|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Identification** | | | **Course** | **GEOL 310- Petroleum Geology- 3 credits** | | |
| **Department** | Petroleum Engineering | | |
| **Program** | Undergraduate | | |
| **Term** | Fall, 2016 | | |
| **Instructor** | Assoc. Prof. Gasham Zeynalov | | |
| **E-mail:** | [gzeynalov@khazar.org](mailto:gzeynalov@khazar.org) | | |
| **Phone:** | (+994 12) 421-79-16 ext. 243 | | |
| **Class hours** | Monday in appointed time | | |
|  | | | **Office hours** | Friday16.00-17.00 | | |
| **Prerequisites** | | | General Geology | | | |
| **Language** | | | English | | | |
| **Compulsory/Elective** | | | Required | | | |
| **Required textbooks and course materials** | | | 1. Richard C. Selley and Steve Sonnenberg, 2015, Elements of Petroleum Geology, 3rdedition, Academic Press of Elsevier, 507 pages | | | |
| **Course objectives** | | | This course is a major subject of a Petroleum Engineering.  Objectives of the Course:   * to acquaint the student with the key concepts of the origin and generation of hydrocarbons, reservoir rocks and subsurface reservoir structures (traps)which are introduced together with some of the key techniques used within the industry (e.g. reservoir geology, petrophysics and formation evaluation) * to understand concept of the petroleum system, demonstrating how all the elements are necessary for a conventional accumulation of hydrocarbons. * to understand details of reservoir architecture and the factors that influence the performance of reservoirs   **Assignment and two quizzes:**  First quiz will be based on course materials which had been taught by between 1-6 weeks. Second quiz will be based on course materials which had been taught by between 8-14 weeks.  **Practical exercises** will be dedicated to evaluation of SEM images and photomicrographs, unconformities in sedimentary sequence, transgressions and regressions in sedimentary rocks, geological mapping, .petrophysical properties of sedimentary rocks etc. | | | |
| **Learning outcomes** | | | By the end of the course the students should be able to :   * Learn the fundamental principles underlying the main methods of geophysical exploration data and their interpretation as applied to Petroleum Geology * understand importance of Petroleum Geology and nature of hydrocarbon exploration and production, both conventional and unconventional hydrocarbons * learn key concepts of the origin and generation of hydrocarbons, reservoir rocks and subsurface reservoir structures and their trapping mechanisms * demonstrate the ability to integrate knowledge and ideas about petroleum geology topics in a coherent and meaningful manner as evidenced by either responses to projects and exam questions * critically assess petroleum geology concepts associated with various sedimentary basins of various regions of the Earth and competently demonstrate that knowledge in exams | | | |
| **Teaching methods** | | | Lecture | | | x |
| Group discussion | | | x |
| Experimental exercises | | | x |
| Case studies | | | x |
| Simulation | | | x |
| **Grades** | | |  | |  | | |
| Evaluation Methods | | Percentage (%) | | |
| Midterm Exam | | 30 | | |
| Participation | | 5 | | |
| Assignment and quizzes | | 15 | | |
| Practical exercises | | 10 | | |
| Final Exam | | 40 | | |
| Total | | 100 | | |
|
| **Academic integrity** | | | Students are responsible for the honest completion and representation of their projects, for the appropriate citation of sources, and for respect of others academic endeavors. Plagiarism and other forms of academic misconduct are serious offenses with severe penalties. | | | |
| **Tentative Schedule** | | | | | | |
| **Week** | **Date/Day** | **Topics** | | | | **Textbook/Assignments** |
| 1 | 19.09.2016 | Introduction: Historical Review of Petroleum exploration Evaluation of Petroleum Exploration Concepts and Techniques  The context of Petroleum Geology  Relationship of Petroleum Geology to Petroleum Exploration and Production | | | | Chapt. 1 (1) |
| 2 | 26.09.2016 | Physical and Chemical properties of Petroleum:  Natural gases  Hydrocarbon gases  Nonhydrocarbon gases  Gas hydrates  Composition and occurrence | | | | Chapt.2 (1) |
| 3 | 03.10.2016 | Methods of Petroleum Exploration:  Well drilling and completion  Formation Evaluation | | | | chapt.3 |
| 4 | 10.10.2016 | Methods of Petroleum Exploration:  Geophysical methods of exploration  Borehole Geophysics and 4 D seismic | | | | chapt.3 |
| 5 | 17.10.2016 | Subsurface Geology  Subsurface Geological mapping  Remote sensing: Visual remote sensing and Radar , Multispectral scanners | | | | Chapt.3 |
| 6 | 24.10.2016 | Subsurface environment: subsurface waters, temperatures, pressures and fluid dynamics | | | | Chapt.4 |
| 7 | 31.10.2016 | Generation and Migration of Petroleum  Origin of Petroleum: Organic and Inorganic  Organic Processes on the Earth surface  Formation of Kerogen  Petroleum Migration  Quiz 1 | | | | Chapter 5 |
| 8 | 07.11.2016 | Mid-term Exam | | | |  |
| 9 | 14.11.2016 | Petroleum System and Basin modelling  Hydrocarbon generation and migration | | | | Chapter 5 |
| 10 | 21.11.2016 | Reservoir  Porosity, Permeability, Capillary pressure  Relationship between porosity, permeability and texture  Effects of diagenesis on Reservoir quality | | | | Chapt.6 |
| 11 | 28.11.2016 | Reservoir Continuity  Reservoir Characterization  Reserve Calculations  Production Methods | | | | Chapt.6 |
| 12 | 05.12.2016 | Traps and Seals:  Nomenclature of Trap  Distribution of petroleum within trap  Seals and Cap Rocks  Classification of traps | | | | Chapter 7 |
| 13 | 12.12.2016 | Sedimentary basins and Petroleum Systems:  Mechanism of Basin Formation  Classification of Sedimentary basins  Distribution of Hydrocarbons in different types of basin | | | | Chapt.8 |
| 14 | 19.12.2016 | Nonconventional Petroleum Recourses:  Plastic and Solid Hydrocarbons  Tar Sands  Oil shales  Shale Gas and Coal-Bed Methane  Quiz 2 | | | | Chapt.9 |
| 15 | 26.12.2016 | Prospects and Probabilities:  Prospect Appraisal  Geological aspects  Economic Aspects  Reserves and Resources | | | | Chapt.10 |
|  | TBA | **Final Exam** | | | |  |