petersburg, St. Petersburg:BHV, 2002.* *[9] Chuprin A.I. AutoCAD 2002. Three-dimensional design. – St. Petersburg: 2002.* *[10] Ordabekova A. J. Research and creation of graphic models in the AutoCAD system. Almaty 2016.*

Module designation	**HUM129 Culturology**
Semester(s) in which the module is taught	*1semester*
Person responsible for the module	*Anassova Kalamkas Temirkulovna*
Language	*Russian*
Relation to curriculum	*Required component* *Basic discipline*
Teaching methods	*Lecture*

Workload (incl. contact hours, self-study hours)	*15 academic hours* *Lecture-15h*
Credit points	*2 credits: contact - 1 (lecture - 1 credit), contactless - 1 credit (SROP, SRO)*
Required and recommended prerequisites for joining the module	*The goal is to form ideas about culture as a social phenomenon, the development of a socio-humanitarian worldview as the basis for the modernization of social consciousness through the formation of cultural identity, the ability to analyze and assess cultural situations based on an understanding of the nature of cultural processes, the specifics of cultural objects, the role of cultural values in intercultural communication.* *Tasks:* *- give students the necessary minimum of theoretical knowledge about the essence, structure, functions, mechanism and historical types of culture;* *- develop the ability to understand and respect various national-cultural concepts, to productive communication of representatives of different cultures;* *- help to navigate the world of cultural symbols, directions in art;* *- promote a harmonious combination of special and humanitarian knowledge, the formation of cultural orientations and personality attitudes;* *- give an objective assessment of the national cultural heritage from the standpoint of maintaining the status of Kazakh culture, the Kazakh language and their role in the formation of cultural and national identity;* *- assess the state of modern Kazakh culture, identify and justify the prospects for its development and areas of modernization; to build programs of professional activities taking into account cultural characteristics;*
Module objectives / intended learning outcomes	*The course « Culturology» will help students to develop an orientation towards humanitarian values, will help to master the spiritual wealth created by humanity. The development of not only an individual, but also the entire society is impossible without studying the cultural heritage created by previous generations, and this study itself, in turn, will be impossible without acquiring certain skills and cultural literacy. The course aims to humanize technical education.*
Content	*The classes use various technologies for the development of critical thinking: stage case, essay writing, (Mind Map), etc.*
Examination forms	*Examination cards*
Study and examination requirements	*- Availability of computer and computer equipment;* *- Availability of Internet channel with speed of at least 0.5 Mbit/s;* *- A personal account with a face photo on an avatar and corporate mail on the Microsoft 365 platform;* *- Attending classes according to the schedule.*
Reading list	1. *Нуржанов Б.Г., Ержанова А.М. Культурология. - Алматы, 2011.* 2. *Тимошинов В.И. Культурология: Казахстан-Евразия-Восток-Запад:Учебное пособие. – 400 с. Алматы, 2001* 3. *Бейсенова Г.А. Проблемы глобализации и идентичности – А.,Print, 2009.*

Module designation	**HUM 100 Contemporary history of Kazakhstan**
Semester(s) in which the module is taught	*2 semester*

Person responsible for the module	*Nurzhanova Aina Mardanovna*
Language	*Kazakh, Russian, English*
Relation to curriculum	*Required Component* *Basic discipline*
Teaching methods	*lecture, practical exercises, IWS, independent work of a student with a teacher*
Workload (incl. contact hours, self-study hours)	*150 academic hours. Lecture - 15 hours, practical classes - 30 hours. ISW (including ISW with a teacher) - 105 hours*
Credit points	*5 credits: contact - 3 (lecture - 1 credit, practice - 2 credits), non-contact - 2 credits (ISW, including ISW with a teacher)*
Required and recommended prerequisites for joining the module	*The goal is to give objective historical knowledge about the main stages of the history of modern Kazakhstan; direct students' attention to the problems of the formation and development of statehood and historical and cultural processes.* *Tasks:* *- systematization of historical knowledge about the main events of modern history that form the scientific worldview and civic position;* *- creation of a scientifically based concept of the modern history of Kazakhstan;* *- creation of an ideological and spiritual basis for the consolidation of a multi-ethnic and poly-confessional Kazakh society.* *Learning outcomes:* *- knowledge of the main periods of the history of the twentieth century and independent Kazakhstan;* *- the ability to analyze the features and significance of the modern Kazakh model of development;* *- be able to substantiate the fundamental role of historical knowledge in the formation of Kazakhstani identity and patriotism;* *- the ability to form one's own civic position on the priorities of mutual understanding, tolerance and democratic values of modern Kazakhstani society.*
Module objectives / intended learning outcomes	*The course is intended for students of all undergraduate specialties. The versatility and significance of the discipline "Modern History of Kazakhstan" is due to its huge role in strengthening the Kazakh identity, self-awareness of the people, the implementation of tasks related to the need for an intellectual breakthrough in the new millennium. This course covers the period of Kazakhstan's history from the beginning of the 20th century, the Soviet period and independent Kazakhstan. During the study of the course, great importance is given to the formation of an active civic position of students. The course is aimed at the humanization of technical education.*
Content	*In the classroom, various technologies for the development of critical thinking are used: case studies, essay writing (Mind Map) etc.*
Examination forms	*Exam tickets*
Study and examination requirements	*- Availability of a computer and computer equipment;* *- Availability of an Internet channel with a speed of at least 0.5 Mbps;* *- Personal account with a photo of the face on the avatar and corporate mail on the Microsoft 365 platform;* *- Attendance at scheduled classes.*

Reading list	1. *1. The history of Kazakhstan (from ancient times to the present day) in five volumes. - Almaty, Atamura, 2010.* 2. *2. Ayagan B., Abzhanov M.H., Seliverstov S.V., Bekenova M.S. Modern history of Kazakhstan: Textbook for students of non-historical specialties (bachelor's degree) of higher educational institutions/under the general editorship of B.G. Ayagan-Almaty: Raritet, 2010.* 3. *3. Modern history of Kazakhstan: Textbook/author. A. Aunasova, A. Suleimenov. Entr.ed. B. Ayagan-Almaty, Raritet, 2010.*

Module designation	**PHY464 Electromagnetism. Optics.**
Semester(s) in which the module is taught	*2 semester*
Person responsible for the module	*Turlybekova G.K.*
Language	russian
Relation to curriculum	basic
Teaching methods	*lectures, practical classes, laboratory classes*
Workload (incl. contact hours, self-study hours)	*Total workload:6 hours* *Contact hours:1/1/1* IWST*:3 hours*
Credit points	*5 credits (1/1/1/2)*
Required and recommended prerequisites for joining the module	*Prerequisites: Physics, Mathematics 1, 2.*
Module objectives / intended learning outcomes	*Purpose:* *- formation of the main modern physical and scientific sources;* *- formation of knowledge and skills in the application of fundamental laws and theories of classical and modern physics;* *- formation of skills for conducting physical research in retshde, based on future practice.* *Student after completing the course:* *- know the tasks, tasks and tasks of the study taking into account the physical requirements;* *- be able to formulate a hypothesis that takes into account the physical Tabigat of the studied;* *- be able to conduct quantitative and qualitative research on the profile of the specialty with the help of modern scientific equipment;* *- be able to correctly interpret the information received to make an effective decision in this situation;* *- be able to solve and solve problems in practice;* *- to know that according to a given mesel, the resulting akparata kyskasha bayandai bshu and its solution;* *-be able to present information on bershgen mesel, using communication skills and Dagda, and form the necessary actions to solve it.*

Content	*В рамках курса студент освоит:* – *deepening and systematization of the understanding of the fundamental laws of physics;* – *"Electromagnetism. Mastering the basic concepts, laws and physical meanings in the sections of the course "Optics";* – *development of the ability to see the applied significance of the most important achievements in the field of physics in the oil industry, energy, transport, construction, communications, medicine, environmental protection;*
Examination forms	*Written exam*
Study and examination requirements	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*
Reading list	[1] Koishybaev N.K. Zhalpa physics courses: Electrical magnetism. -Almaty: Ziyat Press, 2005. 3-4 tomdar. [2] Saveliev I.V. Zhalpa Physics courses: Volume II. Elektr zhene magnetism. - M.: Nauka baspasy, 2004. - 336 bet. [3] Savelyev I.V. Course of general physics: Textbook for higher education institutions: In 5 books: Book 4,5: Waves. Optics.Quantum optics. Atomic physics - M.:Astrel, 2005. -256c, 308 p. [4] Sivukhin D.V. General course of physics, Electricity and magnetism. Optics. Volnov. vol.3. Moscow, Higher School, 2001, 703 p. [5] Trofimova T.I. Zhalpa physics courses. M.: Academy, 2006.- 482b. [6] Detlaf A.A., Yavorsky B.M. Course of physics: Textbook for higher education institutions. Ed. 6th, ispr. - 607 p. M: Higher School, 2003 [7] Koishybaev N.K. Optics. Atom. The core. Eementar belshekter. -Almaty: Ziyat Press, 2006. [8] Wolkenstein, V. S. Zhalpi physics course of the course of yesepter zhinagy: zhogary technikalyk oku oryndaryna arnalgan oku k¥raly. - Almaty : "Mektep" baspasy, 2012. - 486 b. [9] Chertov A., Vorobyev A. A problem book in physics. - M.: Higher School, 1981. [10] Abdulaev Zh. Physics courses. - Almaty, 2004 [11] Trofimova T.I. Collection of problems in the course of physics with solutions. -Moscow, Higher School, 2007, 589 p.

Module designation	***MAT102 Mathematics II***
Semester(s) in which the module is taught	*2*
Person responsible for the module	*Keltenova Raushan Turlybekova*
Language	*Kaz, rus*
Relation to curriculum	*Demanding*
Teaching methods	*lecture, practice work*
Workload (incl. contact hours, self-study hours)	*Total workload:* *Contact hours:1 hour lecture,2 hours practice*
Credit points	*5 ECTS*

Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*Upon completion of the course, the student will know:* *– the concepts of indefinite and definite integral;* *– basic methods of integrating a function of one variable;* *– basic applications of the integral;* *– numerical series with positive terms and alternating series;* *– functional and power series;* *– the main signs of walking;* *– applications of power series.*
Content	*As part of the course, the student will master algorithms of analytical and approximate integration methods, applications of certain integrals, research on the convergence of numerical and functional series, as well as the effective use of mathematical methods. The basic knowledge and skills in the field of higher mathematics, methods of integrating the function of one variable and the application of power series will be formed. The final stage of the course is the successful passing of the final exam.*
Examination forms	*Problem solving*
Study and examination requirements	*Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within a day and explain the plan for self-study of the lesson:* *- - mandatory reading of the submitted materials before the lesson;* *- - delivery of tasks on time. There are penalties of -10% for late delivery;* *- 20% non-participation in the audience (for a good reason with supporting documents) - rating "F (Fail)";* *- plagiarism and cheating during the execution of the task are not allowed;* *- mandatory use of electronic gadgets in the classroom, which is welcome, but it is unacceptable to use them in the exam.*
Reading list	*[1] Д. Письменный Конспект лекций по* *высшей математике. Полный курс. Высшее образование. – Москва: Айрис Пресс. 9-е* *издание, 2009. – 608 с.* *[2] Пискунов Н.С. Дифференциальное и* *интегральное исчисление для втузов. В 2-х т.: – Москва: Интеграл – Пресс, 2004. – 416 с., 544 с.* *[3] Рябушко А.П. Сборник индивидуальных заданий по высшей математике. В 4-х ч. Ч.2, 3: – Минск: Вышэйшая школа, 2013. – 352 с., 367 с.* *[4] Philip Gillett Calculus and Analytic* *Geometry. – Toronto: Massachusetts* *University of Wisconsin. – Second edition, 1984. –991 p.* *[5] George B. Thomas Jr., Maurice D. Weir, Joel R. Hass. Thomas' Calculus. – University of California. –13-th edition, 2014. – 1205 p.* *[6] Лунгу К.Н., Письменный Д. Т. Сборник задач по высшей математике. В 2-х ч.: – М.: Айрис-пресс, 2020. – 214 с., 194 с.*

Module designation	***HUM128 Political science***

Semester(s) in which the module is taught	*2semester*
Person responsible for the module	*Manapova Saniyam Ilyaevna*
Language	*Russian*
Relation to curriculum	*Basic discipline*
Teaching methods	*Lecture, practical classes, SRS*
Workload (incl. contact hours, self-study hours)	*30 academic hours* *Lecture-15h, CPS- 15 hours*
Credit points	*2 credits: contact - 2 (lecture - 1 credit,), contactless - 1 credit (SRS)*
Required and recommended prerequisites for joining the module	*The goal is to form students' knowledge of the theory of politics, laws and patterns of political life and the ability to use political science knowledge in future professional activities* *Course Task:* *Study of laws, basic norms and peculiarities of interaction between states and other subjects of international relations in modern conditions. Particularly significant is the study of decision-making mechanisms, roles and functions of critical institutions in the system of international conflict resolution and consensus-building among States. Corresponding place in political research.* *Training outcomes:* *analyze the peculiarities of political systems and the functioning of political institutions;* *- to critically evaluate theoretical approaches of political science;* *- identify the interrelationships and patterns of the political process; - compare political systems, institutions and actors in the inter-country and subnational context, on the basis of knowledge gained and mastered methods.*
Module objectives / intended learning outcomes	*The course is intended for students of all undergraduate specialties, political science is a necessary theoretical basis for the further development of political research and for the introduction of scientific developments into real politics. It explores real political systems, ways of organizing society and the state, types of political regimes, forms of state structure, the activities of political parties and public organizations, the state of political consciousness and political culture, patterns of political behavior, problems of efficiency and legitimacy of political leadership, ways of forming institutions of power and more.*
Content	*The classes use the case method, the "Six Thinking Hats" method, the «Fishbone» method, and essay writing.*
Examination forms	*Examination cards.*
Study and examination requirements	*- Availability of computer and computer equipment;* *- Availability of Internet channel with speed of at least 0.5 Mbit/s;* *- A personal account with a face photo on an avatar and corporate mail on the Microsoft 365 platform;* *- Attending classes according to the schedule.*
Reading list	*1. Kazakhstan Political Science Encyclopedia/Ed. T.T. Mustafina. - Almaty, 1998y.* *2. Pushkareva, G.V. Political Science: textbook and workshop for universities/G.V. Pushkarev. - Moscow: Yurite Publishing House, 2021. – 295 pages.* *3. G.M. Sergazina, R.N. Abylkalykova/Political Science: a textbook (2nd edition). - Karaganda: Medet Group LLP. — 2019. 270 pages.*

Module designation	***CHE495 «Chemistry»***
Semester(s) in which the module is taught	*2 semester*
Person responsible for the module	*Kalenova A.S.*
Language	*russian*
Relation to curriculum	*basic*
Teaching methods	*lectures, practical classes, laboratory classes*
Workload (incl. contact hours, self-study hours)	*Total workload:5 hours* *Contact hours:1/1/1* *IWST:2 hours*
Credit points	*5 credits (1/1/1/2)*
Required and recommended prerequisites for joining the module	*Prerequisites: CBI101 "Fundamentals of Chemistry"*
Module objectives / intended learning outcomes	*The student should know:* *- the essence of the basic laws of chemistry;* *electronic structure of atoms and molecules, Periodic law of D.I. Mendeleev;* *- fundamentals of the theory of chemical bonding in compounds of different types;* *- basic laws of chemical transformations;* *- electrochemical processes;* *- properties of solutions;* *The student should be able to:* *- carry out quantitative calculations in chemical reactions;* *- determine the kinetic parameters of chemical reactions;* *- determine the quantitative characteristics of solutions;* *- apply chemical laws to solve practical problems;* *- use basic elementary methods of chemical research of substances and compounds to solve professional problems* *Upon completion of the General Chemistry course, the student must be able to:* *- apply the acquired knowledge, skills, skills and competencies in the study of general scientific and special disciplines related to chemical disciplines;* *- apply the acquired knowledge, skills, skills and competencies in solving production and technological tasks.*

