Benha University
Faculty of Science
Department of Geology

Course Specification
100 Geo: Physical and Hıstorıcal Geology

A- Affiliation

Relevant program: **B.Sc. in Geology**

Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **First level**

B - Basic information

Title: Physical and Hıstorıcal Geology **Code:100 Geo** **Year/Level:** First level

Teaching Hours: **Lectures:**2 **Tutorial:** 0
Practical: 3 **Total:**5 h/week

C - Professional information

1 – Course Learning Objectives:

This course aims to enable the students to understand the fundamentals of Physical and Historical Geology and investigate devices and tools used in physical Geology. The student by the end of the course should be able to analyze and evaluate facts and problems in Geology, Earth evolution, and earth materials.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

a.1. recognize the fundamentals of geological process,
a.2. identify the physical geology problem and ways to solve it,
a.3. characterize each type of internal and external process,
a.4. demonstrate the basics of the earth's crust components, geological work for water, and earthquakes and volcanoes.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. interpret the different reasons behind facts in Physical Geology,
b2. decide which physical feature is responsible for the different geological structures,
b3. analyze the various types of data related to surface and underground water,
b4. investigate the distribution of earthquakes, volcanoes, and mineral resources about plate motion.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. analyze physical phenomena and Earth processes,

c2. use the fundamentals and principles to better be understanding the features of surface water, groundwater, oceans, and seas, as well as building mountains,

c3. draw interpretations of Earth's structure, components, and processes.

d - General skills:

On successful completion of the course, the student should be able to:

d1. review available literature and new state-of-the-art techniques,

d2. self-evaluate and report preparation,

d3. apply knoweldge and training in physical Geology problems.

d3. work in a group and manage time and effort.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction	2	0	3
2. Evolution of Earth and Earth structure	2	0	3
3. Internal processes and External processes	2	0	3
4. Earth materials	2	0	3
5. Rock cycle and geotectonics	2	0	3
6. Earthquakes	2	0	3
7. Volcanoes	2	0	3
8. Weathering processes	2	0	3
9. Surface and ground water	2	0	3
10. The fundamental principles of historical geology	2	0	3
11. Formation of the solar system	2	0	3
12. Geologic column and geologic time scale	2	0	3
13. Precambrian and Paleozoıc Era	2	0	3
14. Mesozoıc and Cenozoıc eras	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & understanding	a1	recognize the fundamentals of geological process,	x	x	x	0	0	x
	a2	identify the physical Geology problem and ways to solve,	x	x	0	x	0	0
	a3	characterize each type of the internal and external processes,	x	0	x	0	x	x
	a4	demonstrate the basics of the earth's crust	x	x	0	0	x	x

		components, geological work for water, and earthquakes and volcanoes.						
Intellectual Skills	b1	interpret the different reasons behind facts in physical processes on Earth,	x	x	0	0	x	0
	b2	decide which physical feature is responsible for the different geological structures,	x	0	0	x	x	x
	b3	analyze the various types of data related to surface and underground water,	x	x	0	x	x	0
	b4	investigate the distribution of earthquakes, volcanoes, and mineral resources in relation to plate motion.	x	0	x	0	0	x
Practical and professional skills	c1	analyze physical phenomena and Earth processes,	x	0	x	0	X	x
	c2	use the fundamentals and principals for better understand the features of surface water, underground water, and oceans and seas, as well as building mountains,	x	0	x	0	X	x
	c3	draw interpretations of Earth's structure, components, and processes.	x	0	0	0	x	x
General Skills	d1	review available literature and new state-of-the-art techniques,	x	x	x	0	0	x
	d2	self-evaluate and report preparation,	x	x	x	0	0	x
	d3	apply knowledge and training in physical Geology problems,	x	x	x	o	x	x
	d4	work in a group and manage time and effort.	x	x	o	o	o	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities, and quizzes to assess the student's progress and personal attitude,
5.2. Assignments to assess the student's independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exams to evaluate students and promote other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

-Course Matrix

contents	Knowledge and understanding				Intellectual skills				Practical and professional skills				General skills			
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4

Introduction and History of the Science	x						x						x			
Earth structure		x				x					x					x
Earth Evolution				x												
Earth materials			x													
Rock cycle and geotectonics				x										X		
Geological structures						x				x						
Internal processes		x						x						X		
Earthquakes			x										x			
Volcanoes		x							x						x	
External processes	x						x					x		X		
Weathering processes			x			x							x			
Surface water and ground water		x								x					x	
Oceans and Seas		x														x
Perspectives in Geology and related sciences			x											X		

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s) and approved by the department council, PowerPoint presentations uploaded to the university website.

6-2 Required books.

None

6-3 Recommended books

Earth: An Introduction to Physical Geology, Books a la Carte
by E. J. Tarbuck , F. K. Lutgens, , D. G. Tasa
Edition (11th Edition), (2013)

1.Text book: Historical Geology
Author: Mintz, M. W. 1981
2. Text book: Historical Geology
Author: Poort, M. J., 1992.
3.Text book: The key to Earth history
Author: Doyle, P., Matthew, R. B. &Alistair, N. B., 1995.

6-4 Periodicals, Web sites, etc.

7- Facilities required for teaching and learning:

Data show
Sound system to ensure the ease listening
Using a blackboard
Group discussions

Course coordinators: Prof. Emad Sallam
Prof. Hassan El-Shiekh

Head of the Department: Prof. Gamal El Qot

Date: 2023

Course Specification

Geo 105: Crystals, minerals and rocks

A. Affiliation

Relevant program: **B.Sc. in Geology**

Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **First level**

B . Basic information

Title: General Geology **Code:Geo 105** **Year/level:** First level
Teaching Hours: **Lectures:** 3 **Tutorial:** 0
Practical: 2 **Total:** 5 h/week

C . Professional information

1. Course Learning Objectives:

The objective of this course is to enable the students to understand the fundamentals and methods of identification of crystals, minerals and rocks in different fields and to investigate techniques used in these sciences. The student by the end of the course should be able to analyze and evaluate facts and problems in minerals, crystals and Earth origin of minerals and rocks.

2. Intended Learning Outcomes (ILOS)

a. Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1. recognize the fundamentals of Crystallography and crystal system,
a2. state the cases of solid material, crystal forms and systems,
a3. characterize each of the physical proporeties of minerals,
a4. identify the basics of mineral classification and rock types.

b. Intellectual skills:

On successful completion of the course, the student should be able to.

b1. interpret the origin of rocks and rock cycle,
b2. explain the methods of rock and material age determination,
b3. describe the different crystal systems and forms,
b4. examin the various types of data related to minerals and their characterstics and formation,
b5. explore the different mineral categories and their origin.

c. Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. study the different theories in the genesi of minerals and rocks,
c2. identify the diffent types of minerals, crystals and rocks,

c3. apply the pricicpals for classification of crystals and minerals,

c4. depict interpretations of physical and chemical properties for mineral identification.

d. General skills:

On successful completion of the course, the student should be able to:

d1. review available literature on fundamental Geology and related branches,

d2. combine diffenent data for problem solving,

d3. use knoweldge and training for identification of earth materials,

d4. work in a group and collaborate with peers.

3. Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction to Earth materials	3		2
2. Origin of the Earth and rock life cycle	3		2
3. Cases of solid material	3		2
4. Crystal systems	3		2
5. Crystal symmetry and forms	3		2
6. Example crystals and their study	3		2
7. Minerals: definition and classification	3		2
8. Physical propertires of minerals	3		2
9. Optical and cohesion properties for identification	3		2
10. Minerals of igneous origin	3		2
11. Minerals of sedimentary and metamorphic origin	3		2
12. Igneous and metamorphic rocks	3		2
13. Sedimentary rocks	3		2
14. Summary and Review	3		2
Total hours	**52**		**28**

4. Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1.	recognize the fundamentals of Crystallography and crystal system,	✓	✓	✓			✓
	a2.	state the cases of solid material, crystal forms and systems,	✓	✓		✓		
	a3.	characterize each of the physical	✓		✓		✓	✓

		proporeties of minerals,						
	a4.	identify the basics of mineral classification and rock types.	✓	✓			✓	✓
Intellectual Skills	b1.	interpret the origin of rocks and rock cycle,	✓	✓			✓	
	b2.	explain the methods of rock and material age determination,	✓			✓	✓	✓
	b3.	describe the different crystal systems and forms,	✓	✓		✓	✓	
	b4.	examin the various types of data related to minerals and their characterstics and formation,	✓	✓	✓			✓
	b5.	explore the different mineral categories and their origin.	✓		✓			✓
Practical and professional skills	c1.	study the different theories in the genesi of minerals and rocks,	✓		✓		✓	✓
	c2.	identify the diffent types of minerals, crystals and rocks,	✓		✓		✓	✓
	c3.	apply the pricicpals for classification of crystals and minerals,	✓	✓	✓			✓
	C4.	depict interpretations of physical and chemical properties for mineral identification.	✓				✓	✓
General Skills	d1.	d1. review available literature on fundamental Geology and related branches,	✓	✓	✓			✓
	d2.	combine diffenent data for problem solving,	✓	✓	✓			✓
	d3.	use knoweldge and training for identification of earth materials,	✓	✓	✓		✓	✓
	d4.	work in a group and collaborate with peers.	✓	✓				✓

5. Students' Assessment Methods and Grading:

51. Discussion, class activites and quizzes to assess the student progress and personal attitude,
52. Assignments to assess the student independen work,
53. Written mid-term exam to ensure the student progress and discover the shortage,
54. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading

Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

-Course matrix

contents	Knowledge and understanding				Intellectual skills				Practical and professional skolls				General skills			
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction to Earth materials	x						x						x			
Origin of the Earth and rock life cycle		x				x					x					x
Cases of solid material				x												
Crystal systems			x													
Crystal symmetry and forms				x										x		
Example crystals and their study						x				x						
Minerals: definition and classification		x						x						x		
Physical propertires of minerals			x										x			
Optical and cohesion properties for identification		x							x						x	
Minerals of igneous origin	x						x					x		x		
Minerals of sedimentary and metamorphic origin			x			x							x			
Igneous and metamorphic rocks		x								x					x	
Sedimentary rocks		x														x
Summary and Review			x											x		

6.List of references:

6.1. Course notes

Lecture notes prepared by the course instructor(s) and approved by the department council,

Power point presentations uplaoded to the university website.

6.2 . Required books

None

6.3. Recommended books

The Essential Guide to Crystals, Minerals and Stones

By Margaret Ann Lembo

Llewellyn Publications (April 8, 2013)

Historical Geology

by Reed Wicander &James S. Monroe

Cengage Learning; 7 edition (2012)

6.4. Periodicals, Web sites, etc.

7. Facilities required for teaching and learning:

Data show

Sound system to ensure the ease listening

Using a blackboard

Group discussions

Course coordinators:	Prof. Abdel Azeem Mehanna
	Associate Prof. Adel Mady Afify
Head of the Department:	Prof. Gamal El Qot
Date:	

Benha University
Faculty of Science
Department of Geology

Course Specification
205 Geo: Planar Survey

A- Affiliation

Relevant program: **B.Sc. inGeophysics**
Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Second level**

B - Basic information

Title:Planar Survey **Code:205 Geo** **Year/level:**second level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical:3 **Total:**4 h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to introduce students to fundamentals and methods of survey and applications in different fields. The students are expected to investigate devices and tools used in survey methods, and work on projects in the survey field.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1.recoginze the role of survey in geological and engineering applications,
a2. Identify the survey problem and ways to solve,
a3. Characterize each type of the tools and methods used in geological and civil survey applications,

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. organize the project and set up a survey plan,
b2. decide which survey method and tools are to be used,
b3. analyze the various projection results for a body,
b4. investigate the distribution of points, elevations, altitude and positioning problems,

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1.analyze survey measurements and plan a project,
c2.use the survey tools in mapping buildings and mountains,

c3.draw interpretations of survey measurements and projections.

d - General skills:

On successful completion of the course, the student should be able to:

d1. review available literature and study the area,
d2. interpret measurements using software to write a report,
d3. apply knoweldge and training in survey problems.
d3. workin a group andmanagetimeand effort.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction and definitions	1	0	3
2. Survey tools	2	0	6
3. Survey methods and techniques	2	0	6
4. Types of devitions	2	0	6
5. Cartography and survey	2	0	6
6. Construction and mining survey	2	0	6
7. Applications of planar Survey in Geology and Engineering	2	0	6
8. Revision and feedback	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	recoginze the role of survey in geological and engineering applications,	√					
	a2	identify the survey problem and ways to solve,		√	√			
	a3	characterize each type of the tools and methods used in geological and civil survey applications,	√	√	√			
Intellectual Skills	b1	organize the project and set up a survey plan,			√	√		
	b2	decide which survey method and tools are to be used,	√					
	b3	analyze the various projection results for a				√	√	√

		body,						
	b4	investigate the distribution of points, elevations, altitude and positioning problems	√	√	√	√		
Practical and professional skills	c1	analyze survey measurements and plan a project,		√				
	c2	use the survey tools in mapping buildings and mountains,	√	√	√			
	c3	draw interpretations of survey measurements and projections.				√	√	
General Skills	d1	review available literature and study the area,	√				√	√
	d2	interpret measurements using software to write a report,				√		
	d3	apply knoweldge and training in survey problems.	√			√		
	d4	work in a group and manage time and effort.				√	√	

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes
Lecture notes prepared by the course instructor(s)
Power point presentations

6-2 Required books
None
6-3 Recommended books

Land Surveyor Reference Manual, 4th edition by Andrew. L. Harbin

6-4 Periodicals, Web sites, etc.

7- Facilities required for teaching and learning:

Data show
Sound system to ensure the ease listening
Using a blackboard
Group discussions

Course coordinator: Prof. Dr. Refaat Osman

Head of the Department: Prof. Dr. Gamal El Qot

Date: 2023

Course Specification
Zoo 205: introduction to Invertebrates

A- Affiliation

Relevant program: Geology B.Sc. Program
Department offering the program: Geology Department
Department offering the course: Zoology Department
Academic year/level: Second level

Date of program specifications reapprove: 14/6/2023

External evaluator: Dr. Samia Haroun
Internal evaluator: Prof. Mohamed N Seddek

B -Basic information

Title: introduction to Invertebrates	**Code:**205 Z	**Year/level:** Second level /First semester
Teaching Hours:	**Lectures:**1	**Tutorial:** 0
	Practical:2	**Total:**2

C -Professional information

1 – Course Learning Objectives:

The objective of this course is to enable the students to know a background on morphology, anatomy, development, life cycle and habitat of common invertebrates; Annelida, Arthropoda, Mollusca and Echinodermata.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

a1- Identify the taxonomy of Annelida, Arthropoda, Mollusca and Echinodermata..
a2- Describe the anatomy of the different species in Annelida, Arthropoda, Mollusca and Echinodermata.
a3- Define the morphology of species in Annelida, Arthropoda, Mollusca and Echinodermata.
a4-Acquire knowledge and understanding of the structure and function of various species cells and organelles in Annelida, Arthropoda, Mollusca and Echinodermata.
a5- Appreciate the concepts of bio-diversity.

b - Intellectual skills:

On successful completion of the course, the student should be able to.
b1-Link between animals in each class, order and family.
b2-Compare general characters of Annelida, Arthropoda, Mollusca and Echinodermata.
b3- Interpret life cycle of the parasitic animals.
b4- Combine the structure and function of various types of invertebrate cells and organelles.

c-Practical and professional skills:

On successful completion of the course, the student should be able to:
c1- Identity taxonomy of animal species in Annelida, Arthropoda, Mollusca and Echinodermata.
c2- Draw Annelida, Arthropoda, Mollusca and Echinodermata morphology and body systems.
c3-Dissect different species in Annelida, Arthropoda, Mollusca and Echinodermata.
c4-Describe morphology and life cycle of different animal species in Annelida, Arthropoda, Mollusca and Echinodermata.

d - General skills:
On successful completion of the course, the student should be able to:
d1- Collaborate effectively with teamwork members.
d2- Effectively manages tasks, time, and resources.
d3- Search for information and engage in life-long self learning discipline.
d4- Exhibit the sense of beauty and neatness.

3 - Contents

Topic	**Lecture hours**	**Tutorial hours**	**Practical hours**
1. Annelida. • General characters.	2	0	3
• *Allolopophora*.	2	0	3
• *Neries*&*Hirudo.*	2	0	3
2. Arthropoda. • General characters.	2	0	3
• *Penaeusjaponicus*.	2	0	3
• *Scolopendra*.	2	0	3
• *Buthus*	2	0	3
3. Mollusca. • General characters.	2	0	3
• *Acanthochiton*&*Anodonta*.	2	0	3
• *Eremina*& *Sepia*.	2	0	3
4. Echinodermata. • General characters.	2	0	3

• *Astropecten*.	2	0	3
• *Holothuria&Tripneustes*	2	0	3
5. Seminar.	2	0	0
Total hours	**28**	0	**39**

4 - Teaching and Learning methods:

Intended Learning Outcomes			**Lecture**	**Presentations & Movies**	**Discussions & Seminars**	**Practical**	**Problem solving**	**Brain storming**
Knowledge & Understanding	a1	Identify the taxonomy of Annelida, Arthropoda, Mollusca and Echinodermata..	x	x	x		x	
	a2	Describe the anatomy of the different species in Annelida, Arthropoda, Mollusca and Echinodermata.	x	x	x		x	
	a3	Define the morphology of species in Annelida, Arthropoda, Mollusca and Echinodermata.	x	x	x			
	a4	Acquire knowledge and understanding of the structure and function of various species cells and organelles in Annelida, Arthropoda, Mollusca and Echinodermata.	x	x	x			x
	a5	Appreciate the concepts of bio-diversity.	x	x	x		x	
Intellectual Skills	b1	Link between animals in each class, order and family.	x	**x**	**x**	**x**	**x**	**x**
	b2	Compare general characters of Annelida, Arthropoda, Mollusca and	x	**x**	**x**	**x**	**x**	**x**

		Echinodermata.						
	b3	Interpret life cycle of the parasitic animals.	**x**		**x**	**x**		
	b4	Combine the structure and function of various types of invertebrate cells and organelle.	x	**x**	**x**	**x**	**x**	
Practical and professional skills	c1	Identity animal species in Annelida, Arthropoda, Mollusca and Echinodermata.				x		
	c2	Draw Annelida, Arthropoda, Mollusca and Echinodermata morphology and body systems.				x		
	c3	Dissect different species in Annelida, Arthropoda, Mollusca and Echinodermata.				x		
	c4	Describe morphology and life cycle of different animal species in Annelida, Arthropoda, Mollusca and Echinodermata.	x	x	x	x		
General Skills	d1	Collaborate effectively with teamwork members.	x	x	x	x	x	
	d2	Effectively manages tasks, time, and resources.	x	x	x	x	x	
	d3	Search for information and engage in life-long self learning discipline.	x	x	x	x	x	x
	d4	Exhibit the sense of beauty and neatness	x	x	**x**	x		

5- Students' Assessment Methods and Grading:

Tools:	To Measure	**Time schedule**	**Grading**
Mid-Term Exam	a1 to a5 and b1 tob4	sixth week	12
Term papers, quizzes and seminars	a1 to a5, b1 to b4, and d1 to d4	Bi-weekly	16
Practical exams	a2, c1 toc4 and d4	Fourteenth week	24
Written exam	a1 to a4, b1 to b4 and d4	Sixteenth week	48
Total			100

6- Course matrix

Topic	Knowledge & Understanding	Intellectual Skills	Practical and professional skills
6. Annelida. • General characters.	x	x	x
• *Allolopophora*.			x
• *Neries&Hirudo.*			x
7. Arthropoda. • General characters.	x	x	x
• *Penaeusjaponicus*.			x
• *Scolopendra*.			x
• *Buthus*			x
8. Mollusca. • General characters.	x	x	x
• *Acanthochiton&Anodonta*.			x
• *Eremina*& *Sepia*.			x
9. Echinodermata. • General characters.	x	x	x
• *Astropecten*.			x
• *Holothuria&Tripneustes*			x
10. Seminar.		x	

7- List of references:

7-1 Course notes

Notes approved by Department of Zoology.

7-2 Required books

-A Guide to Common Freshwater Invertebrates of North America by J. Reese Voshell Jr. and Amy Bartlett Wright (Apr 19, 2002)

-Invertebrate Zoology Lab Manual (6th Edition) by Robert L. Wallace and Walter K. Taylor (Apr 15, 2002)

-Biology Of Arthropoda, D.R. Khanna, 2004.

- Echinodermata,Valeria Matranga, 2005.

7-3 Recommended books

-Invertebrates - Second Edition [Hardcover] by Richard C. Brusca, Gary J. Brusca and Nancy J. Haver (Jan 1, 2003)

-Encyclopedia of Texas Seashells: Identification, Ecology, Distribution, and History (Harte Research Institute for Gulf of Mexico Studies Series) by John W. Tunnell Jr., Jean Andrews, Noe C Barrera and Dr. Fabio Moretzsohn Ph.D. (Jul 15, 2010).

7-4 Periodicals, Web sites, etc.

http://www.amazon.com/b?ie=UTF8&node=3049111
http://www.goodreads.com/shelf/show/invertebrates
http://en.wikipedia.org/wiki/Annelid
http://www.annelida.net/bk-reviews.html
http://en.wikibooks.org/wiki/Dichotomous_Key/Arthropoda
http://en.wikipedia.org/wiki/Arthropod

8- Facilities required for teaching and learning:

- Computer, Data show.

- Invertebrate samples and microscopic slides.

Course coordinator:	Dr. Sahar Mohamed Abo Elkhair.
Head of the Department:	Prof. Dr. Nassr-Allah Hassan Abdel-Hameid.
Date:	2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification

215-Geo: Invertebrate Paleontology

Relevant program: **B.Sc. in Geology**

Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Second level**

B - Basic information

Title:Invertbrate Fossils **Code: 215 Geo** **Year/level:** Second level
Teaching Hours: **Lectures:** 2 **Tutorial:** 0
Practical: 3 **Total:** 5 h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to introduce students to the principles of faunal interpretation as applied to the fossil record of the invertebrate phyla.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1.provide an overview of fundamental paleontologic principles such as thenature of fossils and the fossil record, concepts of organic evolution, methods ofclassification, biostratigraphy and paleoecology,

a2. review the morphology, classification, life environments, and ranges ofimportant invertebrate fossil groups,

a3. demonstrate the basic paleontologic skillsrequired for more advanced paleontologic and litho and biostratigraphy.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. differentiate between different types of fossil types,

b2.determine the stratigraphic units based on their funal content,
b3.demenostsate the basic and progressed techniques and methods stratigraphy,
b4.recognize the different formations based on their stratigraphic setting.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1.recognize the fossils and class of a given bed,
c2.analyze the stratigraphic units and fossils,
c3.use the fossil content to identify formations and their properties,
c4.apply the investigation results for bed classification and distinctions.

d - General skills:

On successful completion of the course, the student should be able to:

d1. collect data from sample examination and other data resources,
d2. reproduce the results to meet the projected goals in an easy, readable final form,
d3. collaborate and work in team smoothly adhere to ethics and manage time.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
9. Introduction to Invertebrate fossils	2	0	3
10. Phylum Porifera	2	0	3
11. Phylum Cnidaria	2	0	3
12. Phylum Brachiopoda	2	0	3
13. Phylum Mollusca	2	0	3
14. Class Bivalvia	2	0	3
15. Class Gastropoda	2	0	3
16. Class Cephalopoda	2	0	3
17. Phylum Echinodermata	2	0	3
18. Class Echinoidea	2	0	3
19. Phylum Arthropoda	2	0	3
20. Phylum Hemichordata	2	0	3
21. Applications into the geology of Egypt	2	0	3
22. Revision and course evaluation/open session	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lectures	Presentations	Discussions	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	provide an overview of fundamental paleontologic principles such as the nature of fossils and the fossil record, concepts of organic evolution, methods of classification, biostratigraphy and paleoecology,	√			√		
	a2	review the morphology, classification, life environments, and ranges of important invertebrate fossil groups,	√	√		√		
	a3	demonstrate the basic paleontologic skills required for more advanced paleontologic and litho and biostratigraphy.		√		√		
Intellectual Skills	b1	differentiate between different types of fossil types,	√	√		√		
	b2	determine the stratigraphic units based on their funal content,				√		√
	b3	demenostsate the basic and progressed techniques and methods stratigraphy,	√	√		√		
	b4	recognize the different formations based on their stratigraphic setting.	√	√			√	
Practical and professional skills	c1	recognize the fossils and class of a given bed,		√		√		
	c2	analyze the stratigraphic units and fossils,				√		
	c3	use the fossil content to identify formations and their properties,			√	√		√
	c4	apply the investigation results for bed classification and distinctions.	√				√	√
General Skills	d1	collect data from sample examination and other data resources,				√		
	d2	reproduce the results to meet the projected goals in an easy, readable final form,				√	√	√
	d3	collaborate and work in team smoothly adhere to ethics and manage time.	√			√		

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exams to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Power point presentations

6-2 Required books

none

6-5 Recommended books

1.Text book: Fossils at a Glance
Author: Clare Milsom
Liverpool John Moores University Sue Rigby University of Edinburgh
Second edition 2010
2. Text book: Fossil invertebrates
Author: Boardman, R. S., Cheetham 1987.
3.Text book: Invertebrate paleontology and Evolution
Author: Clarkson, E. N. K., 1986.

6-6 Periodicals, Web sites, etc.

http://www.palaeos.comwww.cmnh.org/site/researchandcollections_InvertebratePaleontology.aspx
http://www.webpages.uidaho.edu/~mgunter/opt_min/article.pdf

7- Facilities required for teaching and learning:

Power point presentations
Data show
Sound system to ensure the ease listening
Group discussions

Course coordinator: Prof. Dr. Gamal El Qot

Head of the Department:	Prof. Dr. Gamal El Qot
Date:	2023

Benha University
Faculty of Science
Department of Geology

Course Specification

216 Geo Micropalaentology

A. Affiliation

Relevant program: **B.Sc.in Geology Program**

Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Second level**

B. Basic information

Title: Micropalaentology **Code:216G** **Year/level:Second level**
Teaching Hours: **Lectures:** 2 **Tutorial: 0**
Practical:3 **Total:** 5**h/week**

C. Professional information

1. Course Learning Objectives:

This course aims to deliver a theoretical and practical understanding of how graduates can understand microfossils, their size, characters and range. Detailed investigation and examination of fossilized protistan life forms that are most commonly used in evolutionary studies applicable to biostratigraphy, paleoceanography, and global climate change.

2. Intended Learning Outcomes (ILOS)

a. Knowledge and understanding:

On successful completion of the course, the student should:

a1.provide an overview of fundamental paleontologic principles such as the nature of fossil record, concepts of organic evolution, methods of classification, biostratigraphy and paleoecology,

a2.review the morphology, classification, life environments, and ranges of important microfossil groups,

a3.demonstrate the basic paleontologic skills required for more advanced paleontology, litho and biostratigraphy.

b. Intellectual skills:

On successful completion of the course, the student should be able to.

b1. differentiate between different types of microfossils.

b2. determine the types of microfossils.

b3.demenostsate the basic and progressed techniques and methods in micropalenotology.

b4. Application of these microfossils in the fields of oil-exploration.

c.Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1.recognize the fossil content a given bed,

c2. analyze the kinds of a microfossils,

c3. use the microscope and identify microfossils and their properties,

c4.apply the investigation results for classification and distinctions.

d. General skills:

On successful completion of the course, the student should be able to:

d1. collect data from sample examination and other data resources,

d2. reproduce the results to meet the projected goals in an easy, readable final form,

d3. collaborate and work in team smoothly adhere to ethics and manage time.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction and course description	2	0	3
2. Foraminiferal general history	2	0	3
3. Benthic and planktic foraminifera	2	0	3
4. Foraminiferal application in the stratigraphy.		0	3
5. Morphology of ostracods.	2	0	3
6. Ostracods distribution and ecology.	2	0	3
7. Recognition of nannoplankton (coccoliths).	2	0	3
8. Living coccoliths and their ecology and classification.		0	3
9. General history of calcareous nannofossils and application in stratigraphy and paleoclimatology.	2	0	3
10. Diatom: living diatom, structure and morphological characteristics, diatom symmetry, ornamentation and taxonomy.	2	0	3
11. Radiolaria: distribution and ecology, sedimentation and dissolution, classification, and geologic record and applications.	2	0	3
12. Dinoflagellates: Living dinoflagellate and its life history, Ecology, classification, dinoflagellate stratigraphic position and applications.	2	0	3
13. Explaination the role of microfossils in palaeoenvironmental interpretation.	2	0	3
14. Revision and course evaluation/open session	2	0	3

Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			**Lecture**	**Presentations & Movies**	**Discussions & Seminars**	**Practical**	**Problem solving**	**Brain storming**
Knowledge & Understanding	a1.	provide an overview of fundamental paleontologic principles such as the nature of fossil record, concepts of organic evolution, methods of classification, biostratigraphy and paleoecology,	✓	✓		✓		
	a2.	review the morphology, classification, life environments, and ranges of important microfossil groups,	✓	✓		✓	✓	✓
	a3.	demonstrate the basic paleontologic skills required for more advanced paleontology, litho and biostratigraphy.	✓	✓		✓	✓	✓
Intellectual Skills	b1.	differentiate between different types of microfossils,	✓	✓		✓	✓	✓
	b2.	determine the types of microfossils,	✓			✓		
	b3.	demenostsate the basic and progressed techniques and methods in micropalenotology,	✓	✓		✓	✓	
	b4.	Application of these microfossils in the fields of oil-exploration.	✓	✓	✓	✓		
Practical and professional skills	c1.	recognize the fossil content a given bed,		✓	✓		✓	
	c2.	analyze the kinds of a microfossils,	✓	✓	✓			
	c3.	use the microscope and identify microfossils and their properties,	✓		✓		✓	
	c4.	apply the investigation results for classification and distinctions.	✓		✓	✓		✓
General Skills	d1.	collect data from sample examination and other data resources,	✓	✓	✓	✓		
	d2.	reproduce the results to meet the projected goals in an easy, readable final form,	✓	✓		✓		
	d3.	collaborate and work in team smoothly	✓	✓		✓	✓	✓

		adhere to ethics and manage time.						

5. Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exams to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6. List of references:

6.1. Course notes

Lecture notes prepared by the course instructor(s)approved by the department council

6.2. Required books

None

6.3. Recommended books

1.Text book: Concepts and methods of biostratigraphy
Author: Kauffman, E. G. & Hazel, J.E. 1977
2. Text book: Sedimentary Structures. 3.Text book: Unlocking to the Stratigraphic Record
Author: Doyle, P. & Matthew, R. B, 1999.
3.Text book: Biostratigraphy: Microfossils and Geological Time
Author: Brian McGowran
Publisher: Cambridge University Press; 1 edition (January 1, 2008), 480 pages

6.4. Periodicals, Web sites, etc.

http://www.xtal.iqfr.csic.es/Cristalografia/parte_03-en.html
http://www.webpages.uidaho.edu/~mgunter/opt_min/article.pdf
http://dave.ucsc.edu/myrtreia/crystal.html

7. Facilities required for teaching and learning:

Power point presentations
Data show
Sound system to ensure the ease listening
Group discussions

Course coordinator: Prof. Hassan El Sheikh
Dr. Fatma Shaker Ali
Dr. Mohamed El Beshtawy

Head of the Department: Prof. Dr. Gamal El Qot
Date: 2023

Course Specification

Chm 216: Organic Environmental Green Chemistry (1)

A- Affiliation

Relevant program: Geology BSc Program

Department offering the program: Department of Geology

Department offering the course: Department of Chemistry

Academic year/level: Second level

Date of specifications approval: **9/12/2015 (Faculty council meeting no. 390), updated 10/ 1/2018 (Faculty council; meeting number, 419), 8/3/2023 (Faculty council; meeting number, 484).**

Course coordinator:

Prof. Dr. Abdelfattah Fadel
Prof. Dr. Mohamed M. Azab

B - Basic information

Title: Organic Environmental Green Chemistry (1) **Code:**Chm216 **Year/level:** Second level

Teaching Hours: **Lectures:** 2 **Tutorial:** 0 **Practical:** 0 **Total:** 2 h/week

Course marks:
100 marks

C - Professional information

1 – Overall aim of the course:

This course aims to enable the students to understand the basic information about green chemistry, environmental organic chemistry and Environmental un-harmful reactions. Also, teach students the basic twelve principles of **Green Chemistry.**

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should demonstrate knowledge and understanding of:

a.1- Investigate the basic information about green chemistry.
a.2- Define the basic twelve principles of green chemistry.
a.3- Name the main types of environmentally un-harmful reactions.
a.4- Recognize theories of different reactions in green chemistry.
a.5- Mention the basic science of environmental organic chemistry.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1- Analyze the given chemical data to identify the green condition
b2- Differentiate between traditional and green chemistry.

b3- explain a specific green chemistry reaction.
b4- Solve environmental pollution problems.

c - Practical and professional skills:

On successful completion of the course, the student should be able to:

c1- Calculate the atom Economy % for different reactions.

c2-Apply the knowledge that the student studied to propose the green reactions with prevent or decreases the waste.

d - General skills:

On successful completion of the course, the student should be able to:

d1- Solve problems on the scientific basis taught in this course.

d2- Work in a team effectively, manage time, collaborate and communicate with others positively.

d3- Help raising public awareness of the benefits of conserving intellectual prope rights and scientific patents on the individuals and communities.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours	% of total
1. Introduction to green chemistry.	2	0	0	7.14%
2. Green Chemistry – Definition and Principles	2	0	0	7.14%
3. Atom Economy & yield%	2	0	0	7.14%
4. Organic Preparations : acetylation of primary amine (Preparation of acetanilide)-base catalyzed aldol condensation-(Synthesis of dibenzalpropanone)	2	0	0	7.14%
5. (Bromination of trans-stilbene) [4+2] cycloaddition reaction (Diels-Alder reaction between furan and maleic acid	2	0	0	7.14%
6. Electrophilic aromatic substitution reaction (Nitration of phenol).Electrophilic aromatic substitution reaction-II (Bromination of acetanilide)	2	0	0	7.14%
7. Mid-Term Exam.	2	0	0	7.14%
8. Rearrangement reaction (1): (Benzil - Benzilic acid rearrangement)-Pinacol-pinacolone rearrangement -(Preparation of benzopinacolone).	2	0	0	7.14%
9. Rearrangement reaction – (2) (Rearrangement of diazoamino benzene to p-aminoazobenzene) -radical coupling reaction -(Preparation of 1,1-bis-2-naphthol)	2	0	0	7.14%
10. Green photochemical reaction: -(Photoreduction of benzophenone to benzopinacol).	2	0	0	7.14%
11. Oxidation Reactions: green oxidation reaction (Synthesis of adipic acid)-Three component coupling (Synthesis of dihydropyrimidinone)	2	0	0	7.14%

12. Solvent-free reaction : (Microwave-assisted ammonium formate-mediated Knoevenagel reaction) Synthesis of Green Reagents (Tetrabutylammonium tribromide (TBATB) and its application)	2	0	0	7.14%
13. Alternative Green Procedure for Organic Qualitative Analysis: Detection of N, S, Cl, Br and I 14. i) Use of zinc and sodium carbonate instead of metallic sod. ii) Novel use of salt of some organic acids in organic mixture analysis.	2	0	0	7.14%
15. Alternative Green Procedure for Derivative for Carboxylic Acids.	2	0	0	7.14%
Total hours	**28**	0	**0**	**100%**

4 - Teaching and Learning methods against course ILOS:

Intended Learning Outcomes			**Lecture**	**Presentations & Movies**	**Discussions & Seminars**	**Practical**	**Problem solving**	**Brain storming**
Knowledge & Understanding	a1	Record the basic information about green chemistry.	X	0	x	0	0	x
	a2	Define the basic twelve principles of green chemistry.	X	0	0	0	0	0
	a3	Name the main types of environmentally unharmful reactions.	X	X	x	0	x	x
	a4	Recognize theories of different reactions in green chemistry.	X	X	x	0	x	x
	a5	State the basic science of environmental organic chemistry.	X	0	0	0	0	x
Intellectual Skills	b1	Design the given chemical data to identify the green condition	X	X	x	X	0	x
	b2	Compare between traditional and green chemistry.	X	0	x	0	0	x
	b3	Construct specific green chemistry reactions.	X	0	x	0	0	x
	b4	Examine environment pollution problems.	0	X	x	0	x	x
Practical and professional	c1	Summarize the atom Economy % for different reactions.	X	0	0	0	x	x
	c2	Assess the knowledge that the student studied to propose the green reactions with prevent or decreases the waste.	X	0	x	0	x	x

General Skills	d1	Community linked thinking on the scientific basis taught in this course	X	0	0	0	0	x
	d2	Work in a team effectively, manage time, collaborate and communicate with others positively.	0	0	x	X	X	x
	d3	Life-long learning the benefits of conserving intellectual property rights and scientific patents on the individuals and communities.	X	0	x	0	0	x

5- Students' Assessment Methods and Grading:

Tools	**To Measure**	**Time schedule**	**Grading**
Semester Work	a1, a2, a3, b2, and d1	Fifth week	**5 %**
Mid-Term Exam	a1, a2, a3, a4, b2, d1, and d2	Seventh week	**5 %**
Oral exam	a1, a2, a3, a4, b1, b2, b3 and d4	fifteenth week	**10 %**
Written exam	a1, a2, a3, a4,a5, b1, b2, b3.	sixteenth week	**80 %**
Total			**100 %**

Course matrix														
Topic	Knowledge and understanding					Intellectual skills				Practical and professional skills		General Skills		
	a1	a2	a3	a4	a5	b1	b2	b3	b4	c1	c2	d1	d2	d3
1. Introduction to green chemistry.	x		x		x									
2. Green Chemistry – Definition and Principles		x	x		x									
3. Atom Economy & yield%										x		x		
4. Organic Preparations : acetylation of primary amine (Preparation of acetanilide)-base catalyzed aldol condensation-(Synthesis of dibenzalpropanone)				x							x		x	
5. (Bromination of trans-stilbene) [4+2] cycloaddition reaction (Diels-Alder reaction between furan and maleic acid				X					X		x		x	
6. Electrophilic aromatic substitution reaction (Nitration of phenol). Electrophilic aromatic substitution reaction-II (Bromination of acetanilide)				X					X					
7. Mid-Term Exam.														
8. Rearrangement reaction (1): (Benzil - Benzilic acid rearrangement)-Pinacol-pinacolone rearrangement -(Preparation of benzopinacolone).				x					x			x		
9. Rearrangement reaction – (2) (Rearrangement of diazoamino benzene to p-aminoazobenzene) -radical coupling reaction -(Preparation of 1,1-bis-2-naphthol)				x					x					
10. Green photochemical reaction: -(Photoreduction of benzophenone to benzopinacol).					x	x					x	x		
11. Oxidation Reactions: green oxidation reaction (Synthesis of adipic acid)-Three component coupling (Synthesis of dihydropyrimidinone)					x		x				x	x		
12. Solvent-free reaction : (Microwave-assisted ammonium formate-mediated Knoevenagel reaction) Synthesis of Green Reagents (Tetrabutylammonium tribromide (TBATB) and its application)					x		x				x	x		x

13. Alternative Green Procedure for Organic Qualitative Analysis: Detection of N, S, Cl, Br and I Use of zinc and sodium carbonate instead of metallic sod. Novel use of salt of some organic acids in organic mixture analysis					x	x					x	x		x
14. Alternative Green Procedure for Derivative for Carboxylic Acids.					x	x					x			x

6- List of references:

6-1 Course notes:

Lecture notes prepared by the course instructor(s) a proved from chemistry department.

