King Saud University

College of Sciences

Geology and geophysics Department

جامعة الملك سعود

كلية العلوم

قسم الجيولوجيا والجيوفيزياء

Igneous Rocks

Geo 321 Course

Academic Year 1431- 1432H

2nd semester

(2010 – 2011)

i. **Course Director:** Dr. Bassam A. Abu Amarah

ii. **Contributer: Hashim Babakur**

iii. **Course Title: Igneous Rocks**

iv. **Course Code: Geo 321.**

v. **Credit hours: 3 credit hours (2+1).**

vi. **Level/year at which this course is offered: 5th level / 1st semester of the above academic year 5th semester**

vii. **Course pre-requisites for this course: Optical mineralogy Course (Geo 224) & Crystallography Course (Geo 223).**

viii. **Group Number: ?????????.**

ix. **Lecture theater (room): B 070.**

x. **Course objectives and Learning Outcomes for this Course:**

- **Students will practice and verify the following:**

  1- The usages of the petrological studies of the different rock types and minerals.
  2- Their relation to the universe and the formation of the Earth.

3- **Its types and forms of magmas and their identification. Value of the economic process. Rock's relation to tectonics (earthquakes and volcanos). Geochemical relations between the magma and the formation of the rocks. Geological maps and its applications**
4- **Gaining and understanding of the processes responsible for forming igneous rocks.**
5- **Gaining and understanding of how the chemical composition, structure and texture of rocks can be used to interpret igneous rocks processes and the geologic history of the earth.**
6- **Identifying igneous rocks in hand specimen and thin section.**

We expect from our students with a major in Geology to demonstrate, and to have the ability in analyzing, interpreting scientific data and verify the origin igneous rocks and its minerals contents in both hand specimen and in thin section by using polarizing Microscope and the other tools related to. The student also should have abilities and competency to use, to read/construct geologic maps; in terms of the geologic and tectonic history of any region based on field studies.

xi. Student Evaluation during the course:

No.	Evaluation Tasks/tools	Week due	%Proportion of the evaluation during the course session
1	Homework	5-9-12	5%
2	Writing Reports or Quizzes	7	3%
3	First Exam	6	10%
4	Practical (Lab)Test	13	15%
5	Second Test	14	10%
6	Field work	14	5%
6	Final Exam	15	50
7	Discussions, presentation, attendance, etc.		2%

xii. Essential References and text books:

- **Required Text(s) :**

- **محمد كمال العقاد 1967. علم الصخور النارية. الطبعة الثانية. جامعة أسيوط. الهيئة العامة لشؤن المطابع الأميرية، القاهرة. 270 صفحة.**
- **Hatch F.H. Hatch, Wells A.K. & Wells M.K. 1962, Petrology of the igneous rocks, 13th edition, George Allen &Unwin, London.**
- **Walter T Huang. Petrology, Ncgraw-Hill Book Company, INC.**
- **Best, M.G. 1982. Igneous and Metamorphic Petrology. W.H. Freeman Company, New York. P. 1-340**

- **Electronic Materials, Web Sites etc**

  - Atlas of Igneous and metamorphic rocks, minerals, and textures

  - **Other learning material such as computer-based programs/CD, professional standards/regulations**

No. of Wk	*Lecture Time*	*Date*	*Lecture's Title*	No. Of Weeks	Contact hours
1	*8 -9 AM*	*Sun 24/10/1431 3/10/2010*	*Introduction, Formation and occurrences of the igneous rocks and their structures.*	**1**	**2**
	8 -9 AM	*Tue 26/10/1431 5/10/2010*			
2	*8 -9 AM*	*Sun 2/11/1431 10/10/2010*	*The magmas and their movements*	**1**	**2**
	8 -9 AM	*Tue 4/11/1431 12/10/2010*			
3	*8 -9 AM*	*Sun 9/11/1431 16/10/2010*	*Principals of geochemistry for minerals and rocks. Field relations. Igneous textures and structures.*	**1**	**2**
	8 -9 AM	*Tue 11/11/1431 19/10/2010*			
4	*8 -9 AM*	*Sun 16/11/1431 24/10/2010*	*Bowen's reaction series , methods of crystallizations, Rocks' derivatives. Geochemistry of the magmas*	**1**	**2**
	8 -9 AM	*Tue 18/11/1431 26/10/2010*			
5	*8 -9 AM*	*Sun 23/11/1431 31/10/2010*	*Chemistry of crystallisation and Crystallisation of the magma. Group of minerals. Replacement and reactions with other rocks (igneous, metamorphic and sedimentary rocks). Hybridization. . Geochemical classifications and the distribution of the elements in the rocks.*	**1**	**2**
	8 -9 AM	*Tue 25/11/1431 2/11/2010*			
6	*8 -9 AM*	*Sun 30/11/1431 7/11/2010*	*Relation between magma and the heat, viscosity and replacement.* ***(Hajj vacation from 4/12 to 16/12/1432 H).***	**1**	**2**
	8 -9 AM	*Tue 3/12/1431 9/11/2010*			
7	*8 -9 AM*	*Sun 15/12/1431 21/11/2010*	***(Hajj vacation from 4/12 to 16/12/1432 H).***	**1**	**2**
	8 -9 AM	*Tue 17/12/1431 23/11/2010*	*Early and post crystallisation of the magma and the relation of the geochemistry of the igneous rocks to the formation of the different minerals*		