Content	*As part of the course, the student will master:* *- Basic concepts and laws in chemistry.* *- Atomic–molecular teaching.* *Periodic table of D.I. Mendeleev.* *- Type of chemical connections.* *Main classes of inorganic compounds: oxides, acids and bases, salts* *Theory of electrolytic dissociation;* *Solutions and their characteristics.* *- Introduction to chemical kinetics.* *- Chemical equilibrium.* – *Fundamentals of electrochemistry.*
Examination forms	*Written exam*
Study and examination requirements	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*
Reading list	** [1] Бірімжанов Б.А. Жалпы химия: оқулық /4-ші бас., өңделіп, толықт. - Алматы: Дәуір, 2011. -752б. - (ҚР Жоғары оқу орындарының қауымдастығы). - ISBN 978-601-217-197-6.* ** [2] Коровин Н. В. Общая химия : Учеб. для вузов / Н.В. Коровин. - 10-е изд. доп. - М. : Высш. шк., 2008. - 557 с. : ил. - (Победитель конкурса учеб.). - ISBN 978-5-6-004403-4.* ** [3] Глинка Н.Л. Общая химия [Текст] : учеб. пособие / Н.Л. Глинка. - изд. стер. - М. : КноРус, 2018. - 750 с. : ил. - ISBN 978-5-406-06002-5.* ** [4] Карапетьянц М.Х. Общая и неорганическая химия : Учеб. пособие для вузов / М.Х. Карапетьянц, С.И. Дракин. - М.: Химия, 2002. - 592 с.: ил. - (Для высш. шк.). - ISBN 5-7245-1130-4.* ** [5] Адамсон Б.И., Гончарук О.Н., Камышова В.К. и др. Задачи и упражнения по общей химии : учеб. пособие для втузов / А. П. Адамсон [и др.]; под ред. Н. В. Коровина. - 4-е изд., перераб. - М. : Высш. шк., 2008. - 255 с. : ил. - ISBN 978-5-06-004140-8.* ** [6] Ахметов Н.С. Общая и неорганическая химия : Учеб. для вузов /* Н.С. Ахметов. - 7-е изд., стер. - М. : Высш. шк., 2006. - 743 с. : ил. - ISBN 5-06-003363-5. **Литература доступна в электронных ресурсах библиотеки* *~ Литература доступна на учебном портале преподавателя.*

Module designation	***HUM132 Philosophy***
Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Mendybayev Serik Kukaevich*
Language	*Russian*
Attitude towards the curriculum	*Required Component* *base*
Form of education	*lecture, practical exercises, SRO, SROP*
Workload (incl. contact hours, self-employment hours	*150 academic hours* *Lecture - 15 hours, practical classes - 30 hours. SRO (including SROP) - 105 hours*

Credit scores	*5 credits: contact - 3 (lecture - 1 credit, practice - 2 credits), non-contact - 2 credits (SROP, SRO)*
Module objectives/intended learning outcomes	*The goal is to know and understand the specifics of philosophy as a science, as the basis for the formation and development of critical thinking and worldview, to see the vital and practical purpose of philosophy.* *- to develop alternative ways of thinking and understanding to technocracy, the ability to see the universal, universal and valuable content in special scientific and vocational knowledge and cognition, to love and appreciate one's work, profession, to respect the work of other people* *- understand philosophy as the ethics of personal and social life, work and knowledge, as the basis of the morality of society, culture* *- to know the basic concepts, themes, schools and personalities of philosophy to master the historical experience of scientific critical and creative thinking* *Skills and abilities (professional, managerial, communicative…) obtained during the course* *- development of constructive critical thinking, outlook;* *- the ability to effectively use modern technologies for the development of critical thinking in the future practice of scientific and professional activities;* *- development of one's vision and understanding of the problems of life, society, practice, knowledge;* *- be able to substantiate and defend one's views, position, conduct a discussion, debate, dialogue;* *- development of a culture of professionalism, professional attitude to work, to practical life;* *- the ability to argue and defend one's views, positions, to lead a discussion, a constructive dialogue, the ability to work in a team;* *- development of personality skills, freedom and responsibility, social, political and business culture, religious tolerance and tolerance;*
Content	*Philosophy forms and develops critical and creative thinking, worldview and culture, provides students with knowledge about the most common and fundamental problems of being and endows them with a methodology for solving various theoretical practical issues. Philosophy expands the horizon of the student's vision of the modern world, forms citizenship and patriotism, contributes to the education of self-esteem, awareness of the value of human existence. It teaches how to think and act correctly, develops the skills of practical and cognitive activities, helps to seek and find ways and means of life in harmony with oneself, society, and the world around.*
Teaching methods	*In the classroom, technologies for the development of critical, creative and analytical thinking are used: case studies, essay writing, etc.*
Exam forms	*Exam tickets*
Tuition and Exam Requirements	*- availability of a computer and computer equipment;* *- availability of an Internet channel with a speed of at least 0.5 Mbps;* *- personal account with a photo of the face on the avatar and corporate mail on the Microsoft 365 platform;* *- attendance at scheduled classes.*
References	*Merab Mamardashvili My experience is not typical, St. Petersburg, Azbuka, 2000 www.yanko.lib.ru* *2 Bertrand Russell A History of Western Philosophy* *http://royallib.com/book/rassel_bertran/istoriya_zapodnoy_filosofii.htm* *3 Skirbek G., Gilier N. History of Philosophy. M., Vlados, 2003* *4 Philosophy. Textbook (under the editorship of V.D. Gubin and others) M., 2001* *5 Golubintsev V.O. etc. Philosophy for technical universities. Rostov-on-Don, 2010,* *6 Modern Western Philosophy. Minsk, Book House, 2009*

Module designation	***CHE451 Life safety***
Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Shevtsova Vladlena Stepanovna*
Language	*Russian*
Relation to curriculum	*elective / specialisation* *Names of other study programmes with which the module is shared*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*2 credit:* *lecture-15 hours, Independent Work -15hours.*
Credit points	*2 credit:* *lecture-15 hours, Independent Work -15hours.*
Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*Key question: What learning results should students achieve?* *As a result of mastering the discipline "Life safety", the student must:* *know:* *- a culture of safety, consciousness and risk assessment, in which safety issues are considered as the most important priorities of human life;* *- a culture of professional safety, the ability to identify hazards and assess risks in the field of their professional activities;* *- willingness to apply professional knowledge to minimize negative production factors, ensure safety and improve working conditions in the field of their professional activities;* *- motivation and ability to independently improve the level of life safety culture;* *- ability to substantiate their decisions in terms of life safety.* *be able to:* *- logically and consistently identify the dangers that surround him and his environment;* *- work with legal documents in the field of life safety;* *- develop measures to reduce risks for their own and public safety, including production.*
Content	*Module "Life safety"; Sections: Risk assessment analysis. Types and working conditions; Identification and impact on humans of harmful and dangerous environmental factors; Physical factors (noise, vibrations, electromagnetic fields). Protecting humans and the environment from negative production factors; Providing comfortable conditions for human life and activity. Life safety management; Emergencies at radiation and chemical hazardous facilities. Ways to protect the population in emergency situations; Liquidation of consequences of emergency situations; Electrical safety. Fire safety; Responsibility for violation of the requirements of legislation in the field of life safety.*
Examination forms	*Exam tickets, test questions.*

Study and examination requirements	*- Availability of a computer and computer equipment;* *- Availability of an Internet channel with a speed of at least 0.5 Mbit/sec;* *- Personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform;* *- Attendance of classes according to the schedule.*
Reading list	*1. Life safety: a short course of lectures / Comp.: A.V. Khizov, I.I. Kuzmin // Saratov State Agrarian University. - Saratov, 2017. - 61 p.* *2. Theory of activity safety: a textbook for bachelors of the direction 20.03.01 "Technospheric safety" / O. N. Rusak. - St. Petersburg: SPbGLTU, 2015. - 48 p.* *3. Life safety [Electronic resource]: textbook. for universities / E. A. Arustamov [and others]; Ed. E. A. Arustamova. - 10th ed., revised. and additional - M. : Dashkov i K, 2006. - 476 p. - ISBN 5-94798-832-1.* *4. Shevtsova V. S. Organizational and legal foundations of life safety: Proc. allowance. - Almaty: KazNRTU, 2021. - 121 p.*

Module designation	***MAT103 Mathematics III***
Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Tulesheva Gulnara Alipovna*
Language	*russian*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, practical classes, SRO*
Workload (incl. contact hours, self-study hours)	*5/1/0/2/2* *Lecture – 15 credits* *Practical classes – 30 credits*
Credit points	*Lecture – 15 credits* *Practical classes – 30 credits*
Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*The key question is: what learning outcomes should students achieve within the module?* *As a result of mastering the discipline "Mathematics I", the student must:* *know:* *- definitions of the basic concepts of partial derivative, differential, directional derivative, gradient, divergence;* *- methods for finding extremums of functions of many variables;* *- Taylor 's formula and the basic forms of residual terms;* *- definitions of multiples, curvilinear and surface integrals;* *- formulas for calculating areas, volumes, formulas for calculating masses, moments and other physical quantities;* *- various equations of straight lines and planes, methods for specifying surfaces and methods for finding normals and tangent planes to them.*

	be able to: *- calculate partial derivatives, find extremes of functions of many variables;* *- apply Taylor's formula to approximate calculations;* *- calculate multiples, curvilinear and surface integrals;* *- apply integrals to solving problems of calculating areas, volumes, to calculating physical quantities (masses, charges, work of forces, etc.);* *- apply linear algebra methods to solving systems of equations, vector algebra to solving problems of analytical geometry;* *- be able to find and use the necessary literature.*
Content	*Module «Mathematics III» sections: Determinants; Elements of vector algebra; Functions of many variables; Partial derivatives; Chain rule and Differentiation of implicit functions; Extremes of functions of many variables; Lagrange multiplier method; Double integral and its properties; Triple integral; Surface integrals of the I kind; Surface integrals of the II kind; Vector field.*
Examination forms	*Exam tickets, test questions*
Study and examination requirements	*- Availability of a computer and computer equipment;* *- Availability of an Internet channel with a speed of at least 0.5 Mbit/sec;* *- A personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform (or personal account students);* *- Conducting classes according to the schedule.*
Reading list	*[1] D. Written Preparing for the math exam, - Moscow: Iris Press, 2008 https://www.twirpx.com/file/1704111 /.* *[2] Ryabushko A.P. Collection of individual tasks in higher mathematics. Ch. 1, 2, 3, - Minsk.: Higher School, 2013.* *[3] Lungu K.N., Written D. T. Collection of problems in higher mathematics, Moscow: Iris-press, 2020.* *[4] Danko P.E., Popov A.G., Kozhevnikov T.Ya. Higher mathematics in exercises and problems. In 2 h.Ch.I,2: - Peace and Education, 2020.*

Module designation	***HUM122 Psychology***
Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Zykova Natalia Mikhailovna*
Language	*Russian*
Relation to curriculum	*Required component* *Basic discipline*
Teaching methods	*lecture, SRO, SROP*
Workload (incl. contact hours, self-study hours)	*45 academic hours.*
Credit points	*2 ECTS*

Required and recommended prerequisites for joining the module	*The purpose of the Psychology module is to form a social and humanitarian worldview among students, expand their horizons, and increase the general culture and education of students. As a result of completing the course, students will be able to:* *- use methods of obtaining psychological information;* *- apply psychological knowledge to solve professional problems;* *- think critically;* *- explain the nature of situations in the field of social communication;* *- be able to find ways to solve conflict situations in society;* *- correctly express and reasonably defend their own position;* *- to know and assume your own identity.*
Module objectives / intended learning outcomes	*The course is for students in all undergraduate majors. The course is unique and innovative in terms of content and material delivery. It contains elements of interactive interaction with students in the process of reading lecture material, as well as practical classes. The course includes sections: an introduction to psychology. Me and my motivation. Emotions and emotional intelligence. Human will and the psychology of self-regulation. Individual-typological personality features. Values, interests, norms as the spiritual basis of the individual. Psychology of the meaning of life and professional self-determination. Personality health psychology. Communication of individuals and groups.* *Perceptual side of communication. Interactive side of communication. Communicative side of communication. Concept and structure of socio-psychological conflict. Patterns of personality behavior in conflict. Techniques and techniques for effective communication.*
Content	*Various teaching methods and technologies are used in the classes: student-centered training, competence-oriented training, role-playing games and educational discussions of various formats, case stadiums (analysis of specific situations), project method (development and transformation of own experience and competence).*
Examination forms	*Examination cards*
Study and examination requirements	*- Availability of computer and computer equipment;* *- Availability of Internet channel with speed of at least 0.5 Mbit/s;* *- A personal account with a face photo on an avatar and corporate mail on the Microsoft 365 platform;* *- Attending classes according to the schedule.*
Reading list	*Dzhakupov S.M. «Introduction to general psychology». - A.: Kazakh University, 2014y.* *Ilyin E.P. «Psychology of communication and interpersonal relations». - St. Petersburg: Peter, 2009. - 576 s. silt. - (Masters of Psychology, series).* *Maklakov A.G. «General Psychology». Textbook for universities. Moscow: Yurite, 2018.* *Maslow A. «Motivation and Personality». - St. Petersburg: 2008. – 352 pages.* *Grishina N.V. «Psychology of Conflict». st. Petersburg: 2008. - 464 p. silt. - (Masters of Psychology, series).* *Efimova N.S. «Social Psychology». - Moscow: Yurite, 2017.* *E.P. Ilyin. «Psychology of creativity, creativity, endowments». - St. Petersburg, 2011. – 448 pages.* *Vinogradova, S. M. «Psychology of Mass Communication»: textbook/S. M. Vinogradova, G.S. Melnik. - Moscow: Yurite, 2014. – 512 pages.*

Module designation	***MNG487 Fundamentals of Entrepreneurship, Leadership and Anti-corruption culture***
Semester(s) in which the module is taught	*3 semester*

Person responsible for the module	*Abenova Mayra Khomarovna*
Language	*russian*
Relation to curriculum	*basic*
Teaching methods	*lectures, practical classes, laboratory classes*
Workload (incl. contact hours, self-study hours)	*Total workload:6 hours* *Contact hours:1/1/1* *SRSP:3 hours*
Credit points	*5 credits (1/1/1/2)*
Required and recommended prerequisites for joining the module	*Prerequisites: Physics, Mathematics 1, 2.*
Module objectives / intended learning outcomes	*As a result of mastering the discipline, the student should be able to:* *- - characterize the types of entrepreneurial activity and the business environment;* *- to operate in practical activities with economic categories;* *- develop a business plan;* *- prepare a package of documents for opening your own business;* *- to draw up documents for opening a current account in a bank;* *- determine the organizational and legal form of the enterprise;* *- develop the strategy and tactics of the company's activities;* *- comply with professional ethics, ethical codes of the company, generally accepted business rules;* *- - to characterize the mechanism of protection of business secrets;* *- distinguish the types of responsibility of entrepreneurs;* *- analyze the financial condition of the company;* *- carry out basic financial transactions;* *- calculate the profitability of entrepreneurial activity.*
Content	*As a result of mastering the discipline, the student should know:* *- the typology of entrepreneurship;* *- the role of the environment in the development of entrepreneurship;* *- technology of making entrepreneurial decisions;* *- basic components of the internal environment of the company;* *- organizational and legal forms of entrepreneurial activity;* *- features of constituent documents;* *- the procedure for state registration and licensing of the enterprise;* *- mechanisms of functioning of the enterprise;* *- the essence of entrepreneurial risk and the main ways to reduce risk;* *- the main elements of the culture of entrepreneurship and corporate culture;* *- list of information subject to protection;* *- the nature and types of responsibility of entrepreneurs;* *- methods and tools of financial analysis;* *- basic provisions of accounting in small enterprises;* *- types of taxes;* *- a system of business performance indicators;* *- principles and methods of assessing the effectiveness of entrepreneurial activity;* *- ways to improve and control the efficiency of entrepreneurial activity.*
Examination forms	*Written exam*
Study and examination requirements	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*

Reading list	*1. E.V. Lysakovskaya. General characteristics and models of state regulation of small and medium-sized enterprises in developed countries// Law and Education, No. 5, 2011, pp. 261 - 266* *2. The Civil Code of the Republic of Kazakhstan dated July 1, 1999 No. 409-I (Special Part) (with amendments and additions as of 06.03.2013)* *3. The Law of the Republic of Kazakhstan "On Private Entrepreneurship" (with amendments and additions as of 02.04.2010)* *4. A. N. Asaul. Organization of entrepreneurial activity: textbook /. - St. Petersburg: ANO IPEV, 2009. 336s.* *5. Koshanov A.K., Mukhamedzhanov B.G., Bektemisova S.T. Formation of private entrepreneurship in the conditions of transition to the market (on the example of the Republic of Kazakhstan). - Almaty: Institute of Economics, PAN RK, 2009.* *6. Bocharov S.A., Ivanov A.A., Oleinikov S.Ya. FUNDAMENTALS OF BUSINESS: Study guide. -- M.: Publishing house of the center of the EAOI, 2007. - 447 p.* *7. http://www.enbek.gov.kz/* *8. http://www.kapital.kz/* *9. http://headhunter.com.kz/*