6-2 Required books:

1- ***Green Chemistry and Pollutants in Ecosystems*****,** **Eric Lichtfouse, Jan Schwarzbaue,Didier Robert (2005),Library of Congress Control Number: 2004110949 ISBN 3-540-22860-8 Springer Berlin Heidelberg New York ,Springer is a part of Springer Science+Business Media, springeronline.com, © Springer-Verlag Berlin Heidelber.**

6-3 Recommended books:

1- *GREEN CHEMISTRY**:An Introductory Text*** *, Mike Lancaster (2002);Network, University o*

Published by The Royal Society of Chemistry (RSC),Thomas Graham House, Science Park, Milton Road, Cambridge CB4 OWF, UK, Registered Charity Number 207890.

2- *Environmental organic chemistry 2nd Edn*, Rene P. Schwarzenbach; Philip M. Gschwend and Dieter M. Imboden*(2003),* by John Wiley & Sons, Inc. All rights reserve.

6-4 Periodicals, Web sites, etc.

http://www.frontiersin.org/Green_and_Environmental_Chemistry

http://www.knockhardy.org.uk/ppoints_htm_files/greenpps.pps

7- Facilities required for teaching and learning:

Using a microphone in lectures-Using a black board-White board Marker - Group Discussions -Data show

Course coordinator:	**Prof. Dr**. Abdel Fattah Fadel
	Prof. Dr. Mohamed M. Azab
Head of the Department:	Prof. Dr. Wagdy El-Dougdoug
Date:	2022-2023

Benha University
Faculty of Science
Department of Geology

Course Specification

Geo 220: Sedimentary Environments and Facies

A- Affiliation

Relevant program:	Geology B.Sc. Program
Department offering the program:	Department of Geology
Department offering the course:	Department of Geology
Academic year/level:	Second level (Geology)

B - Basic information

Title: Sedimentary Environments and Facies	**Code:** Geo 220	**Year/level:** Second level
Teaching Hours:	**Lectures:** 1hr/week	**Tutorial:** 0
	Practical: 3	**Credit hours:** 2 hrs

C - Professional information

1 – Course Learning Objectives:

This course presents an overview of the most common types of depositional environments of sedimentary rocks and examines the processes that lead to their formation. Also it aims to recognize the different types of sedimentary facies and their related depostional environments (Continetal, transitional, or marine environments)

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the post-graduate will be able to:

a1. acquired a mechanistic understanding of the processes that affect sediment formation, transport and deposition;

a2. use sediment facies to interpret depositional environments in marine and continental sedimentary systems.

b - Intellectual skills:

On successful completion of the course, the post-graduate will be able to:

b1. learn of concepts and techniques that are a requisite to handle sedimentological problems in the broadest sense and that are also a requisite for adequate research needed for the majority of the master thesis.

c - General skills:

On successful completion of the course, the graduate will be able to:

d1. work with peers on small projects,

d2. accomplish given scientific tasks either individually, or with a group,

d3. search via the internet and local libraries to prepare a report on a given subject,

d4. communicate scientific data orally to the audience with the help of technology.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
23. Introduction	1	0	3
24. Classification: terrigenous, biogenic, chemical and volcanogenic sediments	1	0	3
25. Weathering and erosion: the continents as sources of sediment	1	0	3
26. Sediment transport processes and related sedimentary structures	1	0	3
27. glacial environments	1	0	3
28. aeolian environments	1	0	3
29. volcanic environments	1	0	3
30. rivers and alluvial fans	1	0	3
31. lakes	1	0	3
32. deltas	1	0	3
33. clastic coasts and seas	1	0	3
34. shallow sandy seas	1	0	3
35. shallow marine shelfs	1	0	3
36. General revision	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Final written exam to evaluate the students and promote to other consequent courses.

5- Students' Assessment Methods and Grading:

Tools	Time schedule	Grading
Semesterwork	Semester course	15 %
Mid-Term exam	Seventh week	5 %
Practical exam	Thirteenth week	25 %
Oral exam	Thirteenth week	5 %
Final written exam	Fourteenth week	50 %
100 %		

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor
Power point presentations by the course instructor

6-2 Required books

None

6-7 Recommended books

Sedimentary Environments and Facies (Reading, 1978)

6-8 Periodicals, Web sites, etc.

7- Facilities required for teaching and learning:

- Data show
- Pen board

Course coordinator: Prof.Dr. Emad Sallam
Head of the Department: Prof. Dr. Gamal El-Qot
Date: 2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 225: Sedimentary Petrology

A- Affiliation

Relevant program: Geology B.Sc. Program
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Second level

B - Basic information

Title: Sedimentary Petrology **Code: Geo 225** **Year/level:** second level
Teaching Hours: **Lectures:** 2 **Tutorial:** 0
Practical: 3 **Credit hrs:** 3 hrs/week

C - Professional information

1 – Course Learning Objectives:

Sedimentary petrology is the study of sediments and sedimentary rocks. This course specifically deals with the description, classification, and origin of sediments and sedimentary rocks, and with the processes that lead to their formation.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the post-graduate will be able to:

a1. acquired a mechanistic understanding of the processes that affect sediment formation, transport and deposition;

a2. use sediment facies to interpret depositional environments in marine and continental sedimentary systems.

b - Intellectual skills:

On successful completion of the course, the post-graduate will be able to:

b1. identity of concepts and techniques that are a requisite to handle sedimentological problems in the broadest sense and that are also a requisite

for adequate research needed for the majority of the master thesis.

c - Practical and professional skills:

On successful completion of the course, the post-graduate will be able to:

c1. design a research project based on sediments and sedimentary archives;

c2. select the most appropriate techniques to analyze sediments for specific purposes, as well as combine and interpret data obtained using several independent techniques.

d - General skills:

On successful completion of the course, the graduate will be able to:

d1. work with peers on small projects,

d2. accomplish given scientific tasks either individually, or with a group,

d3. search via the internet and local libraries to prepare a report on a given subject,

d4. communicate scientific data orally to the audience with the help of technology.

3 - Contents

Topic	Lecture hours	Tutorial hours	Practical hours
37. Introduction	2	0	3
38. Origin and classification of Sedimentary rocks	2	0	3
39. Rudaceous rocks (Breccia and conglomerates)	2	0	3
40. Arenaceous rocks	2	0	3
41. Classification of Sandstones	2	0	3
42. Shales and argillite	2	0	3
43. Limestones	2	0	3
44. Chert	2	0	3
45. Evaporates	2	0	3
46. Sedimentary ironstone and iron formation	2	0	3
47. Sedimentary phosphate deposits	2	0	3
48. Coal	2	0	3
49. Oil shale	2	0	3
50. General revision	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	differentiate between the different types of the stratigraphy.	x	0	x	0	0	x
	a2	identify the main principles of stratigraphy.	x	x	0	0	0	0
	a3	recognize the different stratigrahic relationships and stratigraphic correlation.	x	0	0	0	0	x
	a4	identify the various kinds of the index fossils.	x	x	0	0	X	x
	a5	identify the standard biozones of the phanerozoic of Egypt and their various kinds.	x					
Intellectual Skills	b1	solve the stratigraphic problems and deduce the data of the rock units correlation.	**x**	0	0	**0**	**X**	**0**
	b2	design the fossil tool in description the environmental condition.	**x**	0	0	**0**	**x**	**x**
	b3	identify the most common standard biozones of the phanerozoic.	x	0	0	**0**	**X**	**0**
Practical and professional skills	c1	draw the stratigraphic sections and correlate between the different rock units.	x	0	0	0	X	x
	c2	differentiate the various kinds of biozones of some exposed rock stages and correlate them with some neighboring countries.	x	0	0	0	X	x
	c3	interprete the litho-, biostratigraphic data.	x	0	0	0	x	x
	c4	differentiate between the different rock units in the field						
General Skills	d1	Use computer, internet & communications.	x	x	0	0	0	x
	d2	Management, working in group & life-long learning.	x	x	o	o	o	x
	d3	Ethical behavior, community linked thinking.	x	x	o	o	x	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude.

5.2. Assignments to assess the student independen work,

5.3. A field trip.

5.4. Written mid-term exam to ensure the student progress and discover the shortage.

5.5. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	Time schedule	Grading
Semesterwork	Semester course	15 %
Mid-Term exam	Seventh week	5 %
Practical exam	Thirteenth week	25 %
Oral exam	Thirteenth week	5 %
Final written exam	Fourteenth week	50 %
100 %		

6- List of references:

6-1 Course notes

Manual notes handle of Litho-, Biostratigraphy for students.

6-2 Required books

none

6-9 Recommended books

1.Text book: Sedimentary Petrology: An Introduction. M. Tucker

6-10 Periodicals, Web sites, etc.

www.sciencedirect.com & www.geology.com

7- Facilities required for teaching and learning:

Data show

Using a blackboard

Group discussions

Course coordinators: Prof. Dr. Emad Sallam

Head of the Department: Prof. Dr. Gamal El-Qot

Date: 2022/2023

Course Specification
Zoo 227: Vertebrates

A- Affiliation

Relevant program: Geology B.Sc. Program
Department offering the program: Geology Department
Department offering the course: Zoology Department
Academic year/level: Second level

Date of program specifications approval: 10/1/2018 (faculty council; meeting number, 419)

External evaluator: Dr. Samia Haroun
Internal evaluator: Prof. Mohamed N Seddek

B -Basic information

Title: Invertebrate **Code:**227Z **Year/level:** Second level
Teaching Hours: **Lectures:** 2 **Tutorial:** 0
Practical: 2 **Total:** 3

C -Professional information

1 – Course Learning Objectives:

The objective of this course is to enable the students to identify the characteristic features for each class belongs to phylum Chordata via studying the structures and functions of all systems for one example from each class of phylum Chordata.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

a1- Identify the taxonomy of Chordata.
a2- Graph the anatomy of different species in Chordata.
a3- Define the general characters of each class belong to phylum Chordata.
a4-Acquire knowledge an understanding of the structure and function of all systems for one example from each class of phylum Chordata.

b - Intellectual skills:

On successful completion of the course, the student should be able to.
b1- Link general charactersof each class belongs to phylum Chordata.
b2- Combine the structure and function of all systems for one example from each class of phylum Chordata.
b3- Interpret morphology for one example from each class of phylum Chordata.

c-Practical and professional skills:

On successful completion of the course, the student should be able to:

c1- Identity taxonomy of animal species in phylum Chordata.

c2- Draw body systems of animal species in phylum Chordata.

c3-Dissect different species in phylum Chordata.

c4-Describe morphology of different animal species in phylum Chordata.

d - General skills:

On successful completion of the course, the student should be able to:

d1- Collaborate effectively with teamwork members.

d2- Effectively manages tasks, time, and resources.

d3- Search for information and engage in life-long self learning discipline.

d4- Exhibit the sense of beauty and neatness.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
Introduction and classification of phylum Chordata	2	0	0
General characters for each class of phylum Chordata.	2	0	3
Morphology and physiological anatomy of the vital system of one example from class Hemichordata	2	0	3
Morphology and anatomy of the vital system of one example from class Urochordata.	2	0	3
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Protochordata	2	0	3
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Cyclostomata	2	0	3
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Chondrichthyes	2	0	3
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Osteichthes	2	0	3
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Amphibia	2	0	3
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory ,	2	0	3

skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Reptilia			
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Aves	4	0	3
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Mammalia	4	0	3
Total hours	**28**	0	**39**

4 - Teaching and Learning methods:

Intended Learning Outcomes			**Lecture**	**Presentations & Movies**	**Discussions & Seminars**	**Practical**	**Problem solving**	**Brain storming**
Knowledge & Understanding	a1	Identify the taxonomy of Chordata.	x	x	x	x	x	0
	a2	Graph the anatomy of different species in Chordata.	x	x	x	x	x	0
	a3	Define the general characters of each class belong to phylum Chordata.	x	x	x	0	0	0
	a4	Acquire knowledge an understanding of the structure and function of all systems for one example from each class of phylum Chordata.	x	x	x	x	0	x
Intellectual Skills	b1	Link general characters of each class belong to phylum Chordata.	x	**x**	**x**	**x**	**x**	**x**
	b2	Combine the structure and function of all systems for one example from each class of phylum Chordata.	x	**x**	**x**	**x**	**x**	**x**
	b3	Interpret morphology for one example from each class of phylum Chordata	**x**	**0**	**x**	**x**	**0**	**0**
Practical and professional skills	c1	Identity taxonomy of animal species in phylum Chordata.	0	0	0	x	0	0
	c2	Draw body systems of animal species in phylum Chordata.	0	0	0	x	0	0
	c3	Dissect different species in phylum Chordata.	0	0	0	x	0	0
	c4	Describe morphology of different animal species in phylum Chordata.	x	x	X	x	0	0

General Skills	d1	Collaborate effectively with teamwork members.	x	x	x	x	x	0
	d2	Effectively manages tasks, time, and resources.	x	x	x	x	x	0
	d3	Search for information and engage in life-long self learning discipline.	x	x	x	x	x	X
	d4	Exhibit the sense of beauty and neatness	x	x	**x**	x	0	0

5- Students' Assessment Methods and Grading:

Tools:	To Measure	**Time schedule**	**Grading**
Mid-Term Exam	a1 to a4 and b1 tob3	sixth week	12
Term papers, quizzes and seminars	a1 to a4, b1 to b3, and d1 to d4	Bi-weekly	16
Practical exams	a1, a2, a4, c1 toc4 and d4	Fourteenth week	24
Written exam	a1 to a4, b1 to b3 and d4	Sixteenth week	48
Total			100

6 – Course matrix

Topic	Knowledge & Understanding	Intellectual Skills	Practical and professional skills
Introduction and classification of phylum Chordata	x		x
General characters for each class of phylum Chordata.	x	x	
Morphology and physiological anatomy of the vital system of one example from classeHemichordata	x		x
Morphology and anatomy of the vital system of one example from classeUrochordata.	x		x
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Protochordata	x		x
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Cyclostomata	x	x	x
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Chondrichthyes	x	x	x
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Osteichthes	x		x
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Amphibia	x		x
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Reptilia	x		x
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Aves	x		x
Morphology and physiological anatomy of the vital systems such as digestive, respiratory , circulatory , skeletal, nervous & sense organs, excretory, reproductive systems for one example for each class of Mammalia	X		x

7-1 Course notes
Notes approved by Department of Zoology.

7-2 Required books
- Nath, V. (1984): A text book of zoology, Volume II, 648p
- Campbell, N.A. and Reece, J.B. (2005). Biology (7th ed.). San Francisco, CA: Benjamin Cummings
- Kent, G. C. (1987): Comparative anatomy of the vertebrates, 646p.
- Saxena, R. M. and Saxena, O. P. (1981): Chordate zoology, 520p.
- Alexander, N. (1981): The chordates, 510p.
- Kluge, A. G. (1977): Chordate structure and function, 628p

7-3 Recommended books
- Puranik, P. G. and Thakur, R. S. (1982): A text book of chordate zoology.
- Pearson, R. and Ball, J. N. (1981): Lecture notes on vertebrate zoology, 180p.
- Chiasson, R. B. and Radke, W. J. (1993): Laboratory anatomy of the vertebrates, 224p.
- Walker, W. (1992): Vertebrate dissection, 459p.

7-4 Periodicals, Web sites, etc.
http://www.bumblebee.org/invertebrates/CHORDATA.htm
http://www.goodreads.com/shelf/show/Chordata
http://en.wikipedia.org/wiki/Chordat

8- Facilities required for teaching and learning:

- Computer, Data show.
- Samples and microscopic slides.

Course coordinator:
Head of the Department: Prof. Dr. Nassr-Allah Hassan Abdel-Hameid.
Date: 2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification

Geo 234: Gemstones

A- Affiliation

Relevant program: B.Sc. in Geology Program
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Second Level

B - Basic information

Title: Gemstones Petrology **Code:** Geo 234 **Year/level:** Second level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 2 **Total:** 3 h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to create and sustain interest in, and enjoyment of, gemmology among consumers and those considering a career, or already working in gems and jewellery. This short, online, entry-level course will introduce students to the fascinating world of gemmology and the enormous variety of beautiful gems available. Students can discover the basics of gemmology at their own pace, perfect for anyone with an interest in gems and suitable for those completely new to gemmology.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. recognise, recall and show understanding of basic gemmology from mining and the route to market.
a2. understand the properties of a selection of the most common gem materials
a3. gain an appreciation for the characteristic and identifying features of the gemstones most commonly offered on the market,
a4. work with or buy gems with increased confidence,
a5. take the final GemIntro Assessment.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. develop an interest in and awareness of a selection of gemstones, their properties and uses,

b2. develop knowledge and understanding of the different aspects and basic principles of gemmology,

b3. explain and know about the processes of common treatments of gem materials and the production of synthetics.

c - Practical and professional skills:

On successful completion of the course, the student should be able to:

c1. demonstrate a logical approach to gem testing by selecting appropriate techniques for the material under test.

c2. demonstrate safe and skilful practical techniques

c3. make, record and communicate reliable and valid observations and measurements with appropriate precision and accuracy

c4. interpret, explain and evaluate results clearly and logically using gemmological knowledge and understanding.

c5. identify common gem materials.

c6. compare and contrast the features and properties of common gem materials, treatments and synthetics.

c7. apply knowledge of gemstones to their care and commercial use.

c8. explain the value and price factors of gemstones.

d - General skills:

On successful completion of the course, the student should be able to:

d1. Work with peers on small projects,

d2. gain an appreciation for the characteristic and identifying features of the gemstones found commonly within the gem trade

d3. appreciate the gemstone pipeline from origin to cut stone

d4. improve their knowledge of commercially important features of gemstones • handle confidently rough, cut and set gem materials

d5. report clearly results and conclusions

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours

1. General Introduction	1	0	2
2. The structure and physical properties of gemstones	1	0	2
3. Magnification, light and colour	1	0	2
4. Light and Optics	1	0	2
5. Treatments	1	0	2
6. Imitations, Simulants and Synthetics	1	0	2
7. Gem Properties	1	0	2
8. The Geology of Gems	1	0	2
9. Fashioning Gemstones	1	0	2
10. Crystal structures in terms of chemical bonding	1	0	2
11. The Gemstone Pipeline	1	0	2
12. Gems and Jewellery	1	0	2
13. Composite (assembled) natural and artificial stones; reconstructed materials	1	0	2
14. Revision and feedback	1	0	2
Total hours	**14**	0	**28**

4 - Teaching and Learning methods:

Intended Learning Outcomes			**Lecture**	**Presentations & Movies**	**Discussions & Seminars**	**Practical**	**Problem solving**	**Brain storming**
Knowledge & Understanding	a1	Be able to provide a brief account on the different types of micro fossils including palynomorphs	x	x	0	0	0	0
	a2	Be able to recognize the difference between the different metamorphic groups- particularly palynomorphs	x	x	x	x	0	0
	a3	Understand the paleoenvironmental controls associated with the various types of metamorphics, principally palynomorphs	x	x	0	x	x	x
	a4	Realize the stratigraphic value and range of application of the major metamorphic types specially palynomorphs	x	x	0	x	x	x
Intellectual Skills	b1	Initiate cognitive skill to generate the abilities of identifying the physical properties of metamorphic rocks, facies, and minerals,	x	x	0	x	0	x
	b2	deal with optic characteristics to identify, interpret the mineral- bearing of the rocks, and analyzing its genesis,	0	x	0	x	0	0

	b3	describe the basic morphologic features of the different metamorphic groups with emphsis on palynomorphs,	x	x	x	x	0	0
	b4	Develop the ability to make detailed maps in areas of metamorphic terrains.	0	x	0	x	0	0
Practical and professional skills	c1	Process metamorphic rock samples for their fossil palynomorph content	x	x	0	x	0	0
	c2	Employ metamorphics to provide information about the stratigraphy of their enclosing metamorphic rocks	x	x	0	0	x	x
	c3	Utilize metamorphics as a proxy to interpret the depositional paleoenvironment of rock layers	x	x	0	0	x	x
	c4	Reconstruct the geologic history of stratified rocks based on their metamorphic content	0	0	x	0	x	x
General Skills	d1	Work with peers on small projects	0	x	x	x	x	x
	d2	Accomplish given scientific tasks either individually, or with a group	0	x	x	x	x	x
	d3	Make an internet and library search to prepare a report on a given class assignment	0	x	x	x	x	0
	d4	Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation	0	x	x	0	0	0

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate the students and promote to other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes
Lecture notes prepared by the course instructor
Power point presentations

6-2 Required books
None

6-11 Recommended books

6-12 Periodicals, Web sites, etc.
http://www.nhm.ac.uk/research-curation/research/projects/duxbury/database /
http://www.ucl.ac.uk/GeolSci/micropal/welcome.html

7- Facilities required for teaching and learning:

- Data show
- Sound system to ensure the ease of listening
- Traditional chalk or pen board
- Microscopes
- Lab space equiped with the necessary devices and chemicals for sample processing

Course coordinator: Dr. Moustafa M. Mogahed

Head of the Department: Prof. Dr. Gamal El-Qot
Date: 2022

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 235: Volcanology

A- Affiliation

Relevant program: **B.Sc. in Geology**
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Second level

B - Basic information

Title: Introduction to Medical Geology and Volcanology **Code:** Geo **235** **Year/level:** Second level

Teaching Hours:	**Lectures:** 1	**Tutorial:** 0
	Practical: 3	**Total:** 4 h/week

C - Professional information

2 – Course Learning Objectives:

This course Focus on the emerging specialty discipline of volcanic processes, eruptive products and their mechanism of formation, monitoring of active volcanoes, volcanic hazards, and the environmental impact of volcanism.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1. explain how and why volcanoes erupt,

a2. describe and illustrate spatial and temporal variation in volcanic deposits and describe volcanic facies.

a3. recoginze volcanological facies to reconstruct volcanic histories.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1 explain a) the conditions conducive to the occurrence of and b) the specific hazards resulting from the geologic features and processes covered in this course, including soils, earthquakes, volcanoes, rivers and floods, landslides,

b2. assess landslide hazards based on geologic data, topographic maps, aerial photos and field observations,

b3. Construct an earthquake hazard map and conduct a flood-frequency analysis and be able to interpret flood-frequency graphs,

b4. to describe the relationship between volcanic landforms, deposits, and processes,

b5. identify, describe volcanic rocks and interpret their origin,

b6. review volcanic rocks in a plate tectonics framework.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. construct a written environmental assessment of a specific geologic hazard, using original scientific observations,

c2. conduct an oral presentation of an original environmental assessment and management plan, using scientific evidence to defend conclusions,

c3. discuss the benefits and limitations of geological interpretations based on physical volcanology observations and experiments,

c4. discover the importance of physical volcanology to related fields such as

petrology, geochemistry, geothermal exploration, hazard management, geological engineering.

d - General skills:

On successful completion of the course, the student should be able to:

d1. collect data from books and other resources,

d2. transfer the projected goals to findings using available data and software and formula the results in a easy readable final form,

d3. realize volcanic hazards, hazard mitigation and volcanic monitoring,

d4. evaluate and discuss primary literature on volcanology,

d5. work effectively and professionally in a group cooperate and work in team smoothly while managing the time, and go to point and targeted goals.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
51. Introduction	1	0	3
52. Elemental Link Between Geosphere and Biosphere	1	0	3
53. Essential and Non-essential Elements with Reference to Human Health	1	0	3
54. Global distribution of volcanic environments and their relation to Plate Tectonics	1	0	3
55. Timescales of magmatic processes	1	0	3
56. Dust Storms - Health Effects	1	0	3
57. Magma migration and eruption triggering	1	0	3
58. Volcanology – Field Relations	1	0	3
59. Volcanic/intrusive landforms	1	0	3
60. forms of volcanoes	1	0	3
61. Physical Properties of Magma	1	0	3
62. cooling mechanisms of flows • melt density calculations	1	0	3
63. predicting volcanism versus plutonism	1	0	3
64. viscosity, diffusion and melt structure	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations	Discussions & Seminars	Practical	Problem solving	Brain storming
⊃ ⊆	a1	explain how and why volcanoes erupt	√				√	

	a2	recognize research a current environmental geology issue, develop an opinion based on scientific evidence, and defend that opinion in written and oral format.		√	√			√
	a3	describe and illustrate spatial and temporal variation in volcanic deposits and describe volcanic facies.	√	√	√	√		
Intellectual Skills	b1	Know and explain a) the conditions conducive to the occurrence of and b) the specific hazards resulting from the geologic features and processes covered in this course, including soils, earthquakes, volcanoes, rivers and floods, landslides.				√	√	√
	b2	Assess landslide hazards based on geologic data, topographic maps, aerial photos and field observations.	√	√	√	√		
	b3	Construct an earthquake hazard map and conduct a flood-frequency analysis and be able to interpret flood-frequency graphs.		√				
	b4	to describe the relationship between volcanic landforms, deposits, and processes.	√	√	√			
	b5	to identify, describe volcanic rocks and interpret their origin				√	√	
	b6	to understand volcanic rocks in a plate tectonics framework	√				√	√
Practical and professional skills	c1	Construct a written environmental assessment of a specific geologic hazard, using original scientific observations.				√		
	c2	Conduct an oral presentation of an original environmental assessment and management plan, using scientific evidence to defend conclusions.	√			√		
	c3	Discuss the benefits and limitations of geological interpretations based on physical volcanology observations and experiments.				√	√	
	c4	Discover the importance of physical volcanology to related fields such as petrology, geochemistry, geothermal exploration, hazard management, geological engineering.	√					
G e n	d1	collect data from books and other		√	√			

		resources,						
	d2	transfer the projected goals to findings using available data and software and formula the results in a easy readable final form	√	√	√			
	d3	to understand volcanic hazards, hazard mitigation and volcanic monitoring	√				√	√
	d4	to read, evaluate and discuss primary literature on volcanology			√	√		
	d5	to work effectively and professionally in a group cooperate and work in team smoothly while managing the time, and go to point and targeted goals.	√					

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exams to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s)

Power point presentations

6-2 Required books

None

6-13 Recommended books

Easton, R.M. and Johns, G.W., 1986. Volcanology and mineral exploration: The application of physical volcanology and facies studies: Wood, J., Wallace, H., eds. Volcanology and mineral deposits, Ont. Geol. Surv. Misc. Pap., v. 129, p. 2-40

6-14 Periodicals, Web sites, etc.

International Journal of volcanology

7- Facilities required for teaching and learning:

Data show

Sound system to ensure the ease listening

Using a blackboard

Group discussions

Course coordinator: Dr. Moustafa M. Mogahed

Head of the Department: Prof. Dr. Gamal El-Qot

Date: 2022

Benha University
Faculty of Science
Department of Geology

Course Specification

Geo 236: Rock forming minerals of Hard Rocks

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Second level**

B - Basic information

Title: Rock forming minerals of Hard Rocks	**Code: Geo 236**	**Year/level:** Second level
Teaching Hours:	**Lectures:** 1	**Tutorial:** 0
	Practical: 3	**Total:** 4 h/week

C - Professional information

3 – Course Learning Objectives:

This course is designed to deliver a theoretical and practical understanding of how students can understand the basic principles of mineralogy, identification of minerals, their associations, stability means understanding geological processes. Although rock-forming minerals (mainly silicates) will be emphasized, students will be able to identify other minerals represent common minerals in earth crustal rocks.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. provide an overview of fundamental mineralogical principles such as the nature of mineral and mineral groups,

a2. review the genesis, classification, and distribution of important mineral groups,

a3. identify the basic optical and structural mineralogy skills required for more advanced mineralogical and petrological,

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. differentiate between different types of silicate minerals,
b2. determine the crsytalization sequence of silicate formation,
b3. review the basic and progressed techniques and methods to optical mineralogy,
b4. recognize the different minerals based on their optical properties.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. recognize the physical and optical properties of a given mineral,
c2. analyze the optical propoerties of a given rock forming mineral,
c3. use the polarizing microscope and identify minerals and their optical properties,
c4. apply the investigation results for mineral classification and distinctions.

d - General skills:

On successful completion of the course, the student should be able to:

d1. collect data from sample examination and other data resources,
d2. reproduce the results to meet the projected goals in an easy, readable final form,
d3. collaborate and work in team smoothly adhere to ethics and manage time.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
65. Introduction and course description	1	0	3
66. What is mineral?	1	0	3
67. Classification of minerals	1	0	3
68. How minerals form	1	0	3
69. Mineral compostion of mantle and core	1	0	3
70. Mineral composition of earth crust	1	0	3
71. Silicate minerals	1	0	3
72. Carbonate minerals	1	0	3
73. Phosphate, oxides, and sulfate	1	0	3
74. Sulfide minerals	1	0	3
75. Minerals and the society	1	0	3
76. Mineral economics	1	0	3
77. Ore mineral deposits and tectonism	1	0	3
78. Revision and course evaluation/open session	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	provide an overview of fundamental mineralogical principles such as the nature of mineral and mineral groups,	√	√		√		
	a2	review the genesis, classification, and distribution of important mineral groups,	√	√		√	√	√
	a3	demonstrate the basic optical and structural mineralogy skills required for more advanced mineralogical and petrological,	√	√		√		
	a4							
Intellectual Skills	b1	differentiate between different types of silicate minerals,	√	√		√	√	√
	b2	determine the crsytalization sequence of silicate formation,	√			√		
	b3	review the basic and progressed techniques and methods to optical mineralogy,	√	x		√	√	
	b4	recognize the different minerals based on their optical properties.	√	√	√	√		
Practical and professional skills	c1	recognize the physical and optical properties of a given mineral,		√	√	√	√	
	c2	analyze the optical propoerties of a given rock forming mineral,	√	√		√		
	c3	use the polarizing microscope and identify minerals and their optical properties,	√	√		√	√	
	c4	apply the investigation results for mineral classification and distinctions.	√	√		√		√
General Skills	d1	collect data from sample examination and other data resources,	√	√	√	√		
	d2	reproduce the results to meet the projected goals in an easy, readable final form,	√	√		√		
	d3	collaborate and work in team smoothly adhere to ethics and manage time.	√	√		√	√	√

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exams to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s) approved by the department council

6-2 Required books

None

6-15 Recommended books

Introduction to the Rock-Forming Minerals Third Edition
by W. a. Deer, R. a. Howie, J. Zussman
Paperback: 510 pages
Publisher: Mineralogical Society; Third edition (May 16, 2013)
Language: English
ISBN-10: 0903056275
ISBN-13: 978-090305627

6-16 Periodicals, Web sites, etc.

http://www.indiana.edu/~geol105/images/gaia_chapter_5/rock_forming_minerals.htm

7- Facilities required for teaching and learning:

Power point presentations
Data show
Sound system to ensure the ease listening
Group discussions

Course coordinator: Prof. Dr. Abdel Aziem M. Mehanna

Head of the Department: Prof. Dr. Gamal El-Qot
Date: 2022

Benha University
Faculty of Science
Department of Physics

Course Specification

Phy 238 Radiation physics

A- Affiliation

Relevant program: Physics
Department offering the program: Radiation Physics
Department offering the course: Physics
Academic year/level: 2023
Date of specifications approval:

B - Basic information

Title: Environmental Physics **Code:** Phy 238 **Year/Level: 2023**
Teaching Hours: 24 **Lectures:2** **Tutorial: 0**
Practical:0 **Total:** -2 h/week

C - Professional information

1 – Course Learning Objectives:

By Finishing of this course the graduate will able to:

1- Distinguish between the types of radiation sources.
2- Review of radioactivity: alpha, beta, and gamma radiations
3- Understand the meaning of pollution and pollutants
4- Learne the importances of isotopes and their biological uses
5- Understand phenomenolgogial concepts like; radiation safety, protection and contamination

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

a1- Review radioactivity: alpha, beta, and gamma radiations

a2- Evaluate environmental physics, pollution, waste management and risk.
a3- Know the processes and mechanisms supporting the structure and function of the specific topics.

b - Intellectual skills:

b1- Distinguish between different radiation sources.

b2- Overview of alpha, beta, and gamma radiations

b3- Evaluate the importances of isotopes and their biological uses

c - Practical and professional skills:

C1 -Use roles of optimizing the radiation measurement devices and different techniques.

C2- Summarize the importance radiation physics laws

C3- Practice skills in writing reports in accordance with the course contents with acceptable scientific guidelines

d - General skills:

d1- Choose the suitable material of the desired radiation and health protection applications

d2- Work in a team to study some health physical equipment, such as NMR and X-ray.

d3- Communicate ideas with the future as well as with each other about the course goals.

d4- Provide their own ideas of how to fully understand, improve skills, etc.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
- Introduction to Radiation &radiation sources	2		
2- Radiation characteristics	2		
3- Dosimetry	2		
4- Shielding and measurement techniques	2		
5- Radioactivity alpha, beta, and gamma radiations	2		
6- Ionizing and non-ionizing radiation	2		
7- Instrumentation, detectors, and radiation monitoring	2		
8- Introduction to X-ray	3		
9- Introduction to NMR	3		
10- X-ray, characteristics, function, and production	3		
11- X-ray, characteristics, function, and production	3		
Total hours	**24**		

4 – Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	A	Review of Radiation Sources, Activity, Man-made and Naturally Occurring Radioactivity	y				y	
	A	Describe of Interaction of Radiation with Matter: Beta Particles	y		y			
	A	Describe of Interaction of Radiation with Matter	y					
Intellectual Skills	**b1, b2, b3, b4**		**Lecture, Discussion, seminars and Brainstorming**					
Practical and professional skills	C1	Use roles of optimizing the radiation measurement devices and different techniques	Y	y	Y			
	C2	Summarize the importance of radiation physics laws	y		y			
	C3	Practice skills in writing reports in accordance with the course contents with acceptable scientific guidelines	y				y	
General Skills	d1, d2, d3		**Lectures, Discussions, Seminars, Problem solving, Brainstorming, computer**					

5- Students' Assessment Methods and Grading:

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	20 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	10 %
Oral exam	ILOs c, b	Thirteenth week	10 %
Final written exam	ILOs a, b, c	Fourteenth week	60 %
Total			100 %

6- List of references:

6-1 Course notes

Fundamentals of *Radiation Physics*

6-3 Recommended books.

1-Radiation Biophysics - Second Edition (by Edward L. Alpen)
3-Physics for Radiation Protection (by James E. Martin)

6-4 Periodicals, Web sites, etc.

