Soran University
Faculty of Science and Engineering
Petroleum Geosciences Department

1. Module Title: Clastic Sedimentology & PetrographyI

2. Module Code: PGE202

3. Module Level: 2nd Stage

4. Module Leader: Mohammad Sadi Nourmohammadi

5. Teaching Semester: first semester

6. Credit Rating for the module

7. Prerequisites and co-requisites:

8. Module Summary

Clastic sedimentology and petrography is the branch of earth sciences. That provide an introduction to Clastic Sedimentology & Petrography encompassing Texture, Sedimentary Processes, Sedimentary Structure, Sedimentary environments (We will cover various sedimentary environments such as fluvial, lacustrine, coastal, shelf, deep sea,…, and various examples from modern and ancient sedimentary environments will be used to highlight issues and applications in sedimentology). As well as principles of facies analysis. We will then cover various types of Clastic Sedimentary Rocks and Petrography of them. Because an understanding of Clastic Sedimentary rocks and Carbonate Sedimentary rocks is essential to many aspects of Petroleum Geosciences.

9. Module Aims

The module will introduce you to basic topics and essential topics in Clastic Sedimentology & Petrography, which provide the foundation and good knowledge for more advanced study of this subject area. The course aims to have students learn how to describe and interpret ancient and modern sedimentary deposits. The course is designed to allow you to develop the following skills: field description and interpretation of sediments and sedimentary rocks, critical reading of literature and oral presentation. The course is field-based. These trips are partially subsidized by the department.

10. Learning Outcomes

On successful completion of this module students will:

- An appreciation of the way in which Clastic Sedimentology & Petrography relates to other aspects of Petroleum Geosciences and the Earth sciences.
- Study types of Clastic sedimentary rocks and Petrography studies of these rocks to determine the framework, matrix and types of cements.
- Appreciation of key aspects of Clastic Sedimentology.
- Understand theoretical concepts in Clastic Sedimentology and relate these to specific problems or questions.
- Work safely in the Field and assess related safety issues.
- Undertake practical experimental work using appropriate equipment and instruments.
- Apply basic knowledge of practical approaches and techniques.
- Manage and manipulate numerical data from laboratory work and work productively with others in group laboratory experiments.

11. Syllabus

University Academic Week	Lecture Title & Content	Assessments
1	**Introduction to Sedimentology**: Why study sedimentology? Definition of sedimentology, Significance of sedimentology	
1	**Sedimentary Texture**: Introduction, **Grain Size,** Ways of determining Grain Size, Direct measurement Sieving**,** Settling velocity**,** Stoke's Law**,** Displaying grain size data**,** Describing grain size distributions, Median**,** Mean**,** Sorting**,** Skewness**,** Kurtosis, **Grain Shape**, **Roundness**, Wadell**,** Dobkins and Folk**,** Power's visual comparison chart, **Sphericity,** Wadell**,** Sneed and Folk**,** Riley, **Form, Surface texture, Fabric,** Packing**,** Orientation**, Maturity,** Textural maturity**,** Mineralogical maturity**,** Textural inversions	
2	**Sedimentary Processes:** Processes responsible for *grains formation* in the source region, processes by which the *grains are transported* from the source region to deposition site , Processes responsible for *detritus grains deposition and precipitation* of chemical and biochemical grains in depositional environments, Processes responsible for *chemical, biological and physical changes* in sediments after	

	deposition (in T and P lower than metamorphism).	
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3	**Sedimentary Structure:** Introduction, *Primary sedimentary structure*, physical primary sedimentary structure, Inter layer structure, Up layer structures, *Sole mark.* Deformed structures, *Biogenic primary sedimentary structure*, *Secondary sedimentary structure*, Methods for studying sedimentary structures, Paleocurrent analysis	
4	**Assessment I**	
5	**Sedimentary Structure:** Introduction, *Primary sedimentary structure*, physical primary sedimentary structure, Inter layer structure, Up layer structures, *Sole mark.* Deformed structures, *Biogenic primary sedimentary structure*, *Secondry sedimentary structure*, Methods for studying sedimentary structures, Paleocurrent analysis	
6	**Sedimentary environments: Continental:** Glacial, Alluvial fan, Fluvial Environments, Desert Environments, Lake Environments, **Transitional:** Deltaic Environments, Tidal Environments, Barrier Island Environments, **Marine:** Reef, Shallow marine, Deep marine, .	
7	**Sedimentary environments: Continental:** Glacial, Alluvial fan, Fluvial Environments, Desert Environments, Lake Environments, **Transitional:** Deltaic Environments, Tidal Environments, Barrier Island Environments, **Marine:** Reef, Shallow marine, Deep marine,	
8	**Assessment II**	
9	**Siliciclastic sedimentary rocks**: Conglomerates & types of conglomerates.	

