Satbayev Kazakh National Research Technical University

Petroleum Engineering Department

The educational program
7M07202 – “Petroleum Engineering”

HANDBOOK

Module designation	***LNG 210 Foreign language (professional)***
Semester(s) in which the module is taught	*1 semestr*
Person responsible for the module	*Saparkhojayeva Nurgul Pazharbekovna*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	*Practical classes*
Workload (incl. contact hours, self-study hours)	*General workload:5* *Contact hours:3 (0/0/3)*
Credit points	*5 ECTS*
Required and recommended prerequisites for joining the module	*No*
Module objectives / intended learning outcomes	*Within the frame of four types of speech activities, students will be able to:* *In Listening* – *Expose short presentation of extract* – *Understand the main ideas* – *Listen for the main points* – *Recognize signposting language* – *Identify supporting arguments* – *Take notes while listening* *In Reading* – *Extract the key information from a textbook extract* – *Predict the content of a text* – *Identify the topic, purpose and main idea of a paragraph* – *Take notes to write a summary* – *Recognize definitions, explanations and examples* *In Writing* – *Analyse paragraph structure* – *Organize information in a logical way* – *Expand notes into sentences* – *Plan and write an essay* – *Develop simple and compound sentences as a way of varying sentence structure.* *In Speaking* – *Focus on the module practices identifying questions used for asking additional* – *information* – *Critically comment* – *Participate in a discussion*

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	*[1] Oxford EAP Pre-Intermediate B1 (2015) by Richard Storton. Oxford University Press (e - version) [2] De Chazal E. & Rogers L. (2013) Oxford EAP. A Course in English for Academic Purposes. Intermediate/ B1+. Oxford: Oxford University Press [3] Harrison R. (2015) Headway academic skills: listening, speaking, and study skills. Level 3, Student's book. Oxford: Oxford University Press [4] Zemach Dorothy E. & Rumisek Lisa A. (2005).Academic Writing: from paragraph to essay. MACMILLAN.*

Module designation	***HUM208 Management psychology***
Semester(s) in which the module is taught	*1 semestr*
Person responsible for the module	*Zykova Natalia Mikhailovna*
Language	*Russian*
Relation to curriculum	*Required component* *Basic discipline*
Teaching methods	*lecture, practical classes, SRO, SROP*
Workload (incl. contact hours, self-study hours)	*90 academic hours.* *Lecture-15h, practical classes - 30h.* *SRO (including SROP) - 60 hours*
Credit points	*3 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	***PET266 Theory of motion of gas-liquid mixtures***
Semester(s) in which the module is taught	*1 semester*
Person responsible for the module	*Baimukhametov M.A.*

Language	*Russian*
Attitude towards the curriculum	*Compulsory* *post requisite: PET2672 Principles of oil production technologies*
Teaching methods	*lectures, practical classes*
Workload (incl. contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 2/0/1* *IWMT: 2 hours*
Credit scores	*5 credits (2/0/1/3)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: PET4102 Fluid and Gas Mechanics* *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.*
Module objectives/intended learning outcomes	*Master student should know:* *- Criteria for identifying structures and forms of gas-liquid flows;* *- calculation of oil properties in the process of its single degassing;* *- calculation of pressure distribution in the production well.* *Master student should be able to:* *- to determine the distinctive features of gas-liquid mixtures;* *- identify structures and forms of movement of gas-liquid mixtures;* *- to determine the types and structures of the water-oil mixture.* *After completing the course, the undergraduate must demonstrate the ability to analyze, synthesize and design the operation of an ideal and semi-ideal lift; the operation of the lift in various modes, as well as calculate the costs.*
Content	*As part of the course, the undergraduate will master:* *- distinctive features of gas-liquid mixtures;* *- determination of the density of the gas-liquid mixture;* *- structures and forms of movement of gas-liquid mixtures;* *- Criteria for identifying structures and forms of gas-liquid flows;* *- energy balance in the well.*
Exam forms	*A written exam*
Training and Exam Requirements	*The undergraduate should not be late and miss classes, be punctual and obligatory. The undergraduate must come prepared for lectures and practical exercises. Timely delivery of calculations of practical work, full performance of all types of work (practical and independent) are required.*
Bibliography	** [1] Mishchenko I.T. Well oil production. Textbook for universities. - M.: Federal State Unitary Enterprise "Oil and Gas" Russian State University of Oil and Gas. THEM. Gubkina, 2003. - 816 p.* ** [2] Sakharov V.A., Mokhov M.A. Hydrodynamics of gas-liquid mixtures in vertical pipes and field lifts. - M.: Federal State Unitary Enterprise "Oil and Gas" Russian State University of Oil and Gas. THEM. Gubkina, 2004. - 398 p.* ** [3] Shchurov V.I. Technology and technique of oil production: Textbook for universities. - M .: OOO TID "Alliance", 2005. - 510 p.*

	** [4] Reference manual for the design of the development and operation of oil fields. Oil production. - M .: OOO TID "Alliance", 2005. - 455 p.* ** [5] Mishchenko I.T. Calculations in oil production. – M.: Nedra, 1989. – 245 p.* ** [6] 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.* **Literature is available in the electronic resources of the library* *~ Literature is available on the teacher's educational portal.*

Module designation	***PET 263 «Research seminar for petroleum graduates»***
Semester(s) in which the module is taught	*1 semester*
Person responsible for the module	*Abdeli Dairabay*
Language	*russian*
Attitude towards the curriculum	*Compulsory* *post-requirements: Technology and technique of oil production*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*Total 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	*Ability to analyze, synthesize and master the skills of solving engineering problems*
Module objectives/intended learning outcomes	*A master's student should know:* *- the main directions of development of oil and gas engineering in the field of intensification of oil and gas inflow to wells;* *- hydraulic fracturing technology;* *- chemical methods of processing the bottom-hole zone of the formation, the technology of acid treatment of wells;* *- modern methods of water isolation of bottom-hole zones of wells.* *A master's student should be able to:* *- analyze and evaluate the problems of the oil and gas industry;* *- develop recommendations for improving the technology and technique of hydraulic fracturing;* *- develop recommendations for improving the technology and techniques of acid treatment of wells;* *- to develop recommendations for improving the technology and technique of secondary opening of the reservoir.* *After completing the course, the master's student must demonstrate the ability to analyze, synthesize and possess the skills of scientific research.*