1-www.hps.org/,

7- Facilities required for teaching and learning:

1- Blackboard
2- projector
3- Computers

Course coordinator: Asst. Prof. Hala El Nagar

Head of the Department: Prof. Dr. Saeed El-Sayed Abdel Ghany
Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification

239 G: Crystallography and optical mineralogy (1)

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	Department of Geology
Department offering the course:	Department of Geology
Academic year/level:	Second level

B - Basic information

Title: Crystallography and optical mineralogy (1)	**Code: 239 G**	**Year/level:** Second level
Teaching Hours:	**Lectures:** 2	**Tutorial:** 0
	Practical: 3	**Total:** 5 h/week

C - Professional information

4 – Course Learning Objectives:

This course is designed to introduce students to the different systems and classes of crystal forms for mineralogical applications and solid-state physics. Identifying the crystal system and related proporeties is a clue to understanding the behavior of crystalline materials. Optical mineralogy deals with the polarizing microscope and uses the optical properties of minerals for their identification. Fundamentals of the polarized light and birefraction form a significant part serves a wide variety of applications in physics and chemistry.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1. detect the interrelationship between crystallography and optical mineralogy,
a2. recognize the applications of crystal forms and symmetry in geological and other natural science fields,
a3. describe the crystal forms and identify each shape if composite,
a4. demonstrate the basics and theories of mineral optics using polarized light.

b - Intellectual skills:

On successful completion of the course, the student should be able to:

b1. Differentiate between different types of crystal forms,
b2. Determine the symmetry elements of crystalline materials,
b3. Envisage the basic and advanced techniques and methods to optical mineralogy,
b4. Study the different minerals based on their optical properties.

c - Practical and professional skills:

On successful completion of the course, the student should be able to:

c1. recognize the crystal system and class of a given mineral,
c2. check the symmetrical elements of a crystalline material,
c3. use the polarizing microscope and identify minerals and their optical properties,
c4. apply the investigation results for mineral classification and distinctions.

d - General skills:

On successful completion of the course, the student should be able to:

d1. collect data from sample examination and other data resources,
d2. reproduce the results to meet the projected goals in an easy, readable final form,
d3. collaborate and work in team smoothly adhere to ethics and manage time.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
79. Introduction and course description	2	0	3
80. Fundamentals of crystallography	2	0	3
81. Crystal properties and crystal systems	2	0	3
82. The 32 crystallographic classes: classification	2	0	3
83. The isometric and tetragonal systems	2	0	3
84. Orthorhombic and monoclinic systems	2	0	3
85. Heagaonal and trigonal systems	2	0	3
86. Triclinic system and composite cystal forms	2	0	3
87. Classification of minerals	2	0	3
88. The polarizing microscope: properties normal light	2	0	3
89. Optical properties of minerals in plane polarized light	2	0	3
90. Optical properties of minerals between crossed nicols	2	0	3
91. Isotropic and anisotropic minerals	2	0	3
92. Revision and course evaluation/feedback	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	Detect the interrelationship between crystallography and optical mineralogy	x	x	o	x	o	o
	a2	Recognize the applications of crystal forms and symmetry in geological and other natural science fields	x	x	o	o	o	x
	a3	Describe the crystal forms and identify each shape if composite	x	x	o	x	x	x
	a4	Demonstrate the basics and theories of mineral optics using polarized light.	x	x	o	x	o	o
Intellectual Skills	b1	Differentiate between different types of crystal forms	x	x	o	x	x	x
	b2	Determine the symmetry elements of crystalline materials	x	o	o	x	o	o
	b3	Envisage the basic and advanced techniques and methods to optical mineralogy	x	x	o	x	x	o
	b4	Study the different minerals based on their optical properties	x	x	x	x	o	o
Practical and professional skills	c1	Recognize the crystal system and class of a given mineral	o	x	x	x	x	o
	c2	Check the symmetrical elements of a crystalline material	x	x	o	x	o	o
	c3	Use the polarizing microscope and identify minerals and their optical properties	x	x	o	x	x	o
	c4	Apply the investigation results for mineral classification and distinctions.	x	x	o	x	o	x
General Skills	d1	Collect data from sample examination and other data resources	x	x	x	x	o	o
	d2	Reproduce the results to meet the projected goals in an easy, readable final form	x	x	o	x	o	o
	d3	Collaborate and work in team smoothly adhere to ethics and manage time.	x	x	o	x	x	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exams to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s) approved by the department.

6-2 Required books.

None

6-17 Recommended books

Introduction to Crystallography and Mineral Crystal Systems
http://www.rockhounds.com/rockshop/xtal/index.shtml

William Nesse 2012 Introduction to Optical Mineralogy
Oxford University Press; Fourth Edition edition (March 31 2012) 368 pages,

6-18 Periodicals, Web sites, etc.

http://dave.ucsc.edu/myrtreia/crystal.html

7- Facilities required for teaching and learning:

Power point presentations
Data show
Sound system to ensure the ease listening
Group discussions

Course coordinator: Dr. Moustafa M. Mogahed
Head of the Department: Prof. Dr. Gamal El Qot
Date: 2022

Course Specification

Geo 240:Geographic Information System

A- Affiliation

Relevant program: **B.Sc.in Geology**
Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Second level**

B - Basic information

Title:Geographic Information System		**Code: Geo 240**	**Year/level:** Second level
Teaching Hours:		**Lectures:** 1	**Tutorial:** 0
		Practical:3	**Total:**4 h/week

C - Professional information

1– Course Learning Objectives:

This course is designed to deliver a theoretical and practical understanding of how students can identify the computer-based database management system for capture, storage, retrieval, analysis, and display of spatial data. Students who complete this program will be better prepared to map data for decision-making in business, environmental protection, risk assessment, utility planning and management, emergency response, land use planning, transportation planning, delivery route planning, real estate, and crime prevention.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1.recognize the fundamentals of GIS in geology and other geosciences,
a2. review the basics of projection methods and layer systematics,
a3. demonstrate the basic skills required for GIS based geological projects,
a4. relaize the increasing need for GIS based maps and datasets.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. differentiate between different types of map projections,
b2.determine the database elements,
b3.demenostsate the basic and progressed techniques and methods in GIS,

b4.recognize the different environments of GIS work.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1.use the software for creating data sets in a GIS environment,

c2.analyze the components of a GIS mapping,

c3.explore a GIS project and identify elements and their properties,

c4.envisage the symbols and layers of a composite data set.

d - General skills:

On successful completion of the course, the student should be able to:

d1. collect data from sample examination and other data resources,

d2. reproduce the results to meet the projected goals in an easy, readable final form,

d3. collaborate and work in team smoothly adhere to ethics and manage time.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1- Introduction and course description	1	0	3
2- Mapping Data	1	0	3
3- Data Processing	1	0	3
4- Advantages of Digital Storage	1	0	3
5- Functions of Geological Information System	1	0	3
6- Components of Geological Information System	1	0	3
7- Planning for Geological Information System	1	0	3
8- ArcGIS environment	1	0	3
9- Geocoding	1	0	3
10- Working with Geodatabases	1	0	3
11- Basic Editing in ArcMap	1	0	3
12- Coordinate Systems and Map Projections	1	0	3
13- Drawing and Symbolizing Features	1	0	3
14- Revision and course evaluation/open session	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes	Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming

Knowledge & Understanding	a1	recognize the fundamentals of GIS in geology and other geosciences,	√	√		√		
	a2	review the basics of projection methods and layer systematics,	√	√	√	√	√	√
	a3	demonstrate the basic skillsrequired for GIS based geological projects,	√	√	√	√	√	√
	a4	relaize the increasing need for GIS based maps and datasets.	√	√	√	√		
Intellectual Skills	b1	differentiate between different types of map projection,	√	√		√	√	√
	b2	determine the database elements,	√			√		
	b3	demenostsate the basic and progressed techniques and methods in GIS,	√			√	√	
	b4	recognize the different environments of GIS work.	√	√	√	√		
Practical and professional skills	c1	use the software for creating data sets in a GIS environ,		√	√	√	√	
	c2	analyze the component of a GIS map,	√	√		√		
	c3	explore a GIS project and identify elements and their properties,	√	√		√	√	
	c4	envisage the symbols and layers of a composite data set.	√	√		√		√
General Skills	d1	collect data from sample examination and other data resources,	√	√	√	√		
	d2	reproduce the results to meet the projected goals in an easy, readable final form,	√	√		√		
	d3	collaborate and work in team smoothly adhere to ethics and manage time.	√	√		√	√	√

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activates and quizzes to assess the student progress and personal attitude,

5.2. Assignments to assess the student independent work,

5.3. Written mid-term exam to ensure the student progress and discover the shortage,

5.4. Final written and oral exams to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester Work	a1-a2, a3,b1, b2, b4, and c1	Fifth week	15 %
Mid-Term Exam	a1, a5, b3, b4.	Seventh week	5%

Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	a2, a3, a4, a5, b5, b1, c2, c3	Thirteenth week	5 %
Written exam	a1, a2, a3, a5, b1, b2, b4, b5, c1, c2, c3, d1.	Fourteenth week	50 %
Total			100 %

-Course matrix

Contents	Knowledge and understanding				Intellectual skills				Practical and professional skills				General skills			
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction and course description	x						x						x			
Mapping Data		x				x					x					x
Data Processing				x												
Advantages of Digital Storage			x													
Functions of Geological Information System				x										x		
Components of Geological Information System						x				x						
Planning for Geological Information System		x						x						x		
ArcGIS environment			x										x			
Geocoding		x							x						x	
Working with Geodatabases	x						x					x		x		
Basic Editing in ArcMap			x			x							x			
Coordinate Systems and Map Projections		x								x					x	
Drawing and Symbolizing Features		x														x
Revision and course evaluation/open session			x											x		

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s)approved by the department council

6-2 Required books

None

6-19 Recommended books

-Geographic Information Systems and Science (by Paul A. Longley)

-A to Z GIS: An Illustrated Dictionary of Geographic Information Systems (by Tasha Wade)

-Geographic information system from start, 2007, Dr. Ahmed Saleh El Shemry.

-أساسيات نظم المعلومات الجغرافية للدكتور/ وسام الدين محمد، 2008

6-20 Periodicals, Web sites, etc.

7- Facilities required for teaching and learning:

Power point presentations

Data show

Software

Sound system to ensure the ease listening

Group discussions

Course coordinator:	Prof. Maher El Amawy
	Prof. Wael Hagag
Head of the Department:	Prof. Dr. Gamal El Qot
Date:	2022/2023

Course Specification

240 Ph: Principals of Modern Physics

A. Affiliation

Relevant program:	B.Sc. in Geology Program
Department offering the program:	Department of Geology
Department offering the course:	Department of Physics
Academic year/level:	Second level

B. Basic information

Title: Principles of Modern Physics	**Code:**240 Ph	**Year/level:** second level
Teaching Hours:	**Lectures:**2	**Tutorial:** -
	Practical:2	**Total:**4 h/week

C. Professional information

1. Course Learning Objectives:

By Finishing of this course the graduate will able to

Recognize the concept of Newtonian relativity and Galilian transformation of coordinates Study postulates of special relativity and its applications in time dilation and length contraction. Illustrate black body radiation in two cases: classical and quantum concept. Illustrate photoelectric effect using classical concept and Einstein concept which agree with the experiment. Introduce the x-ray and Compton effect to discuss the concept of particle wave complementarity. Illustrate quantum Bohr model of atom which helps understanding of some spectral series for hydrogen atom and prediction to other spectral lines.

2. Intended Learning Outcomes (ILOS)

a. Knowledge and understanding:

On successful completion of the course, the student should demonstrate knowledge and understanding of:

a1. Recognize the difference between Newtonian relativity concept and Einstein relativity.

a2. Investigate the black body radiation in two cases: classical and quantum concept.

a3. Illustrate photoelectric effect using classical concept and Einstein concept which agree with the experiment.

a4. Describe the x-ray and Compton effect and Uncertainty principle.

a5. Investigate the quantum Bohr model of atom to calculate spectral series for hydrogen atom.

b. Intellectual skills:

On successful completion of the course, the student should be able to.

b1. Exam the validity of different atomic modes.

b2. Collect, summarize and analyze the practical data.

b3. Reason in any atomic phenomena by a logic way.

b4. Interest in X-ray applications.

c. Practical and professional skills:

On successful completion of the course, the student should be able to.

c1. Collect and analyze the atomic spectra.

c2. Design the computer programs to describe the atomic spectroscopy.

c3. Sketch the phase diagram for different types of materials.

d. General skills:

On successful completion of the course, the student should be able to.

d1. Solve problems in time dilation and length contraction using Lorentz trans formations.

d2. Communicate to work efficiently in a team or separately.

d3. Collect data and wrighting reports in the different model of atom and x-ray.

3. Contents

No	Topic	Lecture hours	Tutorial hours	Practical hours
1	Principles of Modern Physics	2		4
2	Black body radiation	2		2
3	Plank's low and photoelectric effect	4		3
4	Rutherford model hydrogen atom	2		2
5	Bohr and Somerfield theories	4		4
6	Compton effect	2		2
7	**Mid-Term Exam**	2		4
8	De proglie waves and Uncertainty Principles	4		2
9	Principle of special relativistic theory	6		5
	Total hours	**28**		**28**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1.	Recognize the difference between Newtonian relativity concept and Einstein relativity.	✓		✓		✓	
	a2.	Investigate the black body radiation in two cases: classical and quantum concept	✓			✓		✓
	a3.	Illustrate photoelectric effect using classical concept and Einstein concept which agree with the experiment	✓		✓	✓		
	a4.	Describe the x-ray and Compton effect and Uncertainty principle	✓		✓		✓	
	a5.	Investigate the quantum Bohr model of atom to calculate spectral series for hydrogen atom	✓			✓		✓
Intellectual Skills	b1.	Exam the validity of different atomic modes.	✓			✓		
	b2.	Collect, summarize and analyze the practical data.	✓		✓			✓
	b3.	Reason in any atomic phenomena by a logic way.	✓					
	b4.	Interest in X-ray applications	✓					
Practical and professional skills	c1.	Collect and analyze the atomic spectra	✓					
	c2.	Design the computer programs to describe the atomic spectroscopy	✓		✓		✓	
	c3.	Sketch the phase diagram for different types of materials	✓		✓	✓		
General Skills	d1.	- Solve problems in time dilation and length contraction using Lorentz trans formations	✓				✓	✓
	d2.	Communicate to work efficiently in a team or separately	✓		✓	✓		
	d3.	Collect data and wrighting reports in the different model of atom	✓		✓			✓

5. Students' Assessment Methods and Grading:

Tools	To Measure	Time schedule	Grading
Semester Work	a1, a2, a4, b1, b2 and d1	Fifth week	5 %
Mid-Term Exam	a1, a2, a3, b2, d1, and d2	Seventh week	5 %
Oral exam	a1, a3, a4, b1, b3, c1, and d2	Thirteenth week	10 %
Written exam	a1, a2, a3, a4, b1, b2, b3, c1, d1and d2	Fourteenth week	80 %
Total			100 %

6. List of references:

6.1. Course notes

Manual notebook

6.2. Required books.

The concepts and theories of modern physics, 2006, by John Bernhard Stallo

6.3. Recommended books.

Concepts of Modern Physics, 2008, by Arthur Beiser

Ancient and Modern Physics, 2010, by Thomas E. Willson

6.4. Periodicals, Web sites, etc.

http://www. Physics2000

http://www. Physics today

7. Facilities required for teaching and learning:

Using a microphone in lectures

Using a black board

Group Discussions

Data show

Course coordinator:

Assistant Professor Dr. Hassan Omar

Associate Professor Dr. Ibrahim Almashad

Head of the Department: Prof. Dr. Saeed El-Sayed Abdel Ghany

Date: **2022-2023**

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 300- Environmental Geology

A- Affiliation

Relevant program: B.Sc. in GeologyProgram
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Third level

B - Basic information

Title: Environmental Geology **Code:300-Geo** **Year/level:** Third level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:**4 h/week

C - Professional information

1 – Course Learning Objectives:

- Understand the principles of Environmental Geology and its significance in addressing contemporary environmental issues.
- Analyze geologic processes and hazards (e.g., earthquakes, landslides, volcanoes) and their environmental impacts.
- Evaluate earth materials and their susceptibility to pollution and contamination.
- Investigate water resources, hydrogeology, and water management for environmental sustainability.
- Assess geological aspects influencing land use planning, urbanization, and infrastructure development, considering potential geologic hazards.
- Apply geologic knowledge to conduct environmental impact assessments, manage geohazards, address natural resource utilization, and promote ethical considerations in environmental decision-making.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

1. Gain a comprehensive understanding of the fundamental principles of environmental geology and its application to real-world environmental issues.
2. Acquire knowledge about geologic processes and hazards, including their potential impact on the environment and human society.

3. Understand the distribution, formation, and properties of earth materials, and their relevance to environmental pollution and contamination.
4. Develop an awareness of water resources, hydrogeology, and their significance for sustainable water management.
5. Familiarize with the geological factors influencing land use planning, urbanization, and infrastructure development, while considering potential geologic hazards.
6. Comprehend the geological aspects of climate change, including their implications for the environment and the identification of related geological records.

b - Intellectual skills:

On successful completion of the course, the student should be able to:

1. Analyze and evaluate geologic processes and hazards, demonstrating the ability to interpret their environmental impacts and associated risks.
2. Critically assess earth materials in the context of pollution, contamination, and sustainable resource utilization.
3. Apply geological knowledge to evaluate and conduct environmental impact assessments for various human activities.
4. Analyze and manage geological hazards, including the development of risk assessment and mitigation strategies.
5. Interpret geological records of climate change and use them to understand past environmental variations.
6. Utilize critical thinking skills to identify geological contributions to environmental policy and land-use planning.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

1. Apply geologic monitoring techniques to assess and develop early warning systems for geologic hazards and environmental changes.
2. Propose and apply strategies for environmental remediation and restoration of polluted or degraded sites.
3. Communicate geological concepts and findings effectively through written reports, presentations, and visual aids.
4. Demonstrate the ability to conduct environmental fieldwork, collect relevant data, and apply geological techniques.
5. Engage in ethical decision-making related to environmental geology issues, considering societal and environmental implications.

d - General skills:

On successful completion of the course, the student should be able to:

1. Enhance problem-solving skills by integrating geological knowledge with environmental challenges.
2. Develop effective communication and collaboration skills to work with diverse stakeholders in environmental decision-making.
3. Foster self-directed learning and research skills to stay informed about current environmental geology practices and advancements.
4. Cultivate a sense of environmental responsibility and awareness, promoting sustainable practices in both personal and professional

contexts.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
93. Introduction to Environmental Geology	1	0	3
94. Geologic Processes and Environmental Hazards	1	0	3
95. Earth Materials and Environmental Pollution	1	0	3
96. Water Resources and Hydrogeology	1	0	3
97. Urbanization and Land Use Planning	1	0	3
98. Geological Aspects of Climate Change	1	0	3
99. Environmental Impact Assessment	1	0	3
100. Geohazards and Risk Assessment	1	0	3
101. Natural Resources and Sustainable Development	1	0	3
102. Environmental Remediation and Restoration	1	0	3
103. Geological Contributions to Environmental Policy	1	0	3
104. Geologic Monitoring and Early Warning Systems	1	0	3
105. Environmental Geology and Public Awareness	1	0	3
106. Ethical Considerations in Environmental Geology	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	1	Gain a comprehensive understanding of the fundamental principles of environmental geology and its application to real-world environmental issues.	x	0	x	0	0	x
	2	Acquire knowledge about geologic processes and hazards, including their potential impact on the environment and human society.	x	x	0	0	0	0
	3	Understand the distribution, formation, and properties of earth materials, and their relevance to environmental pollution and contamination.	x	0	0	0	0	x
	4	Develop an awareness of water resources, hydrogeology, and their significance for sustainable water management.	x	x	0	0	X	x
	5	Familiarize with the geological factors influencing land use planning, urbanization, and infrastructure development, while considering potential geologic hazards.						
	6	Comprehend the geological aspects of climate change, including their implications for the environment and the identification of related geological records.						
Intellectual Skills	1	Analyze and evaluate geologic processes and hazards, demonstrating the ability to interpret their environmental impacts and associated risks.	**x**	0	0	**0**	**X**	**0**
	2	Critically assess earth materials in the context of pollution, contamination, and sustainable resource utilization.	**x**	0	0	**0**	**x**	**x**
	3	Apply geological knowledge to evaluate and conduct environmental impact assessments for various human activities.	x	0	0	**0**	**X**	**0**
	4	Analyze and manage geological hazards, including the development of risk assessment and mitigation strategies.						
	5	Interpret geological records of climate change and use them to understand past						

		environmental variations.						
	6	Utilize critical thinking skills to identify geological contributions to environmental policy and land-use planning.						
Practical and professional skills	1	Apply geologic monitoring techniques to assess and develop early warning systems for geologic hazards and environmental changes.	x	0	0	0	X	x
	2	Propose and apply strategies for environmental remediation and restoration of polluted or degraded sites.	x	0	0	0	X	x
	3	Communicate geological concepts and findings effectively through written reports, presentations, and visual aids.	x	0	0	0	x	x
	4	Demonstrate the ability to conduct environmental fieldwork, collect relevant data, and apply geological techniques.						
	5	Engage in ethical decision-making related to environmental geology issues, considering societal and environmental implications.						
General Skills	1	Enhance problem-solving skills by integrating geological knowledge with environmental challenges.	x	x	0	0	0	x
	2	Develop effective communication and collaboration skills to work with diverse stakeholders in environmental decision-making.	x	x	o	o	o	x
	3	Foster self-directed learning and research skills to stay informed about current environmental geology practices and advancements.	x	x	o	o	x	x
	4	Cultivate a sense of environmental responsibility and awareness, promoting sustainable practices in both personal and professional contexts.	x	x	o	o	x	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude.
5.2. Assignments to assess the student independen work,
5.3. A field trip.
5.4. Written mid-term exam to ensure the student progress and discover the shortage.
5.5. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Manual notes handle of Environmental Geology for students.

6-2 Required books

none

6-21 Recommended books

Montgomery, Carla W. "Environmental Geology." New York: McGraw-Hill Education, 2017.

Turk, Jon, and David M. Mankin. "Environmental Geology: Facing the Challenges of Our Changing Earth." Hoboken, NJ: Wiley, 2017.

Eby, G. Nelson. "Principles of Environmental Geochemistry." Boston, MA: Brooks/Cole, 2003.

Please note that publication years and editions may vary, so it's essential to check for the most recent editions when accessing these textbooks.

6-22 Periodicals, Web sites, etc.

www.sciencedirect.com&www.geology.com

7- Facilities required for teaching and learning:

Data show
Using a blackboard
Group discussions

Course coordinators: Prof. Dr. Sayed Mahfouz Ahmed
Prof. Dr. Emad Sallam

Head of the Department: Prof. Dr. Gamal El Qot
Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 302: Mining Geology

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Third level**

B - Basic information

Title: Mining Geology	**Code: Geo 302**	**Year/Level:** Third level
Teaching Hours:	**Lectures:** 2	**Tutorial:** 0
	Practical: 0	**Total:** 2 h/week

C - Professional information

5 – Course Learning Objectives:

The course looks at the minerals industry and the geology and mineralogy of major ore deposits including copper, gold and iron. This information will be integrated with introductory material on the exploration process, mining methods, minerals processing, metals markets and socio-economic factors..

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. understand the nature and importance of the Egyptian Resource Industry;
a2. describe the variety of mineral deposits and how they are found and formed;
a3. identify common rock types and minerals found in and around ore deposits;
a4. demonstrate knowledge of the variety of ore-forming processes;
a5. differentiate between resources and reserves and how to estimate them;
a6. understand and describe resource operations from exploration to development;
a7. be conversant with resource distribution during the evolution of the Earth;
a8. demonstrate ability to understand the debate about some controversial issues affecting mining and society.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. informed and infused by cutting edge research, scaffolded throughout their program of studies

b2. acquired from personal interaction with research active educators, from year 1

b3. accredited or validated against national or international standards (for relevant programs).

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. adept at operating in other cultures

c2. comfortable with different nationalities and social contexts

c3. able to determine and contribute to desirable social outcomes

c4. demonstrated by study abroad or with an understanding of indigenous knowledges.

d - General skills:

On successful completion of the course, the student should be able to:

d1. a capacity for self-reflection and a willingness to engage in self-appraisal.

d2. open to objective and constructive feedback from supervisors and peers.

d3. able to negotiate difficult social situations, defuse conflict and engage positively in purposeful debate.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
107. Introduction and course description	2	0	0
108. Economic and Mine Geology	2	0	0
109. Introduction to Magmatic Ore Deposits	2	0	0
110. Introduction to Hydrothermal Ore Deposits	2	0	0
111. Hydrothermal Ore Deposits	2	0	0
112. Introduction to Coal and Petrolium Geology	2	0	0
113. Mining and Society (including cultural heritage)	2	0	0
114. The Exploration Process	2	0	0
115. Exploration geochemistry and target definition	2	0	0
116. The Uranium Industry	2	0	0
117. Introduction to mining (open pit and underground)	2	0	0
118. Mining and the Environment	2	0	0
119. Reporting and 3D modelling, The Future of Mining and Industry Careers Session	2	0	0
120. Revision and course evaluation/open session	2	0	0
Total hours	**28**	0	**0**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	understand the nature and importance of the Egyptian Resource Industry	√	√				
	a2	describe the variety of mineral deposits and how they are found and formed			√			
	a3	identify common rock types and minerals found in and around ore deposits					√	
	a4	demonstrate knowledge of the variety of ore-forming processes	√	√			√	√
	a5	differentiate between resources and reserves and how to estimate them		√				√
	a6	understand and describe resource operations from exploration to development	√					
	a7	be conversant with resource distribution during the evolution of the Earth			√			
	8	demonstrate ability to understand the debate about some controversial issues affecting mining and society.	√	√				
Intellectual Skills	b1	informed and infused by cutting edge research, scaffolded throughout their program of studies	√	√			√	√
	b2	acquired from personal interaction with research active educators, from year 1	√					
	b3	accredited or validated against national or international standards (for relevant programs).	√	x			√	
Practical and professional skills	c1	adept at operating in other cultures		√	√		√	
	c2	comfortable with different nationalities and social contexts	√	√				
	c3	able to determine and contribute to desirable social outcomes	√	√			√	
	c4	demonstrated by study abroad or with an understanding of indigenous knowledges	√	√				√
Gen	d1	a capacity for self-reflection and a	√	√	√			

		willingness to engage in self-appraisal.						
	d2	open to objective and constructive feedback from supervisors and peers.	√	√				
	d3	able to negotiate difficult social situations, defuse conflict and engage positively in purposeful debate.	√	√			√	√

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exams to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	20 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	10 %
Oral exam	ILOs c, b	Thirteenth week	10 %
Final written exam	ILOs a, b, c	Fourteenth week	60 %
Total			100 %

6- List of references:

6-1 Course notes
Lecture notes prepared by the course instructor(s) approved by the department council

6-2 Required books
None
6-23 Recommended books

Introduction to the Rock-Forming Minerals Third Edition
by W. a. Deer, R. a. Howie, J. Zussman
Paperback: 510 pages
Publisher: Mineralogical Society; Third edition (May 16, 2013)
Language: English
ISBN-10: 0903056275
ISBN-13: 978-090305627

6-24 Periodicals, Web sites, etc.

http://www.indiana.edu/~geol105/images/gaia_chapter_6/mining geology.htm

7- Facilities required for teaching and learning:

Power point presentations
Data show
Sound system to ensure the ease listening
Group discussions

Course coordinator: Prof. Dr. Abdel Aziem M. Mehanna

Head of the Department: Prof. Dr. Gamal El-Qot
Date: 2022

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 305: Field trip (1)

A- Affiliation

Relevant program: B.Sc. in Geology
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Third level

B - Basic information

Title: Field trip (1) **Code: Geo 305** **Year/level:** Third level
Teaching Hours: **Lectures:** 0 **Tutorial:** 0
Practical: 3 **Total:** 1 h/week

C - Professional information

1 – Course Learning Objectives:

The main objectives of the field course are to provide the student with the following skills:

- Map location with pocket transit and GPS, including triangulation with topographic maps.
- Basic map location techniques with the pocket transit and topographic map (Hand-leveling, triangulation, etc.).
- Topographic and geologic survey techniques with the pocket transit/GPS.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1- know data and information from different sources about a certain topic.
a2- understand essay or research about a given topic.
a3-Geologic field mapping and structural analysis in a poly-deformed metamorphic and igneous terranes and folded to undeformed sedimentary rocks.
a4- Measurement of stratigraphic section and construction of stratigraphic columns with detailed description.
a5- Construction of geologic cross-sections.

b - Intellectual skills:

On successful completion of the course, the student should be able to:

b1- interpret logically

b2- solve problems
b3- interpret accuracy

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1- differentiate available tools to solve a problem or to collect data.
c2- investigate certain subject.
c3- differentiate the basic units of the research including the introduction, material and methods, results, discussions and references

d - General skills:

On successful completion of the course, the student should be able to:

d1. Computer, internet & communications.
d2. Management, working in group & life-long learning.
d3. Ethical behavior, community linked thinking.
d4- How to plan efficient use time
d5- Use of WWW and electronic library for search

3 - Contents

Topic	Lecture hours	Tutorial hours	Practical hours
Geology department organize geologic field trip (10 days) to one of the mountainous terrains in Egypt to train the student on the geologic field work and sample collecting and the basis of geological mapping and the student must introduce comprehensive geologic report about the different activity during the field trip and this report will be evaluated as practical paper. Before the trip the following topics will be covered within the course.			
121. Field Equipment, and rules-, behaviour- and safety in the Field	0	0	3
122. Field-structural skills	0	0	3
123. Observations At Different Scales	0	0	3
124. Description of ignous/ metamorphic rocks	0	0	3
125. Differentiate between different rock types in the field			
126. Geologic structures in the field	0	0	3
127. Measuring structural elements in the field	0	0	3
128. Geologic - and structural- traverses	0	0	3
129. Interpretations based on limited data and time	0	0	3
130. Reporting measurements and observations	0	0	3
131. Geologic mapping techniques	0	0	3
132. Mineral resources in the field	0	0	3
133. Filed study in hydrology	0	0	3
134. i technical reports and structural history	0	0	3
135. Writing technical reports and structural history	0	0	3
Total hours	**0**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	know data and information from different sources about a certain topic	x	0	x	0	0	x
	a2	understand essay or a research about a given topic	x	x	0	0	0	0
	a3	Geologic field mapping and structural analysis in a polydeformed metamorphic and igneous terranes, and folded to undeformed sedimentary rocks.	x	0	0	0	0	x
	a4	Measurement of stratigraphic section and construction of stratigraphic columns with detailed description.	x	x	0	0	X	x
	a5	Construction of geologic cross-sections.	x					
Intellectual Skills	b1	interpret logically	**x**	0	0	**0**	**X**	**0**
	b2	solve problems	**x**	0	0	**0**	**x**	**x**
	b3	interpret accuracy	x	0	0	**0**	**X**	**0**
Practical and professional skills	c1	differentiate available tools to solve a problem or to collect data.	x	0	0	0	X	x
	c2	investigate certain subject.	x	0	0	0	X	x
	c3	differentiate the basic units of the research including the introduction, material and methods, results, discussions and references	x	0	0	0	x	x
General Skills	d1	Computer, internet & communications.	x	x	0	0	0	x
	d2	Management, working in group & life-long learning	x	x	o	o	o	x
	d3	Ethical behavior, community linked thinking.	x	x	o	o	x	x
	d4	How to plan efficient use time	x	x	0	0	x	x
	d5	Use of WWW and electronic library for	x	0	x	0	x	x

		search						

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude.
5.2. Assignments to assess the student independen work,
5.3. A field trip.
5.4. Written mid-term exam to ensure the student progress and discover the shortage.
5.5. Final written and oral exam to evaluate students and promote for other consequent courses.

6- List of references:
6-1 Course notes
Manual of Field Geology

6-2 Required books.

Davis, George H., 1984, Structural Geology of Rocks and Regions: John Wiley & Sons, Inc., New York, New York, 492p.

6-25 Recommended books

Marshak, Stephen and Mitra, Gautam, 1988, Basic methods of structural geology: Prentice Hall, Englewood Cliffs, New Jersey, 446p.

6-26 Periodicals, Web sites, etc.
www.sciencedirect.com & www.geology.com

7- Facilities required for teaching and learning:
Data show
Using a blackboard
Group discussions

Course coordinator:	Prof. Dr.Abdel Aziem M. Mehanna
	Prof. Dr. Mohamed El-Fakharany
	Dr.0 Moustafa M. Mogahed
Head of the Department:	Prof. Dr. Gamal El-Qot
Date:	2022

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 310-Stratigraphy

A- Affiliation

Relevant program: B.Sc. in GeologyProgram
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Thırd level

B - Basic information

Title: Stratigraphy **Code:310-Geo** **Year/level:**Thırd level
Teaching Hours: **Lectures:** 2 **Tutorial:** 0
Practical: 3 **Total:**5 h/week

C - Professional information

1 – Course Learning Objectives:

- The objectives of this course are to enable the students to identify the difference between the lithostratigraphy, biostratigraphy and chronostratigraphy.
- To understand the modern stratigraphic classification
- To explain the stratigraphic procedures, relationships and stratigraphic correlation.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1-differentiate between the different types of the stratigraphy.
a2- identify the main principles of stratigraphy.
a3- recognize the different stratigrahic relationships and stratigraphic correlation.
a4-identifythe various kinds of the index fossils.
a5-identify the standard biozones of the phanerozoic of Egypt and their various kinds.

b - Intellectual skills:

On successful completion of the course, the student should be able to:

b1- solve the stratigraphic problems and deduce the data of the rock units correlation.
b2- design the fossil tool in description the environmental condition.
b3-identify the most common standard biozones of the phanerozoic.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1- draw the stratigraphic sections and correlate between the different rock units.
c2-differentiate the various kinds of biozones of some exposed rock stages and correlate them with some neighboring countries.
c3-interpretethe litho-, biostratigraphicdata.
c4- differentiate between the different lithostratigraphicunits in the field.

d - General skills:

On successful completion of the course, the student should be able to:

d1- Use computer, internet & communications.
d2- Management, working in group & life-long learning.
d3- Ethical behavior, community linked thinking.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
136. Introduction to stratigraphy	2	0	3
137. Stratigraphic concepts	2	0	3
138. The Stratigraphic principles	2	0	3
139. Modern stratigraphic classification	2	0	3
140. The staratigraphic time scale	2	0	3
141. The stratigraphic procedures	2	0	3
142. The stratigraphic relationships	2	0	3
143. The stratigraphic correlation	2	0	3
144. Introduction to Bio-Stratigraphy	2	0	3
145. The principles of biostratigraphy	2	0	3
146. The Biozones and correlation using the Index fossils	2	0	3
147. Methods of Geological dating using index fossils and radiometric methods	2	0	3
148. The most common biozones through the phanerozoic of Egypt	4	0	6
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	differentiate between the different types of the stratigraphy.	X	0	x	0	0	x
	a2	identify the main principles of stratigraphy.	X	x	0	0	0	0
	a3	recognize the different stratigrahic relationships and stratigraphic correlation.	X	0	0	0	0	x
	a4	identify the various kinds of the index fossils.	X	x	0	0	X	x
	a5	identify the standard biozones of the phanerozoic of Egypt and their various kinds.	X	0	0	0	X	x
Intellectual Skills	b1	solve the stratigraphic problems and deduce the data of the rock units correlation.	**X**	0	0	**0**	**X**	**0**
	b2	design the fossil tool in description the environmental condition.	**X**	0	0	**0**	**x**	**x**
	b3	identify the most common standard biozones of the phanerozoic.	X	0	0	**0**	**X**	**0**
Practical and professional skills	c1	draw the stratigraphic sections and correlate between the different rock units.	X	0	0	0	X	x
	c2	differentiate the various kinds of biozones of some exposed rock stages and correlate them with some neighboring countries.	X	0	0	0	X	x
	c3	interprete the litho-, biostratigraphic data.	X	0	0	0	x	x
	c4	differentiate between the different rock units in the field	X	0	0	0	X	x
General Skills	d1	Use computer, internet & communications.	X	x	0	0	0	x
	d2	Management, working in group & life-long learning.	X	x	o	o	o	x
	d3	Ethical behavior, community linked thinking.	X	x	o	o	x	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude.
5.2. Assignments to assess the student independen work,
5.3. A field trip.
5.4. Written mid-term exam to ensure the student progress and discover the shortage.
5.5. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Manual notes handle of Litho-, Biostratigraphy for students.

6-2 Required books

none

6-27 Recommended books

1.Text book: Concepts and methods of biostratigy
Author: Kauffman, E. G. & Hazel, J.E. 1977
2. Text book: Sedimentary Structures.
Author: Collinson, J. D. & Thompson, D. B. 1982.
3.Text book: Unlocking to the Stratigraphic Record
Author: Doyle, P. & Matthew, R. B, 1999.
4.Text book: Biostratigraphy: Microfossils and Geological Time
Author: Brian McGowran
Publisher: Cambridge University Press; 1 edition (January 1, 2008), 480 pages

6-28 Periodicals, Web sites, etc.

www.sciencedirect.com&www.geology.com

7- Facilities required for teaching and learning:

Data show
Using a blackboard
Group discussions

Course coordinators: Prof. Dr. Gamal El Qot
Prof. Dr. Hassan El-Sheikh
Prof. Dr. Refaat Osman

Head of the Department:	Prof. Dr. Gamal El Qot
Date:	2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 314-Vertebrate Paleontology

A- Affiliation

Relevant program: B.Sc. in GeologyProgram
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Thırd level

B - Basic information

Title: Vertebrate Paleontology **Code:314-Geo** **Year/level:**Thırd level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:**4 h/week

C - Professional information

1 – Course Learning Objectives:

- The objectives of this course are to Investigate the evolutionary relationships between broadfin fish and vertebrates, focusing on their impact on vertebrate development.
- Examine the transitional stages of vertebrate evolution from cartilaginous and bony fish to tetrapods, including the emergence of different groups of reptiles such as dinosaurs, marine reptiles, flying reptiles, and bird ancestors.
- Analyze the dominance of mammals during the Cenozoic Era and understand the factors that contributed to their evolutionary success in the context of the primordial Earth vertebrates' history..

