The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

Course Name:

Petroleum Geology

1	Course title	Petroleum Geology
2	Course number	0355492
3	Credit hours (theory, practical)	3 credit hours (only theory, no practical)
	Contact hours (theory, practical)	3 contact hours (only theory, no practical)
4	Prerequisites/corequisites	0305341
5	Program title	
6	Program code	
7	Awarding institution	
8	Faculty	Science
9	Department	Applied and Environmental Geology
10	Level of course	Undergraduate
11	Year of study and semester (s)	Fourth year, 2nd
12	Final Qualification	B.Sc.
13	Other department (s) involved in teaching the course	-
14	Language of Instruction	English
15	Date of production/revision	15/3/2017

16. Course Coordinator: Prof. Dr. Belal S. Amireh

Office numbers, office hours, phone numbers, and email addresses should be listed.
Office hours: 10-11 every day
e-mail: bamireh@ju.edu.jo

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

18. Course Description:

The course introduces the definition and objectives of the petroleum geology sciences, and explains the petroleum physical and chemical properties. The course in addition, explains the petroleum basins and petroleum system elements, and gives an overview of the physical properties of the subsurface environment and fluid dynamics. It discusses the source petroleum rocks, generation, migration, reservoir rock, seals, and the different types of petroleum traps. The course also covers the various techniques used in exploration, petroleum reserves assessments, and petroleum prospects evaluations, and provides an overview of the unconventional petroleum accumulations.

Course Content

1. History of petroleum geology sciences - Physical and chemical petroleum Properties
2. Sedimentary basins and petroleum systems - Basin-forming mechanisms - Evolution of petroleum elements in basins
3. Subsurface Environment - Temperature variation with depth Pressure variation with depth - Porosity variation with depth
4. Fluid Dynamics in the Subsurface - Fundamentals of hydrodynamics - Formation water chemistry
5. Petroleum System Concept - Elements of a petroleum system - Prospects and plays
6. Petroleum Source Rocks - Organic vs. inorganic origin of petroleum - Productivity and preservation of organics - Kerogen chemistry - Maturation of organic matter
First Periodical Exam
7. Petroleum migration - Expulsion and primary migration Secondary migration - Tertiary migration Clastic Reservoirs - Sandstone depositional facies - Geometry and continuity of sandstone reservoirs - Depositional control of reservoir quality - Diagenetic modification of clastic reservoirs

8. Carbonate Reservoirs - Carbonate depositional facies - Geometry and continuity of carbonate reservoirs - Depositional control of reservoir quality - Diagenetic modification of carbonate reservoirs
9. Other Reservoirs- Fractured Basement Rocks- Evaporites-Shales
10. Reservoir Characterization - Reservoir Properties - Petrographic characterization - Petrophysical characterization
Second Periodical Exam
11. Seals - Seal Properties - Top seals - Lateral seals- Structural Traps - Compressional trapping configurations - Extensional trapping configurations - Fault seal considerations Selected exercises
12. Stratigraphic and Diagenetic Traps - Depositional pinch-outs Unconformity traps - Diagenetic traps - Combination traps - Selected exercises
13. Unconventional Petroleum Resources- Unconventional gas Tight gas reservoirs - Shale gas reservoirs - Coal-bed Methane Gas hydrates - Unconventional Oil - Oil shale - Oil sands
Final Exam

1.
2. 19. Course aims and outcomes:
3.

A- Aims:

1. Have a basic understanding of the petroleum system, petroleum as a resource, and the value chain.
2. Have a basic understanding of a broad array of tools used in the search for and production of hydrocarbon reserves.
3. Understand how geologists conduct the search for petroleum resources through the value chain or the life cycle of a petroleum resource. This will include the processes involved and actual examples.
4. Learn details on how to begin evaluating a hydrocarbon play and developing a prospect.
5. Obtain skills in correlating potential reservoir rocks and recognizing normal faults with log data.
6. Learn the principles of mapping a subsurface reservoir and estimating the volumetrics.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

understand the processes leading to petroleum generation and accumulation;
recognize the methods of petroleum exploration and reserves assessments;
characterize the petroleum reservoirs; and
distinguish the unconventional petroleum accumulation patterns.

20. Topic Outline and Schedule:

4.

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
5.	6.	7.	8.	9.	10.
11.	12.	13.	14.	15.	16.
17.	18.	19.	20.	21.	22.
23.	24.	25.	26.	27.	28.
29.	30.	31.	32.	33.	34.
35.	36.	37.	38.	39.	40.
41.	42.	43.	44.	45.	46.

47.

48.

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

23. Course Policies:

A- Attendance policies:

B- Absences from exams and handing in assignments on time:

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior:

E- Grading policy:

F- Available university services that support achievement in the course:

24. Required equipment:

Data show

25. References:

A- Required book (s), assigned reading and audio-visuals:

Selley, R., and Sonnenberg, S., 2014. Elements of Petroleum Geology, Third Edition 3rd Edition

B- Recommended books, materials, and media:

Gluyas, J., and Swarbrick, R. 2004. Petroleum Geoscience, Blackwell Publishing Company, Malden, USA, 389 pp.

26. Additional information:

Bjørlykke, K., 2010. Petroleum Geoscience: From Sedimentary Environments to Rock Physics. Springer Verlag, Berlin, 501 pp.

Name of Course Coordinator: Prof. dr. Belal S. Amireh Signature: ---------- Date: --

---------- Head of curriculum committee/Department: ---------- Signature:

Head of Department: ---------- Signature: ----------

Head of curriculum committee/Faculty: ---------- Signature: ----------

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Dean: ---------- -Signature: ----------

Copy to:

Head of Department

Assistant Dean for Quality Assurance

Course File