Module designation	***GEN408 Strength of materials***
Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Bekenov E.T.*
Language	*russian*
Relation to curriculum	*basic*
Teaching methods	*lectures, practical classes, laboratory classes*
Workload (incl. contact hours, self-study hours)	*Total workload:6 hours* *Contact hours:1/1/1* *SRSP:3 hours*
Credit points	*5 credits (1/1/1/2)*
Required and recommended prerequisites for joining the module	*Prerequisites: Physics, Mathematics 1, 2.*
Module objectives / intended learning outcomes	*Goal:* *As part of the course, the student will master the practical use of:* *- experimental study of the mechanical properties of materials, the stress-strain state of the simplest structural elements, the handling of modern testing machines and measuring equipment;* *- to solve problems related to various types of deformations of mechanical systems.*
Content	*The student must be able to:* *- Use the basic principles and laws of mechanics;* *- Perform structural calculations for strength, rigidity and stability;* *- Accurately and thoroughly argue the course of reasoning, without cluttering it with unnecessary details;* *- Apply the studied material in diverse fields of engineering:*

Examination forms	*Written exam*
Study and examination requirements	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*
Reading list	*1. Tapr C.M. Short course of theoretical mechanics. – M., Higher School, 2018* *2. Darkov A.V., Shpiro G.S. Resistance of materials. – M., 2019* *3. Collection of problems on the resistance of materials /Edited by A.S.Volmir. – M.: Nauka, 2014*

Module designation	***CHE559 – Chemistry of oil and gas***
Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Selenova Bagadat Samatovna*
Language	*russian*
Relation to curriculum	*basic*
Teaching methods	*lectures, practical classes*
Workload (incl. contact hours, self-study hours)	*Total workload:6 hours* *Contact hours 21/1/0* *IWST:3 hours*
Credit points	*5 credits (2/1/0/2)*
Required and recommended prerequisites for joining the module	
Module objectives / intended learning outcomes	*The student should be able to:* *– solve professional engineering tasks in the field of collecting and preparing products of oil and gas wells;* *– apply knowledge about the composition and physico-chemical properties of borehole products in the implementation of technological processes during the collection and preparation of hydrocarbon raw materials.* *At the end of the course, the student should know:* *– chemical and fractional composition and physico-chemical properties of borehole products;* *– physical foundations of mass and heat transfer processes;* *- - modern technological schemes of field preparation of oil and gas to commercial condition.*

Content	*The course is intended for students of OP "6B07204-Petroleum engineering"* *As part of the course, the student will master the theoretical foundations of oil and gas chemistry necessary for practical solutions to physico-chemical problems arising at various stages of the oil chain, to solve problems related to the geology of oil and oil production.Заключительным этапом курса является экзамен.* *After completing the course, the student must demonstrate basic knowledge and skills in the field of oil and gas preparation, physical and chemical properties of hydrocarbon raw materials, as well as methods of processing petroleum hydrocarbons*
Examination forms	*Written exam*
Study and examination requirements	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*
Reading list	*1. Ryabov Vladimir Dmitrievich.* *Chemistry of oil and gas : studies. manual / V.D. Ryabov. - 2nd ed., ispr. and add. - M. : FORUM: INFRA-M, 2017. - 336 p. : ill. - (Higher. education). - ISBN 978-5-8199-0567-8* *2. Verzhichinskaya Svetlana Vladimirovna.* *Chemistry and technology of oil and gas : studies. manual for medium Prof. education / S.V. Verzhichinskaya, N. G. Digurov, S. A. Sinitsin. - 3rd ed., ispr. and add. - M. : FORUM: INFRA-M, 2015. - 416 p. : ill. - (Prof. education). - ISBN 978-5-91134-893-9* *https://cloud.mail.ru/public/2VBx/5rHZXJp7Y* *3. Kapustin Vladimir Mikhailovich.* *Chemistry and technology of oil refining : studies. for the medium. prof. education / V.M. Kapustin, M.G. Rudin; Russian State University of Oil and Gas named after I. M. Gubkin. - M. : Chemistry, 2013. - 496 p. : ill. - (Studies and studies. manuals for students of the environment. special studies. establishments). - ISBN 978-5-98109-105-6 .* *4.Safieva R.Z., Zinovieva L.V., Yanchenko E.E. Methodological guidelines on the discipline "Chemistry of oil and gas", Moscow: Gubkin Russian State University of Oil and Gas, 2002- p.40.* *5.Sardanashvili A.G., Lvova A.I. Examples and calculations on processing technology oil and gas. – Novopolotsk: Lan, 2016. - 256s.* *6.Glushchenko V.N. Oilfield chemistry: textbook: in 5 t/ V.N.Glushchenko, M.A.Silin edited by I.T.Mishchenko.-M.:Intercontact Science, 2009-2010*

Module designation	***PET 408 «Solving the problems of oil and gas engineering»***
Semester(s) in which the module is taught	*3 семестр*
Person responsible for the module	*Akhymbaeva.B.S.*
Language	*russian*
Relation to curriculum	*Basic* *prerequisites:*
Teaching methods	*lectures, practical classes*

Workload (incl. contact hours, self-study hours)	*Total workload: 6 hours* *Contact hours: 1/1/1* *IWS: 3 hours*
Credit points	*5 credits (1/0/2)*
Required and recommended prerequisites for joining the module	*Ability to analyze, synthesize and possess the skills of engineering calculations and methods of solving basic problems of mathematics, physics.*
Module objectives / intended learning outcomes	*The student should know:* *- principles of economic operation of modern oilfield equipment;* *- modern methods of environmental protection in oil and gas production;* *- equipment used in mechanized methods of oil and gas production;* *The student must be able to:* *- possess the calculated ratios of the main parameters and the skills of rational use of equipment;* *- carry out kinematic calculation of equipment;* *- be able to use diagrams and equipment characteristics;* *- make a selection of equipment.* *After completing the course, the student must demonstrate the ability to analyze, synthesize and possess the skills of engineering calculations and methods for solving the main tasks of sections of the mechanized mining system.*
Content	*At the end of the course, students:* *1. description of the stages of drilling and completion of the well, indicating the reasons for each stage of operation* *2. be able to describe the main components and functions of each component in the drilling chain* *3.Distinguish the difference between a diamond, a ball cone and a PDC chisel and be able to give the main characteristics taken into account when designing tools for cutting rocks.* *4. determination of well pressure and determination of the influence of abnormal reservoir pressure on the design and drilling of wells.* *5.distinguish between single-stage and two-stage cementing, cementing through a drilling column and heads and calculate the volume of mortar, cement, mixing water, displacing liquid required for the above cementation works.* *6. functions of drilling fluids and the functions of these*
Examination forms	*Written exam*
Study and examination requirements	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
Reading list	*1. Drilling engineering. (2015) Heriot-Watt Manual. Edinburgh;* *2. Попов А.Н., Спивак А.И., Акбулатов Т.О. Технология бурения нефтяных и газовых скважин (2004)* *3. Рабиа, Хуссейн. Технология бурения нефтяных скважин / Х. Рабиа; Пер. с англ. В. Г. Григулецкого, Ю. М. Кисельмана; Под ред. В. Г. Григулецкого; [Авт. предисл. Д. С. С. Лейелин]. - М. : Недра, 1989. - 412,[1] с. : ил.; 22 см.; ISBN 5-247-01348-4 (В пер.) : 2 р. 20 к.* *4. Долгих Л.Н. Расчеты креплениянефтяных и газовых скважин Пермь: Пермский государственный технический университет, 2006. — 87 с.* *5. Bellarby, J. (2009). Well completion design. 1st edn. Amsterdam: Elsevier Science*

Module designation	***CSE677 Information and Communication technology***
Semester(s) in which the module is taught	*4 semester*
Person responsible for the module	*Moldagulova Ayman Nikolaevna*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	*lecture, laboratory work*
Workload (incl. contact hours, self-study hours)	*Total workload:* *Contact hours:2 hours of lectures,1 hour of laboratory* *Private tuition, including exam preparation, specified in hours 24 : 90 hours*
Credit points	*5 ECTS*
Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*Be know:* – *to explain purpose, maintenance and tendencies of development of information and communication technologies, to prove the choice of the most acceptable technology for the solution of specific objectives;* – *to explain methods of collecting, storage and information processing, ways of realization of information and communication processes;* – *to describe architecture of computer systems and networks, appointment and functions of the main components;* *Навыки:* – *access and use digital technologies;* – *to improve digital skills and understand the basics of the digital economy;* – *to use digital technologies in meaningful and beneficial ways;* – *to use information from the Internet resources, cloud and mobile services for search, storage, processing and dissemination of information;* *- Компетенции:* – *to analyze and prove the choice of methods and means of digital protection, Digital Safety;* – *to develop understandings of how digital technologies have been programmed, how they are making calculations, and how they are making decisions;* – *to carry out design activity in the specialty with application of modern information and communication technologies.*

Content	*Information and communication technologies (ICT) is regarded as modern methods and means of communication of people in a normal and professional activities with the help of information technologies for the search, collection, storage, processing and dissemination of information.* *The discipline of "ICT" serves for formation at students of a certain outlook in the information sphere and the modern information culture, i.e. ability purposefully to work with information, professionally using for receiving, processing, transmission and its storage.* *This course is a top level exposure to computer hardware, software and communication systems. Students learn the functionality of hardware, software and network components as well as suggested best practices in maintenance and safety issues. Through hands-on activities and labs, students learn how to assemble and configure a computer as well as install operating systems and diagnostic application utilities. In addition, an introduction to networking is included. Students should be proficient in daily computer use (such as downloading and installing software from the Internet) and should be familiar with computer terms.*
Examination forms	*Multivariate test*
Study and examination requirements	*Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within a day and explain the plan for self-study of the lesson:* *- mandatory reading of the submitted materials before the lesson;* *- - delivery of tasks on time. There are penalties of -10% for late delivery;* *- 20% non-participation in the audience (for a good reason with supporting documents) - rating "F (Fail)";* *- plagiarism and cheating during the execution of the task are not allowed;* *- mandatory use of electronic gadgets in the classroom, which is welcome, but it is unacceptable to use them in the exam.*
Reading list	*1. June J. Parsons and Dan Oja, New Perspectives on Computer Concepts 2018: Comprehensive, 20th Edition, Course Technology Press, 25 Thompson PI., Boston, MA, COPYRIGHT © 2018.* *2. Shynybekov D.A., Uskenbayeva R.K., Serbin V.V., Duzbayev N.T., Moldagulova A.N., Duisebekova K.S., Satybaldiyeva R.Z., Khasenova G.I., Urmashev B.A. Information and communication technologies. Textbook: in 2 parts. Part 1, 1st ed. - Almaty: IITU, 2017. - 588 p., ISBN 978-601-7911-03-4 (A textbook in English with the stamp of the Ministry of Education and Science of the Republic of Kazakhstan).* *3. Shynybekov D.A., Uskenbayeva R.K., Serbin V.V., Duzbayev N.T., Moldagulova A.N., Duisebekova K.S., Satybaldiyeva R.Z., Khasenova G.I., Urmashev B.A. Information and communication technologies. Textbook: in 2 parts. Part 2, 1st ed. - Almaty: IITU, 2017. - 622 p., ISBN 978-601-7911-04-1 (A textbook in English with the stamp of the Ministry of Education and Science of the Republic of Kazakhstan).*

Module designation	***HUM127 Sociology***
Semester(s) in which the module is taught	*Fall and spring semesters 2.3 course.*
Person responsible for the module	*Yesbergenova Gulnur Bakitbekovna*
Language	*Russian, Kazakh.*

Relation to curriculum	*Basic*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*2 credit*
Credit points	*2 ECTS*
Required and recommended prerequisites for joining the module	*To master this discipline, knowledge, skills and skills acquired in the following disciplines are required:* *- Modern history of Kazakhstan;* *- introduction to the specialty;* *- History of Kazakhstan,* *"People and society.*
Module objectives / intended learning outcomes	*The goal of the program is to form a socio-humanitarian worldview of students in the context of solving the problems of modernizing public consciousness, determined by the state program «Looking to the Future: Modernizing Public Consciousness».* *After completing the course.* *The student must be able to:* *- reasonably discuss problematic issues on the course,* *develop and conduct research on social problems to master the skills: writing analytical reports specialized subjects:* *- draw up a program of sociological research; compile a toolkit for sociological research;* *- acquire skills: preparing a brief report as a result of sociological research, making practical recommendations.* *- correctly express and reasonably defend their own opinion on issues of social importance.* *At the end of the course, the student should know:* *- the ratio of natural and social in the formation and development of the individual and the determination of human behavior, society as a holistic system and its systemic properties.* *- the history of sociology; main sociological directions and schools;* *- methods of conducting sociological research; the basics of family sociology;* *- basic concepts, features of the family situation in the country and the world and trends of its changes;* *- various forms of cultural manifestation in the context of modernist tendencies, structure and distribution of cultural potential in society; main subcultural directions.*
Content	*The course consists of a problem-oriented course of lectures, involving discussive and polemical discussions of their subject content. This procedure for building a training course is based on the preliminary information readiness of students on the materials of the topics and problems of the specified course, the readiness of students for a reasoned*

	discussion of the problems of the upcoming lecture. To do this, the teacher must provide students with problematic issues and a list of literature of upcoming lectures in advance. Students must read materials before each lecture.
Examination forms	*Test questions.*
Study and examination requirements	*Availability of computer and computer equipment;* *- Availability of Internet channel with speed of at least 0.5 Mbit/s;* *- A personal account with a face photo on an avatar and corporate mail on the Microsoft 365 platform;* *- Attending classes according to the schedule.*
Reading list	*1. Biekenov K.U., Biekenova S.K., Kenzhakimova G.A. «Sociology: Academic Special». - Almaty: Evero, 2016. – 584 pages.* *2. «Sociology. Basics of the general theory: a textbook» /Ed. G.V. Osipov, L.N. Moskvichev. - 2nd ed., Rev. and additional. - M.: Norma, 2015. – 912 pages.* *3. Giddens E. «Sociology » /With the participation of C. Birdsall: translation from english. Ed. 2nd, completely overwrought. and additional M.: Yeditorial URSS, 2005. - 632 p.* *4Ritzer J. «Modern Sociological Theories». 5th ed. - St. Peter, 2002. - 688 p.5* *5. Garaja V.I. «Sociology of Religion»: Textbook. - 4th ed., Rev. and additional - M.: INFRA-M, 2014. - 304p. - (Higher education. Baccalaureate).* *6. Z. Zhanazarova «Family and Society». - Almaty: Kazakh university, 2014. – 133 pages.* *7. Giddens A., Sutton Ph. Sociology. Wiley Academic, 2017. (Gidens A, Sutton F. Soushiolodzha. Wiley Akademik, 2017)* *8. Abdiraiymova G.S., Burkhanova D.K. "Social structure of society and middle class": textbook / Almaty: Qazaq University, 2015.*

Module designation	***CHE452 Ecology and sustainable development***
Semester(s) in which the module is taught	*4 semester*
Person responsible for the module	*Deputy Chairman Of The Board Of Directors*
Language	*Kazakh (Qazaq)*
Relation to curriculum	*elective / specialisation* *Names of other study programmes with which the module is shared*
Teaching methods	*lecture*
Workload (incl. contact hours, self-study hours)	*2 credit*
Credit points	*2 ECTS*
Required and recommended prerequisites for joining the module	*No*