Содержание	*As part of the course, the master's student will master:* *- practical use of knowledge about methods of intensification of oil and gas inflow to wells to solve specific problems in the field of oil and gas business;* *- technology of hydraulic fracturing, fundamentals of mechanics and . mathematical modeling of hydraulic fracturing;* *- chemical and thermal methods of processing the bottomhole zone of the formation;* *- hydraulic blasting and slot perforation of wells..*
Exam forms	*A written exam*
Requirements for training and exams	*A master's student should not be late and miss classes, be punctual and mandatory. He should 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] G. Nitters, B. Pittens, N. Buik. Well Stimulation Techniques for Geothermal Projects in Sedimentary Basins. Published by: IF Technology bv. Velperweg 37, P.O. Box 605. 6800 AP ARNHEM, The Netherlands. 10-2018. – 175p. [5] Освоение скважин. Справ. Пособие/ А.И. Булатов, Ю.Д. Каимар, П.П. Макаренко, Р.С. Яремийчук – М.: Недра – 1999.-472с* *[2] Иванов С. И. Интенсификация притока нефти и газа к скважинам: Учеб. пособие. – М.: ООО «Недра-Бизнесцентр», 2016.- 565с.: ил. [6] Economides M.I. Oligney R.A., Valko R. Uniffed Fracture Desing. Chapter -7.-Orsa Press. – Alvin.- Texas, 2012.-350p..* *[3] Ибрагимов Л.Х., Мищенко И.Т., Челоянц Э.К. Интенсификация добыча нефти. – М.: Наука, 2017.-346с. [7] Petroleum Engineering Handbook Larry W. Lake, Editor-in-Chief U. of Texas at Austin. Society of Petroleum Engineers. Copyright 2017 Society of Petroleum Engineers..* *[4] Economides M.I.? Oligney R.A., Valko R. Uniffed Fracture Desing. Chapter -7.-Orsa Press. – Alvin.- Texas, 2016.-350p [8] Michael J. Economides, A. Daniel Hill, Christine Ehlig-Economides, Ding Zhu. Petroleum production systems. Second edition. Text printed in the United States on recycled paper at Courier in Westford, Masscachusetts. Third printing, January, 2016.~* *[6] Абдели Д. Ж. Прикладной курс методов интенсификации притока в скважины: УМКД. – Алматы: Satbayev University, 2021.* **Литература доступна в электронных ресурсах библиотеки* *~ Литература доступна на учебном портале преподавателя.*

Module designation	***PET228 «Advanced Petrophysics»***
Semester(s) in which the module is taught	*1 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 (2/0/1/3)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: «Физика I»* *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:* *- calculate deviation angles,* *- project the curvature of wells* *At the end of the course, the student should know:* *- fundamentals of technology for the construction of inclined and horizontal wells* *- criteria for the effectiveness of bush drilling* *- preparatory work for drilling directional wells*
Content	*As part of the course, the student will master the practical use of knowledge about the location of wellheads on a cluster site, criteria for the effectiveness of cluster drilling, the mechanism of rock destruction, preparatory work for drilling directional wells.*
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] А.Г. Калинин, Б.А. Никитин, К.М. Солодкий, Б.З. Султанов. Бурение наклонных и горизонтальных скважин. Справочник. –М.: Недра 1997* *[2] Т.О. Акбулатов, Л.М. Левинсон, Р.Г. Салихов, Ф.Н. Янгиров Расчеты при бурении наклонных и горизонтальных скважин – Санкт-Петербург.:Недра 2005* *[3] С.С. Сулакшин. Направленное бурение. – М.: Недра 1987* *[4] Музапаров М.Ж Направленное бурение. 1-4 том, Бесклиновая технология: Учебник для ВУЗов.- Алматы. 2001-2005г.г.г*

Module designation	***PET 229 «Advanced Reservoir engineering»***
Semester(s) in which the module is taught	*1 semester*
Person responsible for the module	*Moldabayeva Gulnaz*
Language	*russian*
Attitude towards the curriculum	*Obligatory* *postrequisit:PET4253 Petroleum production engineering*
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 (2/0/1/2)*

Required and Recommended Prerequisites for Attaching to the Module	
Module objectives/intended learning outcomes	*A master's student should know:* *- to demonstrate the derivation of the main differential equation of radial filtration, the equation of quasi-established and steady-state inflows into the well;* *- to 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 oil and gas production;*
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.* *- perform 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"*

Module designation	***PET 232 «Advanced Production Engineering»***
Semester(s) in which the module is taught	*1 semester*
Person responsible for the module	*Moldabayeva Gulnaz*
Language	*russian*
Attitude towards the curriculum	*Elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 5(2/0/1/2)* *PET 1871 «Well Stimulation»*

Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	
Module objectives/intended learning outcomes	*A master's student should know:* *- make design calculations for the development of gas and gas condensate fields, process well research data, choose a rational option for the development of deposits;* *- 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	***PET 213 «Enhanced oil recovery»***
Semester(s) in which the module is taught	*1 semester*
Person responsible for the module	*El-Sayed Negim*
Language	*english*
Attitude towards the curriculum	*Elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 5(2/0/1/2)* *PET 1871 «Well Stimulation»*

Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	
Module objectives/intended learning outcomes	*A master's student:* *Be able to:* *– to learn work on the topic of the dissertation* *– demonstrate the ability to analyze, synthesize and design efficient technological processes for drilling wells, developing, and operating oil and gas fields and transporting oil and gas* *To know:* *– how to calculate the economic benefits and costs of the results of using scientific and technical work.*
Content	*This course is designed to concepts and screening criteria for enhanced oil recovery (EOR) methods; Chemical enhanced oil recovery; Microscopic and macroscopic displacement of fluids in reservoirs; Mobility-control processes; Miscible displacement processes; Chemical flooding processes; Thermal recovery processes.*
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. Don W. Green and G. Paul Willhite. Enhanced Oil Recovery, Second Edition, 2018. ISBN: 978-1-61399-494-8* - *2. James J. Sheng. Enhanced Oil Recovery. Field Case Studies. 2013. ISBN: 978-0-12-386545-8* - *3. Vladimir Vishnyakov, Baghir Suleimanov, Ahmad Salmanov, Eldar Zeynalov, Primer on Enhanced Oil Recovery, Gulf Professional Publishing, 2020, ISBN 9780128176320,* - *4. Ragab A and M. Mansour E . Enhanced Oil Recovery: Chemical Flooding. Geophysics and Ocean Waves Studies. IntechOpen. 2021. DOI: 10.5772/intechopen.90335.*

Module designation	***PET246 «Principles of drilling technology»***
Semester(s) in which the module is taught	*1 semester*
Person responsible for the module	*Smashov N.Zh.*
Language	*russian*
Attitude towards the curriculum	*Elective* *Postrequisites: Geomechanics, Well completion*
Teaching methods	*lectures, laboratory work, 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	*Postrequisites: Geology, 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:* *- well classification, well design and parameters;* *-modern drilling methods and methods of their selection;* *-physical processes occurring in the well and at the bottom of the well during the destruction of rocks.* *-physical and mechanical properties of rocks.* *-technologies of drilling wells according to a given profile, natural, technical and technological means of controlling the trajectory of the wellbore, types of well profiles, methods of their calculation.* *The student should be able to:* *-to choose and justify the methods of drilling wells in specific geological and technical conditions;* *-to justify the choice of rock-crushing and recollecting calibration-centering tools for drilling wells in various mining and geological conditions;* *-perform calculations of the wellbore profile and suggest natural, technical and technological means of controlling the trajectory of the wellbore.* *After completing the course, the student must demonstrate the ability to set and solve the tasks of maintaining the production process in a changing mining and geological environment using engineering research methods.*
Content	*As part of the course, the student will master:* *- physical and mechanical properties of rocks;* *-methods and parameters of well drilling modes;* *-drill string, its elements and operation;* *-a tool for drilling wells according to a given profile.*
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] Попов А.Н., Спивак А.И., Акбулатов Т.О. и др. Технология бурения ненфтяных и газовых скважин. Учебник для вузов-М.,Недра, 2007 508с.* ** [2] Агзамов Ф.Ф., Акбулатов Т.О., Исмаков Р.А. Бурение нефтяных и газовых скважин. Санкт-Петербург, Недра, 2012. – 436с.* ** [3] Басарыгин Ю.М., Булатов А.И., Проселков Ю.М. Технология бурения нефтяных и газовых скважин. Учеб. для вузов. М.; Недра, 2001, - 679с.* ** [4] Ганджумян Р.А., Калиннин А.Г., Никитин Б.А. Инженерные расчеты при бурении глубоких скважин. Справочное пособие. – М.; Недра, 2000, -489с.* ** [5] Рязанов В.И. Напрвленное бурение глубоких скважин. М.;Недра, 1999* *~ [6] Гусман М.Т., Балденко Д.Ф., Кочнев А.М. и др. Забойные винтовые двигатели для бурения скважин. –М.; Недра 1981* **Literature is available in the electronic resources of the library* *~ The literature is available on the teacher's learning portal.*