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

1. Gain a comprehensive understanding of the evolutionary history of vertebrates, starting with the study of broadfin fish and their influence on vertebrate development.
2. Identify and compare the key characteristics of cartilaginous and bony fish,

discerning the evolutionary adaptations that led to the emergence of tetrapods.

3. Explore the diversity of primordial Earth vertebrates, including their morphology and ecological significance, and how they set the stage for subsequent vertebrate evolution.
4. Classify and analyze different groups of reptiles, from primary reptiles to dinosaurs, marine reptiles, flying reptiles, and bird ancestors, to discern the major milestones in their evolutionary journeys.
5. Understand the impact of the Cenozoic Era on the dominance of mammals, and how specific environmental and ecological factors contributed to their evolutionary success.
6. Develop critical thinking skills by evaluating the evidence supporting vertebrate evolutionary relationships, using fossils, comparative anatomy, and genetic data.
7. Apply knowledge gained from the course to interpret and contextualize current biodiversity patterns, making connections between the past and present to gain insights into future evolutionary trajectories.

b - Intellectual skills:

On successful completion of the course, the student should be able to:

1. Critical Thinking: Students will be required to critically evaluate and analyze complex scientific data, such as fossils, anatomical structures, and genetic evidence, to draw conclusions about the evolutionary history of vertebrates.

2. Problem Solving: Participants will encounter various challenges while interpreting incomplete fossil records or deciphering the relationships between different vertebrate groups, honing their problem-solving abilities.

3. Synthesis of Information: The course will necessitate synthesizing information from various sources, such as academic papers, textbooks, and fieldwork findings, to construct a coherent and comprehensive understanding of vertebrate evolution.

4. Analytical Reasoning: Students will employ analytical reasoning skills to compare and contrast the characteristics of different vertebrate groups and identify patterns that contribute to their evolutionary development.

5. Data Interpretation: Participants will learn to interpret complex datasets, including stratigraphic layers, morphological variations, and molecular phylogenies, to reconstruct the evolutionary history of vertebrates accurately.

6. Scientific Methodology: The course will emphasize scientific methodologies, including hypothesis testing, data collection, and data analysis, to approach research questions and draw evidence-based conclusions.

7. Research Skills: Students will develop research skills to locate, evaluate, and synthesize scientific literature related to vertebrate paleontology, fostering their ability to stay up-to-date with the field's latest advancements.

8. Attention to Detail: Vertebrate paleontology often requires meticulous attention to detail, especially when examining fossil remains or anatomical structures, fostering precision in observation and analysis.

9. Inference and Interpretation: Participants will engage in inferential reasoning, drawing conclusions about extinct species and their behavior based on limited evidence, a crucial skill in the field of paleontology.

10. Visual-Spatial Reasoning: Understanding and interpreting three-dimensional fossil remains will encourage the development of visual-spatial reasoning skills, enabling students to visualize and manipulate complex structures mentally.

11. Communication Skills: Students will be expected to effectively communicate their research findings and interpretations through written reports, presentations, and discussions, fostering clear and persuasive communication abilities.

12. Creativity and Imagination: Vertebrate paleontology often requires creative thinking to fill gaps in the fossil record or propose new theories about the evolutionary past, promoting imaginative problem-solving approaches.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

1. Fieldwork Techniques: Participants will gain practical experience in conducting field excavations, learning proper methods for fossil collection, documentation, and site preservation.

2. Fossil Preparation: Students will acquire skills in fossil preparation, including cleaning, consolidating, and repairing specimens for further study and display.

3. Laboratory Techniques: The course may involve training in various laboratory techniques, such as microscopy, imaging, and chemical analysis, used to study fossil specimens in detail.

4. Taxonomic Identification: Participants will learn how to identify and classify fossil specimens to the species level, gaining expertise in taxonomy and systematics.

5. Morphological Analysis: Students will develop the ability to analyze and interpret the morphological characteristics of fossils, extracting valuable information about the ancient organisms.

6. Data Management: Managing large datasets and keeping detailed records of fieldwork findings and laboratory analyses are essential skills for vertebrate paleontologists.

d - General skills:

On successful completion of the course, the student should be able to:

d1- Use computer, internet & communications.
d2- Management, working in group & life-long learning.
d3- Ethical behavior, community linked thinking.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
149. Introduction to Vertebrate Paleontology	1	0	3
150. Fossilization and Taphonomy	1	0	3
151. Vertebrate Evolution and Phylogeny	1	0	3
152. Early Vertebrate Evolution - From Broadfin Fish to Tetrapods	1	0	3
153. Cartilaginous and Bony Fish - Morphology and Diversification	1	0	3
154. Archosaurs - Dinosaurs and Their Relatives	2	0	6
155. Marine Reptiles - The Lords of the Ancient Seas	1	0	3
156. Flying Reptiles - Pterosaurs	1	0	3
157. Bird Ancestors and Avian Evolution	1	0	3
158. Mammals in the Mesozoic Era	1	0	3
159. Cenozoic Mammals - The Age of Mammalian Dominance	1	0	3
160. Ice Ages and Megafaunal Extinctions	1	0	3
161. Vertebrate Paleontology in Modern Science and Applications	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	Demonstrate a comprehensive understanding of the principles, concepts, and terminology in vertebrate paleontology.	x	0	x	0	0	x
	a2	Identify and differentiate between	x	x	0	0	0	0

		various types of vertebrate fossils and their significance in understanding evolutionary relationships.						
	a3	Recognize the geological context of vertebrate fossils, including stratigraphy, dating methods, and biostratigraphy.	x	0	0	0	0	x
	a4	Describe the evolutionary history and major transitions in vertebrate evolution, from early fish to the rise of mammals and birds.	x	X	0	0	X	x
	a5	Understand the diversity of vertebrate groups throughout geological time and their paleoecological roles in ancient ecosystems.	x	0	0	0	X	x
	a6	Identify and explain the significance of standard biozones in the Phanerozoic era, especially in the context of Egypt's paleontological history.						
Intellectual Skills	b1	Apply critical thinking and analytical reasoning to solve complex problems in vertebrate paleontology, including fossil identification and evolutionary interpretations.	**x**	0	0	**0**	**X**	**0**
	b2	Design and implement research methodologies to investigate and address questions related to the ancient environments and behavior of vertebrate organisms.	**x**	0	0	**0**	**x**	**x**
	b3	Analyze and interpret data from fossil discoveries, stratigraphic sequences, and biostratigraphy to draw evidence-based conclusions about vertebrate evolution.	x	0	0	**0**	**X**	**0**
	b3	Develop the ability to synthesize information from diverse sources and present well-reasoned arguments in scientific discussions related to vertebrate paleontology.						
Practical and professional skills	c1	Apply practical techniques for fieldwork, including fossil collection, preparation, and recording stratigraphic data in the context of vertebrate paleontology.	x	0	0	0	X	x
	c2	Use technical tools and software to create accurate stratigraphic sections, geological maps, and diagrams related to vertebrate fossil-bearing sites.	x	0	0	0	X	x
	c3	Demonstrate proficiency in distinguishing and classifying vertebrate fossils, as well as recognizing significant features for	x	0	0	0	x	x

		taxonomic identification.						
	c4	Practice effective communication skills for presenting research findings, both in written reports and oral presentations, to scientific audiences.	x	0	0	0	X	x
General Skills	d1	Utilize computer applications, internet resources, and digital databases to access and disseminate vertebrate paleontology knowledge effectively.	x	X	0	0	0	x
	d2	Develop project management skills, fostering the ability to organize research projects and work collaboratively in team settings.	x	X	o	o	o	x
	d3	Exhibit ethical behavior in the handling and conservation of vertebrate fossil specimens, considering the cultural, social, and environmental implications of paleontological research.	x	X	o	o	x	x
	d4	Demonstrate a commitment to lifelong learning and professional development, staying updated with the latest advancements in the field of vertebrate paleontology.						

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude.
5.2. Assignments to assess the student independen work,
5.3. A field trip.
5.4. Written mid-term exam to ensure the student progress and discover the shortage.
5.5. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes
Manual notes handle of Vertebrate Paleontology for students.

6-2 Required books
none

6-29 Recommended books
Title: "Vertebrate Paleontology" (Fourth Edition)
Author: Michael J. Benton
Publisher: Wiley-Blackwell
Year: 2014
ISBN: 978-1118407554

Title: "Principles of Vertebrate Paleontology" (Third Edition)
Authors: Michael J. Benton and David A. T. Harper
Publisher: Routledge
Year: 2018
ISBN: 978-1138049080

"Title: "Introduction to Vertebrate Paleontology
Author: David E. Fastovsky and David B. Weishampel
Publisher: Wiley
Year: 2013
ISBN: 978-0471399221

These books provide comprehensive coverage of vertebrate paleontology, offering valuable insights into the evolutionary history of vertebrates and the methods used in this field of study.

6-30 Periodicals, Web sites, etc.
www.sciencedirect.com&www.geology.com

7- Facilities required for teaching and learning:

Data show
Using a blackboard
Group discussions

Course coordinators: Prof. Dr. Gamal El Qot

Head of the Department: Prof. Dr. Gamal El Qot
Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 317- Paleonology

A- Affiliation

Relevant program: B.Sc. in GeologyProgram
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Thırd level

B - Basic information

Title: Paleonology **Code:317-Geo** **Year/level:**Thırd level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:**4 h/week

C - Professional information

1 – Course Learning Objectives:

- Understand the principles and methods of palynology, including the study of pollen grains and spores in sedimentary materials.
- Identify and classify various types of pollen and spores, analyzing their significance in reconstructing past climates, environments, and plant communities.
- Apply palynological data in stratigraphy, geochronology, paleoclimatology, and paleoenvironmental reconstructions.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

1. Demonstrate a comprehensive understanding of the fundamental principles and concepts of palynology, including the study of pollen grains, spores, and other microscopic organic materials found in sedimentary deposits.

2. Identify and differentiate various types of pollen grains and spores from different plant groups, and understand their significance in paleoenvironmental reconstructions and geological dating.

3. Comprehend the applications of palynological data in various fields, such as

stratigraphy, geochronology, paleoclimatology, and paleoenvironmental reconstructions.

4. Interpret and analyze palynological data sets, drawing evidence-based conclusions about past climates, vegetation dynamics, and ecological shifts throughout Earth's history.

b - Intellectual skills:

On successful completion of the course, the student should be able to:

13. Apply the methods and techniques used in the collection, preparation, and analysis of palynological samples, gaining proficiency in handling delicate microfossils.

14. Use critical thinking and analytical skills to interpret complex palynological data sets, evaluate scientific literature, and draw well-reasoned conclusions in palynology research.

15. Design and conduct practical laboratory work, including pollen and spore identification, counting, and statistical analysis, to apply theoretical knowledge in a hands-on setting.

16. Analyze the relationships between plants, their environments, and climate through the examination of palynological records, fostering a deeper understanding of ecological processes.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

7. Demonstrate proficiency in the proper collection, preparation, and analysis of palynological samples, following established scientific protocols.

8. Utilize palynological data to interpret past environmental conditions, vegetation dynamics, and ecological changes, gaining practical applications in various research fields.

9. Effectively communicate palynological findings and interpretations, both in written and visual formats, to present scientific knowledge to professional peers and broader audiences.

10. Cultivate an awareness of ethical considerations in palynological research, emphasizing responsible sample collection, data sharing, and cultural sensitivity when studying ancient pollen records.

d - General skills:

On successful completion of the course, the student should be able to:

d1- Use computer, internet & communications.
d2- Management, working in group & life-long learning.
d3- Ethical behavior, community linked thinking.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
162. Introduction to Palynology	1	0	3
163. Microscopic Techniques in Palynology	1	0	3
164. Fossilization and Preservation of Palynomorphs	1	0	3
165. Palynology and Stratigraphy	1	0	3
166. Palynology and Climate Change	1	0	3
167. Palynology of Modern Ecosystems	1	0	6
168. Palynology in Archaeology and Anthropology	1	0	3
169. Palynology and Evolutionary History	1	0	3
170. Applications of Palynology in Environmental Studies	1	0	3
171. Quaternary Palynology	1	0	3
172. Applied Palynology in Petroleum Exploration	1	0	3
173. Palynology and Paleoclimate Modeling	1	0	3
174. Future Directions in Palynology Research	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	Demonstrate a comprehensive understanding of the principles, concepts, and terminology in palynology, the study of pollen grains, spores, and microscopic organic materials found in sedimentary deposits.	x	0	X	0	0	x

	a2	Identify and differentiate between various types of pollen grains and spores from different plant groups, understanding their significance in paleoenvironmental reconstructions and geological dating.	x	x	0	0	0	0
	a3	Recognize the geological context of vertebrate fossils, including stratigraphy, dating methods, and biostratigraphy.	x	0	0	0	0	x
	a4	Describe the evolutionary history and major transitions in plant communities, from early fossilized palynomorphs to the diversification of modern plant species.	x	X	0	0	X	x
	a5	Understand the diversity of plant groups throughout geological time and their paleoecological roles in ancient ecosystems based on palynological evidence.	x	0	0	0	X	x
	a6	Identify and explain the significance of standard biozones in the Phanerozoic era, especially in the context of Egypt's paleontological history, as deduced from palynological records.						
Intellectual Skills	b1	Apply critical thinking and analytical reasoning to solve complex problems in palynology, including the identification and interpretation of palynomorphs for paleoenvironmental reconstructions.	**x**	0	0	**0**	**X**	**0**
	b2	Design and implement research methodologies to investigate ancient environments and vegetation dynamics based on the analysis of palynological samples.	**x**	0	0	**0**	**x**	**x**
	b3	Analyze and interpret palynological data, including pollen assemblages, stratigraphic sequences, and biostratigraphy, to draw evidence-based conclusions about past plant communities and climate.	x	0	0	**0**	**X**	**0**
	b3	Develop the ability to synthesize information from diverse sources and present well-reasoned arguments in scientific discussions related to palynology.						
Practical and professional skills	c1	Apply practical techniques for palynological sample collection, preparation, and microscopy, ensuring accurate analysis of delicate palynomorphs.	x	0	0	0	X	x

	c2	Use technical tools and software to create accurate palynological diagrams, such as pollen diagrams and palynofacies maps, to visualize past vegetation dynamics.	x	0	0	0	X	x
	c3	Demonstrate proficiency in distinguishing and classifying palynomorphs, as well as recognizing significant features for taxonomic identification.	x	0	0	0	x	x
	c4	Practice effective communication skills for presenting research findings related to palynology, both in written reports and oral presentations, to scientific audiences.	x	0	0	0	X	x
General Skills	d1	Utilize computer applications, internet resources, and digital databases to access and disseminate palynological knowledge effectively.	x	X	0	0	0	x
	d2	Develop project management skills, fostering the ability to organize research projects and work collaboratively in team settings in the context of palynological studies.	x	X	O	o	o	x
	d3	Exhibit ethical behavior in the handling and conservation of palynological samples, considering the cultural, social, and environmental implications of palynological research.	x	X	O	o	x	x
	d4	Demonstrate a commitment to lifelong learning and professional development, staying updated with the latest advancements in the field of palynology.						

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude.
5.2. Assignments to assess the student independen work,
5.3. A field trip.
5.4. Written mid-term exam to ensure the student progress and discover the shortage.
5.5. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %

Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Manual notes handle of Palynology for students.

6-2 Required books

none

6-31 Recommended books

Title: "Palynology: Principles and Applications"
Author: J. Jansonius and D.C. McGregor (Editors)
Publisher: American Association of Stratigraphic Palynologists Foundation
Year: 1996
ISBN: 978-0918985496

Title: "Palynology: The Study of Pollen and Spores in Quaternary Sediments"
Author: A.C. Scott
Publisher: Routledge
Year: 1993
ISBN: 978-0412457809

Title: "Introduction to Palynology"
Author: Alfred Traverse
Publisher: Allen & Unwin
Year: 2007
ISBN: 978-0412480807

These books provide comprehensive coverage of palynology, including its principles, methods, applications, and significance in paleoenvironmental reconstructions. They are valuable resources for students and researchers interested in understanding the study of pollen grains, spores, and microscopic organic materials in sedimentary deposits.

6-32 Periodicals, Web sites, etc.

www.sciencedirect.com&www.geology.com

7- Facilities required for teaching and learning:

Data show
Using a blackboard
Group discussions

Course coordinators: Prof. Dr. Hassan El-Sheikh

Head of the Department: Prof. Dr. Gamal El Qot
Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification

319 Geo: Paleoecology

Relevant program: **B.Sc. in Geology**
Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Third Level**

B - Basic information

Title: Paleoecology **Code:** 319 Geo **Year/level:** Third level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:** 4 h/week

C - Professional information

2 – Course Learning Objectives:

This couse is dedicated to furnish the student with the necessary basic information about the different geomorphological features and paleoecology. It aims to teach thomorpe student how to recognize and differentiate between the different types of fossil groups in general and index fossils in particular.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

a1. identifythe paleoenvironmental controls associated with the various types of fossils, principally macrofossils
a2. To give suitable informations on paleoecology and the recognation of paleoenvironmen.
a3. To give suitable informations on taphonomy and the recognation of paleoenvironment.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1- discriminate between terrestrial, aquatic, and marine fossil types,

b2- identify fossil groups and and their ecology in the geologic past

b3- identify microfossil groups and major palynomorph categories under the microscope

b4- To be able to reconstruct the paleoenvironment

c - Practical and professional skills:

On successful completion of the course, the student should be able to:

c1- Process sedimentary rock samples for their fossil palynomorph content,

c2- Employ microfossils to provide information about the stratigraphy of their enclosing sedimentary rocks,

c3- Utilize microfossils as a proxy to interpret the depositional paleoenvironment of rock layers,

c4- Reconstruct the geologic history of stratified rocks based on their microfossil content.

d - General skills:

On successful completion of the course, the student should be able to:

d1- Work with peers on small projects,

d2- Accomplish given scientific tasks either individually, or with a group,

d3- Make an internet and library search to prepare a report on a given class assignment,

d4- Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
15. Paleoecology as a science	1	0	3
16. Types of ancient ecologies	1	0	3
17. Paleosynecology	1	0	3
18. Paleoautecology	1	0	3
19. The fundamental principles of paleoecology	1	0	3
20. Studying the mode of life of organisms and their ecosystem	1	0	3
21. Ecological diversity and adaptation	1	0	3
22. The different environmental factors that control the distribution of organisms in the different environments	1	0	3
23. Use of oxygen isotopes occur in the skeletons and shells of the fossils to deduce some environmental factors such as temperature and salinity	1	0	3
24. Taphonomy.	1	0	3
25. Taphonomical parameters and reconstruction of the Paleoenvironment.	1	0	3
26. studying the physical and chemical changes that occur on the fossil between death	1	0	3

27. Shell-beds and their interpretation.	2	0	6
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	Be able to provide a brief account on the different types of paleoenvironment	√					
	a2	Be able to recognize the difference between the different paleoenvironmental parameters		√				
	a3	Understand the paleoenvironmental controls associated with the various types of fossils		√				
	a4	Realize the stratigraphic value and range of application of the major macro- and microfossil groups	√	√		√	√	√
Intellectual Skills	b1	Discriminate between terrestrial, aquatic, and marine fossil types	√	√		√		√
	b2	Identify different types of paleoenvironment		√		√		
	b3	Describe the basic morphologic features of the different fossil groups	√	√	√	√		
	b4	Recognize example genera and/or species of the different ofossil groups		√		√		
Practical and professional skills	c1	Process sedimentary rock samples for their fossil content	√	√		√		
	c2	Employ fossils to provide information about the stratigraphy of their enclosing sedimentary rocks	√	√			√	√
	c3	Utilize fossils as a proxy to interpret the depositional paleoenvironment of rock layers	√	√			√	√
	c4	Reconstruct the geologic history of stratified rocks based on their fossil content			√		√	√
General Skills	d1	Work with peers on small projects		√	√	√	√	√
	d2	Accomplish given scientific tasks either individually, or with a group		√	√	√	√	√
	d3	Make an internet and library search to prepare a report on a given class assignment		√	√	√	√	
	d4	Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation		√	√			

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate the students and promote to other consequent courses.

Tools	To Measure	Time schedule	Grading
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor
Power point presentations

6-2 Required books

None

6-33 Recommended books

1-.Text book: Palecology
Author: Dood, J. R. & Stanton, R. J.
Second edition 1990

2-.Text book: Paleoecology: Past, Present and Future

Author: David J. Bottjer
First edition 1990

6-34 Periodicals, Web sites, etc.

http://www.nhm.ac.uk/research-curation/research/projects/duxbury/database /
http://www.ucl.ac.uk/GeolSci/micropal/welcome.html

7- Facilities required for teaching and learning:

- Data show
- Sound system to ensure the ease of listening
- Traditional chalk or pen board
- Microscopes
- Lab space equiped with the necessary devices and chemicals for sample processing

Course coordinators: Prof. Gamal El Qot
Prof. Hassan El Shikh

Head of the Department: Prof. Dr. Gamal El Qot

Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 330: Analytical Techniques

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Third level**

B - Basic information

Title: Analytical Techniques	**Code: Geo 330**	**Year/level:** Third level
Teaching Hours:	**Lectures:** 1	**Tutorial:** 0
	Practical: 3	**Total:** 4 h/week

C - Professional information

6 – Course Learning Objectives:

Provide the student with the required knowledge of analytical techniques used to characterize the composition, structure, and texture of Earth and engineering materials. Underlying physical/chemical principles, instrumentation, and application to real-world problems is covered for each technique. Students complete hands-on analytical projects on scanning-electron microscopy, x-ray diffraction, and electron-probe microanalysis.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. recognize the various classification scheme of mineral deposits and gemstones of egypt and as their morphological and structural features, their types and their genesis, and their relation to the theory of plate tectonics.

a2. learn the laboratory methods applied to ore deposits and gemstone studies as well as the methods of collecting, tabulating, representing and indexing data and results.

a3. learn the methods of evaluating and mining of mineral deposits of Egypt.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. identify and analyze the results produced from laboratory tests and field measurements of mineral deposits of egypt.

b2. determine the appropriate tools and techniques of geological and geochemical exploration for a given mineral resources of egypt and management works.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1 . Apply the application of scientific theories in the undertake analyses and field measurements, their statistical analysis and assess their results.

c2. Apply recent methods, tools and approaches concerning the process of mineralization (geological mapping, sampling techniques, geochemical analyses to evaluate the Geochemical data.

c3. Handel laboratory equipments and field samples in appropriate manner, considering safety issues, scientific ethics and accuracy during reporting.

d - General skills:

On successful completion of the course, the student should be able to:

d1. Work with peers on small projects,

d2. Accomplish given scientific tasks either individually, or with a group,

d3. Make an internet and library search to prepare a report on a given class assignment,

d4. Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
175. Introduction: Course philosophy	1	0	3
176. Classification of mineral deposits in Egypt	1	0	3
177. Case studies on chromite and Cu-Ni sulphide deposits	1	0	3
178. Case studies on the porphyry Cu-Au type mineralization	1	0	3
179. Case studies on the vein deposits (molybdenum, tungsten, beryllium, fluorite and uranium deposits).	1	0	3
180. Case studies on the Cu-Pb-Zn deposits in different volcanic regime in Eastern Desert and Sinai	1	0	3
181. Case studies on the Cu-Pb-Zn deposits	1	0	3
182. Case studies on the iron ore deposits	1	0	3
183. Case studies on the manganese deposits	1	0	3
184. Phosphate deposits in western Eastern Desert	1	0	3
185. Sedimentary uranium deposit	1	0	3
186. Mineral identification, mineral association, broad textural features. Paragenesis.	1	0	3
187. Investigation of hand specimens	1	0	3
188. Orthomagmatic Ore Deposits: Partition coefficients	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	recognize the various classification scheme of mineral deposits and gemstones of egypt and as their morphological and structural features, their types and their genesis, and their relation to the theory of plate tectonics.	√	√				
	a2	learn the laboratory methods applied to ore deposits and gemstone studies as well as the methods of collecting, tabulating, representing and indexing data and results.			√	√		
	a3	learn the methods of evaluating and mining of mineral deposits of Egypt.					√	
Intellectual Skills	b1	identify and analyze the results produced from laboratory tests and field measurements of mineral deposits of egypt.	√	√			√	√
	b2	determine the appropriate tools and techniques of geological and geochemical exploration for a given mineral resources of egypt and management works.	√			√		
Practical and professional skills	c1	Apply the application of scientific theories in the undertake analyses and field measurements, their statistical analysis and assess their results.		√	√		√	
	c2	Apply recent methods, tools and approaches concerning the process of mineralization (geological mapping, sampling techniques, geochemical analyses to evaluate the Geochemical data.	√	√		√		
	c3	Handel laboratory equipments and field samples in appropriate manner, considering safety issues, scientific ethics and accuracy during reporting.	√	√			√	
General Skills	d1	Work with peers on small projects	√	√	√			
	d2	Accomplish given scientific tasks either individually, or with a group	√	√				
	d3	Make an internet and library search to prepare a report on a given class	√	√			√	√

		assignment						
	d4	Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation.			√	√	√	√

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exams to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s) approved by the department council

6-2 Required books

None

6-35 Recommended books

Introduction to the Rock-Forming Minerals Third Edition
by W. a. Deer, R. a. Howie, J. Zussman
Paperback: 510 pages
Publisher: Mineralogical Society; Third edition (May 16, 2013)
Language: English
ISBN-10: 0903056275
ISBN-13: 978-090305627

"Modern Chemical Analysis and Instrumentation " , H. F. Walton & J. Reyes, (1980).
"Standard Methods of Chemical Analysis", 6th Ed., volume 3, part A, F. J. Welcher, D. Van Nostrand Company, Inc., Princeton, 5. "Quantitative Analysis", 4th. Ed., Prentice-Hall, R. A. Day and Jr./A. L. Underwood, Inc., Newjersey, 1980,

6-36 Periodicals, Web sites, etc.

http://www.indiana.edu/~geol105/images/gaia_chapter_6/mining geology.htm

7- Facilities required for teaching and learning:

Power point presentations
Data show
Sound system to ensure the ease listening
Group discussions

Course coordinator:	Dr. Moustafa M. Mogahed
Head of the Department:	Prof. Dr. Gamal El-Qot
Date:	2022

Course Specification
Geo 332: Isotope Geochemistry

A- Affiliation

Relevant program: **B.Sc. in Geology**
Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Third level**

B - Basic information

Title: Isotope Geochemistry | **Code: Geo 332** | **Year/level:** third level
Teaching Hours: | **Lectures:** 1 | **Tutorial:** 0
Practical: 3 | **Total:**4 h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to enable students to deduce the role of radiogenic isotopes in identifying the age and source of crustal rocks based on their isotopic systematics. As well, they can reconstruct the climatic changes, environmental conditions and chemistry of fluids forming minerals and rocks using stable isotope geochemistry.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1.recognize the historical development of ideas and scientific breakthroughs associated with formulation of Earth and rocks,

a2. assess the basic physical and geochemical processes that constrain the modern models for Earth's internal structure,

a3. demonstrate the use and importance of radiogenic isotopes in studying geological and geotectonic subjects,

a4. recall the radiogenic isotope systems for age and setting of formation.

b - Intellectual skills:

Successful students should be able to.

b1. discuss the evolution of Earth's crust in view of their chemistry,

b2. envistigate the types of isotope analyses and their uses,

b3.explain the basic and advanced research points related to the type of rocks and their distribution through time,

b4. investiagte the mutual relationship between radiogenic isotope geochemistry of

the crustal rocks and their evolution along the Earth's history.

b5.recount the different systems of selected radiogenic isotopes, e.g., U/Pb, K/Ar, and Rb/Sr.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. reconstruct the geologic setting using mineralogical and geochemical data,

c2. analyze bulk rock geochemical and radiogenic isotope data for the environmental settings,

c3.use the different software and apply methods to solve geological problems,

c4. interprete the isotope value data of a rock or ore deposit for the setting of a specific orogeny.

d - General skills:

On successful completion of the course, the student should be able to:

d1. review available data from publication and other resources,

d2. analyze the results in a meaningful readable final form,

d3. work in team or mosaic a piece of work with other peers.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction to Geochemistry of minerals	1	0	3
2. Introduction to Geochemistry of rocks	1	0	3
3. Types of isotopes	1	0	3
4. Stable isotopes: uses and applications	1	0	3
5. C, O, S and Fe isotopes: uses and applications	1	0	3
6. Strontium and Robidium isotopes: application in dating	1	0	3
7. U-Th, Hf, Nd, Sm isotopes: uses and applications	1	0	3
8. Introduction to radiogenic isotopes of elements	1	0	3
9. Atom structure and decay	1	0	3
10. Radiometric decay	1	0	3
11. Age determination by isotopes	1	0	3
12. Geochronologcial applications	1	0	3
13. Applications and advances	1	0	3
14. Revision and evaluation session	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	recognize the historical development of ideas and scientific breakthroughs associated with formulation of Earth and rocks,	√					
	a2	assess the basic physical and geochemical processes that constrain the modern models for Earth's internal structure,	√	√		√		
	a3	demonstrate the use and importance of radiogenic isotopes in studying geological and geotectonic subjects,	√		√			√
	a4	analyze theradiogenic isotope data for age and setting of formation.		√		√		
Intellectual Skills	b1	recognize the evolution of Earth's crust in view of the Plate Tectonics theory,	√		√	√	√	
	b2	Envistigate the types of isotope analyses and their uses,		√		√	√	
	b3	explain the basic and advanced research points related to the type of rocks and their distribution through time	√			√		
	b4	investiagte the mutual relationship between radiogenic isotope geochemistry of the crustal rocks and their evolution along the Earth's history.		√	√	√		
	b5	recount the different systems of selected radiogenic isotopes, e.g., U (Th/Hf), K/Ar, and Rb/Sr.	√			√	√	√
Practical and professional skills	c1	reconstruct the geologic setting using mineralogical and geochemical data,	√		√			
	c2	analyze bulk rock geochemical and radiogenic isotope data for the environmental settings,	√	√		√		
	c3	use the different software and apply methods to solve geological problems,	√		√	√		√
	c4	interpret the isotope value data of a rock or ore deposit for the setting of a specific		√		√		

		orogeny						
General Skills	d1	interprete the isotope value data of a rock or ore deposit for the setting of a specific orogeny.	√		√			√
	d2	analyze the results in a meaningful readable final form	√					
	d3	work in team or mosaic a piece of work with other peers		√		√		

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

-Course matrix

contents	Knowledge and understanding				Intellectual skills				Practical and professional skolls				General skills			
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction to Geochemistry of minerals	x						x						x			
Introduction to Geochemistry of rocks		x				x					x					x
Types of isotopes				x												
Stable isotopes: uses and applications			x													
C, O, S and Fe isotopes: uses and applications				x										x		
Strontium and Robidium isotopes: application in dating						x				x						
U-Th, Hf, Nd, Sm		x						x						x		

isotopes: uses and applications																
Introduction to radiogenic isotopes of elements			x										x			
Atom structure and decay		x							x						x	
Radiometric decay	x						x					x		x		
Age determination by isotopes			x			x							x			
Geochronological applications		x								x					x	
Applications and advances		x														x
Revision and evaluation session			x											x		

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s), and approved by the department council.

Course files uploaded by the instructor on the university web site.

6-2 Required books

None

6-3 Recommended books

Isotope Geology, byClaude J. Allegre 2008. Cambridge University Press

Radiometric dating of rocks and minerals by Christopher T. Harper. Dowden, Hutchinson & Ross, 1973

6-4 Periodicals, Web sites, etc.

None

7- Facilities required for teaching and learning:

Power point presentations

Data show

Sound system to ensure the ease listening

PCs and software

Course coordinators: Associate Prof. **Adel Mady Afify**
Associate Prof. **Moustafa Mogahid**

Head of the Department: Prof. Gamal El Qot

Date: 2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification
333 G: Igneous Petrology

A- Affiliation

Relevant program: Geology B.Sc. Program
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Third Level

B - Basic information

Title: Igneous Petrology **Code:** 333 G **Year/level:** Third level
Teaching Hours: **Lectures:** 2 **Tutorial:** 0
Practical: 3 **Total:** 5 h/week

C - Professional information

3 – Course Learning Objectives:

This course aims to provide students with a thorough understanding of the nature and origin of igneous rocks, from their formation and distribution to their volcanic exporessions and association with particular plate tectonic settings and to what extent these features have remained the same or changed with time during the geological history of the Earth. The course also builds on fundamental concepts of geochemistry and mineralogy to explain phase behaviour in high temperature systems, and dynamic processes which can, for example, lead to formation of primary igneous ore bodies. Integral practical classes will use both hand specimens and optical mineralogy to understand diagnostic textures - which are used to identify and classify igneous rocks.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. have knowledge of the igneous Petrology
a2. generate the abilities of identifying the the physical properties of minerals.
a3. be able to deal with optics characteristics to identify, interpret the mineral-bearing of the rocks, and analyze its genesis in igneous petrology.
a4. operate the computer with different types of software programs concerning igneous petrology and applying them.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1- assess the concepts, principles, procedures, theories and their interrelationships for interpreting the unique properties and characteristics of igneous rocks and connecting them to economic uses,

b2- deduce appropriate judgments and procedures to handle scientific problems in igneous rocks and rocks identification and exploitation,

b3- be able to provide a petrographic description of igneous rocks, their mineral compositions and textures,

b4- be able to describe the tectonic settings in which igneous rocks occur including a preliminary assessment of volcanic hazard.

c - Practical and professional skills:

On successful completion of the course, the student should be able to:

c1- Understand different geochronological techniques and their applications and igenous processes,

c2- Explain how absolute pressure-temperature information is extracted from rock using thermodynamic expressions,

c3- Understand the key factors that govern the diversity of igneous rock compositions,

c4- Understand how the occurrence and character of different igneous rock suites is governed by and reflects the Earth's tectonic .

d - General skills:

On successful completion of the course, the student should be able to:

d1- Work with peers on small projects,

d2- Accomplish given scientific tasks either individually, or with a group,

d3- Make an internet and library search to prepare a report on a given class assignment,

d4- Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
28. General Introduction	2	0	3
29. Classification of Igneous rocks	2	0	3
30. Formation of igneous rocks	2	0	3
31. Plutonism and volcanism	2	0	3
32. Melting and crystallisation	2	0	3
33. How to study igneous rocks	2	0	3
34. Geochemistry of igneous rocks	2	0	3
35. Isotope geochemistry of igneous rocks	2	0	3
36. Origin and diversivication of magmas.			3
37. Igneous structures and field relationships	2	0	3
38. Aqueous solutions at different temperatures.	2	0	3
39. The Arabian Shield and the occurrence of the main	2	0	3

igneous rocks			
40. Igneous structures and environments	2	0	3
41. Revision and feedback	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			**Lecture**	**Presentations & Movies**	**Discussions & Seminars**	**Practical**	**Problem solving**	**Brain storming**
Knowledge & Understanding	a1	Have knowledge of the igneous Petrology	x	x	0	0	0	0
	a2	Generate the abilities of identifying the the physical properties of minerals.	x	x	x	x	0	0
	a3	Be able to deal with optics characteristics to identify, interpret the mineral- bearing of the rocks, and analyzing its genesis in igneous petrology	x	x	0	x	x	x
	a4	Operate the computer with different types of software programs concerning igneous petrology, and applying them	x	x	0	x	x	x
Intellectual Skills	b1	Assess the concepts, principles, procedures, theories and their interrelationships for interpreting the unique properties and characteristics of igneous rocks and connecting them to economic uses,	x	x	0	x	0	x
	b2	Deduce appropriate judgments and procedures to handle scientific problems in igneous rocks and rocks identification and exploitation,	0	x	0	x	0	0
	b3	Be able to provide a petrographic description of igneous rocks, their mineral compositions and textures	x	x	x	x	0	0
	b4	Be able to describe the tectonic settings in which igneous rocks occur including a preliminary assessment of volcanic hazard.	0	x	0	x	0	0
Practical and professional skills	c1	Understand different geochronological techniques and their applications and igenous Processes	x	x	0	x	0	0
	c2	Explain how absolute pressure-temperature information is extracted from rock using thermodynamic expressions	x	x	0	0	x	x
	c3	Understand the key factors that govern the diversity of igneous rock compositions,	x	x	0	0	x	x
	c4	Understand how the occurrence and character of different igneous rock suites is governed by and reflects the Earth's tectonic	0	0	x	0	x	x

General Skills	d1	Work with peers on small projects	0	x	x	x	x	x
	d2	Accomplish given scientific tasks either individually, or with a group	0	x	x	x	x	x
	d3	Make an internet and library search to prepare a report on a given class assignment	0	x	x	x	x	0
	d4	Communicate scientific data orally to the class audience with the help of technology aids such as a powerpoint presentation	0	x	x	0	0	0

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate the students and promote to other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor
Power point presentations

6-2 Required books

None

6-37 Recommended books

6-38 Periodicals, Web sites, etc.

http://www.nhm.ac.uk/research-curation/research/projects/duxbury/database /
http://www.ucl.ac.uk/GeolSci/micropal/welcome.html

7- Facilities required for teaching and learning:

- Data show
- Sound system to ensure the ease of listening
- Traditional chalk or pen board
- Microscopes
- Lab space equiped with the necessary devices and chemicals for sample processing

Course coordinator: Dr. Moustafa M. Mogahed

Head of the Department: Prof. Dr. Gama El Qot
Date: 2022

Benha University
Faculty of Science
Department of Geology

Course Specification
334 G: Basement Complex

A- Affiliation

Relevant program: B.Sc. in Geology Program
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Third level

B - Basic information

Title: Basement Complex **Code: 334 G** **Year/level:** Third level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:** 4 h/week

C - Professional information

1 – Course Learning Objectives:

This couse is dedicated to furnish the student with the understanding how the basement complex formed, the classification and lithologic units of the Egyptian basement. In addition, students will be getting familiar with description of the rock units constituting the basement complex of the Eastern Desert and Sinai.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. identify basics terminology, nomenclature, concepts, theories, laws and classification systems used in the basement rocks,
a2. define methods of interpreting and analyzing basement rocks information,
a3. recognize importance of the basement rocks to economic and environmental issues,
a4. realize the application of basement rocks to the industrial field and others.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. analyze rock units encountered in any given area of the basement rocks of Egypt,
b2. analyze the stratigraphic units in any sedimentary succession in the Egyptian

territory,

b3. arrange a stratigraphic correlation in different parts of Egypt.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. assess the geological events that govern the arrangement and stacking of the different stratigraphic units in Egypt,

c2. emphasize the age assignment and general geological history of any given stratigraphic succession in Egypt,

c3. deduce a regional and global correlation between the rock units of Egypt and the surrounding countries.

d - General skills:

On successful completion of the course, the student should be able to:

d1. develop core skills

d2. provide opportunities for independent and cooperative learning procedures with supporting argument.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction and course details	1	0	3
2. Historical review	1	0	3
3. Classification of the basement complex in Egypt	1	0	3
4. Stratigraphic and tectonic units	1	0	3
5. Stratigraphic and tectonic units	1	0	3
6. Application of plate tectonic theory	1	0	3
7. History of magmatic activities	1	0	3
8. Tectonic evolution	1	0	3
9. Detailed description of units of the basement complex	1	0	3
10. Volcanicity and volcanic rocks	1	0	3
11. Ophiolitic rocks, gabbroic rocks, and granitoid rocks.	1	0	3
12. Practical examination hand specimens & thin sections	1	0	3
13. Mineral deposits associated with basement rocks	1	0	3
14. Revision and feedback	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes	Lecture	Presentations	Discussions & Seminars	Practical	Problem solving	Brain storming

Knowledge & Understanding	a1	Identify basics terminology, nomenclature, concepts, theories, laws and classification systems used in the basement rocks.,	√	√				
	a2	Define methods of interpreting and analyzing basement rocks information.	√			√	√	√
	a3	Recognize importance of the basement rocks to economic and environmental issues.	√				√	
	a4	Write applicability of basement rocks to the industrial field and others.	√				√	
Intellectual Skills	b1	analyze rock units encountered in any given area of the basement rocks of Egypt.				√		
	b2	analyze the stratigraphic units in any sedimentary succession in the Egyptian territory.					√	
	b3	arrange a stratigraphic correlation in different parts of Egypt.	√		√			√
Practical and professional skills	c1	assess the geological events that govern the arrangement and stacking of the different stratigraphic units in Egypt.						
	c2	emphasize the age assignment and general geological history of any given stratigraphic succession in Egypt.		√		√	√	
	c3	deduce a regional and global correlation between the rock units of Egypt and the surrounding countries		√		√		
General Skills	d1	Developing core skills	√	√		√		
	d2	Providing opportunities for independent and cooperative learning procedures with supporting argument.				√		

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,

5.2. Assignments to assess the student independen work,

5.3. Written mid-term exam to ensure the student progress and discover the shortage,

5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %

Total	100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s)
Power point presentations

6-2 Required books

None

6-39 Recommended books

Text Book: Petrology: Igneous, Sedimentary, and Metamorphic
Author: Harvey Blatt, Robert Tracy, and Brent Owens
Publisher: W. H. Freeman; 3rd edition (November 11, 2005), 530 pages

6-40 Periodicals, Web sites, etc.