Module objectives / intended learning outcomes	*Key question: What learning outcomes should students achieve Key question: What learning outcomes should students achieve within the module?* *As a result of mastering the discipline "Ecology and sustainable development", the student must:* *know:* *-the main patterns that determine the interaction of living organisms with the environment;* *- basic principles of nature protection and rational use of natural resources;* *- socio-ecological consequences of anthropogenic activities;* *- the concept, strategies, problems of sustainable development and practical approaches to their solution at the global, regional and local levels.* *be able to:* *- identify and analyze natural and anthropogenic environmental processes and possible ways to regulate them;* *- to use the acquired knowledge about the laws of interaction between living organisms and the environment in practical activities to preserve sustainable development.* *possess skills:* *-definition of modern strategies for the sustainable development of mankind, aimed at the systematic change of traditional forms of management and lifestyle of people in order to preserve the stability of the biosphere and the development of society without catastrophic crises.*
Content	*Module "Ecology and sustainable development"; Sections; Ecology of individuals, Ecology of populations, Ecology of communities; the biosphere and its sustainability; global environmental problems; sustainable development: concept, indicators, goals of sustainable development; ways to achieve sustainable development: green economy, green technologies and efficient use of natural resources; environmental institutions; actual environmental problems and measures for sustainable development of the Republic of Kazakhstan.*
Examination forms	*Exam tickets, test questions.*
Study and examination requirements	*- Availability of a computer and computer equipment;* *- Availability of an Internet channel with a speed of at least 0.5 Mbit/sec;* *- Personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform;* *- Attendance of classes according to the schedule.*
Reading list	*Экология және тұрақты даму оқулық / М.С. Тонкопий, Г.С. Сатбаева, Н.П. Ишкулова [и др.].- Алматы: Экономика, 2014.- 316 б.* *Баешова А.Қ.Экология және тұрақты даму : оқу құралы. Алматы: Қазақ ун-ті, 2013. - 152 б.: - ISBN 978-601-247-218-9.* *Бейсенова Р.Р. Экология және тұрақты даму пәнінен лекциялар жинағы. Астана, 2010. — 223 б.* *Әлинов М.Ш. Экология және тұрақты даму. Алматы: Бастау, — 2012. — 272 б. ISBN 978-601-7275-58-7.* *Нұрғызарынов А. Экология және тұрақты даму. Астана: Фолиант, 2014. — 344 б.* *Тонкопий М.С., Сатбаева Г.С., Имкулова Н.П., Анимисова Н.М. Экология және тұрақты даму: оқулық: ҚР Білім және ғылым м-гі. Алматы: ЖШС РПБК «Дәуір», 2011 – 312 б.*

Module designation	***PET 411 «Reservoir rock properties»***
Semester(s) in which the module is taught	*4 semester*

Person responsible for the module	*Jamilyam Ismailova*
Language	*English*
Attitude towards the curriculum	*mandatory* *post-requirements: Field development*
Teaching methods	*lectures, laboratory work*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 2/0/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: Fundamentals of oil and gas business* *Technique and technology of oil production* *Geology of oil and gas*
Module objectives/intended learning outcomes	*Familiarization of students with the essence of the basic physical processes in rocks, with the basic petrophysical properties of rocks and their interrelationships: collector, magnetic, electrical, elastic, thermal, nuclear-physical.* *As a result of studying the discipline , the student must:* *to know: the basic physical properties of substances, minerals, rocks, such as density, porosity, permeability, elasticity, elastic wave propagation velocity, electrical resistance (conductivity), thermal conductivity, determining factors of the listed physical properties, their units of measurement, the limits of their change in rocks.* *be able to: analyze petrophysical information.* *possess: methods for calculating the petrophysical model of hydrocarbon deposits.*
Content	*- Introduction. Minerals composing GP. Igneous, metamorphic, sedimentary GP.* *- Porosity and permeability. Classification of porosity, permeability. Irreversible changes in porosity with depth. Elastic changes in porosity during the removal of cores to the surface.* *- Water, oil and gas saturation of GP. Humidity, moisture capacity, bound and free water. Wettability of the solid phase surface.* *- Density of the UCP. Mineralogical density. Compaction of the UCP with depth.* *- Application of Darcy's law. Flow through cracks in the GP. Radial flow. Relative phase permeabilities.* *-Permeability of carbonate GP. Classification of fracturing GP. Petrophysical properties of fractured GP. Double porosity systems. Porosity-permeability relationship* *- The relationship of static stress-stress GP. Deformation of GP. Stress-tension diagrams. Compressibility of GP pores.* *- Electrical properties of GP. Electrical conductivity. The resistivity of the UCP.* *- Magnetic properties of GP. Processes and laws of thermal conductivity and heat distribution in GP*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*

References	*~ [1] CSM course lectures* ** [2]] Djebbar Tiab, Erle C.Donaldson. Petrophysics. Theory and practice of Measuring Reservor Rock and Fluid Properties. Third edition.Gulf Professional Publishing. 2012* ** [3] А.В.Ладынин. Петрофизика. Новосибирск, 2012* ** [4] В.М.Добрынин, Б.Ю.Вендельштейн, Д.А. Кожеников. Петрофизика (Физика горных пород). ФГУП Издательство «Нефть и газ». 2004 г.* **Литература доступна в электронных ресурсах библиотеки* *~ Литература доступна на учебном портале преподавателя.*

Module designation	***PET409 «Thermodynamics and heat engineering»***
Semester(s) in which the module is taught	*4 semester*
Person responsible for the module	*Abdeli Dairabay*
Language	*Kazakh*
Attitude towards the curriculum	*mandatory* *кейінгіреквизит: PET42 Технология и техника добычи нефти*
Teaching methods	*Lecture, practical work*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:1/0/2* *Independent work with a teacher: 2 hours*
Credit scores	*5 ECTS*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites:: MAT 103 Mathematics, PHY111 Physics* *The ability to analyze, synthesize and know how to solve engineering, mathematical, physical calculations.*
Module objectives/intended learning outcomes	*Student:* *- laws of thermodynamics,* *- ideal gas isoprocesses,* *- know the basics of the theory of heat transfer.* *Student:* *- design thermodynamic processes in the oil and gas industry ; ,* *- improvement of heat exchange processes in technological equipment* *-be able to plan and conduct engineering and research development work..* *At the end of the course, the student should be able to prepare engineering and scientific recommendations for the preparation of new technologies and equipment.*
Content	*The course of the student in the igereti network:* *- problems of thermodynamics and thermal engineering in the oil and gas business;* *- the first and second laws of thermodynamics;* *- thermodynamic processes, thermophysical properties of sedimentary rocks and fluids;* *- fundamentals of the theory of heat transfer in technological processes.*

Exam forms	*A written exam*
Requirements for training and exams	*The student must not be late, keep up with classes, be neat and obligatory. The student must come with preparation for lectures, laboratory and practical classes. Reports of practical work must be submitted in a timely manner, all types of work (laboratory, practical and independent) are completed in full.*
References	*[1] Zerbe Gunther, Wilhelm Gernot. Technical Thermodynamics: textbook/ Translated from German. – Astana.: Folio, 2015. - 540 p., ill. [5] Heat engineering, technical thermodynamics: textbook / I. N. Polina, S. G. Efimova, N. A. Korychev; Syktyvkar Forest. in-T. Syktyvkar : SLI, 2012. – 188 p.* *[2] Dayrabai J. Abdel, Dinara N. DELEESHEVA. Thermodynamics and heat engineering. (Oil and gas engineering). Thermodynamics and heat engineering. (Oil and Gas Engineering): textbook (in Kazakh and Russian). - - Almaty, KazNITU, 2020.* *180 c. [6] Joseph M. Powers. Lecture notes on thermodynamics. Department of Aerospace and Mechanical Engineering University of Notre Dame. Notre Dame, Indiana 46556-5637. USA, updated, 29 June 2016, 1:04pm* *[3] Thermodynamics for engineers / Merle C. Potter, Craig W. Somerton. New York: Schaum's Outline Series McGraw-Hill, 2014. – 406. [7] Yunus A. Sengel, Michael A. Boles. Thermodynamics an engineering approach. – New Yor.: McGraw-Hill, 2011. – 807 p.* *[4] Kuptsov S.M. Thermophysical properties of reservoir fluids and rocks of oil fields. - M.: LLC "Nedrabusinesscenter", 2008. - 205 p.: ill. [8] A large reference book of an oil and gas production engineer. Development of deposits. / Edited by U. Lyonoz, G. Plizga – Translated from English – St. Petersburg: Profession, 2009. – 952 p.* *[5] Abdel D. J. "Thermodynamics and heat engineering": UMKD. - Almaty: Satbayev University, 2022.*

Module designation	***PET410 Fluid mechanics***
Semester(s) in which the module is taught	*5 semester*
Person responsible for the module	*Baimukhametov M.A.*
Language	*Russian*
Attitude towards the curriculum	*Compulsory* *post requisite: PET4252 Technology and technique of oil production*
Teaching methods	*lectures, laboratory work, practical classes*
Workload (incl. contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 1/1/1* *IWST: 2 hours*
Credit scores	*5 credits (1/1/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT103 Mathematics, PHY111 Physics* *The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics.*

Module objectives/intended learning outcomes	*The student must know:* *- theoretical foundations of fluid and gas mechanics;* *- conservation equations, on which the theoretical study of hydromechanics is based;* *- the basic laws of fluid and gas mechanics for calculating the determination of pressure losses.* *The student must be able to:* *- use knowledge about the properties of oil and gas in the relevant calculations;* *- explain what data and specific methods are needed to solve the main problems of the sections of fluid and gas mechanics - kinematics, statics and dynamics;* *- apply the fundamental laws of nature (conservation of mass, energy, momentum, etc.) to establish the basic laws governing the movement of liquids and gases.* *Upon completion of the course, the student must demonstrate the ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of sections of fluid and gas mechanics - kinematics, statics and dynamics.*
Content	*As part of the course, the student will learn:* *- properties of liquids and gases;* *- classification of regimes and flows of liquid and gas movement;* *- deformation motion of the elementary volume of the medium;* *- conservation equations, on which the theoretical study of hydromechanics is based.*
Exam forms	*A written exam*
Training and Exam Requirements	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
Bibliography	** [1] Loitsyansky L.G. Mechanics of liquid and gas. - M.: Nauka, 1978. - 736 p., M.: Bustard, 2003. - 840 p.* ** [2] Dmitriev N.M., Kadet V.V. Introduction to underground hydromechanics. - M.: TsentrLitNefteGaz, 2009. - 272 p.* ** [3] Collection of problems in hydraulics and gas dynamics for oil and gas universities. – M.: Griffin, 2007. – 304 p.* ** [4] Collection of problems on technology and technology of oil production: Textbook for universities / Mishchenko I.T., Sakharov V.A., Gron V.G., Bogomolny G.I. – M.: Nedra, 1984. – 272 p.* ** [5] Reference manual for the design of the development and operation of oil fields. Oil production. - M: LLC TID "Alliance", 2005. - 455 p.* *~ [6] Baimukhametov M.A. Mechanics of liquid and gas: UMKD. - Almaty: Satbayev University, 2022.* **Literature is available in the electronic resources of the library* *~ Literature is available on the teacher's educational portal.*

Module designation	***GEO 487 «Geology and Mineral Resources of Kazakhstan»***
Semester(s) in which the module is taught	*4 semester*
Person responsible for the module	*Omarova Gulnara Magauvyanovna*
Language	*Russian*

Relation to curriculum	*Obligatory*
Teaching methods	*lecture, laboratory work*
Workload (incl. contact hours, self-study hours)	*Total workload:* *Contact hours:2 hours of lectures, 1 hour of laboratory* *Office hours, including exam preparation, specified in hours: 2 hours per week, 30 hours*
Credit points	*5 ECTS*
Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*Knowledge:* *– principles of tectonic zoning in general and the territory of Kazakhstan in particular;* *-the main structural elements of the Earth's crust of a certain region of Kazakhstan, their stratigraphy, magmatic complexes, as well as the patterns of development of the main tectonic structures and the placement of mineral deposits in them;* *- mineral resources of Kazakhstan, their types, classification and availability of the country.* *Skills:* *- possession of geological thinking based on an extensive base of factual material with the ability to competently structure it and use it in accordance with the logic of the fundamental conceptual geological paradigms;* *- learn to read and compose schematic geological maps of various contents independently.* *Competencies:* *- analyze the geological structure of any part of the earth's crust, make its integral characteristic and interpret the conditions of its development in time and space;* *- to draw up a scheme of tectonic zoning of the territory of Kazakhstan;* *- to make maps of the placement of minerals on the territory of Kazakhstan.*
Content	*The discipline "Geology and mineral resources of Kazakhstan" is designed to form a holistic view of the geological structure and development of the Earth's crust within the territory of Kazakhstan, as well as to familiarize students with the main types of mineral resources, the country's provision for them in the future and priorities in the mineral resource complex.* *Familiarization with the main features of the geological structure of the region is carried out on the basis of cartographic material of the last years of the publication, using which students should learn to read and compose schematic geological maps of various contents independently.* *In the course "Geology and mineral resources of Kazakhstan", the authors attempted to give a holistic view of the geological structure of the country's territory and the connection of minerals with certain geological structures, the conditionality of the latter by the history and patterns of geological development of a particular region.*
Examination forms	*Written exam*

Study and examination requirements	*Mandatory participation in training sessions according to the schedule, which determines the readiness for the lesson. In case of absence from the lesson, the student is obliged to notify the teacher within a day and explain the plan for self-study of the lesson:* *- mandatory reading of the submitted materials before the lesson;* *- - delivery of tasks during;* *- 20% non-participation in the audience (for a good reason with supporting documents) - rating "F (Fail)";* *- plagiarism and cheating during the execution of the task are not allowed;* *- mandatory use of electronic gadgets in the classroom, which is welcome, but it is unacceptable to use them in the exam.* *Within the framework of training in the discipline, any corruption manifestations in any form are unacceptable. The organizer of such actions (teacher, students or third parties on their behalf) are fully responsible for violating the laws of the Republic of Kazakhstan.*
Reading list	*1. Korobkin V. V. Geology and mineral resources of Kazakhstan : textbook/ V. V. Korobkin; - Almaty : KBTU, 2019. - 236 p.* *2. Evolution of the manifestation of geotectonic processes in the history of the Earth and their material and genetic foundations/Seitov N., Kunaev M.S. –Almaty, 2011* *[2] Geological structure of Kazakhstan / Bekzhanov G.R., Koshkin V.Ya., Nikitchenko I.I. et al. - Almaty: Academy of Mineral Resources of the Republic of Kazakhstan, 2000.* *[3] Minerals of Kazakhstan: Explanatory note to the Map of minerals of Kazakhstan scale 1:1,000,000 / Nikitchenko I.I. – Kokshetau, 2002.*

Module designation	***PET412 «Oil and gas well drilling»***
Semester(s) in which the module is taught	*5 Semester*
Person responsible for the module	*Delikesheva D.N.*
Language	*russian*
Attitude towards the curriculum	*obligatory* *post-requirement: PET4262 Completion of wells*
Teaching methods	*lectures, laboratory work*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours: 2/1/0* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/1/0/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT 103 Mathematics, PHY111 Physics* *The ability to analyze, synthesize and possess the skills of engineering calculations and methods of solving basic problems of mathematics, physics.*

Module objectives/intended learning outcomes	*The student should be able to:* *- - Distinguish the difference between diamond, PDC ball bits and list the main characteristics that are taken into account when designing a rock-breaking tool* *- Determine borehole pressure and determine the effect of abnormal reservoir pressure on well design and drilling.* *- Distinguish between one-stage and two-stage cementation, cementation through a drill string and a shank and calculate the volume of mortar, cement, mixing water, sales fluid required for the above-mentioned cementation work.* *- List and describe the functions of drilling fluids and the properties that affect the ability of the fluid to perform these functions.* *- Calculate the pressure drop in the circulation system for Newtonian fluids and liquids obeying the Bingham Plastic Model and the Power Law, both for laminar and turbulent flows, in order to optimize the hydraulic program.*
Content	*As part of the course, the student will master:* *calculation of excessive loads to which the drill string is subjected; casing string design; performance of rock-breaking tools; priority parameters used in evaluating performance AT; well design: calculation and drawing up graphs of pressure gradients of pores and cracks for the selection of casing strings; competence in well management: primary and secondary indicators of emissions, silencing wells and their return to primary control.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*[1] ~ Fundamentals of Drilling Engineering* *by Robert F. Mitchell (Editor), Stefan F. Miska (Editor). 2011. Society of* *Petroleum Engineers* *[2] ~ Drilling engineering. (2015) Heriot-Watt Manual. Edinburgh;* *[3] ~ Попов А.Н., Спивак А.И., Акбулатов Т.О. Технология бурения нефтяных и газовых скважин (2004)* **Literature is available in the electronic resources of the library* *~ The literature is available on the teacher's learning portal.*