Module designation	***PET247 Principles of designing oil and gas storages***
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	*Elective* *post-requirement: RET448 Design and operation of oil and gas storage facilities*
Teaching methods	*lectures, practical classes*
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* *The ability to analyze, synthesize and possess the skills of engineering calculations and methods of solving basic problems in the storage of oil, gas and petroleum products.*
Module objectives/intended learning outcomes	*A master's student should know:* *- purpose of oil depots and gas storage facilities;* *- - the procedure for selecting basic and auxiliary equipment at oil depots and gas storage facilities;* *- basic requirements for the design of oil depots and gas storage facilities;* *- basic rules of operation, labor protection, diagnostics and testing of storage facilities.* *A master's student should be able to:* *- design oil depots and gas storage facilities 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.* *After completing the course, the master's student must acquire full knowledge for the systematic study, evaluation and synthesis of new complex concepts in order to answer important scientific questions in the field of oil and gas storage and improve existing knowledge or professional practice*
Content	*As part of the course, a Master's student will master:* *- skills in implementing basic technological calculations under various operating conditions of oil depots and gas storage facilities;* *- carrying out calculations on emergency product leaks;* *- modeling and forecasting of the main storage facilities of oil, gas and petroleum products.*
Exam forms	*Written exam*
Requirements for training and exams	*A master's student should not be late and miss classes, be punctual and mandatory. The master's 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. F.F.Abuzova, R.A.Aliyev, V.F.Novoselov, etc. "Technique and technology of oil and gas transportation and storage". Moscow. The bowels. 1988.- 320 p. 2. P.I.Tugunov, V.F.Novoselov, A.A.Korshak, A.M.Shammazov. "Standard calculations in the design and operation of oil depots and oil pipelines". Ufa. Publishing house LLC "Designpoligrafservice". 2002.-658 p. 3. I.R. Ibragimova, M.S. Bukenova. "Calculation of losses from evaporation of oil and petroleum products from ground reservoirs". Part 1. MU for course and diploma design in the discipline "Oil depots and gas storage facilities". Almaty. KazNTU. 2001. -33 p. 4. I.R. Ibragimova, M.S. Bukenova. "Calculation of losses from evaporation of oil and petroleum products from ground reservoirs". Part 2. MU for course and diploma design in the discipline "Oil depots and gas storage facilities". Almaty. KazNTU. 2001. -39 p. 5. T.I. Irgibaev. Examples of solving problems on an oil depot. Almaty. KazNTU. 2006. 6. edited by Zemenkov Yu.D. Handbook of an engineer for the operation of oil and gas pipelines and product pipelines - M., Infra, 2006. 7. Lurie M.V. Taskbook on pipeline transport of oil, petroleum products and gas –M., Nedra, 2003 8. Oil and Gas Magazine 9. Oil and Gas Technologies Magazine 10.Internet resource

Module designation	***HUM210 History and Philosophy of science***
Semester(s) in which the module is taught	*2 semestr*
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	*120 academic hours*
Credit scores	*4 credits: contact - 2 (lecture - 1 credit, practice - 1 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	***HUM209 Higher school pedagogy***
Semester(s) in which the module is taught	*2 semestr*
Person responsible for the module	*Zykova Natalia Mikhailovna*
Language	*Russian*
Relation to curriculum	*Required component* *Basic discipline*
Teaching methods	*lecture, practical classes, SRO, SROP*
Workload (incl. contact hours, self-study hours)	*120 academic hours.* *Lecture-15h, practical classes - 30h.* *SRO (including SROP) - 60 hours*
Credit points	*4 ECTS*
Required and recommended prerequisites for joining the module	*After completing the course, a master's student must demonstrate the ability to plan, organize, analyze and design pedagogical activities.*
Module objectives / intended learning outcomes	*A master's student should be able to:* *- apply new pedagogical technologies of teaching and upbringing in practice;* *- to understand and form an individual creative style of pedagogical activity;* *- use various ways of organizing students' cognitive activity, their independent work and scientific creativity;* *- practically apply active teaching methods;* *- possess public speaking skills.* *At the end of the course, a master's student should know:* *- features of the teacher's pedagogical activity;* *- factors of communicative competence of a higher school teacher;* *- fundamentals of the theory of higher education;* *- the content of education in higher education;* *- forms and methods of higher education;* *- fundamentals of credit training technology;* *- technology for the development of educational and methodological materials.*
Content	*The course is intended for undergraduates of the scientific and pedagogical magistracy of all specialties. As part of the course, undergraduates will master the methodological and theoretical foundations of higher school pedagogy, learn how to use modern pedagogical technologies, plan and organize the processes of teaching and upbringing, master the communicative technologies of subject-subject interaction between a teacher and a student in the educational process of a university.*

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.Ахметова Г.К., Исаева З.А. Педагогика: Учебник для магистратуры университетов. - Алматы: Қазақ университеті, 2016. - 328 с.* *2. Джакупов С.М. Психологическая структура процесса обучения. Алматы, 2019* *3. Загвязинский В.И., Атаханов Р. Методология и методы психолого-педагогического исследования: Учеб. пособие. - М.: Академия, 2011.* *4. Зимняя И.А. Педагогическая психология. М., 2012. С. 217-232* *5. Шейнов В.П. Как управлять другими, как управлять собой. Минск, 2016*

Module designation	***PET 226 «Principles of Reservoir engineering»***
Semester(s) in which the module is taught	*2 semester*
Person responsible for the module	*Moldabayeva Gulnaz*
Language	*russian*
Attitude towards the curriculum	*Elective* *postrequisit:PET4253 Petroleum production engineering*
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 (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	
Module objectives/intended learning outcomes	*A master's student should know:* *- to demonstrate the derivation of the main differential equation of radial filtration, the equation of quasi-established and steady-state inflows into the well;* *- to 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 oil and gas production;*
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.* *- perform 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	***PET267 Principles of production engineering***
Semester(s) in which the module is taught	*2 Semester*
Person responsible for the module	*Baimukhametov M.A.*
Language	*russian*
Attitude towards the curriculum	*Elective* *Postrequisites: RET264 Applied course of methods of intensification of inflow into the well*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*General workload: 5* *Contact hours: 2/0/1* *Independent work with a teacher: 2*
Credit scores	*5 credits (2/0/1/3)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisite: RET2672 Theory of motion of gas-liquid mixtures* *Demonstrate the ability to analyze, synthesize and design the operation of ideal and semi-ideal lifts; the operation of the lift in various modes, as well as calculate costs.*
Module objectives/intended learning outcomes	*A master's student should know:* *- the principle of development to solve the technical problem of eliminating contamination of the bottom-hole zone of the well;* *- how to predict and optimize performance using appropriate tools;* *- uncertainty in the data, discuss possible consequences for the results and consider ways to minimize risks;* *- how to effectively present the results of an engineering study in a written report.*

