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| **Identification** | **Subject**  | PETE 402– Petroleum Production Engineering  |
| **Department** | Petroleum and Natural Gas Engineering |
| **Program** | Undergraduate |
| **Term** | Spring, 2017 |
| **Instructor** | Shahriyar Alkhasli |
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| **Phone:** | +994552926053 |
| **Classroom/hours** |  Monday 18:40 |
|  | **Office hours** | by appointment |
| **Prerequisites** | PETE302, PETE323 |
| **Language**  | English |
| **Compulsory/Elective** | Required |
| **Required textbooks and course materials** | ***Core textbooks:******Well Performance,*** 2nd Ed., Michael. Golan and Curtis.H. Whitson***Multiphase Flow in Wells***, James P. Brill and Hemanta Mukherjee***Production Technology,*** Heriot Watt university manual***Supplementary material:*** Class Lecture Handouts and Additional Reading Materials |
| **Course outline** | This course provides students with a fundamental background on production system design and optimization, description of mathematical models of reservoir-well system, fluid properties, challenges in production system and state-of-the-art technologies applied in the industry. Advanced topics will be covered for deep analysis and guide student for the future research directions. Project will be assigned in the middle of the semester.  |
| **Course objectives**  | The main objective is to give an introductory level of understanding about production system from subsurface to surface facilities and transportation, description of near wellbore dynamic behavior, fluid properties, nodal analysis and optimization, flow assurance and deterioration of flow rates. Also, solution of partial differential equations will be practiced for solving complicated fluid flow equations. Inform students with up to date technologies in the world. Project assignment will master ability to work in a team under instructor’s supervision on advanced topics and will be based on computation fluid properties, inflow and outflow models analysis using programming languages available and the most suitable for the students.**Homework assignments** will be also provided after each class. **Quizzes** will be provided during the classes and are based on the topic covered previously. Four quizzes will be provided during semester. |
| **Learning outcomes** | **By the end of the course the students should be able:*** Design a production system and apply various optimization techniques
* Analyze well production profile and interference with other wells
* Apply fundamental sciences in oil and gas production related concepts
* Differentiate principles of oil and gas wells’ production
* Tight petroleum related disciplines with well performance
* Model a completion design for various types of reservoir
* Describe the options with constrains and advantages for producing from multiple production zones
* Understand reservoir and well integrity specifics
* Distinguish between different types of Artificial Lift systems and their application
* Describe dependencies between flow rate and tubing diameter size, flow line diameter size, etc. , based on Nodal Analysis
* Compute decline rates for different models and provide a forecasting model for them
* Define flow through restrictions and understand their impact on flow
* Solve complicated equations regarding single and multiphase flow
* Manage field development plan for entire field life cycle
* Research on state-of-the-art technologies and understand their working principles
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| **Teaching methods** | **Lecture**  | X |
| **Group discussion** | X |
| **Experiential exercise** |  |
| **Simulation** |  |
| **Case analysis** | X |
| **Course papers** |  X |
| **Others** |  |
| **Evaluation**  | **Methods** | **Date/deadlines** | **Percentage (%)** |
| **Midterm Exam** |  | 30 |
| **Case studies** |  |  |
| **Class Participation** |  | 5 |
| **Assignment and quizzes** |  | 10 |
| **Project** |  | 20 |
| **Presentation/Group Discussion** |  |  |
| **Final Exam** |  | 35 |
| **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 and cases from the end of the chapter and sample exam questions.* **Withdrawal (pass/fail)**

A student is normally expected to achieve a mark of at least 60% 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. In this case, the student will automatically get zero (0), without any considerations.* **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 Feb | Introduction to Petroleum Engineering. Concepts in Production System. | Lecture Notes; Hydrocarbon Exploration and Production. Well Performance, Ch. 1; Lecture Notes |
| 2 | 20 Feb | Fluid Properties: Black Oil and Compositional Models | Lecture Notes |
| 3 | 27 Feb | Conventional and Advanced Wells Completion | Production Technology, Ch.1, 2. |
| 4 | 6 Mar | Restricted flow into the wellbore and stimulation methods | Well Performance, Ch.3;Lecture Notes |
| 5 | 13 Mar | Flow through restrictions | Multiphase flow in well Ch.5, Lecture Notes |
| 6 | 20 Mar | **NOVRUZ HOLIDAY** |  |
| 7 | 27 Mar | Nodal analysis | Lecture Notes;Production Technology Ch. 3 |
| 8 | 3 Apr | Decline Rate Analysis | Well Performance, Ch.4; Lecture Notes  |
| 9 | 10 Apr | **Mid-Term Exam** |  |
| 10 | 17 Apr | Fundamentals of Artificial Lift | Well Performance Ch.5; Production Technology 4. |
| 11 | 24 Apr | Fundamentals of Gas lift | Lecture notes;Production Technology 5. |
| 12 | 1 May | Sand Control | Production Technology 10. |
| 13 | 8 May | Flow Assurance | Lecture Notes |
| 14 | 15 May | Field Development and Fluid processing | Production Technology. Ch.11 |
| 15 | 22 May | Special Topics: Single phase flow | Multiphase flow in well, Ch. 3. |
| 16 | 29 May | Non-working day | Multiphase flow in well, Ch. 4. |
|  | TBA | **Final Exam** |  |

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