Module designation	***PET415 «Reservoir fluid properties»***
Semester(s) in which the module is taught	*5 semester*
Person responsible for the module	*Yskak A.S.*
Language	*English*
Attitude towards the curriculum	*Basic* *Postrequisites: PET425 Petroleum production engineering , PET410 Multidisciplinary petroleum project, ECA003 Preparation for diploma project*

Teaching methods	*lectures, laboratory work*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:2/1/0* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/1/0/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: PET410 Fluid mechanics, PET409 Thermodynamics and heat engineering.* *The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics.*
Module objectives/intended learning outcomes	*Students will be able to:* *Describe how physical properties of hydrocarbon components are affected by molecular structure, size, pressure, and temperature. Explain the physical meaning and evaluate the impact of fluid properties in reservoir engineering and production problems.* *Compute formation volume factors, viscosities, solution gas-oil ratio, densities of oil, water and gas, Z-factor (single and two-phase), and interfacial tensions.* *Calculate gas, oil, and oilfield brine properties (z-factor, density, viscosities) using various correlations with different independent variables: gas or oil composition, API gravity, gas gravity, salinity, bubble-point pressure, and temperature.* *Describe the laboratory procedures required for a Reservoir Fluid Study and calculate reservoir fluid properties (formation volume factors, solution gas oil ratios) from the PVTdata.* *be competent:* *– Apply EOS for calculation of phase boundaries (bubble point or dew points), and two-phase phase equilibrium separations given overall mixture composition, pressure (or temperature), and equilibrium ratios (k-values) from: ideal solution models, from correlationsor from table lookup.*
Content	*As part of the course, the student will learn:* *properties of fluids encountered in petroleum engineering,* *phase behavior,* *density, viscosity, interfacial tension,* *composition of oil, gas, and brine systems,* *interpretation of lab data for engineering applications,* *flash calculations with k-values and equation of state.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*[1] McCain, W. D.: The Properties of Petroleum Fluids, Penn Well Publishing Co.,Tulsa, 1990.* *[2] Textbook series. Reservoir fluids. Zoltan E.Heinemann, Brigitte E.Weinhardt. Leoben,2004.* *[3] Emil J.Burcik. Properties of PetroleumReservoir fluids. (The Pennsylvanian StateUniversity) 1979.* *[4] Ali Danesh: PVT and Phase Behavior ofPetroleum Reservoir Fluids, Elsevier, 1998.* *[5] Tarek Ahmed: Reservoir Engineering Handbook, Gulf Professional Publishing.* *[6] Craft, B.C., Hawkin, M.: Applied Petroleum Reservoir Engineering , PrenticeHall, 2015.* *7] Don W. Green and G. Paul Willhite: Enhanced Oil Recovery, Richardson, Texas,1998.*

Module designation	***PET 416 «Revervoir engineering I: Primary recovery»***
Semester(s) in which the module is taught	*5 Semester*
Person responsible for the module	*G. Zh. Moldabayeva*
Language	*russian*
Attitude towards the curriculum	*obligatory* *post-requirement: Technology and technique of oil production*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*Prerequisites: workload: 5 hours* *Contact hours: 1/0/2/2* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (1/0/2/2)*
Required and Recommended Prerequisites for Attaching to the Module	
Module objectives/intended learning outcomes	*The student should know:* *- demonstrate the derivation of the main differential equation of radial filtration, the equation of quasi-established and steady-state inflows into the well;* *- generalize the solutions of the piezo conductivity equation for use in the study of wells;* *- to reveal the concept of water inflow into the deposit;* *- demonstrate calculations for forecasting the production of oil and gas fields.*
Content	*At the end of the course, the student must know and be able to:* *- be able to determine the parameters of the well according to hydrodynamic studies;* *- be able to determine the PVT properties of reservoir fluids and rocks;* *- be able to analyze the results and be competent in the field of oil field development.* *- to carry out calculations of water inflow into the deposit;* *- predict oil production during flooding;*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*

References	- *Дейк Л.П. Основы разработки нефтяных и газовых месторождений – Elsevier BV, 1978* - *Tarek Ahmed, Reservoir Engineering Handbook - Elsevier Inc, 2006* - *Reservoir Engineering Handbook Ahmed Tarik, 2006* - *Arnold Ken "Surface Production Operations"* - *Erle C "Enhanced Oil Recovery"* - *Schlumberger, 2016, "ECLIPSE 100 BLACK OIL"*

Module designation	***PET418 «Petroleum Engineering seminar»***
Semester(s) in which the module is taught	*5 Semester*
Person responsible for the module	*Akhymbaeva B.S.*
Language	*russian*
Attitude towards the curriculum	*obligatory* *post-requirements: no*
Teaching methods	*lectures, laboratory work*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours: 2/1/0* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/1/0/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: none* *-The presence of a desktop or laptop computer, simultaneous use of other gadgets is welcome, but not necessary.* *-Availability of an Internet channel with a speed of at least 0.5 Mbit/sec.* *-Personal account with a photo of the person on the avatar and corporate mail on the Microsoft 365 platform.* *-Attendance of classes is mandatory according to the schedule.*
Module objectives/intended learning outcomes	*Development of students' general skills and abilities necessary in research, writing research papers, as well as public speaking* *The student should be able to:* *- to see problems, to put forward hypotheses,* *- draw conclusions and conclusions,* *- be able to defend and prove your ideas* *At the end of the course, the student should know:* *- rules for the correct design of scientific papers* *- design options for high-quality scientific articles* *- skills of successful presentation of scientific papers*
Content	*As part of the course, the student will master the design options for high-quality scientific articles and theses; the ability to conduct a critical analysis of research literature; the ability to plan experiments, as well as the skills of successful presentation of scientific papers.*

Exam forms	*A written exam*
Requirements for training and exams	*The student must come prepared for lectures and practical classes. Timely protection and full performance of all types of work (practical and independent) is required. The student should not be late and miss classes, be punctual and mandatory. It is planned to reduce the maximum score by 10% for untimely work. If you are forced to skip the intermediate certification for good reasons, you should warn the teacher in advance before it, so that you can pass the boundary control in advance. Skipping an exam for a disrespectful reason deprives you of the right to take it. If you miss the exam for a good reason, a special permit is issued and the date, time and place of the exam are assigned.*
References	*[1] Charles Lipson. How to write a BA thesis. A practical guide from your first ideas to your finished paper. 2005 [5] Simon Kendal. How to write a research paper. 2015* *[2] Linda J. Webster. Introduction to public speaking. 2012 [6] Rui Pedro. How to write good scientific project proposal. 2013* *[3] College of the Canyons. Fundamentals of* *Public Speaking. 2017* **Literature is available in the electronic resources of the library* *~ The literature is available on the teacher's learning portal.*

Module designation	***PET417 «Petroleum regulations and practices»***
Semester(s) in which the module is taught	*5 semester*
Person responsible for the module	*Moldakhmetova Dilyara*
Language	*kazakh*
Attitude towards the curriculum	*elective* *Postrequisites: graduate work*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*General workload:5 hours* *Contact hours:2/0/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: Development of oil and gas fields* *The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics.*

Module objectives/intended learning outcomes	*Students will be able to:* – *understand the possibilities and problems of hydrodynamic modeling of oil and gasreservoirs,* – *be able to build and run the model for calculation,* – *analyze the results.* – *have skills of modeling structured cells,* – *add wells to the model,* – *model of different pressure maintenance systems;* – *model of multiphase flows.* *be competent:* *in the field of hydrodynamic modeling of oil and gas reservoirs*
Content	*As part of the course, the student will learn:* *– basic principles of hydrodynamic simulators calculating mechanism,* *– basic equations of hydrodynamic simulators,* *– structure and rules for generating a data file,* *– methods for setting initial conditions for modeling,* *– the basics of modeling of non- volatile oil,* *– the basics of compositional modeling.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*[1] ResSim tutorials. IPE, 2009.* *[2] Advanced petroleum reservoir simulation.M.R.Islam.Willey, 2016.* *[3] Principles of applied reservoir simulation.2nd edition. John R.Fanchi. Gulf professional Publishing, 2001.* *[4] Petroleum Reservoir Simulation. A basicapproach. Jamal H. Abou-Kassem. Gulf publishing company.2006.* *[5] Fundamentals of numerical reservoir simulation.Donald W.Peaceman. Elseiver, 1977.* *[6] Eclipse Manual, Schlumberger, 2009.*

Module designation	***PET414 «Drilling fluids»***
Semester(s) in which the module is taught	*5 semester*
Person responsible for the module	*Korgasbekov Darkhan*
Language	*kazakh*
Attitude towards the curriculum	*Elective* *Postrequisites:*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*General workload:5 hours* *Contact hours:2/0/1* *Independent work with a teacher: 5 hours*
Credit scores	*5 credits (2/0/1/2)*

Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: GEO486 Geology of oil and gas, PET103 Reservoir engineering basics, PET410 Fluid mechanics* *The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics.*
Module objectives/intended learning outcomes	*Students will be able to:* – *understand the possibilities and problems of hydrodynamic modeling of oil and gasreservoirs,* – *be able to build and run the model for calculation,* – *analyze the results.* – *have skills of modeling structured cells,* – *add wells to the model,* – *model of different pressure maintenance systems;* – *model of multiphase flows.* *be competent:* *in the field of hydrodynamic modeling of oil and gas reservoirs*
Content	*As part of the course, the student will learn:* – *basic principles of hydrodynamic simulators calculating mechanism,* – *basic equations of hydrodynamic simulators,* – *structure and rules for generating a data file,* – *methods for setting initial conditions for modeling,* – *the basics of modeling of non- volatile oil,* – *the basics of compositional modeling.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*[1] ResSim tutorials. IPE, 2009.* *[2] Advanced petroleum reservoir simulation.M.R.Islam.Willey, 2016.* *[3] Principles of applied reservoir simulation.2nd edition. John R.Fanchi. Gulf professional Publishing, 2001.* *[4] Petroleum Reservoir Simulation. A basicapproach. Jamal H. Abou-Kassem. Gulf publishing company.2006.* *[5] Fundamentals of numerical reservoir simulation.Donald W.Peaceman. Elseiver, 1977.* *[6] Eclipse Manual, Schlumberger, 2009.*

Module designation	***PET420 Development of gas and gas condensate fields***
Semester(s) in which the module is taught	*5 semester*
Person responsible for the module	*Baimukhametov M.A.*
Language	*Russian*
Attitude towards the curriculum	*elective* *post requisite: PET441 Multidisciplinary project design*
Teaching methods	*lectures, practical classes*

Workload (incl. contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 2/0/1* *IWST: 2 hours*
Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT103 Mathematics, PHY111 Physics,* *PET410 Fluid and Gas Mechanics* *The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics, fluid and gas mechanics*
Module objectives/intended learning outcomes	*The student must know:* *- development of oil, gas and gas condensate fields under various conditions;* *- reservoir pressure maintenance calculations;* *- methods of dealing with complications in the development and operation of gas and gas condensate fields;* *- measures for the protection of subsoil and the environment.* *The student must be able to:* *- allocate objects for the development of gas and gas condensate fields;* *- classify oil and gas deposits;* *- to determine the pressure at any point of an infinite reservoir in an elastic regime;* *- analyze systems and technological indicators of field development.* *Upon completion of the course, the student must demonstrate the ability to analyze, synthesize and design the development of gas and gas condensate fields, as well as calculate the economic indicators of the development of gas and gas condensate fields.*
Content	*As part of the course, the student will learn:* *- systems and technological indicators for the development of gas and gas condensate fields;* *- classification of gas and gas condensate deposits;* *- features of the development of gas and gas condensate deposits;* *- physico-chemical methods for the development of gas and gas condensate fields.*
Exam forms	*A written exam*
Training and Exam Requirements	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures and practical exercises. Timely delivery of calculations of practical work, full implementation of all types of work (practical and independent) are required.*
Bibliography	** [1] Zheltov Yu.P. Development of oil fields. Moscow: Nedra, 1986.* ** [2] Lysenko V.D. Theory of development of oil fields with intra-loop waterflooding. Moscow: Nedra, 2004.* ** [3] Shirkovsky A.I. Development and operation of gas and gas condensate fields. Moscow: Nedra, 1987.* ** [4] Gurevich G.R., Sokolov V.A., Shmyglya P.T. Development of gas condensate fields with reservoir pressure maintenance. Moscow: Nedra, 1976.* ** [5] Reference manual for the design of the development and operation of oil fields. Oil production. Under the general editorship. Sh.K. Gimatudinova /R.S. Andriasov, I.T. Mishchenko, A.I. Petrov and others - 2nd ed. M.: LLC TID "Alliance", 2005. - 455 p.* ** [6] Reference guide to the design of oil field development. Edited by Gimatudinov Sh.K. Moscow: Nedra, 1983.* **Literature is available in the electronic resources of the library* *~ Literature is available on the teacher's educational portal.*

Module designation	***PET427 «Design and operation of oil and gas pipelines»***
Semester(s) in which the module is taught	*5 semester*
Person responsible for the module	*Moldakhmetova Dilyara*
Language	*russian*
Attitude towards the curriculum	*Elective* *Postrequisites: - Сорапты қ және компрессорлы қ станса ларды жобалау және пайдалану*
Teaching methods	*lectures, practice*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:2/0/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (1/0/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: Fluid and gas mechanics* *Introduction to the specialty*
Module objectives/intended learning outcomes	*At the end of the course, the student should know:* *- basic operators of the FORTRAN programming language;* *- basics of programming in FORTRAN;* *- algorithms for numerical solution of model equations of hydromechanics, heat transfer and filtration.* *- fundamentals of modeling the flow of a single-phase liquid in a porous medium;* *- ways to set initial conditions for modeling;* *- software implementation of well operation models;* *- fundamentals of modeling two-phase flow in a porous medium;* *- fundamentals of modeling three-phase filtration processes in oil reservoirs.* *As a result of studying the discipline, the student should be able to:* *- build mathematical and numerical models;* *- create a computer program for calculating the simplest hydrodynamic, thermal and filtration processes;* *- to analyze the results obtained.*
Content	*It is expected that during the course, the student will master the skills of practical application of the FORTRAN programming language for the numerical implementation of the equations of hydromechanics, heat transfer and filtration.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*

References	*1. Chen, Zhangxin. (2007). Reservoir Simulation: Mathematical Techniques in Oil Recovery (CBMS-NSF Regional Conference Series in Applied Mathematics).* *2. Роуч П. Вычислительная гидродинамика. М.: Мир, 1980. — 618 с. Отредактирован 28.10.19 г.* *3. Андерсон Д., Таннехилл Дж., Плетчер Р. Вычислительная гидромеханика и теплообмен. В 2-х т.: Пер. с англ. – М.: Мир, 1990. – 384 с.* *4. Zhangxin Chen, Guanren Huan, and Yuanle Ma. (2006). Computational Methods for Multiphase Flows in Porous Media (Computational Science and Engineering 2). Society for Industrial and Applied Mathematics, USA.* *5. Бартеньев О. В. Современный Фортран. - 3-е изд., доп. и перераб. - М.: ДИАЛОГ-МИФИ, 2000. - 449 с.* *6. Немнюгин М. А., Стесик О. Л. Современный Фортран. Самоучитель. — СПб.: БХВ-Петербург, 2004. — 496 с.*

Module designation	***PET422 «Reservoir Engineering II: Secondary and tertiary methods of oil recovery»***
Semester(s) in which the module is taught	*6 semester*
Person responsible for the module	*Yskak A.S.*
Language	*English*
Attitude towards the curriculum	*Basic* *Postrequisites: PET1073 Well testing, PET113 Multidisciplinary petroleum project, ECA003 Preparation for diploma project*
Teaching methods	*lectures, laboratory work, practical classes*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:1/0/2* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (1/0/2/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: GEO486 Geology of oil and gas, PET103 Reservoir engineering basics, PET410 Fluid mechanics* *The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics.*