	A master's student should be able to: *- work effectively, focusing on the assessments of peers and instructors;* *- explain what data and specific methods are needed to solve the main problems of contamination of the bottom-hole zone of the well in terms of drilling, completion and production, prevention and cleaning;* *- describe the various technical, economic, social, political or other constraints that need to be taken into account during the various steps of the decision-making process.* *After completing the course, the master's student must demonstrate the skills of effective teamwork and communication with colleagues, with the head and with representatives of the industry.*
Content	*As part of the course, a master's student will master:* *- distinctive features of the change in the permeability of the bottomhole formation zone;* *- features of well completion at gas and gas condensate fields;* *- features of completion of horizontal wells;* *- completion of wells in conditions of hydrogen sulfide manifestation;* *- analysis of the mining system.*
Exam forms	*A written exam*
Requirements for training and exams	*A master's student should not be late and miss classes, be punctual and mandatory. The master's 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] Басарыгин Ю.М., Булатов А.И., Проселков Ю.М. Заканчивание скважин. Учебное пособие для вузов. – М.: Недра, 2000. – 670с.* ** [2] Ивановский В.Н., Дарищев В.И., Сабиров А.А., Каштанов В.С., Пекин С.С. Оборудование для добычи нефти и газа. – М.: ГУП Изд-во «Нефть и газ» РГУ нефти и газа им. И.М. Губкина, 2002.– Ч. 1.– 768 с.* ** [3] Мищенко И.Т. Скважинная добыча нефти. Учебное пособие для вузов. – М.: ФГУП «Нефть и газ» РГУ нефти и газа им. И.М. Губкина, 2003. – 816 с.* ** [4] Щуров В.И. Технология и техника добычи нефти: Учебник для вузов. – М.: ООО ТИД «Альянс», 2005. – 510 с.* ** [5] Молчанов Г.В., Молчанов А.Г. Машины. Буровое оборудование. Справочник в 2-х томах / Абубакиров В.Ф., Архангельский В.Л. и др. – М.: Недра, 2000.* ** [6] Справочное руководство по проектированию разработки и эксплуатации нефтяных месторождений. Добыча нефти// Под общей редакцией Ш.К. Гиматудинова / Р.С.Андриасов, И.Т.Мищенко, А.И.Петров и др. – М.: ООО ТИД «Альянс», 2005. – 455 с.* **Literature is available in the electronic resources of the library* *~ Literature is available on the teacher's learning portal*

Module designation	***PET268 «Basic Coding for Petroleum Engineering»***
Semester(s) in which the module is taught	*2 Semester*
Person responsible for the module	*Bekbau B.E.*

Language	*Russian*
Attitude towards the curriculum	*Elective* *post-requirement: -*
Teaching methods	*lectures, seminars*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours: 2/0/1* *Independent work of students: 2 hours*
Credit scores	*5 credits (2/0/1/3)*
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	*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 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.* *The literature is available in the library's electronic resources and on the teacher's educational portal.*

Module designation	***PET265 «Methods to improve the efficiency of oil and gas pipelines»***
Semester(s) in which the module is taught	*2 semester*
Person responsible for the module	*Imansakipova N.B.*
Language	*Russian, Kazakh*
Attitude towards the curriculum	*Elective* *post-requirement: RET427 Design and operation of gas and oil pipelines*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours:2/0/1* *Independent work of students: 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* *The ability to analyze, synthesize and possess the skills of engineering calculations and methods of solving basic problems in the transportation of oil and gas through the main pipeline.*
Module objectives/intended learning outcomes	*A master's student should know:* *• the structure and composition of planned preventive measures implemented during the operation of main gas and oil pipelines,* *• methodology for diagnosing damage to main pipelines,* *• the structure of dispatching of main gas and oil pipelines,* *• ways to improve the reliability of trunk pipelines.* *A master's student should be able to:* *- analyze the operation of main gas and oil pipelines;* *- carry out calculations on the efficiency of gas and oil pipelines;* *- the ability to apply advanced skills and knowledge for systematic study;* *- use scientific, technical and reference literature.*

	After completing the course, the master's student must acquire full knowledge for the systematic study, evaluation and synthesis of new complex concepts in order to answer important scientific questions in the field of oil and gas transportation and improve existing knowledge or professional practice
Content	*As part of the course, a Master's student will master:* *- skills in implementing basic technological calculations under various operating conditions;* *- carrying out calculations on emergency product leaks;* *- modeling and forecasting of failures of gas and oil pipelines.*
Exam forms	*Written exam*
Requirements for training and exams	*A master's student should not be late and miss classes, be punctual and mandatory. The master's 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. Galeev V.B., Karpachev M.Z..Kharlenko V.I. Main oil product pipelines– M., Nedra, 1988 2. Tugunov P.I., Novoselov V.F., Korshak A.A., Shammazov A.M. Typical calculations in the design and operation of oil depots and pipelines – Ufa, Designpoligrafservice, 2002 3. Novoselov V.F., Golyanov A.I., Muftakhov E.M. Typical calculations in the design and operation of gas pipelines –M., Nedra, 1982 4. Dyatlov V.A., Mikhailov V.M., Yakovlev E.I. Equipment, operation and repair of main gas pipelines - M., Nedra, 1990 5. edited by Zemenkov Yu.D. Handbook of an engineer for the operation of oil and gas pipelines and product pipelines - M., Infra, 2006. 6. Lurie M.V. Taskbook on pipeline transport of oil, petroleum products and gas –M., Nedra, 2003 7.Magazine "Oil and gas" 8. Magazine "Oil and gas technologies" 9.Internet resource

Module designation	**PET270 «Advanced well completion»**
Semester(s) in which the module is taught	*2 semester*
Person responsible for the module	*Kasenov A.K.*
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	*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	*A doctoral student should be able to:* *- primary opening of a productive reservoir;* *- hydrodynamic perfection of autopsy. Testing layers in the open trunk;* *- principles of well design design;* *- well cementing technology;* *- secondary opening of the productive reservoir;*
Content	*As part of the course, a doctoral student will master the practical use of technological operations for completing the construction of a well before putting it into operation.* *The basic knowledge and skills in the field of well construction, in particular, well completion, as well as methods of opening the productive horizon, well development, etc. will be presented.*
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] Басарыгин Ю.М., Булатов А.И., Проселков Ю.М. Заканчивание скважин.Учебник.-М:Недра, 2000* *[2] Соловьев Е.М. Заканчивание скважин. Учебник.-М:Недра, 1979* *[3] Мусанов А. Заканчивание скважин. Методические указания. Алматы,2009* *[4] Соловьев Е.М. Задачник по заканчиванию скважин. Учебное пособие.-М:Недра,1989* *[5] . Подгорнов В.М., Ведищев И.А. Практикум по заканчиванию скважин - М:Недра,1985.*