Geotectonics
http://www.springer.com/earth+sciences+and+geography/geology/journal/11479
http://www.platetectonics.com/book/

7- Facilities required for teaching and learning:

Data show
Sound system to ensure the ease listening
PCs and software
Electronic library

Course coordinators: Dr. Abdel Aziem Ahmed Rashwan
Dr. Moustafa M. Mogahed

Head of the Department: Prof. Dr. Gamal El Qot
Date: 2022

Benha University
Faculty of Science
Department of Geology

Course Specification
335 G: Geochemistry

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Third level**

B - Basic information

Title: Geochemistry	**Code: 335 G**	**Year/level:** Fourth level
Teaching Hours:	**Lectures:** 2	**Tutorial:** 0
	Practical: 3	**Total:** 5 h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to enable students of demonstrating the chemical aspects of the earth's material and how they were generated. This accomplishement canbe based on a good understand of the basic principles of geochemical processes. Methods and techniques used in the geochemical studies are impornat for a wide variety of applications.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the students should be able to:

a1. recognize the appropriate mathematical strategies for solving geochemical problems,

a2. recall the structure and chemistry of the rock-forming minerals and be familiar with methods for their study,

a3. relate the major chemical processes involved in water-rock reactions in the Earth's crust,

a4. report the origin of earth's crust and mantle rocks and releated mineral resources,

a5. define possible oversimplifications in geochemical models.

b - Intellectual skills:

Successful students will be able to:

b1. review the quality of data generated by analytical geochemical techniques,

b2. present and summarise geochemical data in graphical and tabular forms, and critically appraise its significance, using appropriate statistical techniques where applicable,
b3. discuss the value and limitations of existing information on a given subject,
b4. formulate key hypotheses, using logical and consistent quantitative or qualitative arguments to characertize the investigated rocks,
b5. draw logic conclusions and identify appropriate avenues for further study.

c- Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. evaluate the principles, applications and limitations of the main analytical techniques used in geochemistry,
c2. experiment practical experience of a range of modern geochemical techniques, and advanced experience of some of these techniques,
c3. analyse the geochemical data and quality of the analytical data generated by different Techniques,
c4. reproduce data by calculation of ratios and norm values from geochemical data using specilaized software.

d - General skills:

Successful students will be able to:

d1. communicate by means of well-prepared, clear and confident presentations and concise and grammatical written documents,
d2. diagnose other information sources skilfully and appropriately and to be able to cite them appropriately,
d3. conclude facts from geochemical data, such as origin and tectonic setting of rocks,
d4. organise and prioritise work activities in order to meet deadlines,
d5. work independently, with initiative, and also in teams.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction and course definition/objective	2	0	3
2. Structure and composition of the Earth's Interior	2	0	3
3. Primary geochemical differentiation of the Earth	2	0	3
4. Geochemical classification of elements	2	0	3
5. Crystal chemistry	2	0	3
6. Atomic substitutions	2	0	3
7. Geochemistry of igneous rocks	2	0	3
8. Geochemical environment	2	0	3
9. Hydrothermal alteration geochemistry	2	0	3
10. Geochemistry of metamorphic rocks	2	0	3
11. Chemical composition of meteorites.	2	0	3
12. Uses of stable isotope geochemistry.	2	0	3
13. The geochemical cycle	2	0	3
14. Revision and open questions	2	0	3
Total	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical session	Problem solving	Brain storming
Knowledge & Understanding	a1	recognize the appropriate mathematical strategies for solving geochemical problems,	√					
	a2	recall the structure and chemistry of the rock-forming minerals and be familiar with methods for their study,	√	√		√		
	a3	relate the major chemical processes involved in water-rock reactions in the Earth's crust,	√		√			√
	a4	report the origin of earth's crust and mantle rocks and releated mineral resources,		√		√		
	a5	define possible oversimplifications in geochemical models.	√		√	√	√	
Intellectual Skills	b1	review the quality of data generated by analytical geochemical techniques,		√		√	√	
	b2	present and summarise geochemical data in graphical and tabular forms, and critically appraise its significance, using appropriate statistical techniques where applicable,	√			√		
	b3	discuss the value and limitations of existing information on a given subject,		√	√	√		
	b4	formulate key hypotheses, using logical and consistent quantitative or qualitative arguments to characertize the investigated rocks,	√			√	√	√
	b5	draw logic conclusions, and identify appropriate avenues for further study.	√		√			
Practical and professional skills	c1	evaluate the principles, applications and limitations of the main analytical techniques used in geochemistry,	√	√		√		
	c2	experiment practical experience of a range of modern geochemical techniques, and advanced experience of some of these techniques,	√		√	√		√

	c3	analyse the geochemical data and quality of the analytical data generated by different Techniques,		√		√		
	c4	reproduce data by calculation of ratios and norm values from geochemical data using specilaized software.	√		√			√
General Skills	d1	communicate by means of well-prepared, clear and confident presentations and concise and grammatical written documents,	√					
	d2	diagnose other information sources skilfully and appropriately and to be able to cite them appropriately,	√	√		√		
	d3	conclude facts from geochemical data, such as origin and tectonic setting of rocks,	√		√			√
	d4	organise and prioritise work activities in order to meet deadlines,		√		√		
	d5	work independently, with initiative, and also in teams			√	√	√	

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes
Course notes prepared by the course instructor(s) and approved by the department
Course files uploaded to the instructor's home page on the university web.

6-2 Required books
None

6-41 Recommended books
Essentials of Geochemistry Author: John Victor Walther Publisher: Jones & Bartlett Publishers; 2 edition (November 21, 2008), 700 pages.
Principles of Igneous and Metamorphic Petrology Author: Anthony Philpotts, Jay Ague. Publisher: Cambridge University Press; 2nd edition (February 2, 2009), 686 pages

6-42 Periodicals, Web sites, etc.
Geochemistry
http://www.springer.com/earth+sciences+and+geography/geology/journal/11479

7- Facilities required for teaching and learning:

Power point presentations
Data show
Sound system to ensure the ease listening
PCs and software
Electronic library

Course coordinators:	Dr. Abdel Aziem Ahmed Rashwan Dr. Moustafa M. Mogahed
Head of the Department:	Prof. Dr. Gamal El Qot
Date:	2022

Benha University
Faculty of Science
Department of Geology

Course Specification
338 G: Metamorphic Petrology

A- Affiliation

Relevant program: B.Sc. in Geology Program
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Third Level

B - Basic information

Title: Metamorphic Petrology **Code:** 338 G **Year/level:** Third level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:** 4 h/week

C - Professional information

4 – Course Learning Objectives:

This couse is dedicated to furnish the student with the necessary basic information about the 1) classification and identification of metamorphic rocks, 2) genesis of metamorphic rocks, 3) phase diagrams in metamorphic petrology, and 4) melting and crystallization.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. provide a brief account on the different types of metamorphic rocks,
a2. recognize the difference between the different metamorphic rocks,
a3. identify the pressure temperature controls associated with the various types of metamorphic rocks,
a4. realize the stratigraphic value and range of application of the major metamorphic types.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. Initiate cognitive skill to generate the abilities of identifying the physical

properties of metamorphic rocks, facies, and minerals,

b2. deal with optic characteristics to identify, interpret the mineral. bearing of the rocks, and analyzing its genesis,

b3. describe the basic morphologic features of the different metamorphic groups with emphsis on palynomorphs,

b4. Develop the ability to make detailed maps in areas of metamorphic terrains.

c - Practical and professional skills:

On successful completion of the course, the student should be able to:

c1. Process metamorphic rock samples for their fossil palynomorph content,

c2. Employ metamorphics to provide information about the stratigraphy of their enclosing metamorphic rocks,

c3. Utilize metamorphics as a proxy to interpret the formation conditions of rock types,

c4. Reconstruct the geologic history of deformed rocks based on their metamorphic content.

d - General skills:

On successful completion of the course, the student should be able to:

d1. Work with peers on small projects,

d2. Accomplish given scientific tasks either individually, or with a group,

d3. Make an internet and library search to prepare a report on a given class assignment,

d4. Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
42. General Introduction	1	0	3
43. Classification of metamorphic rocks	1	0	3
44. Formation of metamorphic rocks	1	0	3
45. Plutonism and volcanism	1	0	3
46. Melting and crystallisation	1	0	3
47. How to study metamorphic rocks	1	0	3
48. Geochemistry of metamorphic rocks	1	0	3
49. Isotope geochemistry of metamorphic rocks	1	0	3
50. Stratigraphic column	1	0	3
51. Stratigraphic relationships	1	0	3
52. Satratification and facies	1	0	3
53. Stratigraphic correlation	1	0	3
54. Metamorphic structures and environments	1	0	3
55. Revision and feedback	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	Be able to provide a brief account on the different types of micro fossils including palynomorphs	x	x	0	0	0	0
	a2	Be able to recognize the difference between the different metamorphic groups- particularly palynomorphs	x	x	x	x	0	0
	a3	Understand the paleoenvironmental controls associated with the various types of metamorphics, principally palynomorphs	x	x	0	x	x	x
	a4	Realize the stratigraphic value and range of application of the major metamorphic types specially palynomorphs	x	x	0	x	x	x
Intellectual Skills	b1	Initiate cognitive skill to generate the abilities of identifying the physical properties of metamorphic rocks, facies, and minerals,	x	x	0	x	0	x
	b2	deal with optic characteristics to identify, interpret the mineral- bearing of the rocks, and analyzing its genesis,	0	x	0	x	0	0
	b3	describe the basic morphologic features of the different metamorphic groups with emphsis on palynomorphs,	x	x	x	x	0	0
	b4	Develop the ability to make detailed maps in areas of metamorphic terrains.	0	x	0	x	0	0
Practical and professional skills	c1	Process metamorphic rock samples for their fossil palynomorph content	x	x	0	x	0	0
	c2	Employ metamorphics to provide information about the stratigraphy of their enclosing metamorphic rocks	x	x	0	0	x	x
	c3	Utilize metamorphics as a proxy to interpret the depositional paleoenvironment of rock layers	x	x	0	0	x	x
	c4	Reconstruct the geologic history of stratified rocks based on their metamorphic content	0	0	x	0	x	x
General Skills	d1	Work with peers on small projects	0	x	x	x	x	x
	d2	Accomplish given scientific tasks either individually, or with a group	0	x	x	x	x	x
	d3	Make an internet and library search to prepare a report on a given class assignment	0	x	x	x	x	0
	d4	Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation	0	x	x	0	0	0

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate the students and promote to other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor
Power point presentations

6-2 Required books

None

6-43 Recommended books

6-44 Periodicals, Web sites, etc.

http://www.nhm.ac.uk/research-curation/research/projects/duxbury/database /
http://www.ucl.ac.uk/GeolSci/micropal/welcome.html

7- Facilities required for teaching and learning:

- Data show
- Sound system to ensure the ease of listening
- Traditional chalk or pen board
- Microscopes
- Lab space equiped with the necessary devices and chemicals for sample processing

Course coordinator: Dr. Moustafa M. Mogahed

Head of the Department: Prof. Dr. Gamal El-Qot
Date: 2022

Course Specification
Geo 340:Structural Geology and Geotectonics

A- Affiliation

Relevant program: **B.Sc. in Geology**
Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Third level**

B - Basic information

Title: Structural Geology and Geotectonics | **Code: Geo 340** | **Year/level:** fourth level

Teaching Hours: **Lectures:** 2 | **Tutorial:** 0
Practical:3 | **Total:**5h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to enable students to reconstruct the structural elements and features as well as the major tectonic events of the Earth's crust, deformation, kinematics and stability. Students to investigate the concept of plate tectonics and mountain building processes and cycles.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1.recognize the historical development of ideas and scientific breakthroughs associated with formulation of the Structural Geology and Plate Tectonics theory,

a2. assess the basic physical and geochemical processes that constrain the modern models for Earth's internal structure,

a3. demonstrate the use and importance of radiogenic isotopes in studying geological and geotectonic subjects,

a4. recall the structural elements and tectonic regimes for age and setting of formation.

b - Intellectual skills:

Successful students should be able to.

b1. discuss the evolution of Eart's crust in view of the Plate Tectonics theory,

b2. envisage the geometry of plate margins and evolution of continents and oceans along the time,

b3.explain the basic and advanced research points related to the evolution of orogenic cratons and moblie belts,

b4. investiagte the mutual relationship between structural deformation and evolution along the Earth's history.

b5.recount the different geodynamic systems of some selected terranes.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1.reconstruct the structural and geotectonic setting of certain areas,

c2.analyze bulk rock deformation using structural data for understanding the geotectonic settings,

c3.use the different software and apply methods to solve geological problems,

c4.interprete the structural data of a rock or ore deposit for the setting of a specific orogeny.

d - General skills:

On successful completion of the course, the student should be able to:

d1. review available data from publication and other resources,

d2. analyze the results in a meaningful readable final form,

d3. work in team or mosaic a piece of work with other peers.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
15. Introduction to Geotectonics and plate boundaries	2	0	3
16. Internal structure of the Earth	2	0	3
17. Continental drift and ocean floor spreading	2	0	3
18. Oceanic ridges and transform faults	2	0	3
19. Subduction zones, and collisional sutures	2	0	3
20. Impact of the plate tectonics	2	0	3
21. Plate tectonics and metallogenic provinces	2	0	3
22. Introduction to structural geology	2	0	3
23. Primary structures	2	0	3
24. folds	2	0	3
25. faults	2	0	3
26. joints	2	0	3
27. Applications and advances	2	0	3
28. Revision and evaluation session	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes		Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understa	a1	√					
	a2	√	√		√		
	a3	√		√			√
	a4		√		√		
Intellectual Skills	b1	√		√	√	√	
	b2		√		√	√	
	b3	√			√		
	b4		√	√	√		
	b5	√			√	√	√
Practical and professio	c1	√		√			
	c2	√	√		√		
	c3	√		√	√		√
	c4		√		√		
General Skills	d1	√		√			√
	d2	√					
	d3		√		√		

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,

5.2. Assignments to assess the student independent work,

5.3. Written mid-term exam to ensure the student progress and discover the shortage,

5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50%
		Total	100 %

-Course matrix

contents	Knowledge and understanding				Intellectual skills				Practical and professional skolls				General skills			
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction to Geotectonics and plate boundaries	x						x						x			
Internal structure of the Earth		x				x					x					x
Continental drift and ocean floor spreading				x												
Oceanic ridges and transform faults			x													
Subduction zones, and collisional sutures				x										x		
Impact of the plate tectonics						x				x						
Plate tectonics and metallogenic provinces		x						x						x		
Introduction to structural geology			x										x			
Primary structures		x							x						x	
folds	x						x					x		x		
faults			x			x							x			
joints		x								x					x	
Applications and advances		x														x
Revision and evaluation session			x											x		

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s), and approved by the department council.

Course files uploaded by the instructor on the university web site.

6-2 Required books

None

6-5 Recommended books

1. Plate tectonics and crustal evolution 1996, Kent C. Kondie, Printice-Hall, inc.
2. Microtectonics by Passchier C. W. and Trouw R. A. J. 1996.
3. Park, R.G. (2005) Foundations of structural geology. Blackie & Son Limited, Chapman and Hall, New York.
4. Structural geology of rocks and regions, G. Davis and S. Reynolds.

6-6 Periodicals, Web sites, etc.

Geotectonics Journal- Springer

http://www.springer.com/earth+sciences+and+geography/geology/journal/11479

http://www.platetectonics.com/book/

Journal of Structural Geology-Elsevier

7- Facilities required for teaching and learning:

Power point presentations

Data show

Sound system to ensure the ease listening

PCs and software

Course coordinators: Prof. Maher El Amawy
Prof. Zakaria Hamimi

Head of the Department: Prof. Gamal El Qot

Date: 2022/2023

Course Specification
Geo 341:Rock Mechanics

A- Affiliation

Relevant program: Geology B.Sc. Program
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Third level

B - Basic information

Title: Rock Mechanics **Code: Geo341** **Year/level:** Third level
Teaching Hours: **Lectures:**1 **Tutorial:** 0
Practical:3 **Total:** 4 h/week

C - Professional information

1 – Course Learning Objectives:

This course is dedicated to introduce students to concepts and geological applications of rock deformation. It also aims to familiarize students with the fundamentals of both the microstructural investigation and rock mechanics. In this course, students will be encouraged to use available field-structural data in deciphering structural history of an area and the behavior of deformed rocks.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1.study the geologic structures/microstructures and rock properties,
a2. recognize non-tectonic- and tectonic-structures, along with different failure mechanisms,
a3. demonstrate the geometric and kinematic relationships of geologic structures,
a4. analyze the field-structural data in terms of fabric and microfabric interpretations,
a5. decide the suitable method/criterion to determine/estimate the deformation and failure behaviour of the rock.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. differentiate between ductile and brittle structures and behavior in rocks,
b2. use overprinting relations in unraveling the polyphase deformation,
b3.demenostsate the basic and progressed techniques in structural mapping,

b4.recognize the characterisitic features of various kinds of structural fabrics.
b5. relate software and hardware in structural analysis.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:
c1.interpret structural history of an area and various rock properties,
c2. analyze the experimental data of rock mechanics,
c3. use the different software and apply methods to polyphase deformation history,
c4.read geologic data for paleostress analysis.

d - General skills:

On successful completion of the course, the student should be able to:
d1. collect data from text books and other resources,
d2. transfer the projected goals to findings using available data and software and formulate the results in an easy readable final form,
d3. cooperate and work in team smoothly while managing the time, and go to point and targeted goals.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction to rock mechanics	1	0	3
2. Failure mechanisms of rocks	1	0	3
3. Stress-strain curves and Mohr diagram	1	0	3
4. Rock behavior and deformation	1	0	3
5. Rock response to stress	1	0	3
6. Strain (plastic deformation) and strain markers	1	0	3
7. Measuring rock deformation	1	0	3
8. Folding and plastic deformation	1	0	3
9. Folding mechanisms (Buckling and bending)	1	0	3
10. Fracturing and brittle deformation	1	0	3
11. Anderson Faulting Theory	1	0	3
12. Faults and fault mechanisms	1	0	3
13. Intergranular and intragranular movements	1	0	3
14. Stress and strain regimes	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes		Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understandi	a1	x	0	x	0	0	x
	a2	x	0	0	x	0	0
	a3	x	0	0	x	0	x
	a4	x	x	0	x	X	x
	a5	x	0	x	0	0	X
Intellectual Skills	b1	**x**	0	0	**0**	**X**	**0**
	b2	**x**	0	0	**x**	**x**	**0**
	b3	x	x	x	**x**	**X**	**0**
	b4	x	0	0	**x**	**x**	**0**
	b5	x	0	0	**x**	**0**	**0**
Practical and professio	c1	x	0	x	x	X	x
	c2	0	0	x	x	X	0
	c3	0	0	0	x	x	x
	c4	0	0	x	**x**	**X**	**0**
General Skills	d1	x	x	0	0	0	x
	d2	x	x	o	o	o	x
	d3	x	x	o	o	x	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class participation and quizzes to assess the student progress and personal attitude,

5.2. Assignments to assess the student independent work,

5.3. Written mid-term exam to ensure the student progress and discover the shortage,

5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester Work	a1, a2, a3, b2, and d1	Fifth week	15 %
Mid-Term Exam	a1, a5, b3, b4.	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	a2, a3, a4, a5, b5, b1, c2, c3	Thirteenth week	5%
Written exam	a1, a2, a3, a5, b1, b2, b4, b5, c1, c2, c3, d1.	Fourteenth week	50 %
Total			100 %

-Course matrix

Contents	Knowledge and understanding				Intellectual skills				Practical and professional skills				General skills			
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction to rock mechanics	x						x						x			
Failure mechanisms of rocks		x				x					x					x
Stress-strain curves and Mohr diagram				x												
Rock behavior and deformation			x													
Rock response to stress				x										x		
Strain (plastic deformation) and strain markers						x				x						
Measuring rock deformation		x						x						x		
Folding and plastic deformation			x										x			
Folding mechanisms (Buckling and bending)		x							x						x	
Fracturing and brittle deformation	x						x					x		x		
Anderson Faulting Theory			x			x							x			
Faults and fault mechanisms		x								x					x	
Intergranular and intragranular movements		x														x
Stress and strain regimes			x											x		

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s)
Power point presentations

6-2 Required books

None

6-3 Recommended books

-Fossen, H. (2010) Structural geology. Cambridge University Press, London.
-Rock mechanics on a geological base, R. Pusch, Elsevier.
-Structural geology of rocks and regions, G. Davis and S. Reynolds.

6-4 Periodicals, Web sites, etc.

Journal of Structural Geology
Egyptian Journal of Geology
http://gdex.cr.usgs.gov/gdex/
Hamimi, Z. (2006) Principles of structural geology (Arabic Edition). Hebet El-Nil El-Arabiya, Cairo.

7- Facilities required for teaching and learning:

Data show
Sound system to ensure the ease listening
Using a white board
Group discussions

Course coordinator(s):	Prof. Maher El-Amawy Prof. Wael Hagag
Head of the Department:	Prof. Gamal El Qot
Date:	2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 361: Water Geochemistry

A- Affiliation

Relevant program: **B.Sc. in Microbiology/Chemistry**

Department offering the program: **Department of Botany and Microbiology**
Department offering the course: **Department of Geology**
Academic year/level: **3rd level**

B - Basic information

Title: Water Geochemistry **Code:** Geo **361** **Year/level:** third level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:** 4 h/week

C - Professional information

1 – Course Learning Objectives:

This course is aimed to introducing students to principles and processes of Water Geochemistry, and to train students on recognition of the main concepts of physical, chemical, and biological characteristics of groundwater – rocks water interaction, effect of pollution, good quality drinking water and tracing the origins of water.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. explain and master fundamental qualitative and quantitative principles of Water Geochemistry.
a2. know how to approach and solve basic problems in the field of Water Geochemistry.
a3. of Water Geochemistry data and how to use them in hydrologic investigations,
a4. realize how Water Geochemistry is interrelated with other natural and environmental science disciplines,
a5. recognize the methods and techniques used in interpetation of the Water Geochemistry data.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. identify the ability to imagine and confirm new hypotheses, new water geochemistry problem descriptions, and new water geochemistry methods for analyzing data.
b2. demonstrate of the motivation to question conventional formulations of problems.
B3. analyze the distribution and propagation of different types of water pollution

problems.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1: acquire substantial quantities of information, process it effectively, and draw appropriate conclusions,

c2: make and record accurate observations and measurements,

c3. analyze the various geological and structrual issues of water geochemistry problems,

c4. carry out scientific research and evaluate and make use of the material so acquired,

c5. write and construct scientific documents using appropriate styles, conventions, and terminology.

d - General skills:

On successful completion of the course, the student should be able to:

d1. work productively with others,

d2. communicate effectively in writing,

d3. organise and manage working time, schedule tasks, and meet deadlines,

d4. manage and manipulate numerical data,

d5. work safely in the laboratory and the field and to access related safety issues,

3 – Contents

Topic	**Lecture hours**	**Tutorial hours**	**Practical hours**
1. Introduction and course description	1	0	3
2. The water cycle in nature	1	0	3
3. Chemical components of water- Origin of water	1	0	3
4. Physical properties of water	1	0	3
5. Chemical properties of water	1	0	3
6. Dissolved gases in the groundwater -	1	0	3
7. Biological characteristics of groundwater	1	0	3
8. Radioactive materials in the groundwater	1	0	3
9. Types of rocks and the quality of the groundwater	1	0	3
10. Assessment of water for uses in drinking	1	0	3
11. Assessment of water for uses in agriculture	1	0	3
12. Assessment of water for uses in industry	1	0	3
13. The impact of human activities on water pollution	1	0	3
14. Revision and Feedback	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes	Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming

Knowledge & Understanding	a1	explain and master fundamental qualitative and quantitative principles of hydrogeochemistry,	x	0	x	0	0	x
	a2	know how to approach and solve basic problems in hydrogeochemistry,,	x	x	0	0	0	0
	a3	explore locations of hydrogeochemistry data and how to use them in hydrologic investigations,	x	0	0	0	0	x
	a4	realize how hydrogeochemistry is interrelated with other natural and environmental science disciplines,	x	x	0	0	X	x
Intellectual Skills	b1	identify the ability to imagine and confirm new hypotheses, new hydrogeochemistry problem descriptions, and new hydrogeochemistry methods for analyzing data..	**x**	0	0	**0**	**X**	**0**
	b2	demonstration of the motivation to conventional formulations of problems.	**x**	0	0	**0**	**x**	**x**
	b3	analyze the setting and types of waves	x	x	0	0	0	x
	b4	study the distribution and propagation of different types of waves.	x	x	0	0	0	x
Practical and professional skills	c1	acquire substantial quantities of information, process it effectively, and draw appropriate conclusions,	x	0	0	0	X	x
	c2	make and record accurate observations and measurements,	x	0	0	0	X	x
	c3	carry out scientific research and evaluate and make use of the material so acquired,	x	x	0	0	0	x
	c4	analyze the various geological and structrual issues of an hydrogeochemistry raw material or mineral deposit,	x	x	0	0	0	x
	c5	write and construct scientific documents using appropriate styles, conventions and terminology	x	0	0	0	x	x
General Skills	d1	work safely in the laboratory and the field and to access related safety issues,	x	x	0	0	0	x
	d2	organise and manage working time, schedule tasks, and meet deadlines,	x	x	0	0	0	x
	d3	undertake practical experimental work using appropriate equipment and instruments,	x	x	0	0	0	x
	d4	work safely in the laboratory and the field and to access related safety issues,	x	x	0	0	0	x
	d5	undertake practical experimental work using appropriate equipment and instruments.	x	x	0	0	0	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s) and approved by the Department council

6-2 Required books

None

6-45 Recommended books

Geochemistry, groundwater and pollution (eBook, 2005) Get this from a library!

Geochemistry, **groundwater and pollution**. [C A J Appelo; Dieke Postma]

Physical and Chemical hydrogeology by Domenico, P.A. and Schwartz, F.W., (1990): " (eds)" Wiley,J. and Sons, inc. New York

Groundwater resource development Hamill, L. and Bell, F.G.,(1986): British Library, ISBN 0-408-01409-1, pages. 253

Groundwater Geochemistry A Practical Guide to Modeling of Natural and Contaminated quatic Systems by Broder J. Merkel Britta Planer-Friedrich Edited by Darrell Kirk Nordstrom

ISBN 3-540-24195-7 Springer Berlin Heidelberg New York Library of Congress Control Number: 2004117858

6-4 Periodicals, Web sites, etc.

www.google.com & www.scincedirect.com & *www.worldcat.org/*

7- Facilities required for teaching and learning:

Data show: Power point presentations
Sound system to ensure the ease listening
Using a blackboard

Course coordinator: Prof. Dr. Mohamed El-Fakharany
Dr Nehad Mansour

Head of the Department: Prof. Dr. Gamal El Qot

Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo. 363: Hydrology

A- Affiliation

Relevant program:	**B.Sc. in Microbiology/Chemistry**
Department offering the program:	**Department of Botany and Microbiology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Third level**

B - Basic information

Title: Hydrogeology	**Code:** Geo **363**	**Year/level:** third level
Teaching Hours:	**Lectures:** 1	**Tutorial:** 0
	Practical: 3	**Total:** 4 h/week

C - Professional information

1 – Course Learning Objectives:

This course is aimed to introducing students to principles hydrology, and to define locations of hydrologic data and how to use them in hydrologic investigations. The students should therefore be able to assess how hydrology is interrelated with other natural and environmental science disciplines.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. approach and solve basic problems in the field of hydrology,
a2. explore locations of hydrology data and how to use them in hydrologic investigations,
a3. realize how hydrology is interrelated with other natural and environmental science disciplines,
a4. recognize the methods and techniques used in interpetation of the hydrology data.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. Investigate the distribution of under-gorundwater.
b2. analyze hydrologic processes, particularly the processes of precipitation, evaporation, infiltration, and runoff.
b3. explore methods of hydrologic analysis, including aquifer types, groundwater velocity.
b4. envistigate the methods of hydrologic design, including design of groundwater flow maps.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. acquire substantial quantities of information, process it effectively, and draw appropriate conclusions,
c2. report accurate observations and measurements,
c3. analyze the various geological and structrual issues of aquifers,
c4. carry out scientific research and evaluate and make use of the material so acquired,

d - General skills:

On successful completion of the course, the student should be able to:

d1. work productively with others,
d2. communicate effectively in writing,
d3. organise and manage working time, schedule tasks, and meet deadlines,
d4. Use computer, internet & communications.
d5. adhre to ethical and community linked thinking

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction and course description	1	0	3
2. The hydrologic cycle	1	0	3
3. Precipitation	1	0	3
4. Evaporation	1	0	3
5. Transpiration	1	0	3
6. Surface water hydrograph	1	0	3
7. Drainage basins	1	0	3
8. Vertical distribution of groundwater	1	0	3
9. Porosity	1	0	3
10. Permeability.	1	0	3
11. Aquifer types	1	0	3
12. Wells and springs	1	0	3
13. Groundwater velocity	1	0	3
14. Revision and Feedback	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

	Intended Learning Outcomes		Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Un	a1	approach and solve basic problems in the	x	x	0	0	0	x

		field of hydrogeology,						
	a2	explore locations of hydrogeology data and how to use them in hydrologic investigations,	x	0	0	0	X	x
	a3	realize how hydrogeology is interrelated with other natural and environmental science disciplines,	x	0	0	0	X	x
	a4	recognize the methods and techniques used in interpetation of the hydrogeology data.,	x	x	0	0	0	x
Intellectual Skills	b1	investigate the distribution and migration of undergorundwater.	x	0	0	0	X	x
	b2	analyze hydrologic processes, particularly the processes of precipitation, evaporation, infiltration, and runoff.	x	0	0	0	X	x
	b3	exploremethods of hydrologic analysis, including aquifer types, groundwater movment, and aquifer hydraulic properties	x	x	0	0	0	x
	b4	envisage methods of hydrologic design, including design of flow chart.	x	x	0	0	0	x
Practical and professional skills	c1	acquire substantial quantities of information, process it effectively, and draw appropriate conclusions,	x	0	0	0	X	x
	c2	make and record accurate observations and measurements,	x	0	0	0	X	x
	c3	report accurate observations and measurements,	x	x	0	0	0	x
	c4	analyze the various geological and structrual issues of aquifers,	x	x	0	0	0	x
	c5	carry out scientific research and evaluate hydrogeologic issues.	x	0	0	0	x	x
General Skills	d1	work productively with others,	x	x	0	0	0	x
	d2	communicate effectively in writing,	x	x	0	0	0	x
	d3	organise and manage working time, schedule tasks, and meet deadlines,	x	x	0	0	0	x
	d4	Use computer, internet & communications.	x	x	0	0	0	x
	d5	adhre to ethical and community linked thinking	x	x	0	0	0	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester Work	a1, a2, a3, b2, and d1	Fifth week	15 %
Mid-Term Exam	a1, , b2.	Seventh week	5 %
Oral exam	a2, a3, a4, b1, c2, c3	Thirteenth week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Written exam	a1, a2, a3, b1, b2, c1, c2, c3, d1.	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Course notes prepared by the course instructor(s) and approved by the Department council

6-2 Required books

None

6-46 Recommended books

Basic ground-water hydrology (1987) By RALPH C. HEATH Library of Congress Cataloging in Publication Data Geological Survey water-supply paper; 2220

Groundwater resource development Hamill, L. and Bell, F.G.,(1986): British Library, ISBN 0-408-01409-1, pages. 253.

