



Course Specification

430 G: Geotectonics and radiogenic isotopes

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: Geotectonics and radiogenic Isotopes	Code: 430 G	Year/level: fourth level
Teaching Hours:	Lectures: 2 Practical: 2	Tutorial: 0 Total: 3 h/week

C - Professional information

1 – Course Learning Objectives:

- To reconstruct the major tectonic events of the Earth's crust, deformation, kinematics and stability.
- To investigate of the concept of plate tectonics.
- To deduce the role of radiogenic isotopes in identifying the age and source of crustal rocks.

2 - Intended Learning Outcomes (ILOS)

a - Knowledge and understanding:

On successful completion of the course, the student should:

- recognize the historical development of ideas and scientific breakthroughs associated with formulation of the Plate Tectonics theory,
- assess the basic physical and geochemical processes that constrain the modern models for Earth's internal structure.
- demonstrate the use and importance of radiogenic isotopes in studying geological and geotectonic subjects,
- analyze the radiogenic isotope data for age and setting of formation.

b - Intellectual skills:

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

- recognize the evolution of Earth's crust in view of the Plate Tectonics theory,
- 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 Plate Tectonics,
 - b4- investigate 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.

c - Practical and professional skills:

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

- c1- reconstruct the geotectonic setting using structure and geochemical data,
- c2- analyze bulk rock geochemical and radiogenic isotope data for the geotectonic 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.

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 Geotectonics and plate boundaries	2	0	2
2. Internal structure of the Earth	2	0	2
3. Continental drift and ocean floor spreading	2	0	2
4. Oceanic ridges and transform faults	2	0	2
5. Subduction zones, and collisional sutures	2	0	2
6. Impact of the plate tectonics	2	0	2
7. Introduction to radiogenic isotopes of elements	2	0	2
8. Atom structure and decay	2	0	2
9. Radiometric decay	2	0	2
10. Age determination by isotopes	2	0	2
11. Geochronological applications	2	0	2
12. Applications and advances	2	0	2
Total hours	24	0	24

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 the Plate Tectonics theory,	x	0	x	0	0	x
	a2	assess the basic physical and geochemical processes that constrain the modern models for Earth's internal structure,	x	x	0	0	0	0
	a3	demonstrate the use and importance of radiogenic isotopes in studying geological and geotectonic subjects,	x	0	0	0	0	x
	a4	analyze the radiogenic isotope data for age and setting of formation.	x	x	0	0	X	x
Intellectual Skills	b1	recognize the evolution of Earth's crust in view of the Plate Tectonics theory,	x	0	0	0	X	0
	b2	envisage the geometry of plate margins and evolution of continents and oceans along the time,	x	0	0	0	x	x
	b3	explain the basic and advanced research points related to the evolution of Plate Tectonics,	x	0	0	0	X	0
	b4	investigate the mutual relationship between radiogenic isotope geochemistry of the crustal rocks and their evolution along the Earth's history.	x	0	0	0	0	x
	b5	recount the different systems of selected radiogenic isotopes, e.g., U (Th/Hf), K/Ar, and Rb/Sr.	x	0	0	0	0	x
Practical and professional skills	c1	reconstruct the geotectonic setting using structure and geochemical data,	x	0	0	0	X	x
	c2	analyze bulk rock geochemical and radiogenic isotope data for the geotectonic settings,	x	0	0	0	X	x
	c3	use the different software and apply methods to solve geological problems,	x	0	0	0	x	x
	c4	interpret the isotope value data of a rock or ore deposit for the setting of a specific orogeny.	x	0	0	0	X	0
General Skills	d1	review available data from publication and other resources,	x	x	0	0	0	x
	d2	analyze the results in a meaningful	x	x	0	0	0	x

		readable final form,						
	D3	work in team or mosaic a piece of work with other peers.	x	x	o	o	x	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, b2, and d1	Fifth week	5 %
Mid-Term Exam	a1, a5, b3, b4.	Seventh week	5 %
Oral exam	a2, a3, a4, a5, b5, b1, c2, c3	Thirteenth week	10 %
Written exam	a1, a2, a3, a5, b1, b2, b4, b5, c1, c2, c3, d1.	Fourteenth week	80 %
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

Passchier C. W. and Trouw R. A. J. 1996. Micro-tectonics
Developments in Geotectonics Elsevier
Radiometric dating of rocks and minerals. Christopher T. Harper. Dowden, Hutchinson & Ross, 1973

6-4 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: Prof. Dr. Zakaria Hamimi
Dr. Basem Zoheir
Head of the Department: Prof. Dr. Mohamed El-Fakharany
Date: 2014