Module designation	***PET269 «Well construction and workover supervising»***
Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Kulchytsky B.B.*
Language	*russian*
Attitude towards the curriculum	*Elective*
Teaching methods	*lectures, laboratory classes*
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	*Prerequisite: PET421 «Reservoir geomechanics»*

Module objectives/intended learning outcomes	*The student must be able to:* *- coordinate and manage the work of drilling and service contractors on the drilling site;* *- use the results of geological and technological research in the process of supervising the construction and repair of wells;* *- apply high-quality solutions based on operational information.* *Upon completion of the course, the student should know:* *- job responsibilities of the drilling supervisor;* *- methods of supervising the construction and repair of wells;* *- methods of evaluation of design, engineering and organizational solutions.*
Content	*As part of the course, the student will master the necessary knowledge and skills to provide supervision of well construction and repair according to quality standards, requirements of labor protection and industrial safety, industrial, fire and environmental safety, environmental protection and subsoil protection. The basic knowledge and skills in the field of supervision of construction and repair of wells, including using digital technologies, will be presented.*
Exam forms	*A written exam*
Requirements for training and exams	*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.*
References	*- Кульчицкий В.В. Буровой супервайзинг. Учебное пособие. М.: РГУ нефти и газа (НИУ) им. И.М. Губкина, 2018. – 307 с.* *- Кульчицкий В.В., Щебетов А.В. Цифровой супервайзинг бурения и ремонта скважин: Учебное пособие. М.: ВЕЧЕ, 2021. – 368 с.* *- Кульчицкий В.В., Ларионов А.С., Гришин Д.В., Александров В.Л. Методическое и информационное обеспечение бурового супервайзера: учебное пособие. – М.: Издательский центр РГУ нефти и газа им. И.М. Губкина, 2009. – 248 с.*

Module designation	***PET 222 «Advanced Production Engineering»***
Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Moldabayeva Gulnaz*
Language	*russian*
Attitude towards the curriculum	*Elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 5(2/0/1/2)* *PET 1871 «Well Stimulation»*
Credit scores	*5 credits (2/0/1/2)*

Required and Recommended Prerequisites for Attaching to the Module	
Module objectives/intended learning outcomes	*A master's student should know:* *- make design calculations for the development of gas and gas condensate fields, process well research data, choose a rational option for the development of deposits;* *- 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	***PET 264 «Applied well stimulation»***
Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Abdeli Dairabay*
Language	*russian*
Attitude towards the curriculum	*Elective* *post-requirements: Technology and technique of oil production*
Teaching methods	*lectures, practical classes*
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	*Ability to analyze, synthesize and master the skills of solving engineering problems*
Module objectives/intended learning outcomes	*A master's student should know:* *- the main directions of development of oil and gas engineering in the field of intensification of oil and gas inflow to wells;* *- hydraulic fracturing technology;* *- chemical methods of processing the bottom-hole zone of the formation, the technology of acid treatment of wells;* *- modern methods of water isolation of bottom-hole zones of wells.* *A master's student should be able to:* *- analyze and evaluate the problems of the oil and gas industry;* *- develop recommendations for improving the technology and technique of hydraulic fracturing;* *- develop recommendations for improving the technology and techniques of acid treatment of wells;* *- to develop recommendations for improving the technology and technique of secondary opening of the reservoir.* *After completing the course, the master's student must demonstrate the ability to analyze, synthesize and possess the skills of scientific research.*
Содержание	*As part of the course, the master's student will master:* *- practical use of knowledge about methods of intensification of oil and gas inflow to wells to solve specific problems in the field of oil and gas business;* *- technology of hydraulic fracturing, fundamentals of mechanics and . mathematical modeling of hydraulic fracturing;* *- chemical and thermal methods of processing the bottomhole zone of the formation;* *- hydraulic blasting and slot perforation of wells..*
Exam forms	*A written exam*
Requirements for training and exams	*A master's student should not be late and miss classes, be punctual and mandatory. He should 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] G. Nitters, B. Pittens, N. Buik. Well Stimulation Techniques for Geothermal Projects in Sedimentary Basins. Published by: IF Technology bv. Velperweg 37, P.O. Box 605. 6800 AP ARNHEM, The Netherlands. 10-2018. – 175p. [5] Освоение скважин. Справ. Пособие/ А.И. Булатов, Ю.Д. Каймар, П.П. Макаренко, Р.С. Яремийчук – М.: Недра – 1999.-472с* *[2] Иванов С. И. Интенсификация притока нефти и газа к скважинам: Учеб. пособие. – М.: ООО «Недра-Бизнесцентр», 2016.- 565с.: ил. [6] Economides M.I. Oligney R.A., Valko R. Uniffed Fracture Desing. Chapter -7.-Orsa Press. – Alvin.- Texas, 2012.-350p..* *[3] Ибрагимов Л.Х., Мищенко И.Т., Челоянц Э.К. Интенсификация добыча нефти. – М.: Наука, 2017.-346с. [7] Petroleum Engineering Handbook Larry W. Lake, Editor-in-Chief U. of Texas at Austin. Society of Petroleum Engineers. Copyright 2017 Society of Petroleum Engineers..* *[4] Economides M.I.? Oligney R.A., Valko R. Uniffed Fracture Desing. Chapter -7.-Orsa Press. – Alvin.- Texas, 2016.-350p [8] Michael J. Economides, A. Daniel Hill, Christine Ehlig-Economides, Ding Zhu. Petroleum production systems. Second edition. Text printed in the United States on recycled paper at Courier in Westford, Masscachusetts. Third printing, January, 2016.~* *[6] Абдели Д. Ж. Прикладной курс методов интенсификации притока в скважины: УМКД. – Алматы: Satbayev University, 2021.*

Module designation	***PET240 «Geosteering in driliing»***
Semester(s) in which the module is taught	*3 Semester*
Person responsible for the module	*Smashov N.*
Language	*Russian*
Attitude towards the curriculum	*Elective* *post-requirement: -*
Teaching methods	*lectures, seminars*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours: 2/1/0* *Independent work of students: 2 hours*
Credit scores	*5 credits (2/1/0)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: PET432 «Directional drilling»* *Study of the theoretical foundations, navigation and telemetry systems, as well as technical means of controlling the profile of the wellbore when drilling inclined and horizontal wells*