8	*8 -9 AM*	*Sun 22/12/1431 28/11/2010*	***First assessment exam***	**1**	**2**
	8 -9 AM	*Tue 24/11/1431 30/11/2010*	*Early and post crystallisation of the magma and the relation of the geochemistry of the igneous rocks to the formation of the different minerals*		
9	*8 -9 AM*	*Sun 29/12/1431 5/12/2010*	*Petrological coherences, changing in the geochemistry of the rocks, magma's equilibrium. Type of magmas and their relations to pressure and temperature*	**1**	**2**
	8 -9 AM	*Tue 1/1/1432 7/12/2010*			
10	*8 -9 AM*	*Sun 6/1/1431 12/12/2010*	*. Phase rule, solid, dry and wet magmas, a magma of one, two, three and multi components and its applications on rocks.*	**1**	**2**
	8 -9 AM	*Tue 8/1/1432 14/12/2010*	*Phase rule, solid, dry and wet magmas, a magma of one, two, three and multi components and its applications on rocks.*		
11	*8 -9 AM*	*Sun 13/1/1432 19/12/2010*	*Origin and classification of the igneous rocks. The evolution according to the descriptions of appearance, field and microscopic studies*	**1**	**2**
	8 -9 AM	*Tue 15/1/1432 21/12/2010*	*Aqueous solutions at different temperatures. Change of equilibrium according to temperature. Water and gaseous and their effect on the rocks*		
12	*8 -9 AM*	*Sun 20/1/1432 26/12/2010*	*Rock families and their classifications*	**1**	**2**
	8 -9 AM	*Tue 22/1/1432 28/12/2010*	*Rock forming minerals, the usages of the rocks and minerals in military, structure industrial and construction sectors. Methods of collecting the samples.*		
13	*8 -9 AM*	*Sun 27/1/1432 2/1/2011*	*Rock forming minerals, the usages of the rocks and minerals in military, structure industrial and construction sectors. Methods of collecting the samples.*	**1**	**2**
	8 -9 AM	*Tue 29/1/1432 4/1/2011*	*The applications of the C.I.P.W. Norms and modal analyses.*		
14	*8 -9 AM*	*Sun 4/2/1432 9/1/2011*	*The Arabian Shield and the occurrence of the main igneous rocks*	**1**	**2**
	8 -9 AM	*Tue 6/2/1432 11/1/2011*	*The Arabian Shield and the occurrence of the main igneous rocks*		
15	*8 -9 AM*	*Sun 11/2/1432 16/1/2011*	*Field trips for full three days at weekends*	**1**	**2**
	8 -9 AM	*Tue 13/2/1432 18/1/2011*	***Second assessment exam***		

		18 -29 / 2/1432	**1st semester Final Exams starting and ending dates.**		

N.B.:

- *1st semester course starting date on Sat. 16/10/1431 corresponding to 25/9/ 2010-10-02.*
- *- Al Adha vacation starts on Wed. 4/12/1431 – 10/11/2010.*
- *- Commencing the semester study session by Mon. 16/12/1432 -22/11/2010.*
- *- 1st semester exams will start on 18/2/1432 – 22/1/2011.*
- *- Med year vacation will start by Wed. on 29/2/1432 -2/2/2011.*
- *- Commencing date of the Second semester session will be on Sat. 9/3/1432H-*