Hydrology Principles, Analysis, Design Revised 2nd edition Author: H. M. Raghunath Copyright © 2006 New Age International (P) Ltd., Publishers Published by New Age International (P) Ltd., Publishers pages 463

6-47 Periodicals, Web sites, etc.

www.google.com & www.scincedirect.com

7- Facilities required for teaching and learning:

Data show: Power point presentations
Sound system to ensure the ease listening
Using a blackboard

Course coordinator: Prof. Dr. Mohamed El-Fakharany
Dr Nehad Mansour

Head of the Department: Prof. Dr. Gamal El Qot

Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification
365 G: Hydrogeology

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Third level**

B - Basic information

Title: Hydrogeology	**Code: 365 G**	**Year/level:** third level
Teaching Hours:	**Lectures:** 2	**Tutorial:** 0
	Practical:3	**Total:** 4 h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to master fundamental qualitative and quantitative principles of hydrogeology, and to define locations of hydrogeologic data and how to use them in hydrologic investigations. The students should therefore be able to assess how hydrogeology is interrelated with other natural and environmental science disciplines.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. approach and solve basic problems in the field of hydrogeology,
a2. explore locations of hydrogeology data and how to use them in hydrologic investigations,
a3. realize how hydrogeology is interrelated with other natural and environmental science disciplines,
a4. recognize the methods and techniques used in interpetation of the hydrogeology data.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. Investigate the distribution undergorundwater.
b2. analyze hydrologic processes, particularly the processes of precipitation, evaporation, infiltration, and runoff.
b3. explore methods of hydrologic analysis, including aquifer types, groundwater movment, pumping tests and determination of aquifer hydraulic properties, well digsin
b4. envisage methods of hydrologic design, including design of flow chart.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. acquire substantial quantities of information, process it effectively, and draw appropriate conclusions,

c2. report accurate observations and measurements,

c3. analyze the various geological and structrual issues of aquifers,

c4. carry out scientific research and evaluate and make use of the material so acquired,

d - General skills:

On successful completion of the course, the student should be able to:

d1. work productively with others,

d2. communicate effectively in writing,

d3. organise and manage working time, schedule tasks, and meet deadlines,

d4. Use computer, internet & communications.

d5. adhre to ethical and community linked thinking

3 – Contents

Topic	**Lecture hours**	**Tutorial hours**	**Practical hours**
15. Introduction and course description	2	0	3
16. The hydrologic cycle	2	0	3
17. Stream flow and drainage system	2	0	3
18. Stream flow and hydrograph analyses	2	0	3
19. Rocks and water, porosity and Hydraulic conductivity	2	0	3
20. Aquifer types and confining beds	2	0	3
21. Groundwater velocity, Transmissivity & storage coefficient	2	0	3
22. Groundwater movement, groundwater flow net	2	0	3
23. Cone of deppretion, aquifer boundaries & well interference	2	0	3
24. Analysis of aquifer test data	2	0	3
25. Time-drawdown analysis	2	0	3
26. Distance-drawdown analysis	2	0	3
27. Water-well design	2	0	3
28. Revision and Feedback	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	approach and solve basic problems in the field of hydrogeology,	x	x	0	0	0	x
	a2	explore locations of hydrogeology data and how to use them in hydrologic investigations,	x	0	0	0	X	x
	a3	realize how hydrogeology is interrelated with other natural and environmental science disciplines,	x	0	0	0	X	x
	a4	recognize the methods and techniques used in interpetation of the hydrogeology data.,	x	x	0	0	0	x
Intellectual Skills	b1	investigate the distribution and migration of undergorundwater.	x	0	0	0	X	x
	b2	analyze hydrologic processes, particularly the processes of precipitation, evaporation, infiltration, and runoff.	x	0	0	0	X	x
	b3	exploremethods of hydrologic analysis, including aquifer types, groundwater movment, and aquifer hydraulic properties	x	x	0	0	0	x
	b4	envisage methods of hydrologic design, including design of flow chart.	x	x	0	0	0	x
Practical and professional skills	c1	acquire substantial quantities of information, process it effectively, and draw appropriate conclusions,	x	0	0	0	X	x
	c2	make and record accurate observations and measurements,	x	0	0	0	X	x
	c3	report accurate observations and measurements,	x	x	0	0	0	x
	c4	analyze the various geological and structrual issues of aquifers,	x	x	0	0	0	x
	c5	carry out scientific research and evaluate hydrogeologic issues.	x	0	0	0	x	x
General Skills	d1	work productively with others,	x	x	0	0	0	x
	d2	communicate effectively in writing,	x	x	0	0	0	x
	d3	organise and manage working time, schedule tasks, and meet deadlines,	x	x	0	0	0	x
	d4	Use computer, internet & communications.	x	x	0	0	0	x
	d5	adhre to ethical and community linked thinking	x	x	0	0	0	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester Work	a1, a2, a3, b2, and d1	Fifth week	15 %
Mid-Term Exam	a1, , b2.	Seventh week	5 %
Oral exam	a2, a3, a4, b1, c2, c3	Thirteenth week	5 %
Practical exam	A1,a2,a3,b1, b2,c2,c3		25%
Written exam	a1, a2, a3, b1, b2, c1, c2, c3, d1.	Fourteenth week	50%
Total			100 %

6- List of references:

6-1 Course notes

Course notes prepared by the course instructor(s) and approved by the Department council

6-2 Required books

None

6-48 Recommended books

Basic ground-water hydrology (1987) By RALPH C. HEATH Library of Congress Cataloging in Publication Data Geological Survey water-supply paper; 2220

Groundwater resource development Hamill, L. and Bell, F.G.,(1986): British Library, ISBN 0-408-01409-1, pages. 253.

Hydrology Principles, Analysis, Design Revised 2nd edition Author: H. M. Raghunath Copyright © 2006 New Age International (P) Ltd., Publishers Published by New Age International (P) Ltd., Publishers pages 463

6-49 Periodicals, Web sites, etc.

www.google.com & www.scincedirect.com

7- Facilities required for teaching and learning:

Data show: Power point presentations
Sound system to ensure the ease listening
Using a blackboard

Course coordinator:	Prof. Dr. Mohamed El-Fakharany Dr.Nehad Manssour
Head of the Department:	Prof. Dr. Gamal El-Qot
Date:	2023

Course Specification
Geo403:Engineering Geology

A. Affiliation

Relevant program: **B.Sc. in Geology Program**

Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Fourth level**

B. Basic information

Title: Engineering Geology **Code: Geo 403** **Year/level:** Fourth level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical:3 **Total:**4 h/week

C. Professional information

1. Course Learning Objectives:

This course is designed to introduce students to the major principles of physical geology covering the structure of the Earth, plate tectonics, volcanism and other mountain building processes, the surface erosion process, and the formation and properties of minerals and rocks. The relationship between application of geological knowledge to civil engineering problems such as landslide, subsidence and earthquake etc. To inspire the students to think clearly and critically the solution of the civil engineering problems in the context of geological knowledge

2. Intended Learning Outcomes (ILOS)

a. Knowledge and understanding:

On successful completion of the course, the student should:

a1.Acquire the knowledge of the most important rocks and minerals
a2. Realize the relationship between rocks and engineering
a3. Identify weathering as they influence civil engineering works
a4. Review mass movement as they influence civil engineering works
a5. Demonstrate the seismic wave and earthquake.
a6. Review the Atterberg limits of soil.

b. Intellectual skills:

On successful completion of the course, the student should be able to.

b1.Import, survey, classify and criticize the published Engineering Geology and industrial rock data.
b2. Apply the information, the experimental and field methods in solving site engineering and industrial rock resources management and related problems.
b3. Set-up discussions concerning the program's aims, concerning research plans, work-steps and give value to the other arguments.
b4. Organize the suitable work methods and time-plan to carry out field studies in a given site or quarry.

b5. Arrange the appropriate tools and techniques for a given experiments both in situ or laboratory.
b6. Assemble and integrate the collected surface and subsurface observations, results and data.
b7. Relate each group data to their responsible sources, and then derive the best design to produce, display, interpret, manage and/or predict the engineering and industrial problems in geotechnical report.

c.Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1.Design and undertake Engineering Geology and rock mechanics experimental analyses and field studies and assess their results.
c2. Construct and carry out the Engineering Geology and rock mechanics scientific researches and applied projects and fulfill their written reports.
c3. Evaluate and carrying out the feasibility studies of engineering projects and writing geotechnical reports.
c4.Interpret the scientific and applied geotechnical maps, sections and documents.
c5. Use Information Technology (IT) in the different steps of collecting, presenting and analyze the geotechnical and rock mechanics data.

d. General skills:

On successful completion of the course, the student should be able to:

d1.Collaborate effectively and positively with others as a part of team through constructive discussions and arguments.
d2. Undertake responsibility of doing Engineering and industrial rocks projects by himself and the others in team works.
d3. Formulate well scheduled working-plan and carry out its requirements both in situ and laboratory.
d4. Use the modern software and IT in different engineering and industrial tasks, simulation and modeling.
d5. Display the engineering and industrial information and results using the suitable equipments and / or explanatory posters, reports and models. collect data from books and other resources.

3. Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1- Introduction to Engineering Geology	1	0	3
2- Geology and Civil Engineering	1	0	3
3- Earth structure, minerals and rocks	1	0	3
4- Weathering, erosion and soil formation	1	0	3
5- Structural geology and mapping techniques	1	0	3
6- Physical and engineering properties of rocks	1	0	3
7- Geologic work of surface and subsurface water	1	0	3
8- Site investigations	1	0	3
9- Geology of Tunnels, Highways, Railways and Bridges	1	0	3
10- Geology of Dams Sites and Reservoirs	1	0	3
11- Geological Materials Used in Construction	1	0	3
12- Geologic Resources and Energy Resources	1	0	3
13- Natural Geological Hazards Related to Civil Engineering	1	0	3
14- Review Questions and Problems	1	0	3
	14	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1.	Acquire the knowledge of the most important rocks and minerals	✓					
	a2.	Realize the relationship between rocks and engineering	✓	✓	✓	✓		
	a3.	Identify weathering as they influence civil engineering works	✓	✓				
	a4.	Review mass movement as they influence civil engineering works	✓	✓	✓			✓
	a5.	Demonstrate the seismic wave and earthquake.				✓		
	a6.	Review the Atterberg limits of soil.			✓	✓		
Intellectual Skills	b1.	Import, survey, classify and criticize the published Engineering Geology and industrial rock data.		✓		✓		
	b2.	Apply the information, the experimental					✓	✓

		and field methods in solving site engineering and industrial rock resources management and related problems.						
	b3.	Set-up discussions concerning the program's aims, concerning research plans, work-steps and give value to the other arguments.				✓		
	b4.	Organize the suitable work methods and time-plan to carry out field studies in a given site or quarry.	✓					
	b5.	Arrange the appropriate tools and techniques for a given experiments both in situ or laboratory.	✓	✓	✓	✓		
	b6.	Assemble and integrate the collected surface and subsurface observations, results and data.	✓	✓				
	b7.	Relate each group data to their responsible sources, and then derive the best design to produce, display, interpret, manage and/or predict the engineering and industrial problems in geotechnical report.	✓	✓	✓			✓
Practical and professional skills	c1.	Design and undertake Engineering Geology and rock mechanics experimental analyses and field studies and assess their results.				✓		
	c2.	Construct and carry out the Engineering Geology and rock mechanics scientific researches and applied projects and fulfill their written reports.			✓	✓		
	c3.	Evaluate and carrying out the feasibility studies of engineering projects and writing geotechnical reports.		✓		✓		
	c4.	Interpret the scientific and applied geotechnical maps, sections and documents.					✓	✓
	c5.	Use Information Technology (IT) in the different steps of collecting, presenting and analyze the geotechnical and rock mechanics data.				✓		
General Skills	d1.	Collaborate effectively and positively with others as a part of team through constructive discussions and arguments.	✓					
	d2.	Undertake responsibility of doing Engineering and industrial rocks projects by himself and the others in team works.	✓	✓	✓	✓		
	d3.	Formulate well scheduled working-plan and carry out its requirements both in situ	✓	✓				

		and laboratory.						
	d4.	Use the modern software and IT in different engineering and industrial tasks, simulation and modeling.	✓	✓	✓			✓
	d5.	Display the engineering and industrial information and results using the suitable equipments and / or explanatory posters, reports and models. collect data from books and other resources.				✓		

5. Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exams to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs b, c	Thirteenth week	25 %
Oral exam	ILOs b, c	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

-Course matrix

contents	Knowledge and understanding				Intellectual skills				Practical and professional skolls				General skills			
	a 1	a 2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction to Engineering Geology	x						x						x			
Geology and Civil Engineering		x				x					x					x
Earth structure, minerals and rocks				x												
Weathering, erosion and soil formation			x													
Structural geology and mapping techniques				x										x		
Physical and engineering properties of rocks						x				x						
Geologic work of surface and subsurface water		x						x						x		

Site investigations			x										x			
Geology of Tunnels, Highways, Railways and Bridges		x							x						x	
Geology of Dams Sites and Reservoirs	x						x					x		x		
Geological Materials Used in Construction			x			x							x			
Geologic Resources and Energy Resources		x								x					x	
Natural Geological Hazards Related to Civil Engineering		x														x
Review Questions and Problems			x											x		

6. List of references:

6.1. Course notes

Lecture notes prepared by the course instructor(s)

Power point presentations

6.2. Required books

None

6.3. Recommended books

Fundamentals of Engineering Geology 2016 (With 773 Review Questions and Problems; 63 Illustrative Worked Examples; and 295 Figures); Prof. Hussein Hameed Karim (Professor of Engineering Geophysics, Building and Construction Engineering Department, University of Technology, Baghdad- Iraq.

Engineering Geology: Subinoy Gangopadhyay (Formerly, Senior Director, Geological Survey of India); Oxford University Press 2013.

6.4. Periodicals, Web sites, etc.

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7. Facilities required for teaching and learning:

Data show

Sound system to ensure the ease listening

Using a blackboard

Group discussions

Course coordinator: Prof. Refaat Osman
Prof. Wael Hagag

Head of the Department: Prof. Gamal El Qot

Date: 2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 405 Field Geology

A- Affiliation

Relevant program: B.Sc.in Geology
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Fourthlevel

B - Basic information

Title:Field Geology	**Code:405 Geo**	**Year/level:**Fourthlevel
Teaching Hours:	**Lectures:**0	**Tutorial:** 0
	Practical:3	**Total:**3h/week

C - Professional information

1 – Course Learning Objectives:

The objective of this course is to introduce students to fundamentals of field geology. The students will be teached how to report geologicasl features, data and samples. The course is designed to familiarize students with geologic mapping techniques, and to encourage the use of sedimentology and field-structural for lithology identification and stratigraphic setting.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1.study the field relations between various lithologies,
a2. recognize non-tectonic- and tectonic-structures in outcrop- and regional-scales.
a3. demonstrate successive relations between geologic structures,
a4. analyze collected field-structural measurements,
a5. decide which mapping technique is appropriate

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. differentiate between various lithologies in the field,
b2. use different techniques in geologic mapping,

b3.demenostsatethe basic and progressed techniques and methods to analyze structural data,

b4.recognizefield relations and geologic features at different scales, and

b5. relate software and hardware in stratigraphy and paleontology.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1.locate himself in the field,

c2.describe and identify different lithologies and stratigraphic setting in the field,

c3.collect samples for palaeontological studies,

c4. report the field observations in a comprehensive trip report.

d - General skills:

On successful completion of the course, the student should be able to:

d1. work in a team,

d2. adhere to safty and security regulations

d3. collaborate with peers in a common project

d4.organize a short term trip for projected geological purpose

Topic	Field Trip	Technical Report
189. Introduction		
190. Field equipment, rules, behavior and safety in the Field		
191. Planning for a field trip		
192. Observation study and reporting		
193. Hand specimen collection in different rocks		
194. Descripting an exposure		
195. Geologic - and structural- traverses		
196. Measuring structural elements in the field		
197. Interpretations based on limited data and time		
198. Reporting measurements and observations		
199. Geologic mapping techniques		
200. Mineral deposits and their setting		
201. Filed study in hydrology		
202. Writing technical a report		
Total hours	**28**	**14**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Field Trip	Technical Report
Knowledge & Understanding	a1	study various kinds of structural fabrics	x	0
	a2	recognize field-structural relations	x	0
	a3	demonstrate structural history of an area	x	0
	a4	analyze collected field-structural measurements	x	0
	a5	decide which mapping technique is appropriate	x	0
Intellectual Skills	b1	differentiate between primary- and secondary strutures	**X**	**0**
	b2	use Brunton Compass in collecting structural data	**x**	**0**
	b3	demonstratesuccessive relations between geologic structures	**X**	**0**
	b4	Recognize and recordductile- and brittle-structures	**x**	**x**
	b5	relate software and hardware in structural synthesis	**x**	**0**
Practical and professional skills	c1	interpret geologic- and structural- maps,	x	0
	c2	analyze geological features on aerial and satellite images,	x	0
	c3	use software in plotting and analyze directional data	x	0
	c4	contribute in developing mapping techniques	**x**	**0**
General Skills	d1	collect and recordfield-structural data	x	x
	d2	transfer the projected goals to findings using collected field-structural data,construct maps, and write a technical report	0	x
	d3	Cooperate and work in a team smoothly while managing the time, and go to point and targeted goals.	x	x

5- Students' Assessment Methods and Grading:

5.1. Field behavior and activity,
5.2. Assignments to assess the student during geologic-structural traverses and collecting filed data,
5.3. Field Notebook, technical report and simplified geologic- and structural maps,
5.4. Student participation in outcrop investigation and group discussions.

Tools	To Measure	Time schedule	Grading
Field Work	a1-5, b1-5, c1-4, and d3	Field trip	40 %
Technical Report	d3, d2 and d3	Field and office Work	40 %
Final Discussion	d3, d2 and d3	Field and office Work	20 %
Total			100 %

6- List of references:

6-1 Course notes

Power point presentations

6-2 Required books

None

6-50 Recommended books

McClay, K.R. (1995) The mapping of geological structures. John Wiley & Sons, New York.

Barnes, J.W. with Lisle, R.J. (2003) Basic geological mapping (4th edition). Blackwell Science, 196p.

Gokhale, N.W (2007) Guide to field geology. Cbs Publishers & Distributors, London.

Lisle, R.J. and Leyshon, P.R. (2004) Stereographic projection techniques in structural geology (2nd edition). CambridgeUniversity Press.

6-51 Periodicals, Web sites, etc.

http://www.geology.pitt.edu/GeoSites/field_geology.htm

http://www.field-geology.com/

http://ncgmp.usgs.gov/ncgmpgeomaps

http://ncgmp.usgs.gov/ncgmpgeomaps

http://en.wikipedia.org/wiki/Geologic_map

http://academic.emporia.edu/aberjame/field/geo_map.htm

http://www.geology.siu.edu/courses/geol454/index.html

http://ncgmp.usgs.gov/

http://csmres.jmu.edu/geollab/Fichter/Wilson/wilsonsimp.html

http://www.geo.utexas.edu/courses/660/

http://banglapedia.net/HT/F_0066.HTM

7- Facilities required for teaching and learning:

Field equipments; transportation gear, camping gear, mapping gear and outdoor gear.

Course coordinator: Prof. **Refaat Osman,**
Prof. **Dr. Gamal El Qot**

Prof. **Dr. Emad Sallam**

Head of the Department: Prof. **Dr. Gamal El Qot**

Date: 2023

Course Specification
406 Geo: Research and Essay in Geology

A. Affiliation

Relevant program: **B.Sc. in Geology**

Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Fourth level**

B. Basic information

Title: Research and Essay in Geology **Code:406 G** **Year/level:** fourth level
Teaching Hours: **Lectures:** 3 **Tutorial:** 0
Practical: 0 **Total:**3 h/week

C. Professional information

1. Course Learning Objectives:

This course is aimed to widen the range of academic and transferable skills associated with geological sciences education thus equipping graduates for either subject-related or employment opportunities. It provides a broad foundation for geological study and opportunities for subsequent specialization. Students to develop their geological abilities, knowledge, and career-related life-long learning skills.

2. Intended Learning Outcomes (ILOS)

a. Knowledge and understanding:

On successful completion of the course, the student should:

a1. generate geological research questions and to identify and use appropriate methods in reaching and reporting conclusions,

a2. critically evaluate evidence, ideas and theoretical standpoints within a breadth of geographical and geological contexts,

a3. undertake a deeper approach to learning and understanding.

b. Intellectual skills:

On successful completion of the course, the student should be able to.

b1. recognize the basic theoretical, philosophical and methodological issues relating to qualitative and quantitative research,

b2. realize the concept of, and importance of, sustainability in the management of Earth and its resources,

b3. discover the constructed and dynamic nature of all knowledge.

c. Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

- **c1.** collect, record, analyze and present data of various forms using appropriate analytical techniques,
- **c2.** develop a reasoned and critical argument through the integration and interpretation of analytical data and observations,
- **c3.** accomplish timely organized research on a national or international relevant problem upon arrangement with a staff member "instructor".

d. General skills:

On successful completion of the course, the student should be able to:

- **d1.** communicate ideas and arguments effectively in writing, verbally, and graphically,
- **d2.** work and communicate effectively as part of a team,
- **d3.** demonstrate competence in the use of appropriate IT packages to find, explore, develop and present numbers, text and images.

3. Contents

Topic	Lecture hours	Tutorial hours	Practical hours
Topics are elected upon arrangement with the instructor in any of the geological sciences subjects or related environmental issues. Approval of the subject by the department council is necessary.	2		
Total hours	**28**	0	**0**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1.	generate geological research questions and to identify and use appropriate methods in reaching and reporting conclusions,			✓			✓
	a2.	critically evaluate evidence, ideas and theoretical standpoints within a breadth of geographical and geological contexts,	✓	✓				
	a3.	undertake a deeper approach to learning and understanding.	✓					✓
In	b1.	recognize the basic theoretical,	✓				✓	

		philosophical and methodological issues relating to qualitative and quantitative research,						
	b2.	realize the concept of, and importance of, sustainability in the management of Earth and its resources,	✓	✓				✓
	b3.	discover the constructed and dynamic nature of all knowledge.	✓	✓				✓
Practical and professional skills	c1.	collect, record, analyze and present data of various forms using appropriate analytical techniques,	✓				✓	✓
	c2.	develop a reasoned and critical argument through the integration and interpretation of analytical data and observations,	✓		✓		✓	✓
	c3.	accomplish timely organized research on a national or international relevant problem upon arrangement with a staff member "instructor".	✓				✓	
General Skills	d1.	communicate ideas and arguments effectively in writing, verbally, and graphically,	✓	✓				✓
	d2.	work and communicate effectively as part of a team,	✓	✓				✓
	d3.	demonstrate competence in the use of appropriate IT packages to find, explore, develop and present numbers, text and images.	✓	✓			✓	✓

5. Students' Assessment Methods and Grading:

5.1. Discussions

5.2. Assignments to assess the student independent work, and final written essay to evaluate the work within a team.

Tools	Grading
Semester work	20 %
Report preparation	30 %
Presentation	10 %
Discussion and Oral exam	40 %
	100 %

6. List of references:

6.1. Course notes
Materials are arranged through discussions and meetings with the instructor and from the faculty library.

6.2. Required books.
None
6.3. Recommended books
Scientific Writing
http://www.columbia.edu/cu/biology/ug/research/paper.html

6.4. Periodicals, Web sites, etc.
None

7. Facilities required for teaching and learning:

Data show and equipped hall, PCs with access to the internet

Course coordinator:	Prof. Dr. Gamal El Qot Dr. Wafaa Elshahat Afifi
Head of the Department:	Prof. Dr. Gamal El Qot
Date:	Approved on 9/12/2015 (meeting number 390) and updated on 10/1/2018 (meeting number 419) and updated on 2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 411- Quaternary Geology

A- Affiliation

Relevant program: B.Sc. in GeologyProgram
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Fourth level

B - Basic information

Title: Quaternary Geology **Code:411-Geo** **Year/level:**Thırd level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:**4 h/week

C - Professional information

1 – Course Learning Objectives:

- Study Quaternary sediments, their formation, and petrography, analyzing their stratigraphic and geomorphological implications.
- Classify ancient human civilizations from Stone Age periods, understanding the tools used to determine their ages and cultural development.
- Explore the Quaternary climate of the northern hemisphere, focusing on four glacial periods in the Pleistocene and their impact on Egyptian sediments.
- Analyze and interpret geological data to reconstruct past environmental changes and develop practical skills in Quaternary sediment analysis.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

1. Demonstrate a comprehensive understanding of Quaternary sediments, their formation, and petrography, including their stratigraphic and geomorphological implications.
2. Identify and differentiate various types of tools and artifacts from Stone Age civilizations, comprehending their significance in determining the age and cultural development of ancient human societies.

3. Comprehend the Quaternary climate of the northern hemisphere, with a specific focus on studying the four glacial periods (Shab, Mandal, Günz, and Wurm) in the Pleistocene epoch and their impact on Egyptian sediment stratigraphy.
4. Interpret and analyze geological data to reconstruct past environmental changes during the Quaternary period, gaining insights into past climate fluctuations, vegetation dynamics, and ecological shifts.

b - Intellectual skills:

On successful completion of the course, the student should be able to:

1. Apply critical thinking and analytical reasoning to interpret complex geological data, including the stratigraphy, petrography, and geomorphology of Quaternary sediments.
2. Design and implement research methodologies to investigate and address questions related to Quaternary geology, including the study of ancient civilizations and paleoclimatic conditions.
3. Analyze and interpret data sets, including palynological, radiometric dating, and other geological data, to draw evidence-based conclusions about past Quaternary environments and human history.
4. Synthesize information from various sources to present well-reasoned arguments and scientific discussions on Quaternary geology topics.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

1. Apply practical techniques for fieldwork, including sedimentary sampling, geological mapping, and artifact identification, to gain hands-on experience in Quaternary geology research.
2. Use technical tools and software to analyze and interpret geological data, creating accurate stratigraphic profiles, geomorphological maps, and paleoenvironmental reconstructions.
3. Demonstrate proficiency in distinguishing and classifying Quaternary sediments, fossils, and artifacts, as well as recognizing significant features for geological interpretations.
4. Practice effective communication skills for presenting research findings, both in written reports and oral presentations, to scientific audiences and the general public.

d - General skills:

On successful completion of the course, the student should be able to:

1. Utilize computer applications, internet resources, and digital databases to access and disseminate Quaternary geology knowledge effectively.
2. Develop project management skills, fostering the ability to organize research projects and work collaboratively in team settings in the context of Quaternary geology studies.

3. Exhibit ethical behavior in the handling and conservation of geological specimens, considering the cultural, social, and environmental implications of Quaternary geology research.
4. Demonstrate a commitment to lifelong learning and professional development, staying updated with the latest advancements in the field of Quaternary geology..

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
203. Introduction to Quaternary Geology	1	0	3
204. Sedimentology and Stratigraphy of Quaternary Deposits	1	0	3
205. Geomorphology of Quaternary Landscapes	1	0	3
206. Quaternary Climate Change	1	0	3
207. Glacial Geology	1	0	3
208. Interglacial Periods and Interstadials	2	0	6
209. Dating Techniques in Quaternary Geology	1	0	3
210. Archaeological Methods in Quaternary Geology	1	0	3
211. Evolution of Human Civilization in the Quaternary	1	0	3
212. Quaternary Paleoclimatology and Environmental Reconstructions	1	0	3
213. Quaternary Sea-Level Changes and Coastal Geology	1	0	3
214. Quaternary Mass Extinctions and Biodiversity Changes	1	0	3
215. Quaternary Geology and Climate Change Mitigation	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	Demonstrate a comprehensive understanding of the principles, concepts, and terminology in Quaternary geology,	x	0	x	0	0	x

		encompassing the study of sedimentology, stratigraphy, and geomorphology of Quaternary deposits.						
	a2	Identify and differentiate various types of artifacts and tools from Stone Age civilizations, comprehending their significance in determining the age and cultural development of ancient human societies during the Quaternary period.	x	X	0	0	0	0
	a3	Recognize the Quaternary climate of the northern hemisphere, with a specific focus on studying the four glacial periods (Shab, Mandal, Günz, and Wurm) in the Pleistocene epoch and their impact on Egyptian sediment stratigraphy.	x	0	0	0	0	x
	a4	Describe and analyze the geological history and major environmental transitions during the Quaternary period, including glacial-interglacial cycles and their effects on landscapes and ecosystems.	x	X	0	0	X	x
Intellectual Skills	b1	Apply critical thinking and analytical reasoning to interpret complex geological data in Quaternary geology, including the study of sediments, artifacts, and climatic fluctuations.	**x**	0	0	**0**	**X**	**0**
	b2	Design and implement research methodologies to investigate and address questions related to Quaternary environments and the behavior of ancient civilizations during this geological epoch.	**x**	0	0	**0**	**x**	**x**
	b3	Analyze and interpret data sets, including palynological, radiometric dating, and other geological data, to draw evidence-based conclusions about past Quaternary environments, human history, and climate changes.	x	0	0	**0**	**X**	**0**
	b3	Develop the ability to synthesize information from diverse sources and present well-reasoned arguments in scientific discussions related to Quaternary geology and the study of ancient civilizations.						
Practical and	c1	Apply practical techniques for fieldwork in Quaternary geology, including sedimentary	x	0	0	0	X	x

		sampling, archaeological excavations, and recording stratigraphic data from different sites.						
	c2	Use technical tools and software to analyze and interpret geological data, creating accurate stratigraphic profiles, geomorphological maps, and paleoenvironmental reconstructions relevant to Quaternary geology.	x	0	0	0	X	x
	c3	Demonstrate proficiency in distinguishing and classifying Quaternary artifacts, sediments, and fossils, as well as recognizing significant features for geological and archaeological interpretations.	x	0	0	0	x	x
	c4	Practice effective communication skills for presenting research findings related to Quaternary geology and the study of ancient civilizations, both in written reports and oral presentations, to scientific audiences and the general public.	x	0	0	0	X	x
General Skills	d1	Utilize computer applications, internet resources, and digital databases to access and disseminate knowledge effectively in the field of Quaternary geology and its connections to ancient civilizations.	x	X	0	0	0	x
	d2	Develop project management skills, fostering the ability to organize research projects and work collaboratively in team settings while studying Quaternary geology and archaeological topics.	x	X	o	o	o	x
	d3	Exhibit ethical behavior in the handling and conservation of geological specimens and archaeological artifacts, considering the cultural, social, and environmental implications of Quaternary geology research.	x	X	o	o	x	x
	d4	Demonstrate a commitment to lifelong learning and professional development, staying updated with the latest advancements in the field of Quaternary geology and related archaeological studies.	x	X	o	o	x	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude.
5.2. Assignments to assess the student independen work,
5.3. A field trip.
5.4. Written mid-term exam to ensure the student progress and discover the shortage.
5.5. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes
Manual notes handle of Palynology for students.

6-2 Required books
none

6-52 Recommended books
Title: "Quaternary Environments"
Author: Martin Williams
Publisher: Routledge
Year: 2018
ISBN: 978-0415679068

Title: "Quaternary Dating Methods"
Author: Mike Walker
Publisher: John Wiley & Sons
Year: 2005
ISBN: 978-0470869277

Title: "Quaternary Geochronology: Methods and Applications"
Author: Mike Walker
Publisher: Elsevier
Year: 2015
ISBN: 978-0444538024

These books cover various aspects of Quaternary geology, including dating methods, environmental changes, and geological processes during the Quaternary period. They are valuable resources for students and researchers interested in understanding the geological history and evolution of Earth's recent past..

6-53 Periodicals, Web sites, etc.
www.sciencedirect.com&www.geology.com

7- Facilities required for teaching and learning:

Data show
Using a blackboard
Group discussions

Course coordinators: Prof. Dr. Refaat Osman

Head of the Department: Prof. Dr. Gamal El Qot
Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification

414 Geo: Magneto- and Chemotratigraphy

A- Affiliation

Relevant program: **B.Sc. in Geology**
Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Fourth level**

B - Basic information

Title: Magneto- and Chemotratigraphy **Code: 414 Geo** **Year/level:** Fourth level

Teaching Hours: **Lectures:**1 **Tutorial:** 0
Practical: 3 **Total:** 4 h/week

C - Professional information

1 – Course Learning Objectives:

This course is aimed at introducing students to o introduce the morphology and evolution of fossil invertebrates. Includes discussion of ancient environments and changes in life forms with time.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1. approach Geologic Time Scale and "how it grew" including the most significant biological events of the Phanerozoic

a3. review processes of fossilization including "what is a fossil?" with examples,

a4. realize taxonomic and habitat classification of major invertebrate groups; phylogeny of dominant invertebrate taxa – grades and clades how hydrogeology is interrelated with other natural and environmental science disciplines.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1- analyze the anatomy of stratigraphically significant invertebrate taxa,

b2- determine chronostratigraphic distribution of dominant invertebrate groups,

b3. Investigate Invertebrate fossils as indicators of ancient environments,

b4. explore the major extinction events in the biologic history of Earth as evidenced in the fossil record.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1: acquire substantial quantities of information, process it effectively, and draw appropriate conclusions,

c2: report accurate observations and measurements,

c3. analyze the various geological and stratigraphical issues of fossils,

c4. carry out scientific research and evaluate and make use of the material so acquired,

d - General skills:

On successful completion of the course, the student should be able to:

d1. work productively with others,

d2: communicate effectively in writing,

d3. organise and manage working time, schedule tasks, and meet deadlines,

d4. Use computer, internet & communications.

d5. adhre to ethical and community linked thinking

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction	1	0	3
2. Geochemical fingerprints in sedimentary sequences	1	0	3
3. Use of mineral and geochemical features as guide and reference layers especially in identifying the stratigraphic boundaries	1	0	3
4. How to search for and record geochemical fingerprints in the stratigraphic record	1	0	3
5. Use of radioactive isotopes in studying earth cycles	1	0	3
6. Use of oxygen and carbon isotopes in the stratigraphic correlation and paleoclimate extrapolation	1	0	3
7. Chemistry of oceans and the skeletal composition of organisms	1	0	3
8. Methods for estimating important major and trace elements	1	0	3
9. The paleomagneto-stratigraphy	1	0	3
10. The study of the geomagnetic polarity during the Phanerozoic	2	0	6
11. The uses of magnetic changes in determining the ages of the Cenozoic Era.	2	0	6
12. Completeness of the stratigraphical record	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	differentiate between the different types of the stratigraphy.	x	0	x	0	0	x
	a2	identify the main principles of stratigraphy.	x	x	0	0	0	0
	a3	recognize the different stratigrahic relationships and stratigraphic correlation.	x	0	0	0	0	x
	a4	identify the various kinds of the index fossils.	x	x	0	0	X	x
	a5	identify the standard biozones of the phanerozoic of Egypt and their various kinds.	x	0	0	0	X	x
Intellectual Skills	b1	solve the stratigraphic problems and deduce the data of the rock units correlation.	**x**	0	0	**0**	**X**	**0**
	b2	design the chronostratigraphical and chemostratgraphical tools in description the environmental condition.	**x**	0	0	**0**	**x**	**x**
	b3	identify the most common standard biozones of the phanerozoic.	x	0	0	**0**	**X**	**0**
Practical and professional skills	c1	draw the stratigraphic sections and correlate between the different rock units.	x	0	0	0	X	x
	c2	differentiate the various kinds of biozones of some exposed rock stages and correlate them with some neighboring countries.	x	0	0	0	X	x
	c3	interprete the litho-, biostratigraphic data.	x	0	0	0	x	x
	c4	differentiate between the different rock units in the field	x	0	0	0	X	x
General Skills	d1	Use computer, internet & communications.	x	x	0	0	0	x
	d2	Management, working in group & life-long learning.	x	x	o	o	o	x
	d3	Ethical behavior, community linked thinking.	x	x	o	o	x	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s)
Power point presentations
Manual notes handle of Hydrogeology for students.

6-2 Required books

None

6-54 Recommended books

G. Nichols (2009) Sedimentology and Stratigraphy, 2nd edition. ISBN 978-1-4051- 3592-4
H. Levin (2010) The Earth through Time.ISBN: 978-0470-387740
Brookfield, M (2004) Principles of Stratigraphy. ISBN 1-4051-1164-X

6-55 Periodicals, Web sites, etc.

www.google.com & www.scincedirect.com

7- Facilities required for teaching and learning:

Data show & video shows
Sound system to ensure the ease listening
Using a blackboard
Group discussions

Course coordinator: Prof. Gamal El Qot
Prof. Dr. Hassan El Shikh

Head of the Department: Prof. Dr. Gamal El Qot
Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification

415 Geo: Geology of Egypt

A- Affiliation

Relevant program: B.Sc.in Geology Program
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Fourth Level

B - Basic information

Title: Geology of Egypt **Code:** 415Geo **Year/level:** Fourth level
Teaching Hours: **Lectures:** 2 **Tutorial:** 0
Practical: 3 **Total:** 5 h/week

C - Professional information

5 – Course Learning Objectives:

This couse is dedicated to furnish the student with the necessary basic information about the geology of Egypt in terms of sedimentary cover over the Precambrian basement and their depositional environments and related oil and ore potential.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1.trace the basics, fundamentals and developments related to the geology of egypt,

a2. demonstrate the influence of professional practices of geological studies on the community and the environment,

a3. follow the basics and ethics of scientific research and professional practices,

a4. appreciate the principles and basics of quality control and its application in geological field.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. distinguish between the different types of weathering and their effects on the

soil,

b2. integrate useful solutions of soil conservation from winds.

c - Practical and professional skills:

On successful completion of the course, the student should be able to:

c1. execute professional reports related to geology of egypt in a responsible, safe and ethical manner for preparation of his/her research.

d - General skills:

On successful completion of the course, the student should be able to:

d1. work with peers on small projects,

d2. accomplish given scientific tasks either individually, or with a group,

d3. apply CIT, tools and scientific resources effectively in different tasks related to geology of Egypt,

d4. Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
56. General Introduction	2	0	3
57. Precambrian rock units in Egypt.	2	0	3
58. Classification and distributiom of phanerozoic rocks	2	0	3
59. Lower Paleozoic rock units of Egypt	2	0	3
60. Upper Paleozoic rock units of Egypt	2	0	3
61. Triassic rock units of Egypt	2	0	3
62. Jurassic rock units of Egypt	2	0	3
63. LowerCretaceous rock units of Egypt	2	0	3
64. Upper Cretaceous rock units of Egypt	2	0	3
65. Paleogene rock units of Egypt	2	0	3
66. Neogene rock units of Egypt	2	0	3
67. Oil and gas possibilities in Egypt	2	0	3
68. The value and distribution of mineral deposits in Egypt	2	0	3
69. Revision and feedback	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	trace the basics, fundamentals and and developments related to the geology of egypt,	√					
	a2	demonstrate the influence of professional practices of geological studies on the community and the environment,		√	√			
	a3	follow the basics and ethics of scientific research and professional practices,	√	√	√			
	a4	appreciate the principles and basics of quality control and its application in geological field.	√				√	√
Intellectua l Skills	b1	distinguish between the different types of weathering and their effects on the soil,			√	√		
	b2	integrate useful solutions of soil conservation from winds.	√					
Practical and professional skills	c1	execute professional reports related to geology of egypt in a responsible, safe and ethical manner for preparation of his/her research.				√	√	√
General Skills	d1	work with peers on small projects,	√	√	√	√		
	d2	accomplish given scientific tasks either individually, or with a group,		√				
	d3	apply CIT, tools and scientific resources effectively in different tasks related to geology of Egypt,	√	√	√			
	d4	Communicate scientific data orally to the class audience with the help of technology aids such as a PowerPoint presentation.				√	√	

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,

5.2. Assignments to assess the student independent work,

5.3. Written mid-term exam to ensure the student progress and discover the shortage,

5.4. Final written and oral exam to evaluate the students and promote to other consequent courses.

Tools	To Measure	Time schedule	Grading
Semesterwork	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor
Power point presentations

6-2 Required books

None

6-56 Recommended books

Issawi, B., Francis, M., Youssef, E.A., Osman, R. A. 2009. The Phanerozoic Geology of Egypt a Geodynamic Approach.