Module objectives/intended learning outcomes	*Students will be able to:* - *make calculations development of oil and gas fields, process well survey data,* - *choose a rational option for the development of a deposit,* - *select equipment and set the optimal mode of operation wells, taking into account complicating factors,* - *choose a method of influencing bottomhole zone of wells* *be competent:* - *modern methods for determining the properties of oil and gas, systems for the development of oil and gas deposits,* - *features of operation of oil and gas wells, technological parameters of formation movement, modern* - *oil and gas treatment methods, Buckley-Leverett equations, material balance equations,* - *Equation for changing the phase fraction in a multiphase flow.*
Content	*As part of the course, the student will learn:* - *oil recovery classification, the need for Secondary and Enhanced oil Recovery,* - *general classification and description of EOR processes, waterflooding.* - *Miscible Gas injection (Principles of phase behavior related to miscibility, First contact miscibility process, Measurement and prediction of Minimum Miscibility Pressure),* - *Chemical flooding,* - *Thermal methods,* - *Non-Conventional Hydrocarbon Extraction*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*[1]Reservoir Engineering II. Prepared by Dr. Luis E. Zerpa. Colorado School of Mines. Satbayev university.* *[2] Dake L. Fundamentals of Reservoir Engineering– Elsevier BV, 1978.* *[3] B.C.Craft and M.F. Hawkins, Applied Petroleum Reservoir Engineering, 1990.* *[4] Tarek Ahmed, Reservoir Engineering Handbook - Elsevier Inc, 2006.* *[5] Erle C "Enhanced Oil Recovery", 2009.* *[6] William D. McCain Jr., The properties of petroleum fluids – PennWell Publishing Company, 1989.*

Module designation	***PET424 «Well log analysis»***
Semester(s) in which the module is taught	*6 Semester*
Person responsible for the module	*Logvinenko A.V.*
Language	*English*
Attitude towards the curriculum	*elective* *post-requirements: Completion of the graduation project*
Teaching methods	*lectures, laboratory work*

Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours: 2/1/0* *Independent work with a teacher:: 2 hours*
Credit scores	*5 credit (2/1/0)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: Properties of rocks, Properties of reservoir fluids* *The ability to analyze, synthesize and possess the skills of engineering calculations..*
Module objectives/intended learning outcomes	*The student should know:* *- theoretical foundations of the physics of the formation and reservoir fluid;* *- geology of the hydrocarbon reservoir;* *- processes of borehole operations.* *The student should be able to:* *- use knowledge about the properties of oil, gas, water and rock in appropriate calculations;* *- explain what data and specific methods are needed to construct logging curves;* *- apply the fundamental laws of nature (conservation of mass, energy, momentum, etc.) to establish the basic laws of oil, gas, water and rock.* *After completing the course, the student must demonstrate the ability to analyze, synthesize and possess the skills of engineering calculations and methods of conducting geophysical well surveys.*
Content	*As part of the course, the student will master:* *- properties of liquids, gases and rocks;* *- - classification of geophysical research in the well;* *- calculations of the corresponding curves in the interpretation of logging data;* *- methods of interpretation of logging data..*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory and independent) are required.*
References	*[1] Djebbar Tiab and Erle C. Donaldson. Petrophysics. Theory and Practice of Measuring Reservoir Rock and Fluid Transport Properties. Gulf. 2012.* *[2] John H. D.,Basics of Oil and Gas Log Analysis, 1999* *[3] George A. and Charles G., Basic Well Log Analysis for Geologists, 1993* *[4] Honggi L., Principles and Aplications of Well Logging, 2017* *[5] Toby D., Well Logging and Formation Evaluation, 2005* *[6] Serra O., Fundamentals of Well Log Interpretation, 1984*

Module designation	***PET426 «Well completion»***
Semester(s) in which the module is taught	*6th semester*
Person responsible for the module	*Akhymbaeva B.S.*

Language	*Russian*
Attitude towards the curriculum	*Mandatory* *Post requisites:* *Field Development Plan, Individual Project*
Teaching methods	
Workload (including contact hours, self-employment hours)	*Lectures, practice*
Credit scores	*5 ECTS*
Required and Recommended Prerequisites for Attaching to the Module	*Contact hours: 2/0/1*
Module objectives/intended learning outcomes	*The course will continue the study of wellbore construction from PET101, Drilling Engineering.* *• Determine the pore pressure and fracture gradient* *• Identify casing setting points* *• Calculate the state of stress in a casing or tubing string* *• Describe various completion techniques advantage and disadvantage* *• Select a proper perforation technique* *• Describe various sand control methods and equipment* *• Design a completion procedure*
Content	*It will cover the basic engineering and procedures for the completion of a well. This course is designed to familiarize you with casing and tubing design and procedures and some of the engineering methodology used in today's completion operations. We will cover the basics of pore pressure/fracture gradient prediction, casing and tubing design, cementing, wellheads, completion types and equipment, perforating, and sand control. Covered will be the basics of loads and backups, stress determination, and the potential for failure. We will use the pore pressure/fracture gradient plots and casing setting depths to be able to design the required casing. Completion types are considered with tubing design (stress and movements) and completion equipment selection. Finally perforating and sand control are covered.*
Exam forms	*Written exam*
Requirements for training and exams	*The student must come prepared for lectures and practical classes. Timely protection and full performance of all types of work (practical and independent) is required. The student should not be late and miss classes, be punctual and mandatory. It is planned to reduce the maximum score by 10% for untimely work. If you are forced to skip the intermediate certification for good reasons, you must warn the teacher in advance before it, so that you can pass the boundary control in advance. Skipping an exam for a disrespectful reason deprives you of the right to take it. If you miss the exam for a good reason, a special permit is issued and the date, time and place of the exam are assigned.*
References	*1. Drilling Engineering. Heriot-Watt Manual. Edinburgh, 2015.* *2. Bellarby J., Well Completion Design. 1st edn. Amsterdam: Elsevier Science, 2009* *3. Spivak A.I. Popov A.N., Technology of Drilling for Oil and Gas Wells. Moscow: Nedra, 2004* *4. Dolgih L.N., Oil and Gas Well Design Calculations. Perm: PNRPU, 2006* *5. Fundamentals of Drilling Engineering SPE Textbook.*

Module designation	***PET425 «Petroleum production engineering»***
Semester(s) in which the module is taught	*6 semester*
Person responsible for the module	*Yskak A.S.*
Language	*English*
Attitude towards the curriculum	*profile (specialized)* *Postrequisites: PET113 Multidisciplinary petroleum project, ECA003 Preparation for diploma project*
Teaching methods	*lectures, laboratory work, practical classes*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:1/1/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (1/1/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: GEO486 Geology of oil and gas, PET103 Reservoir engineering basics, PET410 Fluid mechanics* *The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics.*
Module objectives/intended learning outcomes	*Students will be able to:* *- understand the processes of oil and gas production at the fields;* *- understand the process of lifting the gas-liquid mixture from the bottom to the wellhead;* *- understand the hydrodynamic processes occurring in the well and in the bottomhole formation zone;* *- evaluate the prospects for the development and improvement of known processes.* *be competent:* - *evaluate the main technical and economic indicators of development options,* - *make calculations of oil and gas properties, selection of well equipment and collection of oil and gas,* - *solve technological calculations*
Content	*As part of the course, the student will learn:* - *Review of fluid properties;* - *Inflow Performance Relationship (IPR);* - *Outflow Performance Relationship (OPR);* - *Flow through Restrictions;* - *Nodal Analysis;* - *Liquid Loading,* - *Gas Lift;* - *Electric Submersible Pump (ESP);* - *Sucker Rod Pump (SRP);* - *Artificial Lift Selection.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*

References	*[1]Boyun Guo, William C. Lyons. Petroleum Production Engineering– Elsevier Science and Technology, 2007.* *[2] Michael J. Economides and etc. Petroleum Production systems-Prentice Hall PRT, 1994.* *[3] Tarek Ahmed, Reservoir Engineering Handbook - Elsevier Inc, 2006.* *[4] Ronald E. Terry, J. Brandon Rogers. Applied Petroleum Reservoir Engineering- Pearson Education, Inc., 2015.* *[5] [6] William D. McCain Jr., The properties of petroleum fluids – PennWell Publishing Company, 1989.* *[6] B.C.Craft and M.F. Hawkins, Applied Petroleum Reservoir Engineering, 1990.*

Module designation	***PET455 «Fundamentals of Data Analytics and Programming for Petroleum Engineering»***
Semester(s) in which the module is taught	*6 semester*
Person responsible for the module	*Bekbauov B.*
Language	*Kazakh, russian*
Attitude towards the curriculum	*profile (specialized)* *Postrequisites:*
Teaching methods	*lectures, laboratory work, practical classes*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:1/1/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (1/1/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: No* .
Module objectives/intended learning outcomes	*Students will be able to:* *- build mathematical and numerical models;* *- create a computer program for calculating the simplest hydrodynamic, thermal and filtration processes;* *- to analyze the results obtained.* *Upon completion of the course, the student must know:* *- basic operators of the FORTRAN programming language;* *- basics of programming in FORTRAN;* *- algorithms for numerical solution of model equations of hydromechanics, heat transfer and filtration.* *- fundamentals of modeling the flow of a single-phase liquid in a porous medium;* *- ways to set initial conditions for modeling;* *- software implementation of well operation models;* *- fundamentals of modeling two-phase flow in a porous medium;* *- fundamentals of modeling three-phase filtration processes in oil reservoirs.*
Content	*This course provides knowledge about the basics of programming in relation to solving hydrodynamic, thermal and filtration problems.*
Exam forms	*A written exam*

Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*1.Zhangxin Chen, Guanren Huan, and Yuanle Ma. (2006). Computational Methods for Multiphase Flows in Porous Media (Computational Science and Engineering 2). Society for Industrial and Applied Mathematics, USA.* *2. Chen, Zhangxin. (2007). Reservoir Simulation: Mathematical Techniques in Oil Recovery (CBMS-NSF Regional Conference Series in Applied Mathematics).* *3. . Немнюгин М. А., Стесик О. Л. Современный Фортран. Самоучитель. — СПб.: БХВ-Петербург, 2004. — 496 с.* *4.Бартеньев О. В. Современный Фортран. - 3-е изд., доп. и перераб. - М.: ДИАЛОГ-МИФИ, 2000. - 449 с.*

Module designation	***PET 437 «Well Stimulation»***
Semester(s) in which the module is taught	*7 semester*
Person responsible for the module	*Moldabayeva Gulnaz*
Language	*Russian*
Attitude towards the curriculum	*is mandatory*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 5(2/0/1/2)* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/0/1/3)*
Required and Recommended Prerequisites for Attaching to the Module	
Module objectives/intended learning outcomes	*The student should know:* *- explain the basic geological properties of rocks for the purpose of intensification of inflow;* *- assess the deterioration of reservoir properties of the reservoir, explain how and why it happens;* *- generalize the solutions of the piezo conductivity equation for use in the study of wells;* *- to reveal the concept of water inflow into the deposit;* *- demonstrate calculations for forecasting the production of oil and gas fields;*
Content	*At the end of the course, the student must know and be able to:* *- be able to determine the parameters of the well according to hydrodynamic studies;* *- be able to determine the PVT properties of reservoir fluids and rocks;* *- be able to analyze the results and be competent in the field of oil field development.* *- to carry out calculations of water inflow into the deposit;* *- predict oil production during flooding;*

Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	- *Дейк Л.П. Основы разработки нефтяных и газовых месторождений – Elsevier BV, 1978* - *Tarek Ahmed, Reservoir Engineering Handbook - Elsevier Inc, 2006* - *Reservoir Engineering Handbook Ahmed Tarik, 2006* - *Arnold Ken "Surface Production Operations"* - *Erle C "Enhanced Oil Recovery"* - *Schlumberger, 2016, "ECLIPSE 100 BLACK OIL"*

Module designation	***PET433 « Flow assurance»***
Semester(s) in which the module is taught	*7 semester*
Person responsible for the module	*Moldabekov M.S.*
Language	*kazakh*
Attitude towards the curriculum	*Elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:2/0/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics.*
Module objectives/intended learning outcomes	*A student should know after completing the course:* *- The main causes of difficulties in the operation of Wells;* *- Ways to solve these problems ; ;* *- Forecasting changes in the operating conditions of oil wells;* *- Calculate the main parameters of the use of protective equipment and ways to eliminate problems* *- Development of key measures to prevent and eliminate the consequences of bottlenecks in production wells;;* *- Evaluation of the effectiveness of the use of wells in the application of methods of combating difficulties;* *- Determination and design of measures to improve the efficiency of operation of wells with the use of Fountain, gas lift and pumps*
Content	*After completing the course, the student should demonstrate the ability to analyze, synthesize information and design approaches to ensuring oil and gas flow, as well as be able to calculate costs*
Exam forms	*A written exam*

Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*[1] Персиянцев М.Н. Добыча нефти в осложненных уловиях. ООО «Недра-Бизнесцентр», 2000г.* *[2] Michael J. Economides, A. Daniel Hill, Christine Ehlig-Economides, Ding Zhu Petroleum Production Systems* *[3] Сулейманов А.Б., Карапетов К.А., Ящин А.С. Практические расчеты при текущем и капитальном ремонте скважин. М: недра, 1984г* *[4] Larry W. Lake. Petroleum Engineering Handbook, 2007*

Module designation	***PET431 «Reservoir Engineering III: reservoir simulation»***
Semester(s) in which the module is taught	*7 semester*
Person responsible for the module	*Yskak A.S.*
Language	*English*
Attitude towards the curriculum	*Specialized* *Postrequisites: ECA003 Preparation for diploma project*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*General workload:5 hours* *Contact hours:2/0/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: GEO486 Geology of oil and gas, PET103 Reservoir engineering basics, PET410 Fluid mechanics* *The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics.*
Module objectives/intended learning outcomes	*Students will be able to:* – *understand the possibilities and problems of hydrodynamic modeling of oil and gasreservoirs,* – *be able to build and run the model for calculation,* – *analyze the results.* – *have skills of modeling structured cells,* – *add wells to the model,* – *model of different pressure maintenance systems;* – *model of multiphase flows.* *be competent:* *in the field of hydrodynamic modeling of oil and gas reservoirs*
Content	*As part of the course, the student will learn:* *– basic principles of hydrodynamic simulators calculating mechanism,* *– basic equations of hydrodynamic simulators,* *– structure and rules for generating a data file,* *– methods for setting initial conditions for modeling,* *– the basics of modeling of non- volatile oil,* *– the basics of compositional modeling.*

Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*[1] ResSim tutorials. IPE, 2009.* *[2] Advanced petroleum reservoir simulation.M.R.Islam.Willey, 2016.* *[3] Principles of applied reservoir simulation.2nd edition. John R.Fanchi. Gulf professional Publishing, 2001.* *[4] Petroleum Reservoir Simulation. A basicapproach. Jamal H. Abou-Kassem. Gulf publishing company.2006.* *[5] Fundamentals of numerical reservoir simulation.Donald W.Peaceman. Elseiver, 1977.* *[6] Eclipse Manual, Schlumberger, 2009.*

Module designation	***PET 432 «Directional drilling»***
Semester(s) in which the module is taught	*7 semester*
Person responsible for the module	*Moldabekov Murat*
Language	*kazakh*
Attitude towards the curriculum	*elective:*
Teaching methods	*лекции, лабораторные работы*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:2/0/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/1/0/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Пререквизиты:*
Module objectives/intended learning outcomes	*The student should know:* *- theoretical foundations of the physics of the formation and reservoir fluid;* *- geology of the hydrocarbon reservoir;* *- processes of borehole operations.* *The student must be able to:* *- use knowledge about the properties of oil, gas, water and rock in appropriate calculations;* *- explain what data and specific methods are needed to construct logging curves;* *- apply the fundamental laws of nature (conservation of mass, energy, momentum, etc.) to establish the basic laws of oil, gas, water and rock.* *After completing the course, the student must demonstrate the ability to analyze, synthesize and possess the skills of engineering calculations and methods of conducting geophysical well surveys..*

Content	*As part of the course, the student will master:* *- properties of liquids, gases and rocks;* *- - classification of geophysical research in the well;* *- calculations of the corresponding curves in the interpretation of logging data;* *- methods of interpretation of logging data..*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory and independent) are required.*
References	*[1] Djebbar Tiab and Erle C. Donaldson. Petrophysics. Theory and Practice of Measuring Reservoir Rock and Fluid Transport Properties. Gulf. 2012.* *[2] John H. D.,Basics of Oil and Gas Log Analysis, 1999* *[3] George A. and Charles G., Basic Well Log Analysis for Geologists, 1993* *[4] Honggi L., Principles and Aplications of Well Logging, 2017* *[5] Toby D., Well Logging and Formation Evaluation, 2005* *[6] Serra O., Fundamentals of Well Log Interpretation, 1984*

