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| **Identification** | **Subject**  | PETE 551:Design  and Development of Oil and Gas Fields -4 credits |
| **Department** | Petroleum Engineering |
| **Program** | Graduate |
| **Term** | Spring, 2017 |
| **Instructor** | Jabrayil Eyvazov |
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| **Classroom/hours** | 11 Mehseti str.(Neftchilar campus), Monday18:30-21:20 |
|  | **Office hours** |  |
| **Prerequisites** | Consent of instructor |
| **Language**  | English |
| **Compulsory/Elective** | Required |
| **Required textbooks and course materials** | ***Coretextbook:***HavardDevold ,Oil and gas production handbook, 2013Concept Selection for Hydrocarbon Field Development Planning J. Efrain Rodriguez-Sanchez\* , J. Martin Godoy-Alcantar, Israel Ramirez-Antonio, 2012United States Department of the Interior Bureau of Land Management , Oil and Gas Exploration and Development, 2012 |
| **Course outline** | This course is prepared to give deeply knowledge about Design  and Development of Oil and Gas Fields. For the exploitation of a hydrocarbon field the process of identifying the concepts technically feasible and associated to the best economical performance is called field development planning process. Oil and gas exploration and exploitation require a large amount of economical resources mainly in offshore environments thus, field development planning has the main objective of maximizing the revenue for a given investment. |
| **Course objectives**  | *Generic Objective of the Course:***Exploration** involves the search for rock formations associated with oil or natural gas deposits, and involves geophysical prospecting and/or exploratory drilling.**Well development** occurs after exploration has located an economically recoverable field, and involves the construction of one or more wells from the beginning to either abandonment if no hydrocarbons are found, or to well completion if hydrocarbons are found in sufficient quantities**Production** is the process of extracting the hydrocarbons and separating the mixture of liquid hydrocarbons, gas, water, and solids, removing the constituents that are non-saleable, and selling the liquid hydrocarbons and gas. Production sites often handle crude oil from more than one well. Oil is nearly always processed at a refinery; natural gas may be processed to remove impurities either in the field or at a natural gas processing plant.Finally, **site abandonment** involves plugging the well(s) and restoring the site when a recently-drilled well lacks the potential to produce economic quantities of oil or gas, or when a production well is no longer economically viable.***Quizzes*** First quiz will be in 4th week and will be based on course materials, which had been taught by between 1-3 weeks.Second quiz will be in 7th week and will be based on course materials, which had been taught by between 5-7 weeks.***Project objectives***Determine STOIP (Stock Tank Oil in Place) in a given reservoir parametersDetermine Oil Reserves by using probabilistic and deterministic methodsCreate Economic Model for this field (calculate Capex, Opex, Royalty, Tax, NPV, Payback time and etc.)Describe Exploration and Appraisal stages (define acceptable and economical number, type and location for wells)Determine appropriate platform type for this fieldCreate Well Drilling program example for proposed wellGenerate Well Design example for one proposed wellCreate suitable subsurface production systems for one wellChoose EOR method for one well and substantiate it( why you choose this method)Determine favorable upstream process facilitiesCreate surface facilities scheme (separators, terminals, storage facilities, compressors, pipelines andetc.) |
| **Learning outcomes** | **By the end of the course the students should be able to learn :*** Definition of exploration
* Drilling of appraisal wells
* Field evaluation
* Reservoir estimation
* Drilling production wells
* Increase plateau period of field
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| **Teaching methods** | **Lecture**  | x |
| **Group discussion** | x |
| **Experiential exercise** | x |
| **Simulation** | x |
| **Case analysis** | x |
| **Course paper** |  |
| **Others** |  |
| **Evaluation**  | **Methods** | **Date/deadlines** | **Percentage (%)** |
| **Midterm Exam** |  | 30 |
| **Case studies** |  |  |
| **Class Participation** |  | 5 |
| **Assignment and two quizzes** |  | 15 |
| **Project** |  | 10 |
| **Presentation/Group Discussion** |  |  |
| **Final Exam** |  | 40 |
| **Others** |  |  |
| **Total**  |  | 100 |
| **Policy** | * **Preparation for class**