Module objectives/intended learning outcomes	*At the end of the course, the student should know:* - *principles of operation of software used in the course of professional activity;* - *technology of directional drilling of wells;* - *the chain of production processes, using modern equipment and materials.* *As a result of studying the discipline, the student should be able to:* - *to select a telemetry system and a geonavigation system for drilling wells;* - *to determine the interaction of forces affecting the folding of the drilling tool* - *when drilling a well on a horizontal section;* - *determine the causes of fluctuations occurring in the drill string and where the greatest fluctuations occur when drilling a well and what parameters affect these fluctuations.*
Content	*The course covers the basics of telemetry, measurements and logging during drilling and directional drilling technology, criteria for selecting the minimum required set of logging data before performing geonavigation, errors and uncertainties when drilling horizontal wells related to both geology and limitations of telemetry and logging tools, as well as methods for calculating the trajectory of the well, modern methods of geonavigation, fundamentals of interpretation of azimuthal logging diagrams, modeling of various geonavigation scenarios before drilling for risk management purposes.*
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. Строительство скважин. Нефтегазовое дело : учеб. пособие. - Санкт-Петербург : Недра, 2012.* *2. Вадецкий, Ю. В. Бурение нефтяных и газовых скважин / Ю.В. Вадецкий. - М.: Академия, 2013. - 352с* *3. Нескоромных В. В. Направленное бурение. Бурение горизонтальных и многозабойных скважин : учебник для бакалавров направления подготовки 21.03.01 "Нефтегазовое дело", специалистов направления подготовки 23.04.03 "Эксплуатация транспортно- технологических машин и комплексов" / В. В. Нескоромных ; Сиб. федер. ун-т, Ин-т нефти и газа. - Красноярск : СФУ, 2020. - 408 с., 25.6 уел. печ. л . : ил., табл., цв. ил. - Библиогр.: с. 405-406. - 500 экз. – ISBN* *1. Гречин Е. Г. Проектирование технических средств для бурения искривленных скважин : учебник / Е. Г. Гречин, В. П. Овчинников. - Тюмень: Экспресс, 2010. -2 1 0 с*

Module designation	***PET211 «Petroleum Reservoir Simulation: Compostional model»***
Semester(s) in which the module is taught	*3rd semester*
Person responsible for the module	*Bekbauov B.E.*
Language	*Russian*

Attitude towards the curriculum	*Elective* *post-requirement: -*
Teaching methods	*lectures, seminars*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 2/0/1* *CPO: 2 hours*
Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT103 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	*At the end of the course, the student should know:* *- fundamentals of modeling the flow of a single-phase liquid in a porous medium;* *- fundamentals of modeling two-phase flow in a porous medium;* *- fundamentals of modeling three-phase flow in a porous medium;* *- fundamentals of compositional modeling of hydrodynamic processes in oil reservoirs;* *- ways to set initial conditions for modeling;* *- methods of setting boundary conditions for modeling.* *As a result of studying the discipline, the student should be able to:* *- build mathematical and numerical models of fluid flow in a porous medium;*
	- create a computer program for calculating filtration flows; *- launch a single-phase, two-phase, three-phase and composite model of chemical flooding of an oil reservoir for calculation;* *- to analyze the results obtained.* *After completing the course, the student must demonstrate the ability and skills to analyze the results of modeling, as well as high professional qualities in the field of mathematical and numerical modeling of reservoir processes.*
Content	*As part of the course, the student will master the practical use of methods of mathematical and numerical modeling of complex processes in oil and gas reservoirs.*
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. 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.* *3. Aziz, K., Aziz, K. and Settari, A. (1979) Petroleum Reservoir Simulation. Applied Science Publishers, 476 p.* *4. Øystein Pettersen. (2006). Basics of Reservoir Simulation with the Eclipse Reservoir Simulator // Lecture Notes. © Dept. of Mathematics, Univ. of Bergen, 112 p.* *5. Bekbauov, B. E., Kaltayev, A., Berdyshev, A. (2015) A New Mathematical Formulation of the Governing Equations for the Chemical Compositional Simulation // arXiv:1512.08170 [physics.flu-dyn]* *6. Андерсон Д., Таннехилл Дж., Плетчер Р. Вычислительная гидромеханика и теплообмен. В 2-х т.: Пер. с англ. – М.: Мир, 1990. – 384 с.* *7. Lake, Larry W. (1989). Enhanced oil recovery. Englewood Cliffs, N.J.: Prentice Hall.* *Литература доступна в электронных ресурсах библиотеки и на учебном портале преподавателя.*

Module designation	***PET260 «Advanced Rock Mechanics»***
Semester(s) in which the module is taught	*3 Semester*
Person responsible for the module	*Smashov N.*
Language	*Russian*
Attitude towards the curriculum	*Elective* *post-requirement: -*
Teaching methods	*lectures, seminars*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours: 2/1/0* *Independent work of students: 2 hours*
Credit scores	*5 credits (2/1/0)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: PET411 «Reservoir rock properties»* *Mastering disciplinary knowledge of physical properties and processes in rocks, patterns of formation and changes in properties, principles of their use, when solving problems in the construction of wells.*

Module objectives/intended learning outcomes	*At the end of the course, the student should know:* - *the history of the development of rock mechanics;* - *basic laws of rock mechanics;* - *methods of theoretical and experimental research related to the mechanics of rocks;* - *modeling methods in rock mechanics;* - *-stress distribution in the rock.* *As a result of studying the discipline, the student should be able to:* - *to substantiate the method and technology of opening productive layers;* - *carry out calculations and choose the technology of construction, repair or operation of the well, depending on the properties of rocks;* - *to justify the order and modes of technological operations in the well, depending on the properties of rocks;* - *to assess risks and determine measures to ensure safety during work in the well.*
Content	*As part of the course, a master's student must master:* - *the conditions of the rocks of the face and the borehole space of drilling wells;* - *mechanical models of the destruction of rocks under the influence of external loads of various physical nature;* - *factors affecting the stability of rocks composing the walls of drilling wells.*
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. Купенко И.В., Марийчук И.Ф., Нефёдов В.Е. Курс лекций по дисциплине «Механика горных пород». ДонНТУ, Донецк, 2018 г., 256 стр.* *2. Малышева Н.Н., Марийчук И.Ф., Нефёдов В.Е.,Самойлов В.Л. Механика горных пород. Конспект лекций. ДонНТУ, Донецк, 2021 г., 159 стр., УДК: 531:622 (078)* *3. Ашихмин С.Г., Кашников Ю.А. Механика горных пород при разработке месторождений углеводородного сырья. Издание 2. Горная книга, Москва, 2019 г., 552 стр., УДК622.02:531+622.83, ISBN: 978-5-98672* *4. Викторов С.Д., Гончаров С.А., Закалинский В.М., Иофис М.А. Механика сдвижения и разрушения горных пород. Монография. Институт проблем комплексного освоения недр им.ак. Н.В.Мельникова, Москва, 2019 г., 360 стр.,*

Module designation	***PET261 «Basic Statistics for Petroleum Engineers»***
Semester(s) in which the module is taught	*3 Semester*
Person responsible for the module	*Bekbau B.E.*
Language	*Russian*

Attitude towards the curriculum	*Elective* *post-requirement: -*
Teaching methods	*lectures, seminars*
Workload (including contact hours, self-employment hours)	*General workload: 5 hours* *Contact hours: 2/0/1* *Independent work of students: 2 hours*
Credit scores	*5 credits (2/0/1)*
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	*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 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.* *The literature is available in the library's electronic resources and on the teacher's educational portal.*