Module designation	***PET434 «Design and operation of oil and gas storages»***
Semester(s) in which the module is taught	*7 semester*
Person responsible for the module	*Abdeli Dairabay*
Language	*kazakh*
Attitude towards the curriculum	*Basic* *Postrequisites: PET42 Oil production technology and techniques*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:1/0/2* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (1/0/2/2)*
Required and Recommended Prerequisites for Attaching to the Module	*prerequisites: MAT 103 Mathematics, PHY111 Physics, RET4091 Thermodynamics and Heat Engineering* *The ability to analyze, synthesize and know the techniques of solving engineering, engineering calculations.*

Module objectives/intended learning outcomes	*Student:* *- problems and processes solved during transportation and storage of oil and gas and petroleum products;* *- rational design, assembly and operation of gas and oil facilities;* *- processes of oil and gas storage in warehouses and their transportation through pumping and compressor stations;* *- know the oil and gas treatment systems.* *Student:* *- evaluate ways to increase oil recovery;* *- design of installations and processes for transportation and storage of oil and gas;* *- to design the processes of transportation of products through pumping and compressor stations.* *At the end of the course, the student should be able to prepare engineering and scientific recommendations for the preparation of new technologies and equipment.*
Content	*Mastered by the student in the line of courses:* *- construction, operation and design of oil warehouses;* *- construction, operation and design of gas storage facilities;* *- design of oil, gas and petroleum products treatment systems;* *- construction, operation and design of petroleum products warehouses;.*
Exam forms	*A written exam*
Requirements for training and exams	*The student must not be late, keep up with classes, be neat and obligatory. The student must come with preparation for lectures, laboratory and practical classes. Reports of practical work must be submitted in a timely manner, all types of work (laboratory, practical and independent) are completed in full.*
References	*[1] Проектирование и эксплуатация нефтебаз и нефтехранилищ : В 2 ч. Ч. 1 / сост. : П. В. Коваленко, М. Н. Клебанова ; под общ. ред. П. В. Коваленко. – Новополоцк : ПГУ, 2020. – 340 с.* *[2] Petroleum Engineering Handbook Larry W. Lake, Editor-in-Chief U. of Texas at Austin. Society of Petroleum Engineers. Copyright 2019 Society of Petroleum Engineers.* *[3] Petroleum & chemical storage tanks. © Highland Tank HT-9997 - 9/2018. www.highlandtank.com* *[4] Проектирование и эксплуатация нефтебаз и АЗС: учеб. пособие / В. В. Шалай, Ю. П. Макушев. – Омск: Изд-во ОмГТУ, 2015. – 296 с.* *[5] The Engineer's Guide to Tank Gauging. Lennart Hägg, Johan Sandberg. Emerson. 2017 Edition.* *[6] Фык М.И., Донской Д.Ф. Основы технологий, R&D проектирования и эксплуатации подземных хранилищ нефти и газа.– Харьков: НТУ «ХПИ»; ТО Эксклюзив, 2016. – 166 с. – На рус. яз.* *[7] Gas and LNG Storage. The Future of Modular LNG Tanks. 2016 Edition. IGU (2016), "2016 World Energy Report", International Gas Union.* *[8] Storage of oil and petroleum products. / V.N. Tatishchev, G.V. Bakhmat, G.G. Vasiliev, etc.; under the general editorship of Yu.D. Zemenkov. – M.: FSUE, "Oil and Gas" Gubkin Russian State University of Oil and Gas, 2003. – 560 p.* *[9] Abdel D. J. "Design and operation of oil and gas storage facilities": UMKD. - Almaty: Satbayev University, 2021.*

Module designation	***PET439 «Artificial lift systems»***
Semester(s) in which the module is taught	*7th semester*
Person responsible for the module	*Imansakipova Z.B.*
Language	*russian*
Attitude towards the curriculum	*Elective* *prerequisites: PET42 Technology and technique of oil production*
Teaching methods	*lectures, laboratory work, practical classes*
Workload (including contact hours, self-employment hours)	*Total workload:56 hours* *Contact hours:1/1/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (1/1/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT 103 Mathematics, PHY111 Physics* *The ability to analyze, synthesize and possess the skills of engineering calculations and methods of solving basic problems of mathematics, physics.*
Module objectives/intended learning outcomes	*The student should know:* *- principles of economic operation of modern oilfield equipment;* *- modern methods of environmental protection in oil and gas production;* *- equipment used in mechanized methods of oil and gas production;* *The student should be able to:* *- possess the calculated ratios of the main parameters and the skills of rational use of equipment;* *- carry out kinematic calculation of equipment;* *- be able to use diagrams and equipment characteristics;* *- make a selection of equipment.* *After completing the course, the student must demonstrate the ability to analyze, synthesize and possess the skills of engineering calculations and methods for solving the main tasks of sections of the mechanized mining system.*
Content	*As part of the course, the student will master:* *- classification of pumps for oil production ;* *-selection and main technical characteristics of pumps;* *-the method of choosing the depth of immersion and calculation at the pump reception.* *- determination of the required pressure. Processing techniques.* *- selection and adjustment of pump performance characteristics.*
Exam forms	*A Written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*

References	*1. Нефтепромысловые машины и механизмы: Учеб. для ВУЗов /Л.Г. Чичеров, А.Г.Молчанов. – М.: Недра, 1984.* *2. Справочник мастера по ремонту нефтегазового технологического оборудования: том 1 Учеб.пособие в 2-х томах Бочарников В.Ф. – М.: Инфра-инженерия, 2008.* *3. Нефтепромысловое оборудование Ивановский В.Н. – М.: ЦентрЛитНефть. 2006.* *4. Казак и др. Погружные бесштанговые насосы для добычи нефти. – М.: Недра, 1973.* *5. Вирновский А.С. Теория и практика глубиннонасосной добычи нефти. М.: Недра, 1971.* *6. Адонин А.Н. Добыча нефти штанговыми насосами. – М.: Недра, 1979.* *7. Справочник по нефтепромысловому оборудованию. Под.ред. Е.И.Бухаленко. – М.: Недра, 1983.* **Литература доступна в электронных ресурсах библиотеки* *~ Литература доступна на учебном портале преподавателя.*

Module designation	***PET442 «Well test»***
Semester(s) in which the module is taught	*7 semester*
Person responsible for the module	*Nurbekova.K.S*
Language	*kazakh*
Attitude towards the curriculum	*mandatory* *post-requirement:*
Teaching methods	*lectures, laboratory work*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours:2/1/0* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/1/0/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT 103 Mathematics, PHY111 Physics* *Ability to analyze, synthesize and possess the skills of engineering calculations and methods of solving basic problems of mathematics, physics.*
Module objectives/intended learning outcomes	*At the end of the course, the student should know:* *- basic operators of the FORTRAN programming language;* *- basics of programming in FORTRAN;* *- algorithms for numerical solution of model equations of hydromechanics, heat transfer and filtration.* *- fundamentals of modeling the flow of a single-phase liquid in a porous medium;* *- ways to set initial conditions for modeling;* *- software implementation of well operation models;* *- fundamentals of modeling two-phase flow in a porous medium;* *- fundamentals of modeling three-phase filtration processes in oil reservoirs.*

	As a result of studying the discipline, the student should be able to: *- build mathematical and numerical models;* *- create a computer program for calculating the simplest hydrodynamic, thermal and filtration processes;* *- to analyze the results obtained.* *After completing the course, the student must demonstrate the ability and skills of software implementation of numerical methods for solving equations and systems of equations describing hydrodynamic, thermal and filtration processes.*
Content	*It is expected that during the course, the student will master the skills of practical application of the FORTRAN programming language for the numerical implementation of the equations of hydromechanics, heat transfer and filtration.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*[1] KAPPA DDA book, Olivier Houzé, Didier Viturat, Ole S. Fjaere.* *[2] Advances in Well Test Analysis,Earlougher, R.C., Jr.* *[3] Well Test Analysis, Heriot Watt University, 2013, George Stewart,Mahmoud Jamiolahmady*[*].* *[4] Well Testing Textbook, John Lee.* *[5] Ahmed, Tarek_-Reservoir Engineering Handbook*[*] *[6] Arnold Ken "Surface Production Operations"* **Textbooks are available at learning platforms.*

Module designation	***PET440 «Well workover»***
Semester(s) in which the module is taught	*7 semester*
Person responsible for the module	*Akhymbayeva B.S.*
Language	*russian*
Attitude towards the curriculum	*Elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours:2/0/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: «Fundamentals of oil and gas business», «Technique and technology of oil production», «Development of oil and gas fields»* *The ability to analyze, synthesize and master the skills of engineering calculations and methods for solving the main problems of mathematics, physics.*

Module objectives/intended learning outcomes	*The student must be able to:* *- to study the methods of cutting and drilling the second trunk,* *- to draw conclusions on the elimination of accidents with underground equipment* *– to identify works that require qualified engineering personnel* *At the end of the course, the student should know:* *- theories and practices of work to restore the operability of the bottomhole zone* *- well flushing with solvents* *- skills of successful presentation of scientific papers*
Content	*After completing the course, the student must demonstrate the ability to analyze, synthesize knowledge, and also demonstrate the skills and abilities necessary in research, writing research papers, as well as public speaking.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and obligatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	*[1] Басарыгин Ю.М., Будников В.Ф., Булатов А.И. «Теория и практика предупреждения осложнений и ремонта скважин при их строительстве и эксплуатации» Справочное пособие: в 6 томах. М.: ООО «Недра-Бизнесцентр», 2001г.* *[2] Басарыгин Ю.М., Макаренко П.П.,* *Мавромати В.Д., «Ремонт газовых скважин» - М.: ОАО изд. «Недра» 1998г* *[3] Сулейманов А.Б., Карапетов К.А., Яшин А.С., «Практические расчеты при текущем и капитальном ремонте скважин» - М.:* *Недра, 1984г* *[4] Терентьев Ю.Г., Куксов А.К. и др. Методика глушения скважин при ГНВП. – М.: изд. ВНИИКРнефти 1979*

Module name	***PET430 «Computer-Aided Design Systems»***
Semester(s) in which the module is delivered	*7th semester*
Individual responsible for the module	*Moldakhmetova D.E.*
Language	*English*
Stance in the curriculum	*elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, extracurricular hours)	*Total workload: 6 hours* *Contact hours: 2/0/1*
Number of credits	*3 credits (2/0/1)*

Required and recommended prerequisites for enrolling in this module	*Prerequisites: no* *- The presence of a desktop or laptop computer, the simultaneous use of other gadgets is welcome, but not required.* *- Availability of an Internet channel with a speed of at least 0.5 Mbps.* *- Personal account with a photo of the face on the avatar and corporate mail on the Microsoft 365 platform.* *- Attendance is mandatory according to the schedule.*
Module objectives / intended learning outcomes	*The development of students' general skills and abilities necessary to work with computer-aided design programs* *The student must be able:* *- design objects in AutoCad, Compass, Sketch up, etc.;* *- develop specifications for design objects* *At the end of the course, the student should know:* *- goals of creation, tasks, structure, subsystems and classification of CAD;* *- design, typical design schemes;* *- production automation systems;* *- CAD software;* *- overview of modern CAD systems*
Content	*During the course, the student will master the ability to create a drawing and a document in a CAD system.*
Exam type	*written exam*
Learning and exam requirements	*The student should not be late and miss classes, be punctual. The student must come prepared for lectures and practical classes. Timely delivery of assignments, full delivery of all types of work (practical and independent) are required.*
Literature	*[1] Oxford dictionary of computing / Под общ. ред. John Daintith. — 5-е изд. — Oxford: Oxford University Press, 2004. — ISBN 978-0-19-860877-6* *[2] Clifford, Matthews. Aeronautical engineer's data book. — Oxford: Butterworth-Heinemann, 2002. — ISBN 978-0-75-065125-7* *[3] Норенков И. П. Основы автоматизированного проектирования: учеб. для вузов. — 4-е изд., перераб. и доп. — М.: Изд-во МГТУ им. Н. Э. Баумана, 2009. — 430 с. — ISBN 978-5-7038-3275-2* *[4] Норенков И. П. Автоматизированное проектирование. Учебник. — М.: Изд-во МГТУ им. Н. Э. Баумана, 2000. — 188 с.*

Module name	***PET438 Offshore Fields Development***
Semester(s) in which the module is delivered	*8 semester*
Individual responsible for the module	*El-Sayed Negim Moussa El-Ashmawy*
Language	*english*
Stance in the curriculum	*elective*
Teaching methods	*lectures, practical classes*

Workload (including contact hours, extracurricular hours)	*Total load: 5 hours* *Contact hours: 2/0/1* *SIWT: 2 hours*
Number of credits	*5 credits (2/0/1/2)*
Required and recommended prerequisites for enrolling in this module	*Prerequisites: Drilling engineering, Structural geology* *Ability to analyze and synthesize the skills of engineering calculations*
Module objectives / intended learning outcomes	*To introduce basics of offshore structures and its historical development.* *After completing the course, the students be able to:* - *Selection of equipment for offshore fields* - *Determination of factors affecting drilling and mining rigs.* - *Calculation of the main parameters of the reservoir,* - *Learn to determine the parameters of fluid movement* - *Demonstrate the ability to analyze, and design efficient technological processes for drilling wells, developing, operating oil and gas fields and transporting oil and gas.* - *Calculate the economic benefits and costs of the results of using scientific and technical work.*
Content	*The course covers and answers the following questions:* *(1) features of drilling engineering;* *(2) operation of hydraulic structures necessary for exploration and production;* *(3) offshore oil and gas development;* *(4) types of equipment when exposed to the formation;* *(5) collection systems, transportation of hydrocarbons in offshore fishing;* *(6) the importance of environmental protection.*
Exam type	*Written exam*
Learning and exam requirements	*The student should not be late and miss classes, be punctual. The student must come prepared for lectures and practical classes. Timely delivery of assignments, full delivery of all types of work (practical and independent) are required.*
Literature	*[1] Yong B., Jin W.-L. Marine Structural Desin, 2nd Edition, 2015* *[2] Robert E.M. Progress in developing realistic corrosion models. Structure and Infrastructure Engineering Vol. 14, Issue 7, p. 843-853, 2018.* *[3] James Speight, Handbook of Offshore Oil and Gas Operations. Gulf Professional Publishing, 2014.*

Module designation	***PET436 – Economic evaluation of oil and gas projects***
Semester(s) in which the module is taught	*7 semester*
Person responsible for the module	*Taikulakova G.S.*
Language	*russian*
Relation to curriculum	*profile*
Teaching methods	*lectures, practical classes, laboratory classes*

Workload (incl. contact hours, self-study hours)	*Total workload:2 hours* *Contact hours 1/0/2* *IWS: 2 hours*
Credit points	*5 credits (1/0/2/2)*
Required and recommended prerequisites for joining the module	*Prerequisites:* *Enterprise economics, the economic part of the diploma*
Module objectives / intended learning outcomes	*Purpose of the course:* *-Development of students' economic thinking based on the study and acquisition of skills of economic analysis, evaluation and reasoning of conclusions with justification of decisions on effective investment in oil projects.* *Expected results:* *Upon successful completion of this course, students should receive the following competencies:* *General competencies:* *- -Formed theoretical knowledge and practical skills in 6 areas determined by the main purpose of the course* *- Mastering the course and acquiring professional competencies according to the competence model of the bachelor OP 6B07204*
Content	*The course is intended for students of OP "6B07204-Petroleum engineering"* *The economic assessment of oil and gas projects is an economic discipline, the subject of which is the cash flows generated from the project.* *The final stage of the course is the exam.* *- To make a decision on the attractiveness of oil projects through the construction of various variable scenarios;* *- Carry out an analysis of investment costs and analysis of risk assessment methods;* *- Competently apply specific analysis methods and criteria tools to determine the effectiveness of oil and gas projects.*
Examination forms	*Written exam*
Study and examination requirements	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*
Reading list	*1. Damodaran A. Investment assessment. Tools and techniques for evaluating any assets. M.Alpina Business Books, 2016.* *2. Markarian, E.A. Investment analysis. Theory and practice /E.A.markarian, G.P. Gerasimenko. KnoRus, 2018. -176 p* *3. Mezhov , S.I. Investment analysis (for bachelors) Study guide* *4. Kiseleva O.V. Investment analysis (for bachelors) Study guide*