10	**Siliciclastic sedimentary rocks**: Sandstones, nominate the Sandstones based on folk and pettijohn classifications.	
11	**Assessment III**	
12	**Siliciclastic sedimentary rocks**: Sandstones, nominate the Sandstones based on folk and pettijohn classifications.	
13	**Siliciclastic sedimentary rocks**: Mudstones and shales,	
14	**Siliciclastic sedimentary rocks**: Study Diagenetic processes & Provenance of siliciclastic sedimentary rocks,	
15	**Assessment IV**	
16	**Revision Week**	

Practicals associated with this unit:

University Academic Week	Experiment
1	Introduction to Laboratory activity **Sedimentary Texture, Determining Grain Shape, Roundness (Wadell, Dobkins and Folk, Power's visual comparison chart), Sphericity(Wadell, Sneed and Folk, Riley), Form (Zingg diagram)**
2	**Sedimentary Texture, Determining Grain Size: Ways of determining Grain Size, Direct measurement, Sieving, Displaying grain size data, Describing grain size distributions, Median, Mean, Sorting, Skewness, Kurtosis.**
3	**Sedimentary Texture, Determining Grain Size: Settling velocity, Stoke's Law**
4	**Classification of Unconsolidated Sediments based on folk triangles.**
5	**Paleocurrent analysis: Rose diagram**
6	**Paleocurrent analysis: Victor mean**

7	**Assessment I**
8	**Study conglomerate and breccia and determining types of Congolomerates**
9	**Study and determining types of Quartz, feldspar, rock fragments and matrix then nominate the rock based on folk and pettijohn classifications.**
10	**Assessment II**
11	**Study and determining types of Quartz, feldspar, rock fragments and matrix then nominate the rock based on folk and pettijohn classifications.**
12	**Study and determining types of Quartz, feldspar, rock fragments and matrix then nominate the rock based on folk and pettijohn classifications.**
13	**Study and determining types of Quartz, feldspar, rock fragments and matrix then nominate the rock based on folk and pettijohn classifications.**
14	**Study and determining types of Quartz, feldspar, rock fragments and matrix then nominate the rock based on folk and pettijohn classifications.**
15	**Study and determining types of Quartz, feldspar, rock fragments and matrix then nominate the rock based on folk and pettijohn classifications.**
16	**Assessment III**

12. Assessment Strategy

The sessions involves in-class formative feedback. To plan and design courses, and to find out how well the students understand the material being covered, the formative assessments are used as a good tool. These include short oral presentations of what you had been taught, giving multiple choice questions and short quizzes.

This module has both theoretical and practical examination which form the summative assessments. Part of the summative assessments (continuous exams) are during the semester and another part is at the end of the semester.

13. Summary description of assessment items

Assessment Type	Description of Item	% Weighting	Grading	Tariff	Week due
EXM	**Theory** (65% of total course marks) • The average of 2 written examinations will stand for 25% of the total course marks. • A Final examination will stand for the remaining 40% of total course marks.	25 40		2 hours	Once in every four to five weeks

EXM	**<u>Practical</u>** (35% of total course marks) • The average of 2 written examinations will stand for 10% of the total course marks. • A final examination will stand for 20% of the total course marks.	10 20		2 hours	
CWK	The average grade of several practical reports will account for 5% of the total course marks.	5			

14. Learning Session Structure

This course is 2 hours theoretical lecture and 3 hours practical in a week. The theoretical session is divided into two parts: one part is assigned to introduce the students with the concepts, and topics related to sedimentology. The other part is related to petrography of sedimentary rocks. During the practical session we will do several experiments and also several questions related to these experiment will be given to the students, and they must be try to solve them on themselves, with the assistance from the instructor.

15. Learning and Teaching Methods

The following teaching & learning strategies are used within this module:

- 1 x 2 h lectures and 1 x 3 h laboratory sessions per week.

16. Bibliography

[List of books or articles to be used in the module]

Boggs S. Jr, 2006; Principles of Sedimentology and Stratigraphy.4th Edition.
Boggs S. Jr, 2009; Petrology of Sedimentary Rocks: 2nd Edition. Cambridge University Press, New York.
Folk, R, L., 1974, Petrology of sedimentary rocks: Hemphill publishing co., Austian, Texas, 182p.
Selley R.C 1998; Applied Sedimentology.

17. Authored by

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18. Validated and Verified by

[Another member of staff who has checked the module specification to ensure that it meets the requirements of the course of which it a part and has checked the specification for any errors. This will include the date it was approved.]