



Course Specification

Diploma

Course Title: **Stratigraphy**

Course Code: **APMQ2209**

Program: **Mining and Quarrying**

Department: **Diploma Department**

College: **The Applied College**

Institution: **Umm Al-Qura University**

Version: **1**

Last Revision Date: **20 February 2025**



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A. General information about the course:

1. Course Identification

1. Credit hours: (2)

2. Course type

A. ☐ University ☐ College ☒ Department ☐ Track ☐ Others
B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: (2)
(2nd. Level)

4. Course General Description:

Course Description

Overview of the principles and fundamentals of stratigraphic: Introduction; Bedding, stratification and layering of rocks; Sea level changes and the sedimentation style; Cyclic successions; Stratigraphic contacts; The use of unconformities in dating geologic events; Relative geologic time; Definition of some stratigraphic terms; Major types of stratigraphic units: lithostratigraphic units, allosratigraphic units, bios-tratigraphic units, pedo-stratigraphic units, chronostratigraphic units, and geochronologic units; Magneto-stratigraphy, Seismic stratigraphy, Correlation in stratigraphy; lithocorrelation, bio correlation, chrono correlation, Geologic Time Scal. Mass extinctions and the main causes. Precambrian geography and fossil evidence of early life; The geologic systems; nomenclature, facies, life, subdivisions, and paleogeography.

Stratigraphy is a branch of Geology and the earth sciences that deals with the arrangement and succession of strata, or layers, as well as the origin, composition and distribution of these geological strata.

5. Pre-requirements for this course (if any):

APMQ1203

7. Course Main Objective(s):

1. Introduction to Stratigraphy Sequence:

Introduction to Stratigraphy Sequence: introduction, historical development of stratigraphy, basic principles of stratigraphy, fossil succession, lateral continuity, cross-cutting relationships, inclusions, unconformities, order of superposition, original horizontality, uniformitarianism and catastrophism, relationship of stratigraphical patterns to changes in subsidence rates caused by earth scale tectonic movements and regional processes, oarasequences as a correlation device, parasequences and stacking patterns, sequence stratigraphy in mixed carbonate and clastic province.

2. Sequence Stratigraphical Surfaces:

Types of stratal terminations, stratigraphical contacts, sequence stratigraphical surfaces, maximum regressive surface, maximum flooding surface, regressive surface of marine erosion, basal surface of forced regression, correlative conformity, transgressive surface of erosion, difference between sequence stratigraphical surfaces and other stratigraphical contacts, mechanisms for identification of sequence stratigraphical surfaces on well-log section.

3. Sequence Definitions from Seismic and Wells:

The purpose and use of well log data, identification of stratal surfaces on seismic, definition of system and surface tracts, seismic facies analysis, geological correlations, the purpose and use of well log data, analysis of seismic attributes, recognition of system tracts on seismic, analysis of seismic attributes, seismic geometrics, circle hierarchy, unconformities, eustasy

4. Techniques for the Collection of Stratigraphical Data:

equipment needed, choosing a traverse, measuring thickness, recording lithological characters, stratigraphic correlation, stratigraphic column, recording and collecting fossil data, preparing a stratigraphic column.

5. Introduction to Chronostratigraphy:

Outline and overview, condensation surfaces, erosion and non-deposition surfaces, chronostratigraphy and seismic models, coastal onlap and eustatic, highstand System Tract (HST) alluvial, shelf sands, deltaic, and shoreline complexes, worldwide circle chart and application, exploration and production scaled strategies and case histories, transgressive Systems Tract (TST) incised valley fill, reservoir seal, and source rock.

6. Integrated Stratigraphical Techniques:

Stratigraphic terminology, procedure, and classification, lithostratigraphy, biostratigraphy, geomagnetic polarity time scale, radiogenic isotope geochronology, cyclostratigraphy, chemostratigraphy (strontium isotope stratigraphy, oxygen, and carbon), other methods, determining chronostratigraphic correlations.

