



مركز الاعتماد  
وَضمان الجودة  
ACCREDITATION & QUALITY ASSURANCE CENTER



**The University of Jordan**

**Accreditation & Quality Assurance Center**

## **Course Syllabus**

**Course Name:**

**Petroleum Geology**

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|----|--|---|
| 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, 2 <sup>nd</sup>                |
| 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

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| 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<br>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<br>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 |

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| 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  |
| <b>Second Periodical Exam</b>   |
| 11. Seals - Seal Properties - Top seals - Lateral seals- Structural Traps - Compressional trapping configurations - Extensional trapping configurations - Fault seal considerations<br><br>Selected exercises |
| 12. Stratigraphic and Diagenetic Traps - Depositional pinch-outs<br><br>Unconformity traps - Diagenetic traps - Combination traps - Selected exercises  |
| 13. Unconventional Petroleum Resources- Unconventional gas<br><br>Tight gas reservoirs - Shale gas reservoirs - Coal-bed Methane<br><br>Gas hydrates - Unconventional Oil - Oil shale - Oil sands             |
| <b>Final Exam</b>   |

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



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**20. Topic Outline and Schedule:**

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| 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.       |

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**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:

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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