Module designation	***PET 231 «Advanced Gas Engineering»***
Semester(s) in which the module is taught	*3 semestr*
Person responsible for the module	*Moldabayeva Gulnaz*
Language	*russian*
Attitude towards the curriculum	*Elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 5(2/0/1/2)* *PET 1871 «Well Stimulation»*
Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	
Module objectives/intended learning outcomes	*A master's student should know:* - make design calculations for the development of gas and gas condensate fields, process well research data, choose a rational option for the development of deposits; - 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 name	***PET224 Optimization of pumping and compressor stations***
Semester(s) in which the module is delivered	*3 semester*
Individual responsible for the module	*Imansakipova N.B.*
Language	*Russian, Kazakh*
Stance in the curriculum	*elective*
Teaching methods	*lectures, practical classes*
Workload (including contact hours, extracurricular hours)	*Total load: 5 hours* *Contact hours: 2/1/0* *SIWT: 2 hours*
Number of credits	*5 credits (2/1/0/2)*
Required and recommended prerequisites for enrolling in this module	*PET428 «Design and operation of pump and compressor stations»*
Module objectives / intended learning outcomes	*Reservoir geomechanics course aims at providing students with the learning outcomes that follow:* *the purpose of pumping and compressor stations in the system of trunk pipelines, the composition of the structure, the procedure for selecting the main and auxiliary equipment, regulation of the operating mode when changing the mode of technological processes, calculations of changes in the operating mode when changing the physico-chemical properties of the pumped working agent.*

Content	*The course covers and answers the following questions:* *(1) familiarization with the main facilities of pumping and compressor stations;* *(2) ability to regulate the modes of operation of pumping stations;* *(3) familiarity with the basic rules of operation, diagnostics and testing of station facilities.* *(4) familiarity with the scope of work carried out during the current, medium and major repairs of pumping and compressor units.*
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. Shammazov A.M. Design of pumping and compressor stations. Ufa, 2003.- 398 p.* *2. Zaitsev L.A. Regulation of operating modes of trunk oil pipelines. M., Nedra.- 240 p .* *3.P.I.Tugunov, V.F.Novoselov, A.A.Korshak, A.M.Shammazov. "Standard calculations in the design and operation of oil depots and oil pipelines." Ufa. Publishing house LLC "Designpoligrafservice". 2002.-658 p* *4 Bukenova M.S. "Calculations on gas preparation for transport". Methodological guidelines for practical classes. –Almaty:KazNTU, 2006, 23 p.*

Module designation	***PET 224 «Design of pumping and compressor stations»***
Semester(s) in which the module is taught	*3rd semester*
Person responsible for the module	*Imansakipova N.B.*
Language	*russian*
Attitude towards the curriculum	*Elective*
Teaching methods	*lectures, laboratory classes*
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)*
Required and Recommended Prerequisites for Attaching to the Module	*Ability to analyze, synthesize and master the skills of solving engineering problems*

Module objectives/intended learning outcomes	*A master's student should know:* *- the main directions of development of oil and gas engineering in the field of intensification of oil and gas inflow to wells;* *- hydraulic fracturing technology;* *- chemical methods of processing the bottom-hole zone of the formation, the technology of acid treatment of wells;* *- modern methods of water isolation of bottom-hole zones of wells.* *A master's student should be able to:* *- analyze and evaluate the problems of the oil and gas industry;* *- develop recommendations for improving the technology and technique of hydraulic fracturing;* *- develop recommendations for improving the technology and techniques of acid treatment of wells;* *- to develop recommendations for improving the technology and technique of secondary opening of the reservoir.* *After completing the course, the master's student must demonstrate the ability to analyze, synthesize and possess the skills of scientific research.*
Содержание	*As part of the course, the master's student will master:* *- practical use of knowledge about methods of intensification of oil and gas inflow to wells to solve specific problems in the field of oil and gas business;* *- technology of hydraulic fracturing, fundamentals of mechanics and . mathematical modeling of hydraulic fracturing;* *- chemical and thermal methods of processing the bottomhole zone of the formation;* *- hydraulic blasting and slot perforation of wells..*
Exam forms	*A written exam*
Requirements for training and exams	*A master's student should not be late and miss classes, be punctual and mandatory. He should 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] G. Nitters, B. Pittens, N. Buik. Well Stimulation Techniques for Geothermal Projects in Sedimentary Basins. Published by: IF Technology bv. Velperweg 37, P.O. Box 605. 6800 AP ARNHEM, The Netherlands. 10-2018. – 175p. [5] Освоение скважин. Справ. Пособие/ А.И. Булатов, Ю.Д. Каимар, П.П. Макаренко, Р.С. Яремийчук – М.: Недра – 1999.-472с* *[2] Иванов С. И. Интенсификация притока нефти и газа к скважинам: Учеб. пособие. – М.: ООО «Недра-Бизнесцентр», 2016.- 565с.: ил. [6] Economides M.I. Oligney R.A., Valko R. Uniffed Fracture Desing. Chapter -7.-Orsa Press. – Alvin.- Texas, 2012.-350p..* *[3] Ибрагимов Л.Х., Мищенко И.Т., Челоянц Э.К. Интенсификация добыча нефти. – М.: Наука, 2017.-346с. [7] Petroleum Engineering Handbook Larry W. Lake, Editor-in-Chief U. of Texas at Austin. Society of Petroleum Engineers. Copyright 2017 Society of Petroleum Engineers..* *[4] Economides M.I.? Oligney R.A., Valko R. Uniffed Fracture Desing. Chapter -7.-Orsa Press. – Alvin.- Texas, 2016.-350p [8] Michael J. Economides, A. Daniel Hill, Christine Ehlig-Economides, Ding Zhu. Petroleum production systems. Second edition. Text printed in the United States on recycled paper at Courier in Westford, Masscachusetts. Third printing, January, 2016.~* *6] Абдели Д. Ж. Прикладной курс методов интенсификации притока в скважины: УМКД. – Алматы: Satbayev University, 2021.*

Module designation	***PET 206 «Applied Well Testing»***
Semester(s) in which the module is taught	*3rd semester*
Person responsible for the module	*Abdeli Dairabay*
Language	*russian*
Attitude towards the curriculum	*Elective* *post-requirements: Technology and technique of oil production*
Teaching methods	*lectures, practical classes*
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)*
Required and Recommended Prerequisites for Attaching to the Module	*Ability to analyze, synthesize and master the skills of solving engineering problems*
Module objectives/intended learning outcomes	*A master's student should know:* *- the main directions of development of oil and gas engineering in the field of intensification of oil and gas inflow to wells;* *- hydraulic fracturing technology;* *- chemical methods of processing the bottom-hole zone of the formation, the technology of acid treatment of wells;* *- modern methods of water isolation of bottom-hole zones of wells.* *A master's student should be able to:* *- analyze and evaluate the problems of the oil and gas industry;* *- develop recommendations for improving the technology and technique of hydraulic fracturing;* *- develop recommendations for improving the technology and techniques of acid treatment of wells;* *- to develop recommendations for improving the technology and technique of secondary opening of the reservoir.* *After completing the course, the master's student must demonstrate the ability to analyze, synthesize and possess the skills of scientific research.*
Содержание	*As part of the course, the master's student will master:* *- practical use of knowledge about methods of intensification of oil and gas inflow to wells to solve specific problems in the field of oil and gas business;* *- technology of hydraulic fracturing, fundamentals of mechanics and . mathematical modeling of hydraulic fracturing;* *- chemical and thermal methods of processing the bottomhole zone of the formation;* *- hydraulic blasting and slot perforation of wells..*
Exam forms	*A written exam*