6-57 Periodicals, Web sites, etc.

http://www.nhm.ac.uk/research-curation/research/projects/duxbury/database /
http://www.ucl.ac.uk/GeolSci/micropal/welcome.html

7- Facilities required for teaching and learning:

- Data show
- Sound system to ensure the ease of listening
- Traditional chalk or pen board
- Microscopes
- Lab space equiped with the necessary devices and chemicals for sample processing

Course coordinator: Prof. Gamal El Qot
Prof. Hassan El-Sheikh
Prof. Refaat Osman

Head of the Department: Prof. Dr. Gamal El Qot
Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification

Geo 425: Sequence stratigraphy and sedimentary basins

A- Affiliation

Relevant program:	Geology B.Sc. Program
Department offering the program:	Department of Geology
Department offering the course:	Department of Geology
Academic year/level:	Fourth level

B - Basic information

Title: Sequence stratigraphy and sedimentary basins	**Code:** Geo 425	**Year/level:** Fourth level
Teaching Hours:	**Lectures:** 1hr/week	**Tutorial:** 0
	Practical: 3	**Credit hrs:** 2 hrs

C - Professional information

2 – Course Learning Objectives:

This course aims to Sequence stratigraphy analyzes of sedimentary response to changes in base level, and the depositional trends that emerge from the interplay of accommodation (space available for sediments to fill) and sedimentation. Sequence stratigraphy has tremendous potential to decipher the Earth's geological record of local to global changes, and to improve the predictive aspect of economic exploration and production. For these reasons, sequence stratigraphy is currently one of the most active areas of research in both academic and industrial environments.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the post-graduate will be able to:

a1. provide a brief account on the applications of seq. stratigraphy,

a4. realize the stratigraphic sequence and implications into palaeogeography.

b - Intellectual skills:

On successful completion of the course, the post-graduate will be able to:

b1- discriminate between terrestrial, aquatic, and marine stratigaphic environments,

b2- identify features indicating specific stratigraphic position of the layer,

b3- describe the stratigraphic position of a particular bed in a specific formation,

b4- recognize the different units of stratigraphy including member, formation and subformation.

c - General skills:

On successful completion of the course, the graduate will be able to:

d1. work with peers on small projects,

d2. accomplish given scientific tasks either individually, or with a group,

d3. search via the internet and local libraries to prepare a report on a given subject,

d4. communicate scientific data orally to the audience with the help of technology.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
216. An overview	1	0	3
217. Methods of seq. stratigraphic analysis	1	0	3
218. Accommodation and shore shifts	1	0	3
219. Stratigraphic surfaces	1	0	3
220. Systems tracts	1	0	3
221. Sequence models	1	0	3
222. Sequence stratigraphic elemenets	1	0	3
223. Sequence boundaries	1	0	3
224. Flooding surface	1	0	3
225. Transgression and regression	1	0	3
226. Aggradation and progradation	1	0	3
227. Transgression and regression	1	0	3
228. Eustasy	1	0	3
229. Revision	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Final written exam to evaluate the students and promote to other consequent courses.

5- Students' Assessment Methods and Grading:

Tools	Time schedule	Grading
Semesterwork	Semester course	15 %
Mid-Term exam	Seventh week	5 %
Practical exam	Thirteenth week	25 %
Oral exam	Thirteenth week	5 %
Final written exam	Fourteenth week	50 %
100 %		

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor

Power point presentations by the course instructor

6-2 Required books

None

6-58 Recommended books

Principles of Sequence Stratigraphy (Catuneaunu, 2005).

6-59 Periodicals, Web sites, etc.

7- Facilities required for teaching and learning:

- Data show
- Pen board

Course coordinator: Prof.Dr. Emad Sallam
Head of the Department: Prof. Dr. Gamal El-Qot
Date: 2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Geo 427: Marine Geology

A- Affiliation

Relevant program: Geology B.Sc. Program
Department offering the program: Department of Geology
Department offering the course: Department of Geology
Academic year/level: Fourth level

B - Basic information

Title: Marine Geology **Code:** Geo 427 **Year/level:** Fourth level
Teaching Hours: **Lectures:** 1hr/week **Tutorial:** 0
Practical: 3 **Credit hrs:** 2 hrs

C - Professional information

3 – Course Learning Objectives:

This course is divided into four parts. The first part examines what it is about sedimentary rocks that makes them important and useful for determing sea-level change. Part 2 covers the theory of sequence stratigraphy and mechanisms of sea-level change. Part 3 is a case study from the world. Part 4 examines how carbonate sediments repond to sea-level change.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the post-graduate will be able to:

a1. deal with sequence stratigraphy in regard to sea-level change;
a2. examine how carbonate carbonate sediments rspond to sea-level chane

b - Intellectual skills:

On successful completion of the course, the post-graduate will be able to:

b1- interpreting time from sedimentary record;

a2. learn ideas about sedimentary rocks as a record of Earth processes.

c - General skills:

On successful completion of the course, the graduate will be able to:

d1. work with peers on small projects,

d2. accomplish given scientific tasks either individually, or with a group,

d3. search via the internet and local libraries to prepare a report on a given subject,

d4. communicate scientific data orally to the audience with the help of technology.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1.Introduction	1	0	3
2.Sedimentary rocks as a record of earth processes	1	0	3
3.Modern carbonate environments	1	0	3
4.Stratigraphical record and geological time	1	0	3
5.Sea-level change	1	0	3
6.Carbonate mineralogy and chemistry	1	0	3
7.Sequence stratigraphy and sea-level change	1	0	3
8.Sequence stratigraphy	1	0	3
9.Sea-level change vs sediment supply	1	0	3
10. Parasequences	1	0	3
11.Sequence and systems tracts	1	0	3
12. Sequence boundaries	1	0	3
13. Eustasy (global sea level)	1	0	3
14. Revision	1	0	3
Total hours	14	0	42

4 - Teaching and Learning methods:

Final written exam to evaluate the students and promote to other consequent courses.

5- Students' Assessment Methods and Grading:

Tools	**Time schedule**	**Grading**
Semesterwork	Semester course	15 %

Mid-Term exam	Seventh week	5 %
Practical exam	Thirteenth week	25 %
Oral exam	Thirteenth week	5 %
Final written exam	Fourteenth week	50 %
100 %		

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor
Power point presentations by the course instructor

6-2 Required books

None

6-60 Recommended books

The sedimentary record of sea-level change (Coe et al., 2003)

6-61 Periodicals, Web sites, etc.

7- Facilities required for teaching and learning:

- Data show
- Pen board

Course coordinator: Prof. Dr. Emad Sallam
Head of the Department: Prof. Dr. Gamal El-Qot
Date: 2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification

430 G: Ore microscopy and Ore petrology

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Fourth level**

B - Basic information

Title: Ore microscopy and petrology	**Code: 430 G**	**Year/level: Fourth level**
Teaching Hours:	**Lectures:** 2	**Tutorial:** 0
	Practical: 3	**Total:** 5 h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to introduce students to definiation and classification of ore deposits. Investigation of the charactersitcs, genesis and distinctions of ore minerals, their optical properties and genetic associations is a prime purpose. The students are to be trained on identification of ores in the field, and the global distribution of the ore deposits and its controls and chronology.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1. explain the major ore deposit types and industrial minerals and predict how these will affect exploration, evaluation and exploitation,

a2. investigate the role of ore bearing fluids in the genesis of ore deposits and identify and explain the major controls to mineralisation for a variety of deposit types,

a3. recognize the mineralogical and petrological signatures of major ore deposits and industrial mineral types, identify and analyse their assemblages, textural relationships and parageneses and relate these to the mode and timing of formation,

a4. demonstrate the importance of making scientific observations, recognizing similarities between these and stated models and using these observations to

determine or support complex geological interpretations.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. analyze the geologic and tectonic setting of the different ore deposits,

b2. assess mineral paragensis and textures and reconstruct the ore genesis,

b3. apply mineral association criteria to the setting and genesis of ore textures and their evolution,

b4. investigate the distribution of ores and industrial materials in the various rock assemblages,

b5. inspect examples of the Egyptian ores.

c - Practical and professional skills:

Successful students should be professionally able to:

c1. indentify the ore minerals and the associated criteria in the field and in hand speciemen,

c2. acquire the basic concepts of ore petrography is given, which forms the base for an integrated study of an ore deposit,

c3. characterize each type of the ore deposits, occurrence, setting and mineralogy,

c4. detect the paragenetic and evolutionary relationships using the microscopic features.

d - General skills:

On successful completion of the course, the student should be able to:

d1. review available literature from text books, published maps, publications and other resources,

d2. interpret the various types of data and observations into information using software and formulate the results in a readable final form,

d3. contribute significantly to the scientific skills and attitudes of his/her peers.

d4. cooperate and work in team smoothly and manage the time while going to the targeted goals.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
230. Introduction to ore microscopy	2	0	3
231. Ore minerals	2	0	3
232. Classification of the ore deposits	2	0	3
233. Ore deposits in a global tectonic context	2	0	3
234. Ore-forming processes	2	0	3
235. Syngenetic ore deposits	2	0	3
236. Epigenetic ore deposits	2	0	3
237. Surficial and supergene ore-forming processes	2	0	3
238. Exploration vectors for ore deposits	2	0	3
239. Genetic studies of the ore deposits	2	0	3

240. Controls of ore deposit formation and distribution	2	0	3
241. Hydrothermal alteration	2	0	3
242. Examples from the Egyptian ore deposits	4	0	3
243. Revision and evaluation session	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			**Lecture**	**Presentations & Movies**	**Discussions & Seminars**	**Practical**	**Problem solving**	**Brain storming**
Knowledge & Understanding	a1	explain the major ore deposit types and industrial minerals and predict how these will affect exploration, evaluation and exploitation,	√					
	a2	investigate the role of ore bearing fluids in the genesis of ore deposits and identify and explain the major controls to mineralisation for a variety of deposit types,	√	√		√		
	a3	recognize the mineralogical and petrological signatures of major ore deposits and industrial mineral types, identify and analyse their assemblages, textural relationships and parageneses and relate these to the mode and timing of formation,	√		√			√
	a4	demonstrate the importance of making scientific observations, recognizing similarities between these and stated models and using these observations to determine or support complex geological interpretations		√		√		
Intellectual Skills	b1	analyze the geologic and tectonic setting of the different ore deposits	√		√	√	√	
	b2	assess mineral paragensis and textures and reconstruct the ore genesis		√		√	√	
	b3	apply mineral association criteria to the setting and genesis of ore textures and their evolution	√			√		

	b4	investigate the distribution of ores and industrial materials in the various rock assemblages		√	√	√		
	b5	inspect examples of the Egyptian ores	√			√	√	√
Practical and professional skills	c1	indentify the ore minerals and the associated criteria in the field and in hand speciemen	√		√			
	c2	acquire the basic concepts of ore petrography is given, which forms the base for an integrated study of an ore deposit,	√	√		√		
	c3	characterize each type of the ore deposits, occurrence, setting and mineralogy,	√		√	√		√
	c4	detect the paragenetic and evolutionary relationships using the microscopic features.		√		√		
General Skills	d1	review available literature from text books, published maps, publications and other resources,	√		√			√
	d2	interpret the various types of data and observations into information using software for a readable final form,	√					
	d3	contribute significantly to the scientific skills and attitudes of his/her peers.	√	√		√		
	d4	cooperate and work in team smoothly and manage the time while going to the targeted goals.			√			√

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %

Total	100 %

6- List of references:

6-1 Course notes

Course notes prepared by the course instructor(s) and approved by the department council

6-2 Required books

None

6-62 Recommended books

Ore Microscopy and Ore Petrography Author: James R. Craig and David J. Vaughan Publisher: John Wiley and Sons (WIE); 2nd edition (May 31, 1995), 448 pages
Robb, L. (2005) Introduction to Ore-Forming Processes. Blackwell Publishing
http://www.smenet.org/opaque-ore/IX_t_0.htm

6-63 Periodicals, Web sites, etc.

Economic Geology
Ore Geology Reviews
Mineralium Deposita

7- Facilities required for teaching and learning:

Data show: Power point presentations
Sound system to ensure the ease listening
Polished and thin sections of ore deposits
Reflected-light microscopes

Course coordinator: Dr. Adel M. Afify
Head of the Department: Prof. Dr. Gamal El-Qot
Date: 2022

Course Specification

Geo 432: Geology of Mineral Exploration

A. Affiliation

Relevant program: **B.Sc. in Geology Program**

Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Third level**

B. Basic information

Title: Geology of Mineral Exploration	**Code: Geo 432**	**Year/level: Third** level
Teaching Hours:	**Lectures:** 1	**Tutorial:** 0
	Practical: 3	**Total:**4 h/week

C. Professional information

1. Course Learning Objectives:

This course is designed to introduce students to principles and processes of mining and exploration of earth resources. One important goal is to train students on recognization of raw materials and industrial minerals in the field and hand specimen, and to add significantly to the students basic and advanced knowedge on the different methods used in exploration for geological raw and industrial material, as well as relationships between resources exploition and the environmental issues.

2. Intended Learning Outcomes (ILOS)

a. Knowledge and understanding:

On successful completion of the course, the student should:

- **a1.** realize the principals of mineral exploration and branches of geological and mineralogical sciences,
- **a2.** identify the different industrial materials to petrological and geochemical environment,
- **a3.**describe each of thecommonly used mining methods used for mineral extraction,
- **a4.** reciteboth in theory (mathematical and physical background) and in practice (applications and training) how to map, sample and evaluate industrial minerals or raw materials,
- **a5.** recognize the methods and techniques used for mineral prospection and extraction.

b. Intellectual skills:

Successful studentsin this course should be able to.

b1. identify the different minerals in hand specimen and under the microscope,
b2. assess mineral paragensis and textures and reconstruct the ore genesis,
b3. analyze the setting and genesis of ore textures and their evolution,
b4. study the distribution of ores and industrial materials in the various rock assemblages,
b5. recognize the economics of minerals and rocks, with emphasize on the Egyptian resources.

c.Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. identify the different minerals in hand specimen and under the microscope,
c2. characertize each of the mineral assemblages and rock clans and their geologic settings,
c3. demonstrate the economic importance of minerals and rocks and how a feasibility study can be accomplished,
c4. analyze the various geologic, mineralogical and economic issues of an potential raw material or mineral deposit.

d. General skills:

On successful completion of the course, the student should be able to:

d1. assess a case study in Egypt, i.e., working mines or quarries,
d2. present results and analyze data using statistical software and formulate the results in a readable final form,
d3. apply knoweldge and training in probem solving and new findings.
d4. work smoothly in team andmanage the time while going to the targeted goals.

3. Contents

Topic	Lecture hrs	Tutorial hrs	Practical hrs
1. Introduction to mineral exploration methods	1		3
2. Industrial minerals and rocks- geologic settings	1		3
3. Types of industrial minerals	1		3
4. Methods used in mineral exploration	1		3
5. Metallic and non-metallic minerals	1		3
6. Mapping and sampling	1		3
7. Feasibility studies	1		3
8. Industrial materials marketing	1		3
9. Geochemical exploration methods	1		3
10. Geophysical exploration methods	1		3
11. Statistical methods used in exploration	1		3
12. Work opportunities in mineral exploration	1		3
13. Important minerals and rocks in Egypt	1		3
14. Revision and course evaluation	1		3
Total hours	**14**		**42**

4. Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1.	realize the principals of mineral exploration and branches of geological and mineralogical sciences,	✓					
	a2.	identify the different industrial materials to petrological and geochemical environment,		✓	✓			
	a3.	describe each of the commonly used mining methods used for mineral extraction,	✓	✓	✓			
	a4.	recite both in theory (mathematical and physical background) and in practice (applications and training) how to map, sample and evaluate industrial minerals or raw materials,	✓				✓	✓
	a5.	recognize the methods and techniques used for mineral prospection and extraction.			✓	✓		
Intellectual Skills	b1.	identify the different minerals in hand specimen and under the microscope,	✓					
	b2.	assess mineral paragensis and textures and reconstruct the ore genesis,				✓	✓	✓
	b3.	analyze the setting and genesis of ore textures and their evolution,	✓	✓	✓	✓		
	b4.	study the distribution of ores and industrial materials in the various rock assemblages,		✓				
	b5.	recognize the economics of minerals and rocks, with emphasize on the Egyptian resources.	✓	✓	✓			
Practical and	c1.	identify the different minerals in hand specimen and under the microscope,				✓	✓	
	c2.	characertize each of the mineral	✓				✓	✓

		assemblages and rock clans and their geologic settings,						
	c3.	demonstrate the economic importance of minerals and rocks and how a feasibility study can be accomplished,				✓		
	c4.	analyze the various geologic, mineralogical and economic issues of an potential raw material or mineral deposit.	✓			✓		
General Skills	d1.	assess a case study in Egypt, i.e., working mines or quarries, 0				✓	✓	
	d2.	present results and analyze data using statistical software and formulate the results in a readable final form,	✓					
	d3.	apply knoweldge and training in probem solving and new findings.		✓	✓		✓	✓
	d4.	work smoothly in team and manage the time while going to the targeted goals.	✓	✓	✓		✓	✓

5. Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,

5.2. Assignments to assess the student independen work,

5.3. Written mid-term exam to ensure the student progress and discover the shortage,

5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

-Course matrix

contents	Knowledge and understanding				Intellectual skills				Practical and professional skolls				General skills			
	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction to mineral exploration methods	x						x						x			
Industrial minerals and rocks- geologic settings		x				x					x					x
Types of industrial minerals				x												
Methods used in mineral exploration			x													
Metallic and non-metallic minerals				x										x		
Mapping and sampling						x				x						
Feasibility studies		x						x						x		
Industrial materials marketing			x										x			
Geochemical exploration methods		x							x						x	
Geophysical exploration methods	x						x					x		x		
Statistical methods used in exploration			x			x							x			
Work opportunities in mineral exploration		x								x					x	
Important minerals and rocks in Egypt		x														x
Revision and course evaluation			x											x		

6. List of references:

6.1. Course notes

Lecture notes prepared by the course instructor(s), and approved by the department council

6.2. Required books

None.

6.3. Recommended books

Marjoribanks, R, 1997. Geological Methods in Mineral Exploration and Mining, Chapman & Hall, London, 2nd ed. 2010, XV, 238 p.

Tatiya, R., 2005. Surface and underground excavations: methods, techniques and equipment, Taylor & Francis, ISBN 90-5809-627-0

6.4. Periodicals, Web sites, etc.

Economic Geology

Ore Geology Reviews

Journal of Geochemical Exploration

7. Facilities required for teaching and learning:

Data show

Digital movies of operating mines and tools used in exploration.

Sound system to ensure the ease listening

Course coordinators:	Associate Prof. **Adel Mady Afify**
	Associate Prof. **Moustafa Mogahid**
Head of the Department:	Prof. Gamal El Qot
Date:	2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification
435 G: Economic Geology

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Fourth level**

B - Basic information

Title: Economic Geology	**Code: 435 G**	**Year/level:** Fourth level
Teaching Hours:	**Lectures:** 2	**Tutorial:** 0
	Practical: 3	**Total:** 5 h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to introduce students to classification of earth resources in terms of their being biological or physical, renewable or non-renewable. The students will investigate formation, discovery, extraction and use of physical resources with respect to ores, mineral and rock resources. The overall goal is to make students familiarized with the fundamentals of mineral resources and their geological context.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of this course, the students will be able to:

a1. recognize wide variety of geological environments, and emphasis their relationship with petrological and geochemical processes and geological settings,

a2. recite the theory of light reflection and optical properties of ore minerals under the microscope,

a3. identify each type of the ore deposits, occurrence, setting and mineralogy,

a4. reveal both in theory (mathematical and physical background) and in practice (applications and training) how earth resources contribute to the industry and deveopment,

a5. recognize the methods and techniques used for mineral prospection and extraction.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. identify the different ore minerals in hand specimen and under the microscope,
b2. assess mineral paragensis and textures and reconstruct the ore genesis,
b3. analyze the setting and genesis of ore textures and their evolution,
b4. investigate the distribution of ores and industrial materials in the various rock assemblages,
b5. review the economics of ore minerals, with emphasize on the Egyptian ores.

c - Practical and professional skills:

Successful students should be professionally able to:

c1. investigate ore minerals and associated criteria in the field and in hand speciemen,
c2. characertize each of the mineral deposits and their geologic settings,
c3. use the reflected light microscope to identify the ore minerals and textures for genetic aspects,
c4. draw interpretations of the various geologic, mineralogical and economic issues for sake of evaluating ore deposits.

d - General skills:

On successful completion of the course, the student should be able to:

d1. review available literature from text books, published maps, publications and other resources,
d2. interpret the various types of data and observations into information using software and formulate the results in a readable final form,
d3. apply knoweldge and training in probem solving and new findings,
d4. cooperate and work in team smoothly and manage the time while going to the targeted goals.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
244. Introduction and course structure	2	0	3
245. Earth and earth resources	2	0	3
246. Mineral deposits and their geologic settings	2	0	3
247. Types of mineral deposits and their economics	2	0	3
248. Distribution of ore deposits in the globe	2	0	3
249. Formation models of ore deposits	2	0	3
250. Magma and magmatic ore deposits	2	0	3
251. Ore deposits in convergent tectonic setting	2	0	3
252. Ore dpeosits in divergent tectonic setting	2	0	3
253. Sedimentary ore deposits	2	0	3
254. Study of the ore deposits – geologic view	2	0	3
255. Tools applied to exploration for ore deposits	2	0	3

256. Egyptian ore deposits, distribution and genetic issues	2	0	3
257. Revision and evaluation/improvement plans	2	0	3
Total hours	**28**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			**Lecture**	**Presentations**	**Discussions & Seminars**	**Practical**	**Problem solving**	**Brain storming**
Knowledge & Understanding	a1	recognize wide variety of geological environments, and emphasis their relationship with petrological and geochemical processes and geological settings,	√					
	a2	recite the theory of light reflection and optical properties of ore minerals under the microscope,	√	√		√		
	a3	identify each type of the ore deposits, occurrence, setting and mineralogy,	√		√			√
	a4	reveal both in theory (mathematical and physical background) and in practice (applications and training) how earth resources contribute to the industry and deveopment,		√		√		
	a5	recognize the methods and techniques used for mineral prospection and extraction.	√		√	√	√	
Intellectual Skills	b1	identify the different ore minerals in hand specimen and under the microscope,		√		√	√	
	b2	assess mineral paragensis and textures and reconstruct the ore genesis,	√			√		
	b3	analyze the setting and genesis of ore textures and their evolution,		√	√	√		
	b4	investigate the distribution of ores and industrial materials in the various rock assemblages,	√			√	√	√
	b5	review the economics of ore minerals,	√		√			

		with emphasize on the Egyptian ores.						
Practical and professional skills	c1	investigate ore minerals and associated criteria in the field and in hand speciemen,	√	√		√		
	c2	characertize each of the mineral deposits and their geologic settings,	√		√	√		√
	c3	use the reflected light microscope to identify the ore minerals and textures for genetic aspects,		√		√		
	c4	draw interpretations of the various geologic, mineralogical and economic issues for sake of evaluating ore deposits.	√		√			√
General Skills	d1	review available literature from text books, published maps, publications and other resources,			√			√
	d2	interpret the various types of data and observations into information using software for a readable final form,		√		√	√	
	d3	apply knoweldge and training in probem solving and new findings,			√			√
	d4	cooperate and work in team smoothly and manage the time while going to the targeted goals.		√	√			√

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes
Course notes prepared by the course instructor(s) and approved by the department council.

6-2 Required books
None

6-64 Recommended books
Walter L. Pohl ., 2011. Economic Geology: Principles and Practice, ISBN: 978-1-4443-3663-4, 680 pages, Wiley-Blackwell
The principles of economic geology by Emmons, William H. (1918)
https://archive.org/details/principlesofecon00emmoiala

6-65 Periodicals, Web sites, etc.
Economic Geology
Ore Geology Reviews
Mineralium Deposita
www.segweb.org

7- Facilities required for teaching and learning:
Data show & Power point presentations
Sound system to ensure the ease listening
Equipped laboratory

Course coordinator:	Dr. Abdel Aziem A. Rashwan
	Dr. Adel M. Afify
Head of the Department:	Prof. Dr. Gamal El-Qot
Approval date:	2022

Course Specification

Geo 436: Geochemistry of Hard Rocks

A. Affiliation

Relevant program: **B.Sc. in Geology**

Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Fourth level**

B. Basic information

Title: Geochemistry of Hard Rocks **Code: 436G** **Year/level:** Fourth level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:** 4 h/week

C. Professional information

1. Course Learning Objectives:

This course is designed to enable students of demonstrating the chemical aspects of the earth's material and how they were generated. This accomplishement canbe based on a good understand of the basic principles of geochemical processes. Methods and techniques used in the geochemical studies are impornat for a wide variety of applications.

2. Intended Learning Outcomes (ILOS)

a. Knowledge and understanding:

On successful completion of the course, the students should be able to:

a1. recognize the appropriate mathematical strategies for solving geochemical problems,
a2. recall the structure and chemistry of the rock-forming minerals and be familiar with methods for their study,
a3. relate the major chemical processes involved in water-rock reactions in the Earth's crust,
a4. report the origin of earth's crust and mantle rocks and releated mineral resources,
a5. define possible oversimplifications in geochemical models.

b. Intellectual skills:

Successful studentswill be able to:

b1. review the quality of data generated by analytical geochemical techniques,
b2. present and summarise geochemical data in graphical and tabular forms, and critically appraise its significance, using appropriate statistical techniques where applicable,
b3. discuss the value and limitations of existing information on a given subject,

b4. formulate key hypotheses, using logical and consistent quantitative or qualitative arguments to characertize the investigated rocks,

b5. draw logic conclusions, and identify appropriate avenues for further study.

c.Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. evaluate the principles, applications and limitations of the main analytical techniques used in geochemistry,

c2. experiment practical experience of a range of modern geochemical techniques, and advanced experience of some of these techniques,

c3. analyse the geochemical data and quality of the analytical data generated by different Techniques,

c4. reproduce data by calculation of ratios and norm values from geochemical data using specilaized software.

d. General skills:

Successful students will be able to:

d1. communicate by means of well-prepared, clear and confident presentations andconcise and grammatical written documents,

d2. diagnose other information sources skilfully and appropriately and to be able to cite them appropriately,

d3. conclude facts from geochemical data, such as origin and tectonic setting of rocks,

d4. organise and prioritise work activities in order to meet deadlines,

d5. work independently, with initiative, and also in teams.

3. Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction and course definition/objective	1		3
2. Structure and composition of the Earth's Interior	1		3
3. Primary geochemical differentiation of the Earth	1		3
4. Geochemical classification of elements	1		3
5. Crystal chemistry	1		3
6. Atomic substitutions	1		3
7. Geochemistry of igneous rocks	1		3
8. Geochemical environment	1		3
9. Hydrothermal alteration geochemistry	1		3
10. Geochemistry of metamorphic rocks	1		3
11. Chemical composition of meteorites.	1		3
12. Uses of stable isotope geochemistry.	1		3
13. The geochemical cycle	1		3
14. Revision and open questions	1		3
Total	**14**		**42**

4. Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical session	Problem solving	Brain storming
Knowledge & Understanding	a1.	recognize the appropriate mathematical strategies for solving geochemical problems,	✓					
	a2.	recall the structure and chemistry of the rock-forming minerals and be familiar with methods for their study,	✓	✓		✓		
	a3.	relate the major chemical processes involved in water-rock reactions in the Earth's crust,	✓		✓			✓
	a4.	report the origin of earth's crust and mantle rocks and releated mineral resources,		✓		✓		
	a5.	define possible oversimplifications in geochemical models.	✓		✓	✓	✓	
Intellectual Skills	b1.	review the quality of data generated by analytical geochemical techniques,		✓		✓	✓	
	b2.	present and summarise geochemical data in graphical and tabular forms, and critically appraise its significance, using appropriate statistical techniques where applicable,	✓			✓		
	b3.	discuss the value and limitations of existing information on a given subject,		✓	✓	✓		
	b4.	formulate key hypotheses, using logical and consistent quantitative or qualitative arguments to characertize the investigated rocks,	✓			✓	✓	✓
	b5.	draw logic conclusions, and identify appropriate avenues for further study.	✓		✓			
Practical and professional skills	c1.	evaluate the principles, applications and limitations of the main analytical techniques used in geochemistry,	✓	✓		✓		
	c2.	experiment practical experience of a range of modern geochemical techniques, and advanced experience of some of these techniques,	✓		✓	✓		✓
	c3.	analyse the geochemical data and quality		✓		✓		

		of the analytical data generated by different Techniques,						
	c4.	reproduce data by calculation of ratios and norm values from geochemical data using specilaized software.	✓		✓			✓
General Skills	d1.	communicate by means of well-prepared, clear and confident presentations and concise and grammatical written documents,	✓					
	d2.	diagnose other information sources skilfully and appropriately and to be able to cite them appropriately,	✓	✓		✓		
	d3.	conclude facts from geochemical data, such as origin and tectonic setting of rocks,	✓		✓			✓
	d4.	organise and prioritise work activities in order to meet deadlines,		✓		✓		
	d5.	work independently, with initiative, and also in teams			✓	✓	✓	

5. Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

-Course matrix

contents	Knowledge and understanding				Intellectual skills				Practical and professional skolls				General skills			
	a 1	a 2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction and course definition/objective	x						x						x			
Structure and composition of the Earth's Interior		x				x					x					x
Primary geochemical differentiation of the Earth				x												
Geochemical classification of elements			x													
Crystal chemistry				x										x		
Atomic substitutions						x				x						
Geochemistry of igneous rocks		x						x						x		
Geochemical environment			x										x			
Hydrothermal alteration geochemistry		x							x						x	
Geochemistry of metamorphic rocks	x						x					x		x		
Chemical composition of meteorites.			x			x							x			
Uses of stable isotope geochemistry.		x								x					x	
The geochemical cycle		x														x
Revision and open questions			x											x		

6. List of references:

6.1. Course notes

Course notes prepared by the course instructor(s)and approved by the department
Course files uploaded to the instructor's home page on the university web.

6.2. Required books

None

6.3. Recommended books

Essentials of Geochemistry Author: John Victor Walther Publisher: Jones & Bartlett Publishers; 2 edition (November 21, 2008), 700 pages.
Principles of Igneous and Metamorphic Petrology Author: Anthony Philpotts, Jay Ague. Publisher: Cambridge University Press; 2nd edition (February 2, 2009), 686 pages

6.4. Periodicals, Web sites, etc.

Geochemistry
http://www.springer.com/earth+sciences+and+geography/geology/journal/11479

7. Facilities required for teaching and learning:

Power point presentations
Data show
Sound system to ensure the ease listening
PCs and software
Electronic library

Course coordinators:	**Prof. Dr. Abdelazim Mehanna** **Associate Prof. Moustafa Mohamed Megahed**
Head of the Department:	Prof. Gamal El Qot
Date:	2022/2023

Course Specification

Geo 438: Ore Geochemistry

A. Affiliation

Relevant program: **B.Sc. in Geology**

Department offering the program: **Department of Geology**

Department offering the course: **Department of Geology**

Academic year/level: **Fourth level**

B. Basic information

Title: Ore Geochemistry	**Code: Geo 438**	**Year/level: Fourth level**
Teaching Hours:	**Lectures:** 1	**Tutorial:** 0
	Practical: 3	**Total:** 4 h/week

C. Professional information

1. Course Learning Objectives:

This course is designed to introduce students to definiation and classification of ore deposits according to their geochemistry. Investigation of the charactersitcs, genesis and distinctions of ore minerals, their geochemical properties and genetic associations is a prime purpose. The students are to be trained on identification of the geochemical characteristics of ores.

2. Intended Learning Outcomes (ILOS)

a. Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1. explain the major ore deposit types and industrial minerals and predict how these will affect exploration, evaluation and exploitation,

a2. investigate the chemistry of ore bearing fluids in the genesis of ore deposits and identify and explain the major controls to mineralisation for a variety of deposit types,

a3. recognize the mineralogical and geochemical signatures of major ore deposits and industrial mineral types, identify and analyse their assemblages, chemistry relationships and parageneses and relate these to the mode and timing of formation,

a4. demonstrate the importance of making scientific observations, recognizing similarities between these and stated models and using these observations to determine or support complex geological interpretations.

b. Intellectual skills:

On successful completion of the course, the student should be able to.

b1. analyze the geologic and geochemical setting of the different ore deposits,

b2. assess mineral paragensis and textures and reconstruct the ore genesis,

b3. apply mineral association criteria to the setting and genesis of ore chemistry and their evolution,

b4. investigate the distribution of ores and industrial materials in the various rock assemblages,

b5. inspect examples of the Egyptian ores.

c.Practical and professional skills:

Successful students should be professionally able to:

c1. indentify the ore minerals and the associated criteria in the field and in hand speciemen,

c2. acquire the basic concepts of ore geochemistry is given, which forms the base for an integrated study of an ore deposit,

c3. characterize each type of the ore deposits, occurrence, setting and mineralogy,

c4. detect the paragenetic and evolutionary relationships using the chemical characteristics features.

d. General skills:

On successful completion of the course, the student should be able to:

d1. review available literature from textbooks, published maps, publications and other resources,

d2. interpret the various types of data and observations into information using software and formulate the results in a readable final form,

d3. contribute significantly to the scientific skills and attitudes of his/her peers.

d4. cooperate and work in team smoothly andmanage the time while going to the targeted goals.

3. Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction to ore Geochemistry	1		3
2. Ore minerals	1		3
3. Classification of the ore deposits	1		3
4. Ore deposits in a global tectonic context	1		3
5. Ore-forming processes	1		3
6. Geochemistry of magmatic ore deposits	1		3
7. Geochemistry of alteration zones and related ores			3
8. Surficial and supergene ore-forming processes and their geochemistry	1		3
9. Exploration vectors for ore deposits	1		3
10. Genetic studies of the ore deposits	1		3

11. Controls of ore deposit formation and distribution	1		3
12. Hydrothermal alteration	1		3
13. Examples from the Egyptian ore deposits	1		3
14. Revision and evaluation session	1		3
Total hours	**14**		**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			**Lecture**	**Presentations & Movies**	**Discussions & Seminars**	**Practical**	**Problem solving**	**Brain storming**
Knowledge & Understanding	a1.	explain the major ore deposit types and industrial minerals and predict how these will affect exploration, evaluation and exploitation,	✓					
	a2.	investigate the chemistry of ore bearing fluids in the genesis of ore deposits and identify and explain the major controls to mineralisation for a variety of deposit types,	✓	✓		✓		
	a3.	recognize the mineralogical and geochemical signatures of major ore deposits and industrial mineral types, identify and analyse their assemblages, chemistry relationships and parageneses and relate these to the mode and timing of formation,	✓		✓			✓
	a4.	demonstrate the importance of making scientific observations, recognizing similarities between these and stated models and using these observations to determine or support complex geological interpretations		✓		✓		
Intellectual Skills	b1.	analyze the geologic and geochemical setting of the different ore deposits	✓		✓	✓	✓	
	b2.	assess mineral paragensis and textures and reconstruct the ore genesis		✓		✓	✓	
	b3.	apply mineral association criteria to the	✓			✓		

		setting and genesis of ore textures and their evolution						
	b4.	investigate the distribution of ores and industrial materials in the various rock assemblages		✓	✓	✓		
	b5.	inspect examples of the Egyptian ores	✓			✓	✓	✓
Practical and professional skills	c1.	indentify the ore minerals and the associated criteria in the field and in hand speciemen	✓		✓			
	c2.	acquire the basic concepts of ore petrography is given, which forms the base for an integrated study of an ore deposit,	✓	✓		✓		
	c3.	characterize each type of the ore deposits, occurrence, setting and mineralogy,	✓		✓	✓		✓
	c4.	detect the paragenetic and evolutionary relationships using the microscopic features.		✓		✓		
General Skills	d1.	review available literature from text books, published maps, publications and other resources,	✓		✓			✓
	d2.	interpret the various types of data and observations into information using software for a readable final form,	✓					
	d3.	contribute significantly to the scientific skills and attitudes of his/her peers.	✓	✓		✓		
	d4.	cooperate and work in team smoothly and manage the time while going to the targeted goals.			✓			✓

5. Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,

5.2. Assignments to assess the student independen work,

5.3. Written mid-term exam to ensure the student progress and discover the shortage,

5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %

Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

-Course matrix

contents	Knowledge and understanding				Intellectual skills				Practical and professional skolls				General skills			
	a 1	a 2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction to ore Geochemistry	x						x						x			
Ore minerals		x				x					x					x
Classification of the ore deposits				x												
Ore deposits in a global tectonic context			x													
Ore-forming processes				x										x		
Geochemistry of magmatic ore deposits						x				x						
Geochemistry of alteration zones and related ores		x						x						x		
Surficial and supergene ore-forming processes			x										x			
Exploration vectors for ore deposits		x							x						x	
Genetic studies of the ore deposits	x						x					x		x		
Controls of ore deposit formation and distribution			x			x							x			
Hydrothermal alteration		x								x					x	
Examples from the Egyptian ore deposits		x														x
Revision and evaluation session			x											x		

6. List of references:

6.1. Course notes
Course notes prepared by the course instructor(s)and approved by the department council

6.2. Required books
None

6.3. Recommended books
Ore Microscopy and Ore Petrography Author: James R. Craig and David J. Vaughan Publisher: John Wiley and Sons (WIE); 2nd edition (May 31, 1995), 448 pages
Robb, L. (2005) Introduction to Ore-Forming Processes. Blackwell Publishing
http://www.smenet.org/opaque-ore/IX_t_0.htm

6.4. Periodicals, Web sites, etc.
Economic Geology
Ore Geology Reviews
Mineralium Deposita

7. Facilities required for teaching and learning:
Data show: Power point presentations
Polished and thin sections of ore deposits

Course coordinator: Associate Prof. Adel Mady Afify

Head of the Department: Prof. Gamal El Qot
Date: 2022/2023

Course Specification

Geo 440: Structural Analysis

A. Affiliation

Relevant program: **Geology B.Sc. Program**

Department offering the program: **Department of Geology**
Department offering the course: **Department of Geology**
Academic year/level: **Fourth level**

B. Basic information

Title: structural analysis **Code:** Geo 440 **Year/level:** Fourth level
Teaching Hours: **Lectures:** 1 **Tutorial:** 0
Practical: 3 **Total:**4 h/week

C. Professional information

1. Course Learning Objectives:

This course is designed to provide the students with a review of the theory and practice of structural analysis techniques. The students will be trained to assess how the geologic history can be interpreted using software and structural analysis.

2. Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to.

a1. identify the basics of structural analysis.
a2. Demonstrate the structural analysis methods in different fields of applications.
a3. recognize the outlines of the theories, measurements, interpretations and applications of the different types of structural analysis.
a4. identify the different cross-cutting field relationships and their analysis.
a5. demonstrate the detection and mapping of tectonic boundaries of normally simple geometry.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. acquire geological and structural data from field measurements
b2. Use information from a variety of scientific fields for problem solving.
b3. Recognize and apply Earth Science theories and principles.
b4 hypothesize a range of principles and concepts in solving structural and tectonic problems.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. Use the recent techniques and instrumentation in structural analysis of rocks and regions.

c2. execute professional reports related to different structural analysis applications in a responsible, safe and ethical manner for preparation of his/her research articles and achieve standard quality results using existing tools and methods.

c3 investigate the deformation phases and structural history of the area under study.

c4. use laboratory and field equipments safely for collecting and analyzing orientational data.

d - General skills:

On successful completion of the course, the student should be able to:

d1. apply different tools and scientific resources effectively in different tasks related to structural analysis

d2. detect geological structures, analyses and their interpretation.

d3 apply logical analysis to problem solving.

d4 apply team-working and team leadership skills to addressing complex problems.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. Introduction to structural geology and geotectonics	1	0	3
2. Introduction to structural analysis	1	0	3
3. Measuring structural data in the field and laboratory	1	0	3
4. Foliation, lineation and fabric	1	0	3
5. Stereographic projection	1	0	3
6. Representation of planar structures	1	0	3
7. Representation of linear structures	1	0	3
8. Representation of folds and analyzing its components	1	0	3
9. Representation of faults and analyzing its components	1	0	3
10. AMS technique in structural analysis	1	0	3
11. Stress-tensor method in structural analysis	1	0	3
12. Examples from the Egyptian Nubian Shield (ENS)	1	0	3
13. Field relations and observations from the ENS	1	0	3
14. General revision	1	0	3
Total hours	**14**	**0**	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes		Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	√		√	√	√	√
	a2	√	√	√	√	√	√
	a3	√		√	√		√
	a4	√		√	√		√
	a5	√		√	√		√
Intellectual Skills	b1	√			√	√	
	b2	√			√	√	√
	b3	√		√	√	√	√
	b4	√	√		√		√
Practical and profession al skills	c1	√				√	√
	c2	√	√	√	√	√	√
	c3	√	√		√		√
	C4	√	√		√		√
General Skills	d1	√	√	√	√		√
	d2	√	√		√		√
	d3	√	√		√		√
	d4	√	√		√		√

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5 %
Practical exam	ILOs c, b	Thirteenth week	25 %

Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

-Course matrix

contents	Knowledge and understanding				Intellectual skills				Practical and professional skolls				General skills			
Introduction to structural geology and geotectonics	a 1	a 2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction to structural analysis	x						x						x			
Measuring structural data in the field and laboratory		x				x					x					x
Foliation, lineation and fabric				x												
Stereographic projection			x													
Representation of planar structures				x										x		
Representation of linear structures						x				x						
Representation of folds and analyzing its components		x						x						x		
Representation of faults and analyzing its components			x										x			
AMS technique in structural analysis		x							x						x	
Stress-tensor method in structural analysis	x						x					x		x		
Stress-tensor method in structural analysis			x			x							x			
Examples from the Egyptian Nubian Shield (ENS)		x								x					x	
Field relations and observations		x														x
General revision			x											x		

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s)
Power point presentations

6-2 Required books

None

6-3 Recommended books

1. Structural analysis and synthesis: S.M. Rowland, E.M. Duebendorfer and I.M. Schiefelbein.
2. Park, R.G. (2005) Foundations of structural geology. Blackie & Son Limited, Chapman and Hall, New York.
3. Structural geology of rocks and regions, G. Davis and S. Reynolds.
4. Stereographic projection techniques in structural geology; Peter Leyshon and Richard Lisle.

6-4 Periodicals, Web sites, etc.

Journal of Structural Geology- Elsevier
Geotectonics Journal- Springer

7- Facilities required for teaching and learning:

Data show
Sound system to ensure the ease listening
Using a blackboard
Group discussions

Course coordinator:	Prof. Zakaria Hamimi
	Prof. Wael Hagag
Head of the Department:	Prof. Gamal El Qot
Date:	2022/2023

Benha University
Faculty of Science
Department of Geology

Course Specification
G460: Hydrogeochemistry

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Fourth level**

B - Basic information

Title: Hydrogeochemistry	**Code: 460 G**	**Year/level: Fourth level**
Teaching Hours:	**Lectures:** 1	**Tutorial:** 0
	Practical: 3	**Total:** 4 h/week

C - Professional information

1 – Course Learning Objectives:

This course is aimed at introducing students to principles and processes of geochemistry of surface and groundwater, and to train students on recognition of the main concepts of water – rocks interaction, effect of pollution, good quality drinking water and tracing the origins and the history of water.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

a1. explain and master fundamental qualitative and quantitative principles of hydrogeochemistry,
a2. know how to approach and solve basic problems in the field of hydrogeochemistry,
a3. explore locations of hydrogeochemistry data and how to use them in hydrologic investigations,
a4. realize how hydrogeochemistry is interrelated with other natural and environmental science disciplines,
a5. recognize the methods and techniques used in interpetation of the hydrogeochemistry data.

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. identify the ability to imagine and confirm new hypotheses, new hydrogeochemistry problem descriptions, and new hydrogeochemistry methods

for analyzing data.

b2. demonstrate of the motivation to question conventional formulations of problems.

b3. examine the setting and types of waves

b4. analyze the distribution and propagation of different types of waves.

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1: acquire substantial quantities of information, process it effectively, and draw appropriate conclusions,

c2: make and record accurate observations and measurements,

c3. analyze the various geological and structrual issues of hydrogeochemistry problems,

c4. carry out scientific research and evaluate and make use of the material so acquired,

c5. write and construct scientific documents using appropriate styles, conventions and terminology.

d - General skills:

On successful completion of the course, the student should be able to:

d1. work productively with others,

d2. communicate effectively in writing,

d3. organise and manage working time, schedule tasks, and meet deadlines,

d4. manage and manipulate numerical data,

d5. work safely in the laboratory and the field and to access related safety issues,

3 – Contents

Topic	**Lecture hours**	**Tutorial hours**	**Practical hours**
1. Introduction	1	0	3
2. Sampling of groundwater	1	0	3
3. Field analyses and sample conservations	1	0	3
4. Accuracy of chemical analyses	1	0	3
5. Overall controls on water quality	1	0	3
6. Classification and assessment of Groundwater	2	0	6
7. Graphical presentation of analyses	3	0	6
8. Groundwater classification	3	0	12
9. Revision and Feedback	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	explain and master fundamental qualitative and quantitative principles of hydrogeochemistry,	x	0	x	0	0	x
	a2	know how to approach and solve basic problems in hydrogeochemistry,,	x	x	0	0	0	0
	a3	explore locations of hydrogeochemistry data and how to use them in hydrologic investigations,	x	0	0	0	0	x
	a4	realize how hydrogeochemistry is interrelated with other natural and environmental science disciplines,	x	x	0	0	X	x
Intellectual Skills	b1	identify the ability to imagine and confirm new hypotheses, new hydrogeochemistry problem descriptions, and new hydrogeochemistry methods for analyzing data..	**x**	0	0	**0**	**X**	**0**
	b2	demonstration of the motivation to conventional formulations of problems.	**x**	0	0	**0**	**x**	**x**
	b3	analyze the setting and types of waves	x	x	0	0	0	x
	b4	study the distribution and propagation of different types of waves.	x	x	0	0	0	x
Practical and professional skills	c1	acquire substantial quantities of information, process it effectively, and draw appropriate conclusions,	x	0	0	0	X	x
	c2	make and record accurate observations and measurements,	x	0	0	0	X	x
	c3	carry out scientific research and evaluate and make use of the material so acquired,	x	x	0	0	0	x
	c4	analyze the various geological and structrual issues of an hydrogeochemistry raw material or mineral deposit,	x	x	0	0	0	x
	c5	write and construct scientific documents using appropriate styles, conventions and terminology	x	0	0	0	x	x
General Skills	d1	work safely in the laboratory and the field and to access related safety issues,	x	x	0	0	0	x
	d2	organise and manage working time, schedule tasks, and meet deadlines,	x	x	0	0	0	x
	d3	undertake practical experimental work	x	x	0	0	0	x

		using appropriate equipment and instruments,						
	d4	work safely in the laboratory and the field and to access related safety issues,	x	x	0	0	0	x
	d5	undertake practical experimental work using appropriate equipment and instruments.	x	x	0	0	0	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s) and approved by the Department council

6-2 Required books

None

6-66 Recommended books

Geochemistry, groundwater and pollution (eBook, 2005) Get this from a library!
Geochemistry, **groundwater and pollution**. [C A J Appelo; Dieke Postma]
Physical and Chemical hydrogeology by Domenico, P.A. and Schwartz, F.W., (1990): " (eds)" Wiley,J. and Sons, inc. New York
Groundwater resource development Hamill, L. and Bell, F.G.,(1986): British Library, ISBN 0-408-01409-1, pages. 253
Groundwater Geochemistry A Practical Guide to Modeling of Natural and Contaminated quatic Systems by Broder J. Merkel Britta Planer-Friedrich Edited by Darrell Kirk Nordstrom
ISBN 3-540-24195-7 Springer Berlin Heidelberg New York Library of Congress Control Number: 2004117858

6-4 Periodicals, Web sites, etc.

www.google.com & www.scincedirect.com & *www.worldcat.org/*

7- Facilities required for teaching and learning:

Data show: Power point presentations

Sound system to ensure the ease listening

Using a blackboard

Course coordinator:	Prof. Dr. Mohamed El-Fakharany Dr.Nehad Manssour
Head of the Department:	Prof. Dr. Gamal El-Qot
Date:	2023

Benha University
Faculty of Science
Department of Geology

Course Specification
462 G: Hydrogeology of Egypt

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Fourth level**

B - Basic information

Title: Hydrogeology of Egypt	**Code: 462 G**	**Year/level:** Fourth level
Teaching Hours:	**Lectures:** 1	**Tutorial:** 0
	Practical: 3	**Total:** 4 h/week

C - Professional information

1 – Course Learning Objectives:

This course is designed to study the distribution of groundwater aquifers in different provences in Egypt. The students should therefore be able to assess the hydrogeological and hydrochemical characteristics of groundwater aquifers

2 - Intended Learning Outcomes (ILOS)

On successful completion of the course, the graduate will be able to:

a.1. Gain knowledge and systematic understanding of hydrogeological units in some localities of Egypt

a.2. Gain a critical awareness of hydrocgeological and hydrogeochemical characters of the concerned hydrogeological units

a.3. An understanding of the theoretical basis for groundwater Classification in some localities

a.4. Realize the hydrogelogic value for the hydrocgeological and hydrogeochemical characters

b - Intellectual skills:

On successful completion of the course, the graduate will be able to:

b1. explain the basic principles of Hydrogeology of certain area;

b2. identify and classify the groundwater aquifers and;

b3. identify and classify different hydrogeological units

b4. explain the basic processes for studing defferent water units

b5. know and understand the hydrogeochemical characters of certain area

c - Practical and professional skills:

On successful completion of the course, the graduate will be able to:

c1. identify and interpret aquifer geochemistry of certain area
c2. understand different hydrogeochemical parameterss of certain area ;
c3. understand the key factors that govern aquifers geochemistry of certain area;
c4. interrogate and interpret the geological literature on aquifers geochemistry
c5. write clear and concise hydrogeological reports of an area.

d - General skills:

On successful completion of the course, the graduate will be able to:

d1. Collaborate effectively and positively with others as a part of team through constructive discussions and arguments..
d2. Undertake responsibility of doing hydrogeological projects by himself and the others in team works.
d3. Display the hydrogeological and hydrogeochemical information and results, using the suitable equipments and / or explanatory posters, reports and models.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
258. Introduction to the hydrogeology of Egypt	1	0	3
259. Groundwater aquifers in the Nile Delta basin	1	0	6
260. Groundwater aquifers in the Eastern Desert	3	0	6
261. Groundwater aquifers in Sinai	2	0	6
262. Groundwater aquifers in the Western Deserta	4	0	6
263. Groundwater aquifers in the Nile Vally	2	0	6
264. Revision and Feedback	1	0	3
Total hours	**14**	0	**42**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	Gain knowledge and systematic understanding of hydrogeological units in some localities of Egypt	x	0	x	0	0	x
	a2	Gain a critical awareness of hydrocgeological and hydrogeochemical characters of the concerned hydrogeological units	x	x	0	0	0	0
	a3	An understanding of the theoretical basis for groundwater Classification in some localities	x	0	0	0	0	x
	a4	Realize the hydrogelogic value for the hydrocgeological and hydrogeochemical	x	x	0	0	X	x

		characters						
ntellectual Skills	b1	explain the basic principles of Hydrogeology of certain area;	x	0	0	0	X	x
	b2	identify and classify the groundwater aquifers and;	x	0	0	0	X	x
	b3	identify and classify different hydrogeological units	x	x	0	0	0	x
	b4	explain the basic processes for studing defferent water units	x	x	0	0	0	x
	b5	know and understand the hydrogeochemical characters of certain area	x	x	0	0	0	x
Practical and professional skills	c1	identify and interpret aquifer geochemistry of certain area	x	0	0	0	X	x
	c2	understand different hydrogeochemical parameterss of certain area	x	0	0	0	X	x
	c3	understand the key factors that govern aquifers geochemistry of certain area	x	x	0	0	0	x
	c4	interrogate and interpret the geological literature on aquifers geochemistry	x	x	0	0	0	x
	c5	c5. write clear and concise hydrogeological reports of an area.	x	0	0	0	x	x
General Skills	d1	Collaborate effectively and positively with others as a part of team through constructive discussions and arguments.	x	x	0	0	0	x
	d2	Undertake responsibility of doing hydrogeological projects by himself and the others in team works.	x	x	0	0	0	x
	d3	Display the hydrogeological and hydrogeochemical information and results, using the suitable equipments and / or explanatory posters, reports and models.	x	x	0	0	0	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %

Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes
Lecture notes prepared by the course instructor(s)

6-2 Required books
None
6-67 Recommended books
Strategies for planning and Management of groundwater in the Nile valley and Delta in **Egypt** by HEFNY, K AND SHATA, A 1995: Pap. No. 31.

Hydrogeological map of Egypt, Scale 1:100,000 1st edition, Kom Ombo, QENA, Gerga, Sohag, Tahta, Assuit, El-Minya, Beni Suef and Cairo sheets by RESEARCH INSTITUTE FOR GROUNDWATER (RIGW), 1989

Hydrogeological map of Egypt, Scale 1:500,000 1st editions, Nile Delta. By RESEARCH INSTITUTE FOR GROUNDWATER (RIGW), 1992:

WATER RESOURCES AND HYDROMETEOROLOGYbOF THE ARAB REGION by MAMDOUH SHAHIN *Water Resources Engineering Consultant Formerly Professor Cairo University, Giza, Egypt and IHE-Delft, The Netherlands* Published by Springer, P.O. Box 17, 3300 AA Dordrecht, The Netherlands.

6-68 Periodicals, Web sites, etc.
www.springer.com

7- Facilities required for teaching and learning:
Data show
Sound system to ensure the ease listening
Using a blackboard
Group discussions

Course coordinator:	Prof. Dr. Mohamed El-Fakharany Dr.Nehad Manssour
Head of the Department:	Prof. Dr. Gamal El-Qot
Date:	2022

Benha University
Faculty of Science
Department of Geology

Course Specification
464 G: Petroleum Exploration

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Fourth level**

B - Basic information

Title: Petroleum Geology	**Code: 464 G**	**Year/level:** Fourth level
Teaching Hours:	**Lectures:** 1	**Tutorial:** 0
	Practical: 3	**Total:** 4 h/week

C - Professional information

2 – Course Learning Objectives:

- Explanation of Petroleum exploration.
- The basic concepts upon which petroleum exploration is carried out.
- The student should know the methods of petroleum exploration.
- The student should be able to understand petroleum exploration activities.

2 - Intended Learning Outcomes (ILOS)

On successful completion of the course, the graduate will be able to:

a.1. -Knowledge The understanding of petroleum exploration methods
A.2.-Understand the end product of petroleum exploration methods
A.3. - Recognize the different types of petroleum traps of the Egyptian fields
A.4**.** - Understand the petroleum exploration stages of each method

b - Intellectual skills:

On successful completion of the course, the graduate will be able to:

b.1. Present the subsurface geologic data resulting from the petroleum exploration methods.
b.2. Interpret the subsurface maps and cross-sections for delineation of hydrocarbon accumulations.
b.3. - The logical thinking of linking geological and geophysical data to petroleum exploration.
b.4.- Explore petroleum in Egypt

c - Practical and professional skills:

On successful completion of the course, the graduate will be able to:

c.1. Determination of the geological and geophysical information and data of the petroleum accumulations.

c2. Integrate the available data to orient the exploration for petroleum.

c.3. Use specific software applied in exploration of petroleum.

c.4. Join and manage geologic field trips.

d - General skills:

On successful completion of the course, the graduate will be able to:

d.1. - Work with different team groups of physics, geophysics and chemistry for studying petroleum potentiality of Egypt.

d.2. Write geologic reports on the petroleum geology of Egypt.

d.3. Skills of the fieldtrip works and activities.

d.4. Take part in the exploration companies in Egypt.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
Introduction,	1	0	1
Field geology exploration	1	0	1
Geological surface exploration methods	2	0	1
Geochemical exploration	2	0	2
The Gravity Method and Borehole Gravity,	1	0	1
The Magnetic methods,	1	0	1
Electrical Methods.	1	0	1
Seismic Methods	2	0	3
Mapping with Two-Dimensional Seismic Data,	1	0	1
Three-Dimensional Seismic Method,	1	0	1
Seismic Inversion, Amplitude Versus Offset (AVO) Analysis,	1	0	1
Total hours	**14**	0	**14**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understandi	a1	Show understanding of the processes leading to petroleum exploration	x	0	x	0	0	x
	a2	recognize the methods of source rocks investigation , petroleum exploration and reserves assessments.	x	x	0	0	0	0

ntellectu al Skills	b1	distinguish the unconventional petroleum accumulation patterns	x	0	0	0	X	x
	b2	Associate geologic environments with petroleum producing regions of the world	x	0	0	0	X	x
Practical and professional skills	c1	Apply technology-based methods to petroleum exploration and present results.	x	0	0	0	X	x
	c2	analyses critically and synthesize complex information in order to interpret geological data and apply them to solving problems pertinent to the oil and gas industry	x	0	0	0	X	x
General Skills	d1	Collaborate effectively within a multidisciplinary team.	x	x	0	0	0	x
	d2	Acquire entrepreneurial skills to Prepare technical petroleum reports.	x	x	0	0	0	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independent work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester Work	a1, a2, a3, and b2	Fifth week	20 %
Mid-Term Exam	a1, a5, b3, b4.	Seventh week	10 %
Oral exam	a2, a3, a4, a5, b5, b1, c2, c3	Thirteenth week	10 %
Final written exam	a1, a2, a3, a5, b1, b2, b4, b5, c1, c2, c3, d2.	Fourteenth week	60 %
Total			100 %

6- List of references:

6-1 Course notes
Lecture notes prepared by the course instructor(s)

6-2 Required books
None
6-69 Recommended books
Geology of Egypt. R. Said (Editor). Published for the Egyptian General Petroleum Corporation, Conoco Hurghada Inc. and Repsol Exploracion, S. A.
.by A.A. BALKEMA / ROTTERDAM / BROOKFIELD / 1990
Well Evaluation Conference, Egypt, 1984. Schlumberger, Middle East S. A.
www.springer.com

7- Facilities required for teaching and learning:

Data show
Sound system to ensure the ease listening
Using a blackboard
Group discussions

Course coordinator:	**Assist. Prof. Mohamed Moustafa Afife**
Head of the Department:	Prof. Dr. / Gamal El Qot
Date: 2023	

Benha University
Faculty of Science
Department of Geology

Course Specification
466 G: Petroleum Geology

A- Affiliation

Relevant program:	**B.Sc. in Geology**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Fourth level**

B - Basic information

Title: Petroleum Geology	**Code: 466 G**	**Year/level:** Fourth level
Teaching Hours:	**Lectures:** 2	**Tutorial:** 0
	Practical: 3	**Total:** 4 h/week

C - Professional information

3 – Course Learning Objectives:

This course is designed to introduce you to basic petroleum geology, whether you are a upper level undergraduate or a graduate student. Petroleum geology combines. the disciplines of geology, geochemistry, geophysics, and engineering to understand the origin, distribution, and properties of petroleum and petroleum bearing rocks. This course is structured to deliver the fundamentals of petroleum geology, many of which are also directly applicable to CO_2 sequestration

2 - Intended Learning Outcomes (ILOS)

On successful completion of the course, the graduate will be able to:

a.1. Demonstrate knowledge of the geological processes that lead to the accumulation of petroleum.

a.2. Describe the nature of petroleum, and the chemical composition of liquid and gaseous hydrocarbons.

b.1. Think logically to link geological and geophysical data to the petroleum exploration.

b.2. Interpret the subsurface maps and cross-sections for delineation of hydrocarbon accumulations.

c.1. Integrate the available data to find hydrocarbon pools.

c.2. Apply technology-based methods to petroleum exploration and presentation of results.

d.1. Work with different team groups of geology, physics and chemistry for studying petroleum potentiality of an area.

d.2. Acquire entrepreneurial skills to prepare reports on the petroleum geology.

b - Intellectual skills:

On successful completion of the course, the graduate will be able to:

b1. Think logically to link geological and geophysical data to the petroleum exploration.

b2. Interpret the subsurface maps and cross-sections for delineation of

hydrocarbon accumulations.

c - Practical and professional skills:

On successful completion of the course, the graduate will be able to:

c1. Integrate the available data to find hydrocarbon pools.

c2. Apply technology-based methods to petroleum exploration and presentation of results.

d - General skills:

On successful completion of the course, the graduate will be able to:

d1. Work with different team groups of geology, physics and chemistry for studying petroleum potentiality of an area.

d2. Acquire entrepreneurial skills to prepare reports on the petroleum geology

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3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
1. The History and Nature of Petroleum	2	0	1
2. Occurrence and origin of petroleum	2	0	1
3. Chemical Composition of Petroleum	2	0	1
4. Source rock	4	0	2
5. Migration of hydrocarbons	2	0	1
6. Reservoir rock, Reservoir pore spaces	6	0	3
7. Subsurface Environments	2	0	1
8. Entrapments	2	0	1
9. Petroleum Exploration Methods	2	0	1
10. Evaluation of petroleum prospects	2	0	1
11. Rig Components	2	0	1
Total hours	**28**	0	**14**

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understa...	a1	Demonstrate knowledge of the geological processes that lead to the accumulation of petroleum	x	0	x	0	0	x
	a2	Describe the nature of petroleum, and the	x	x	0	0	0	0

		chemical composition of liquid and gaseous hydrocarbons.						
ntellectual Skills	b1	Think logically to link geological and geophysical data to the petroleum exploration.	x	0	0	0	X	x
	b2	Interpret the subsurface maps and cross-sections for delineation of hydrocarbon accumulations.	x	0	0	0	X	x
Practical and professiona	c1	Integrate the available data to find hydrocarbon pools.	x	0	0	0	X	x
	c2	Apply technology-based methods to petroleum exploration and presentation of results.	x	0	0	0	X	x
General Skills	d1	Work with different team groups of geology, physics and chemistry for studying petroleum potentiality of an area.	x	x	0	0	0	x
	d2	Acquire entrepreneurial skills to prepare reports on the petroleum geology.	x	x	0	0	0	x

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activites and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	To Measure	Time schedule	Grading
Semester Work	a1, a2, a3, and b2	Fifth week	20 %
Mid-Term Exam	a1, a5, b3, b4.	Seventh week	10 %
Oral exam	a2, a3, a4, a5, b5, b1, c2, c3	Thirteenth week	10 %
Final written exam	a1, a2, a3, a5, b1, b2, b4, b5, c1, c2, c3, d2.	Fourteenth week	60 %
Total			100 %

6- List of references:

6-1 Course notes
Lecture notes prepared by the course instructor(s)

6-2 Required books
None

6-70 Recommended books

- Rich and C. Selle y, (2**015) Elements of Petroleum Geo-logy**. 3 rd. Edition Elsevier Academic Press, 520p.
- Geology of Petroleum, A.I. Levorsen,2nd Edition. CBS, Publishers, **2006**.2 Amyx, J. W., Bass,.
- Unconventional Petroleum Geology, Caineng Zou et al., Elsevier, **2013**.

6-71 Periodicals, Web sites, etc.
www.springer.com

7- Facilities required for teaching and learning:
Data show
Sound system to ensure the ease listening
Using a blackboard
Group discussions

Course coordinator: **Assist. Prof. Mohamed Moustafa Afife**
Head of the Department: Prof. Dr. / Gamal El Qot
Date: 2023

Benha University
Faculty of Science
Department of Geology

Course Specification
Gph 470: Well logging

A- Affiliation

Relevant program:	**Geology B.Sc. Program**
Department offering the program:	**Department of Geology**
Department offering the course:	**Department of Geology**
Academic year/level:	**Fourth level**

B - Basic information

Title: Well logging	**Code: Gph 470**	**Year/level:** Fourth level
Teaching Hours:	**Lectures:** 1 **Practical:** 3	**Tutorial:** 0 **Total:** 4h/week

C - Professional information

1 – Course Learning Objectives:

Impart students with knowledge of conventional and new techniques of well logging.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should be able to.

a1. identify the borehole geophysics and the surface geophysics.
a2. Define the objectives of well logging methods in different fields of applications.
a3. recognize the borehole environment opposite permeable and impermeable zones
a4. The identification of porous and permeable sands from the SP and Gamma Ray Logs;
a5.The determination of porosity, lithology, and hydrocarbon type from sonic, density, and neutron logs
a6. An understanding of electrical resisitivity in reservoir rocks and its relationship to porosity and water saturation

b - Intellectual skills:

On successful completion of the course, the student should be able to.

b1. Understand the physics of nuclear, electrical resistivity, and acoustic measurements from openhole, cased hole, wireline, and LWD well logs
b2. Analyze the effect of static (e.g., porosity, volumetric concentration of shale, water saturation, and volumetric concentrations of mineral constituents) and dynamic (e.g., permeability and saturation-dependent capillary pressure) petrophysical properties on well logs
b3. Evaluate the quality of well logs and identify rock types for quantifying reservoir quality using well logs

c - Practical and professional skills:

On successful completion of the course, the student should be professionally able to:

c1. use the recent techniques and instrumentation of well logging for solving fossil fuel resources problems.

c2. make professional reports related to different well logging applications in a responsible, safe and ethical manner for preparation of his/her research articles and Achieve experiments in well logging that achieve standard quality results using existing tools and methods.

c3. Estimate petrophysical and compositional properties (e.g., porosity, water saturation, volumetric concentration of shale, volumetric concentrations of minerals, permeability, and saturation-dependent capillary pressure) using combined interpretation of well logs and core measurements in different formations such as clay-free, shaly-sand, carbonate, and organic-shale formations

d - General skills:

On successful completion of the course, the student should be able to:

d1. apply different tools and scientific resources effectively in different tasks related to well logging

d2. Use a commercial software (e.g., Interactive Petrophysics (IP) and Techlog) for well-log interpretation

d3 apply logical analysis to problem solving.

d4 apply team-working and team leadership skills to addressing complex problems.

3 – Contents

Topic	Lecture hours	Tutorial hours	Practical hours
WELL LOGGING			
265. Introduction and histroy of the science	1	0	3
266. Logging environment	1	0	3
267. Data quality control	1	0	3
268. Caliper, tension, and temperature logs	1	0	3
269. GR Logs	1	0	3
270. Spontaneous Potential (SP) logs	1	0	3
271. Density logs	1	0	3
272. PEF logs	1	0	3
Midterm Exam			3
273. Electrical resistivity logs, electromagnetic properties of rocks	1	0	3
274. Magnetic method	1	0	3
275. Invasion effects on well logs and annulus effect	1	0	3
Lithology assessment based on well logs, Multi-mineral 276. Analysis	1	0	3
277. Rock typing techniques based on well logs	1	0	3
278. General revision	1	0	3
Final Exam	14	0	42

4 - Teaching and Learning methods:

Intended Learning Outcomes			Lecture	Presentations & Movies	Discussions & Seminars	Practical	Problem solving	Brain storming
Knowledge & Understanding	a1	identify the borehole geophysics and the surface geophysics	√		√	√	√	√
	a2	define the objectives of well logging methods in different fields of applications	√		√	√	√	√
	a3	Recognize the borehole environment opposite permeable and impermeable zones and the outlines on the theories, measurements, interpretations and applications of the different types of wire line logs	√		√	√		√
	a4	The identification of porous and permeable sands from the SP and Gamma Ray Logs;	√		√	√		√
	a5	The determination of porosity, lithology, and hydrocarbon type from sonic, density, and neutron logs;	√		√	√		√
	a6	An understanding of electrical resisitivity in reservoir rocks and its relationship to porosity and water saturation	√		√	√		√
Intellectual Skills	b1	Understand the physics of nuclear, electrical resistivity, and acoustic measurements from openhole, cased hole, wireline, and LWD well logs	√			√	√	
	b2	Analyze the effect of static (e.g., porosity, volumetric concentration of shale, water saturation, and volumetric concentrations of mineral constituents) and dynamic (e.g., permeability and saturation-dependent capillary pressure) petrophysical properties on well logs.	√			√	√	√
	b3	Evaluate the quality of well logs and identify rock types for quantifying reservoir quality using well logs	√		√	√	√	√
Practical and	c1	Use the recent techniques and instrumentation of well logging for solving fossil fuel resources problems.	√				√	√

	c2	Make professional reports related to different well logging applications in a responsible, safe and ethical manner for preparation of his/her research articles and Achieve experiments in well logging that achieve standard quality results using existing tools and methods.	√	√	√	√	√	√
	c3	Estimate petrophysical and compositional properties (e.g., porosity, water saturation, volumetric concentration of shale, volumetric concentrations of minerals, permeability, and saturation-dependent capillary pressure) using combined interpretation of well logs and core measurements in different formations such as clay-free, shaly-sand, carbonate, and organic-shale formations	√		√	√		√
General Skills	d1	Apply different tools and scientific resources effectively in different tasks related to well logging	√	√		√		√
	d2	Use a commercial software (e.g., Interactive Petrophysics (IP) and Techlog) for well-log interpretation	√			√		
	d3	apply logical analysis to problem solving.		√	√			
	d4	apply team-working and team leadership skills to addressing complex problems		√	√	√		

5- Students' Assessment Methods and Grading:

5.1. Discussion, class activities and quizzes to assess the student progress and personal attitude,
5.2. Assignments to assess the student independen work,
5.3. Written mid-term exam to ensure the student progress and discover the shortage,
5.4. Final written and oral exam to evaluate students and promote for other consequent courses.

Tools	**To Measure**	**Time schedule**	**Grading**
Semester work	ILOs a, b, d	Semester course	15 %
Mid-Term exam	First ½ of ILOs a, b, c	Seventh week	5%
Practical exam	ILOs c, b	Thirteenth week	25 %
Oral exam	ILOs c, b	Thirteenth week	5 %
Final written exam	ILOs a, b, c	Fourteenth week	50 %
Total			100 %

6- List of references:

6-1 Course notes

Lecture notes prepared by the course instructor(s)
Power point presentations

6-2 Required books

-Introduction to Wireline Log Analysis, Baker Hughes CD.
-Ellis, D. V., 1987, Well Logging for Earth Scientists. Elsevier Science Publishing Company

6-72 Recommended books

- Bassiouni, Z., 1994, Theory, Measurement, and Interpretation of Well Logs. SPE Textbook Series Vol. 4.
- Ellis, D. V., 2007, Well Logging for Earth Scientists. Elsevier Science Publishing Company.
- Rider, M. and Kennedy, M., 2011, The Geological Interpretation of Well Logs. Rider French Consulting, Ltd.
- Coates, G. R., Xiao, L., Prammer, M. G., NMR Logging: Principles and Applications.Halliburton Energy Services Publication.
- Mavko, G., Mukerji, T., and Dvorkin, J., Rock Physics Handbook. Cambridge University Press.
- Bassiouni, Z., Kulha, J., and Thomas, E. C., 2003, Shaly Sand Analysis. SPE Reprint Series No. 55.
- Hearst, J. R., Nelson, P. H., and Paillet, F. L., 2000, Well Logging for Physical Properties: A handbook for geophysicists, geologists, and engineers. John Wiley and Sons, Ltd.
- Dewan, J. T., 1983, Essentials of Modern Open-Hole Log Interpretation. PennWell Publishing Company.

6-73 Periodicals, Web sites, etc.

· Society of Petrophysicists and Well Log Analysts

http://www.spwla.org/

· Schlumberger Oil Field Glossary

http://www.glossary.oilfield.slb.com/

· Mnemonics Data Search

http://www.spwla.org/technical/curve-mnemonics

· Log Interpretation Charts, Schlumberger

http://www.slb.com/resources/publications/books/log_charts.aspx

· Log Interpretation Charts, Halliburton

http://www.halliburton.com/premium/lp/contents/Books_and_Catalogs/web/Log_Interpretation_Charts/hespslog_el1001_toc.pdf

7- Facilities required for teaching and learning:

Data show
Sound system to ensure the ease listening
Using a blackboard
Group discussions
software and computers

Course coordinator: Dr. Wafaa Elshahat Afify
Dr.
Head of the Department: Prof. Dr. Gamal El-Qot
Date: 2023-2024