Module designation	***PET435 – Oil and gas facilities design and operation***
Semester(s) in which the module is taught	7 semester
Person responsible for the module	Imansakipova N.B.
Language	Russian, Kazakh

Relation to curriculum	profile
Teaching methods	*lectures, practical classes, laboratory classes*
Workload (incl. contact hours, self-study hours)	*Total workload:2 hours* *Contact hours 1/0/2* *IWS: 2 hours*
Credit points	*5 credits (1/0/2/2)*
Required and recommended prerequisites for joining the module	*Prerequisites:* *Postrequisites: RET410 Fluid mechanics*
Module objectives/intended learning outcomes	*At the end of the course, the student should know:* *- determine the physical properties of oil and gas* *- analyze the main characteristics of oil and gas fields;* *- understand the structures of the well;* *- navigate the schemes of pumping oil and gas through the pipeline.* *As a result of studying the discipline, the student should be able to:* *- basic properties of oil and gas;* *-collection and preparation of oil and gas for transportation;* *- transportation and storage of oil, petroleum products and gas.*
Content	*The course is intended for students of the educational program "6B07204– Petroleum engineering". The course is the final discipline in the training of engineers of oil and gas specialties and is to provide students with knowledge of the physical foundations of the process of collecting and preparing oil, gas and water, substantiation of calculations of the technology of preparation of well products in oil and gas fields, disclosure of the essence of the processes occurring in oilfield equipment.*
Examination forms	*Written exam*
Study and examination requirements	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*
Reading list	*1. K.I.Dzhiembayeva, N.V.Lalazaryan. Collection and preparation of well products in oil fields. Textbook for universities. – Almaty: 2005.* *2. G.S. Lutoshkin, I.I.Dunyushkin. Collection of tasks for the preparation of oil, gas and water in the fields. – M.: Nedra, 2003.* *3. N.M.Baykov, G.N.Pozdnyshev, R.I.Mansurov. Collection and field preparation of oil, gas and water. - M.: Nedra, 2001.* *4. V.P.Tronov. Field preparation of oil abroad. - M.: Nedra, 2003.* *5. R.Ya.Isakovich, V.I.Loginov, V.E.Popadko. Automation of production processes in the oil and gas industry. - M.: Nedra, 2005.*

Module designation	***PET118 «Multidisciplinary petroleum project»***
Semester(s) in which the module is taught	*8 semester*
Person responsible for the module	*Kazangapov.A*
Language	*kazakh*

Attitude towards the curriculum	*mandatory* *post-requirement: ED 42 Technology and technique of oil production*
Teaching methods	*lectures, laboratory work, practical classes*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 2/1/0/*
Credit scores	*5 credits (2/1/0/3)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT 103 Mathematics, PHY111 Physics* *Ability to analyze, synthesize and possess the skills of engineering calculations and methods of solving basic problems of mathematics, physics.*
Module objectives/intended learning outcomes	*The student should know:* *- theoretical foundations of fluid and gas mechanics;* *- conservation equations on which the theoretical study of hydromechanics is based;* *- the basic laws of fluid mechanics for calculating the determination of pressure losses.* *The student must be able to:* *- use knowledge about the properties of oil and gas in the relevant calculations;* *- explain what data and specific methods are needed to solve the main problems of the sections of fluid mechanics - kinematics, statics and dynamics;* *- apply fundamental laws of nature (conservation of mass, energy, momentum, etc.) to establish the basic laws of motion of liquids and gases.* *After completing the course, the student must demonstrate the ability to analyze, synthesize and possess the skills of engineering calculations and methods for solving the main problems of the sections of fluid mechanics - kinematics, statics and dynamics.*
Content	*As part of the course, the student will master:* *- properties of liquids and gases;* *- classification of modes and flows of fluid and gas movement;* *- deformation movement of the elementary volume of the medium;* *- conservation equations on which the theoretical study of hydromechanics is based.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*

References	** [1] Loitsyansky L.G. Mechanics of liquid and gas. – M.: Nauka, 1978. – 736 p., M.: Bustard, 2003. – 840 p.* ** [2] Dmitriev N.M., Kadet V.V. Introduction to underground hydromechanics. – Moscow: CentrLitNefteGaz, 2009. – 272 p.* ** [3] Collection of problems in hydraulics and gas dynamics for oil and gas universities. – M.: Gryphon, 2007. – 304 p.* ** [4] Collection of tasks on oil production technology and technology: A textbook for universities / Mishchenko I.T., Sakharov V.A., Gron V.G., Bogomolny G.I. – M.: Nedra, 1984. – 272 p.* ** [5] Reference guide for the design development and operation of oil fields. Oil production. – M: LLC TID "Alliance", 2005. – 455 p.* *~ [*Literature is available in the electronic resources of the library* *~ The literature is available on the teacher's learning portal.*

Module name	***PET419 Corrosive protection of oil and gas equipment***
Semester(s) in which the module is delivered	*8 semester*
Individual responsible for the module	*Yekigbayeva G.Zh..*
Language	*english*
Stance in the curriculum	*elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, extracurricular hours)	*Total load: 5 hours* *Contact hours: 2/0/1* *SIWT: 2 hours*
Number of credits	*5 credits (2/0/1/2)*
Required and recommended prerequisites for enrolling in this module	*Prerequisites: General chemistry* *Ability to analyze and synthesize the skills of engineering calculations*
Module objectives / intended learning outcomes	*The purpose of the course: To study the basics of the theory of corrosion of various types of materials, methods of protecting equipment from corrosion from the standpoint of minimizing environmental impact, as well as the use of inhibitory protection and modern methods of research of technological processes and natural environments:* *(1) to know the general patterns of corrosion processes in chemical and electrochemical corrosion occurring in various corrosive environments;* *(2) to have an idea of various methods of protecting metals and alloys from corrosion,* *(3) to know the basic methods of corrosion studies of metals and alloys;* *(4) be able to classify the processes of corrosion of metals and alloys;* *(5) be able to use scientific and reference literature on corrosion and protection of metals and alloys from corrosion;* *(6) to possess by the basic concepts and theoretical concepts of chemical and electrochemical corrosion of metals, types of corrosion and methods of protection against it.*

Content	*The course covers and answers the following questions:* *(1) what is the difference between chemical (gas) and electrochemical corrosion,* *(2) what types of corrosion are there;* *(3) what are the corrosion characteristics of metals, alloys and other materials;* *(4) what methods of protection are used against corrosion for machines and apparatuses;* *(5) how to choose a corrosion-resistant material for a specific production equipment during storage and transportation of oil and gas.*
Exam type	*Written exam*
Learning and exam requirements	*The student should not be late and miss classes, be punctual. The student must come prepared for lectures and practical classes. Timely delivery of assignments, full delivery of all types of work (practical and independent) are required.*
Literature	*[1] Heidersbach R. Metallergy and Corrosion Control in Oil and Gas Production. AjohnWiley&Sons, Inc.Publication (2011)* *[2] Канайкин В.А. Диагностика коррозионных повреждений магистральных газопроводов. МГТУ (2000).* *[3] Мазур И.И., Иванцов О.М. Безопасность трубопроводных систем (2004).*

Module name	***PET421 «Reservoir geomechanics»***
Semester(s) in which the module is delivered	*8 semester*
Individual responsible for the module	*Baibussinova Zh.B.*
Language	*english*
Stance in the curriculum	*elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, extracurricular hours)	*Total load: 5 hours* *Contact hours: 2/0/1* *SIWT: 2 hours*
Number of credits	*5 credits (2/0/1/2)*
Required and recommended prerequisites for enrolling in this module	*Prerequisites: Drilling engineering, Structural geology* *Ability to analyze and synthesize the skills of engineering calculations*

Module objectives / intended learning outcomes	*Reservoir geomechanics course aims at providing students with the learning outcomes that follow:* *(1) Understand the fundamental concepts of reservoir geomechanics;* *(2) Apply well data in yielding pore and overburden pressures;* *(3) Build a summary map of wellbore failures and instabilities encountered during drilling;* *(4) Understand rock failure in compression, tension and shear;* *(5) Perform calculations to determine the horizontal stresses, angle of internal friction and coefficient of friction;* *(6) Assess risks associated with wellbore stability* *(7) Predict and optimize well productivity using well simulation and uncertainty estimation.*
Content	*The course covers and answers the following questions:* *(6) how drilling, production and development operations influence stress distribution within the reservoir;* *(7) how changes in stress state can cause different failures and instabilities;* *(8) how drilling operations can be conducted in a safe manner;* *(9) how to drill horizontal wells so as to maximize production;* *(10) appreciate the role of geomechanics in reservoir development.*
Exam type	*Written exam*
Learning and exam requirements	*The student should not be late and miss classes, be punctual. The student must come prepared for lectures and practical classes. Timely delivery of assignments, full delivery of all types of work (practical and independent) are required.*
Literature	*[1] Zoback, M. (2007) Reservoir Geomechanics.New York: Cambridge University Press* *[2] Drilling engineering. (2015) Heriot-Watt Manual. Edinburgh* *[3] Dolgih, L. N. (2006). Oil and gas well design calculations. Perm: PNRPU;*

Module designation	***PET423 «Geostatistics»***
Semester(s) in which the module is taught	*8 semester*
Person responsible for the module	*Nurbekova.K.S.*
Language	*kazakh*
Attitude towards the curriculum	*elective* *post-requirement: ED 42 Technology and technique of oil production*
Teaching methods	*lectures, laboratory work*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours:2/0/1* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (2/0/1/2)*

Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT 103 Mathematics, PHY111 Physics* *Ability to analyze, synthesize and possess the skills of engineering calculations and methods of solving basic problems of mathematics, physics.*
Module objectives/intended learning outcomes	*The student should know:* *- theoretical foundations of geostatistics;* *- the equations on which the theoretical study of geostatistics is based;* *- basic laws of geostatistics* *The student must be able to:* *- use knowledge about the properties of oil and gas in the relevant calculations;* *- have a subject analysis;* *- apply fundamental laws of nature (conservation of mass, energy, momentum, etc.) to establish the basic laws of motion of liquids and gases.* *After completing the course, the student must demonstrate the ability to analyze, synthesize and possess the skills of engineering calculations and methods for solving the main problems of geostatistics.*
Content	*As part of the course, the student will master:* *- subject analysis;*
Exam forms	*A Written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures, laboratory and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (laboratory, practical and independent) are required.*
References	** [* [1] "Fundamentals of design of oil refining and petrochemical enterprises" V.M. Kapustin, M.G. Rudin, A.M. Kudinov* ** [2] "Collection and preparation of well products in oil fields" K.I. Dzhiembayeva, N.V. Lalazaryan* ** [3] "Calculations of machinery and equipment for oil and gas production" A. I.* *Snarev * [4] "Machinery and equipment of gas and oil pipelines" F.M. Mustafin et al.* ** [5] "Design of gas and oil pipelines, compressor and pumping stations" A.K. Nikolaev, V.P. Dokukin* **[6] "Ensuring the reliability of main oil and petroleum product pipelines" Korshak A.A., Korobkov G.E., Dushin V.A., Nabiev R.R.* **[*[7] "Geostatistics in petroleum geology" Dubrul O.* **Literature is available in the electronic resources of the library* *~ The literature is available on the teacher's learning portal.*

Module designation	***PET428 «Design and operation of pump and compressor stations»***
Semester(s) in which the module is taught	*8 semester*
Person responsible for the module	*Imansakipova N.B.*
Language	*Russian, Kazakh*

Attitude towards the curriculum	*profile* *Postrequisites: RET410 Fluid mechanics*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*General workload: 3 hours* *Contact hours: 1/0/2* *Independent work with a teacher: 2 hours*
Credit scores	*5 credits (1/0/2/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Postrequisites: MAT 103 Mathematics, PHY111 Physics* *The ability to analyze, synthesize and possess the skills of engineering calculations and methods of solving basic problems of mathematics, physics.*
Module objectives/intended learning outcomes	*The student should know:* *- purpose of pumping and compressor stations;* *- the order of selection of basic and auxiliary equipment;* *- regulation of the operating mode when changing the mode of technological processes;* *- basic rules of operation, labor protection, diagnostics and testing of station facilities.* *The student should be able to:* *- design pumping and compressor stations according to regulatory and technical documents;* *- carry out calculations on the selection of basic and auxiliary equipment;* *- to carry out calculations of changes in the operating mode when the physico-chemical properties of the pumped working agent change;* *- use scientific, technical and reference literature.*
	Upon completion of the course, the student must gain full knowledge of the purpose of pumping and compressor stations on the main pipeline, classification of pumping stations, the composition of structures, the basics of station design according to regulatory and technical documents, the development of technological schemes, the selection of basic and auxiliary equipment, connections of pumping units, determination of the main technical indicators of pumping and compressor units, regulation operating modes of pumping and compressor units in different situations, about auxiliary systems and equipment of units and stations, as well as about technological operations carried out at stations.
Content	*As part of the course, the student will master:* *- design skills of pumping and compressor stations;* *- carrying out calculations on the selection of basic and auxiliary equipment;* *- main facilities of pumping and compressor stations;* *- the ability to regulate the modes of operation of pumping stations.*
Exam forms	*A written exam*
Requirements for training and exams	*The student should not be late and miss classes, be punctual and mandatory. The student must come prepared for lectures and practical classes. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*

References	1. Шаммазов А.М. Проектирование насосных и компрессорных станций. Уфа, 2003.- 398 с. 2. Зайцев Л.А. Регулирование режимов работы магистральных нефтепроводов. М., Недра.- 240 с. 3. П.И.Тугунов, В.Ф.Новоселов, А.А.Коршак, А.М.Шаммазов. «Типовые расчеты при проектировании и эксплуатации нефтебаз и нефтепроводов». Уфа. Издательство ООО «ДизайнПолиграфСервис». 2002.-658 с. 4. Букенова М.С., Молдахметова Д.Е. «Расчет основных параметров компрессорной станции». Методические указания к практическим занятиям. –Алматы: КазНТУ, 2005, 29 с. 5. Букенова М.С. «Расчеты по подготовке газа к транспорту». Методические указания к практическим занятиям. –Алматы:КазНТУ, 2006, 23 с.

Module name	***PET429 «Multi-phase flow systems»***
Semester(s) in which the module is delivered	*8 semester*
Individual responsible for the module	*Baimukhametov M.A.*
Language	*english*
Stance in the curriculum	*elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, extracurricular hours)	*Total load: 5 hours* *Contact hours: 1/0/2* *SIWT: 2 hours*
Number of credits	*5 credits (2/0/1/2)*
Required and recommended prerequisites for enrolling in this module	*Prerequisites: Drilling engineering, Structural geology* *Ability to analyze and synthesize the skills of engineering calculations*
Module objectives / intended learning outcomes	*Multi-phase flow systems course aims at providing students with the learning outcomes that follow:* *(1) Understand the fundamental concepts of reservoir geomechanics;* *(2) Apply well data in yielding pore and overburden pressures;* *(3) Build a summary map of wellbore failures and instabilities encountered during drilling;* *(4) Understand rock failure in compression, tension and shear;* *(5) Perform calculations to determine the horizontal stresses, angle of internal friction and coefficient of friction;* *(6) Assess risks associated with wellbore stability* *(7) Predict and optimize well productivity using well simulation and uncertainty estimation.*

Content	*The course covers and answers the following questions:* *(1) how drilling, production and development operations influence stress distribution within the reservoir;* *(2) how changes in stress state can cause different failures and instabilities;* *(3) how drilling operations can be conducted in a safe manner;* *(4) how to drill horizontal wells so as to maximize production;* *(5) appreciate the role of geomechanics in reservoir development.*
Exam type	*Written exam*
Learning and exam requirements	*The student should not be late and miss classes, be punctual. The student must come prepared for lectures and practical classes. Timely delivery of assignments, full delivery of all types of work (practical and independent) are required.*
Literature	*[1] Zheltov Yu.P. (2017) Development of oil fields. Moscow* *[2] Drilling engineering. (2015) Heriot-Watt Manual. Edinburgh* *[3] Dolgih, L. N. (2006). Oil and gas well design calculations. Perm: PNRPU;*