Requirements for training and exams	*A master's student should not be late and miss classes, be punctual and mandatory. He should 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] G. Nitters, B. Pittens, N. Buik. Well Stimulation Techniques for Geothermal Projects in Sedimentary Basins. Published by: IF Technology bv. Velperweg 37, P.O. Box 605. 6800 AP ARNHEM, The Netherlands. 10-2018. – 175p. [5] Освоение скважин. Справ. Пособие/ А.И. Булатов, Ю.Д. Каимар, П.П. Макаренко, Р.С. Яремийчук – М.: Недра – 1999.-472с* *[2] Иванов С. И. Интенсификация притока нефти и газа к скважинам: Учеб. пособие. – М.: ООО «Недра-Бизнесцентр», 2016.- 565с.: ил. [6] Economides M.I. Oligney R.A., Valko R. Uniffed Fracture Desing. Chapter -7.-Orsa Press. – Alvin.- Texas, 2012.-350p..* *[3] Ибрагимов Л.Х., Мищенко И.Т., Челоянц Э.К. Интенсификация добыча нефти. – М.: Наука, 2017.-346с. [7] Petroleum Engineering Handbook Larry W. Lake, Editor-in-Chief U. of Texas at Austin. Society of Petroleum Engineers. Copyright 2017 Society of Petroleum Engineers..* *[4] Economides M.I.? Oligney R.A., Valko R. Uniffed Fracture Desing. Chapter -7.-Orsa Press. – Alvin.- Texas, 2016.-350p [8] Michael J. Economides, A. Daniel Hill, Christine Ehlig-Economides, Ding Zhu. Petroleum production systems. Second edition. Text printed in the United States on recycled paper at Courier in Westford, Masscachusetts. Third printing, January, 2016.~* *[6] Абдели Д. Ж. Прикладной курс методов интенсификации притока в скважины: УМКД. – Алматы: Satbayev University, 2021.* **Литература доступна в электронных ресурсах библиотеки* *~ Литература доступна на учебном портале преподавателя.*

Module designation	***PET216 «Petroleum Reservoir Simulation: Black -oil model»***
Semester(s) in which the module is taught	*3rd semester*
Person responsible for the module	*Bekbauov B.E.*
Language	*Russian*
Attitude towards the curriculum	*Elective* *post-requirement: -*
Teaching methods	*lectures, seminars*
Workload (including contact hours, self-employment hours)	*Total workload: 5 hours* *Contact hours: 2/0/1* *CPO: 2 hours*
Credit scores	*5 credits (2/0/1/2)*
Required and Recommended Prerequisites for Attaching to the Module	*Prerequisites: MAT103 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	*At the end of the course, the student should know:* *- fundamentals of modeling the flow of a single-phase liquid in a porous medium;* *- fundamentals of modeling two-phase flow in a porous medium;* *- fundamentals of modeling three-phase flow in a porous medium;* *- fundamentals of compositional modeling of hydrodynamic processes in oil reservoirs;* *- ways to set initial conditions for modeling;* *- methods of setting boundary conditions for modeling.* *As a result of studying the discipline, the student should be able to:* *- build mathematical and numerical models of fluid flow in a porous medium;* *- create a computer program for calculating filtration flows;* *- launch a single-phase, two-phase, three-phase and composite model of chemical flooding of an oil reservoir for calculation;* *- to analyze the results obtained.* *After completing the course, the student must demonstrate the ability and skills to analyze the results of modeling, as well as high professional qualities in the field of mathematical and numerical modeling of reservoir processes.*
Content	*As part of the course, the student will master the practical use of methods of mathematical and numerical modeling of complex processes in oil and gas reservoirs.*
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. 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.* *3. Aziz, K., Aziz, K. and Settari, A. (1979) Petroleum Reservoir Simulation. Applied Science Publishers, 476 p.* *4. Øystein Pettersen. (2006). Basics of Reservoir Simulation with the Eclipse Reservoir Simulator // Lecture Notes. © Dept. of Mathematics, Univ. of Bergen, 112 p.* *5. Bekbauov, B. E., Kaltayev, A., Berdyshev, A. (2015) A New Mathematical Formulation of the Governing Equations for the Chemical Compositional Simulation // arXiv:1512.08170 [physics.flu-dyn]* *6. Андерсон Д., Таннехилл Дж., Плетчер Р. Вычислительная гидромеханика и теплообмен. В 2-х т.: Пер. с англ. – М.: Мир, 1990. – 384 с.* *7. Lake, Larry W. (1989). Enhanced oil recovery. Englewood Cliffs, N.J.: Prentice Hall.* *Литература доступна в электронных ресурсах библиотеки и на учебном портале преподавателя.*

Module designation	***PET248 Advanced Drilling Fluids***

Semester(s) in which the module is taught	*3 semester*
Person responsible for the module	*Kudaikulova Gulzhan*
Language	*russian*
Attitude towards the curriculum	*Elective* *postrequirements:*
Teaching methods	*lecture, practical work*
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:* *Demonstrate the ability to analyze, synthesize and design the operation of ideal and semi-ideal lifts; the operation of the lift in various modes, as well as calculate costs.*
Module objectives/intended learning outcomes	*A master's student should know:* *- the principle of development to solve the technical problem of eliminating contamination of the bottom-hole zone of the well;* *- how to predict and optimize performance using appropriate tools;* *- uncertainty in the data, discuss possible consequences for the results and consider ways to minimize risks;* *- how to effectively present the results of an engineering study in a written report.* *A master's student should be able to:* *- work effectively, focusing on the assessments of peers and instructors;* *- explain what data and specific methods are needed to solve the main problems of contamination of the bottom-hole zone of the well in terms of drilling, completion and production, prevention and cleaning;* *- describe the various technical, economic, social, political or other constraints that need to be taken into account during the various steps of the decision-making process.* *After completing the course, the master's student must demonstrate the skills of effective teamwork and communication with colleagues, with the head and with representatives of the industry.*
Content	*As part of the course, the master's student will master new drilling mud systems and technologies for their use.* *New knowledge and skills in the field of drilling fluids, as well as methods for studying and monitoring drilling fluid systems will be presented.* *After completing the course, the master's student must demonstrate the ability to analyze, synthesize and design new drilling fluid systems, as well as perform calculations for the preparation of drilling fluids.*
Exam forms	*A written exam*
Requirements for training and exams	*A master's student should not be late and miss classes, be punctual and mandatory. The master's 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. Bulatov A.I., Makarenko P.P., Proselkov Yu.M. Drilling flushing and grouting* *solutions. – M.: Nedra, 1999.* *2. Bulatov A.I., Proselkov Yu.M., Ryabchenko V.I. Technology of well flushing. – M.: Nedra, 1981.* *3. Kudaikulova G.A. Drilling clay solutions. Almaty, KazNTU, 2003.* *4. Kudaikulova G.A. Drilling fluids, Almaty KBTU, 2013* *5. Kudaikulova G.A. Physico-chemical foundations of the development of environmentally friendly drilling* *fluids to improve the efficiency of drilling wells. Almaty, KazNTU, 2010.* *6. Ryazanov Ya.A. Encyclopedia of drilling fluids. – Publishing house "Chronicle", Orenburg, 2005.* *7. Kalinin A.G., Oshkordin O.V., Pitersky V.M., Soloviev N.V. Exploratory drilling. Moscow:* *Nedra, 2000.*