7. Seismic Stratigraphy and Controls on Basin Stratigraphy:

Types of seismic reflector terminations, principles and geometry of depositional systems, orders of cyclicity, controls on basin stratigraphy, types of sedimentary basins, changes in accommodation space.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> Traditional classroom E-learning 		
4	Distance learning		



3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

1.0	Knowledge and understanding			
1.1	An understanding of the various types of sedimentary basins and their different depositional patterns and recognising the main sequences of seismic.	K1	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
1.2	Integration of different stratigraphic information, radiometric dating, bio-stratigraphical, and chemo-stratigraphical.	K2	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
1.3	An understanding of the vital role of chronostratigraphy in proving spatial and temporal displays of depositional packages.	K4	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
1.4	Recognising the various terms and definitions utilised in seismic and sequence stratigraphy.	K5	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
1.5	Learning how to integrate geological data and identify various sequences and parasequences on well logs.	K6	Lectures and Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes.
2.0	Skills			
2.1	Analyze the geological record of Earth history using stratigraphic techniques.	S1	Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes
2.2	Interpret the effects of sea-level changes, tectonics, and climate on sediment accumulation.	S2	Interactive Discussions	Written Exams (Mid-Term and Final Exams), Quizzes



3.2	Apply seismic and sequence stratigraphy to reconstruct Earth history.	S3	Interactive Discussions	Written Exams (Mid-Term and Final Exams),
3.0	Values, autonomy, and responsibility			
3.1	Apply Knowledge to Mining and Resource Assessment. Identify the controls on basin stratigraphy. Understand how to use seismic and sequence stratigraphy in mining activities and resource estimation. and as an aid for play and prospect risking.	V1	Individual and Group Presentations	Presentations

C. Course Content

No	List of Topics	Contact Hours
1.	Types of Stratigraphic Units (Formations, Members, Beds).	2
2.	Stratigraphic Nomenclature and Terminology.	2
3.	Sedimentology and Depositional Environments and Facies.	2
4.	Paleontology and Fossils and their use in Stratigraphy (Biostratigraphy and Correlation).	2
5.	Fossil identification and Correlation.	2
6.	Petrology: Diagenesis and the formation of sedimentary rocks.	2
7.	Petrographic Analysis and Identification of Sedimentary Rocks.	2
8.	Sea-Level Changes: Causes and Effects of Sea-level Changes.	2
9.	Sequence Stratigraphy and Sea-level Cycles.	2
10.	Tectonics: Plate Tectonics and its Effects on Sedimentation	2
11.	Tectonic Controls on Sedimentation.	2
12.	Climate Change and its Effects on Sedimentation - Climate-controlled Depositional Systems.	2
13.	Seismic Stratigraphy.	2
14.	Seismic Reflection Profiles and their Interpretation.	2
15.	Sequence Stratigraphic Analysis of Well Logs	2
Total		30



D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	5	10
2.	Mid-Term Exam	8	20
3.	Presentations	12	10
4.	Homework	All weeks	10
5.	Final Exam	16	50

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Boggs, S. Jr. 2001. Principles of Sedimentology and Stratigraphy. 4th Edition. Prentice Hall. New Jersey. 726pp. ISBN. 0-13-099696-3
Supportive References	<ul style="list-style-type: none"> • Holland, Steven (2018). An Online Guide to Sequence Stratigraphy. https://strata.uga.edu/sequence/index.html. • Van Wagoner, J. C., 1995, Overview of sequence stratigraphic foreland basin deposits: terminology, summary of papers, and glossary of sequence stratigraphy, in J. C. Van Wagoner, and G. T. Bertram, eds., Sequence Stratigraphy of Foreland Basin Deposits: Outcrop and Subsurface Examples from the Cretaceous of North America: AAPG Memoir 64
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	



F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Faculty	Direct (project, HW, Quiz, midterm and final exam)
Effectiveness of Students assessment	Students	Indirect (Student Survey)
Quality of learning resources	Program Coordinator	Direct analysis
The extent to which CLOs have been achieved	Program Coordinator	Direct analysis
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Umm Al-Qura University Council
REFERENCE NO.	851110214476/195605
DATE	18/2/1447