The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major points introduced in the text. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. After the lecture, you should study your notes and work relevant problems .* **Withdrawal (pass/fail)**

This course strictly follows grading policy of the School of Economics and Management. Thus, a student is normally expected to achieve a mark of at least 65% to pass. In case of failure, he/she will be required to repeat the course the following term or year. * **Cheating/plagiarism**

Cheating or other plagiarism during the Quizzes, Mid-term and Final Examinations will lead to paper cancellation. **Professional behavior guidelines**The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited. |
| **Tentative Schedule** |
| **Week** | **Date/Day****(tentative)** | **Topics** | **Textbook/Assignments** |
| 1 | 13.02.17 | Discovery of oil and gas fields* Find oil and gas trapped in reservoir rocks(onshore/offshore)
* Locate hydrocarbon accumulation by seismic
* Build a model of geological layering
* Identify potential reservoirs
* Exploration wells
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| 2 | 20.02.17 | Evaluation of oil and gas fields* Build 3D numerical reservoir simulation model
* Simulate reservoir fluid flow behavior for different field development scenarios
* Define number, type and location for wells
* Define level of field production
* Appraisal wells are drilled to improve the field description through further data acquisition
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| 3 | 27.02.17 | Field Development Plan* The number of wells to be drilled to reach production objectives
* The recovery techniques to be used to extract hydrocarbons
* The type and cost of installation: Platforms, Network, Terminal and etc.
* The separation systems for gas and fluids
* The treatment systems to preserve the environment
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| 4 | 06.03.17 | Oil and gas Production* Period of production increase, “build up
* A stabilization phase, “plateau”period
* Injection phase to assist the hydrocarbon recovery and thus maintain a satisfactory volume of produced resources

The depletion period when hydrocarbon production declines progressively*Quiz 1* |  |
| 5 | 13.03.17 | Oil and gas Production* Period of production increase, “build up
* A stabilization phase, “plateau”period
* Injection phase to assist the hydrocarbon recovery and thus maintain a satisfactory volume of produced resources
* The depletion period when hydrocarbon production declines progressively
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| 6 | 20.03.17 | NOVRUZ HOLIDAY |  |
| 7 | 27.03.17 | Upstream process sections* Wellheads
* Manifolds and gathering
* Separation
* Metering, storage and export
* Utility systems

*Quiz 2* |  |
| 8 | 03.04.17 | Midstream operations* Gas Plants
* Gas compression
* Pipelines
* LNG liquefaction and re-gasification facilities

Manifolds and gathering* Pipelines and risers
* Production, test and injection manifolds

Quiz 1 |  |
| 9 | 10.04.17 | **Midterm Exam** |  |
| 10 | 17.04.17 | Separation* Test separators and well test
* Production separators
* Second stage separator

Third stage separator |  |
| 11 | 24.04.17 | Gas treatment and compression* Heat exchangers
* Scrubbers and re-boilers
* Compressors, anti-surge and performance
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| 12 | 01.05.17 | Oil and gas storage, metering and export* Fiscal metering
* Storage
* Export
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| 13 | 08.05.17 | Gas processing* Acid gas removal
* Dehydration
* Mercury removal
* Nitrogen rejection
* NGL recovery and treatment
* Sales gas specifications
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| 14 | 15.05.17 | Pipelines* Pipeline terminal
* Gas Pipelines, compressor and valve stations
* Liquid pipelines, pump and valve stations

LNG* LNG liquefaction
* Storage, transport and re-gasification
* Quiz 2
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| 15 | 22.05.17 | PROJECT AND CONTRACT MANAGEMENT * Phasing and organization
* Planning and control
* Cost estimation and budgets
* Reasons for contracting
* Types of contract

PETROLEUM ECONOMICS * Basic principles of development economics
* Constructing a Project Cash flow
* Calculating a discounted cash flow
* Profitability indicators
* Project screening and ranking
* Per barrel costs
* Sensitivity analysis
* Exploration economics
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|  |  | Final Exam |  |
|  | TBA |  |  |

This syllabus is a guide for the course and any modifications to it will be announced in advance.