King Saud University

College of Sciences

Geology and geophysics Department

جامعة الملك سعود
كلية العلوم
قسم الجيولوجيا والجيوفيزياء

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Of

Igneous Rocks

321 Geo

Dr. Bassam Abdulmutti Abu Amarah

1431- 1432 (2010/2011)

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: King Saud University
College/Department : College of Science – Geology and Geophysics Department.

A Course Identification and General Information

1. Course title and code: Igneous Petrology – (321 Geo)
2. Credit hours : 3 credit hours (2 + 0+1)
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) (Geology Program Of Bachelor Degree)
4. Name of faculty member responsible for the course Assistant Professor / Dr. Bassam Abdulmutti Abu Amarah
5. Level/year at which this course is offered : Fifth Level/ 2nd year semester 1431- 1432
6. Pre-requisites for this course (if any) : (223 Geo, and 224 phys)
7. Co-requisites for this course (if any) Field Geology
8. Location if not on main campus: King Saud University Campus in Ad-Dariyah

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

- The Course intends to investigate the rock forming minerals , using the polarizing microscope.

- This Course will develop student's knowledge of the P. M. techniques , and the principles behind the interaction of light with isotropic and anisotropic minerals. Hence, the learning outcomes will be summarized as follows:

1) Provide the students with knowledge of the igneous Petrology .
2) Initiating cognitive skill to generate the abilities of identifying the the physical properties of minerals.
3) Skillfulness in dealing with optics characteristics to identify, interpret the mineral- bearing of the rocks, and analyzing its genesis in igneous petrology.
4) Skillfulness in communication with others to generate the strategically scientific thinking.
5) Skillfulness in operating the computer with different types of software programs concerning igneous petrology, and applying them

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

1) The course content will be periodically reviewed by the instructor and the courses planning committee as and when necessary.
2) By using the internet in locating the recent books, articles, and periodicals related to igneous petrology.
3) Chasing all the comments and suggestions issued by the improvement and development study plan committees in geology program to run all procedures in changing and modifying the course content periodically.
4) Applying and using all the results of postgraduate scientific studies to develop 321 Geo course program.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

Topics to be Covered		
Topics	No of Weeks	Contact hours
1. Introduction	1	2
2. Formation and occurrences of the igneous rocks and their structures.	1	2
3. The magmas and their movements	1	2
4. Principals of geochemistry for minerals and rocks. Field relations. Igneous textures and structures.	1	2
5. Bowen's reaction series , methods of crystallizations, Rocks' derivatives. Geochemistry of the magmas	1	2
6. 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
7. Relation between magma and the heat, viscosity and replacement.	1	2
8. Early and post crystallisation of the magma and the relation of the geochemistry of the igneous rocks to the formation of the different minerals.	1	2
9. Petrological coherences, changing in the geochemistry of the rocks, magma's equilibrium. Type of magmas and their relations to pressure and temperature.	1	2
10. Phase rule, solid, dry and wet magmas, a magma of one, two, three and multi components and its applications on rocks.	1	2
11. Origin and classification of the igneous rocks. The evolution according to the descriptions of appearance, field and microscopic studies.	1	2
12. Aqueous solutions at different temperatures. Change of equilibrium according to temperature. Water and gaseous and their effect on the rocks	1	2
13. The Arabian Shield and the occurrence of the main igneous rocks	1	2

14. Rock forming minerals, the usages of the rocks and minerals in military, structure industrial and construction sectors. Methods of collecting the samples.	1	2
15. The applications of the C.I.P.W. Norms and modal analyses, exercises, and reviews.	1	2
Total	!5	30
Field trips for full three days at weekends =30 hours (10 hours /day) at selected weekends	3 Days	3 Days
Labs and practical work	15	15

2 Course components (total contact hours per semester):

Lecture:	Tutorial:	Practical/Fieldwork/Internship:	Other:
30 lectures	Hypothetical (le ctures)	15 hours + 2 days fieldwork	Nil

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week) : students are expected an average of 2 – 3 learning hours per week.

30 hours Lectures, and 15 hours lab work..

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;

  - The course gives a basic knowledge on igneous petrology.

- A description of the teaching strategies to be used in the course to develop that knowledge or skill; : Teaching is conducted through lectures , practical sessions and fieldwork.

- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

  - Methods include quizes , homeworks , tests and examinations.

- The course is briefed and designed to eradicate and to develop all students , understanding, achievement , and applying skills.

- Describing the teaching strategies used for improving the students knowledge and skilfulness.

- Demonstrate the course evaluating methods to meet learning outcome of the

academic program.

a. Knowledge

(i) Description of the knowledge to be acquired

1) The student is expected to acquire knowledge in methods and procedures to identify different igneous rocks .
2) Acquaintance the characteristics of mineral's optics to assure the difference between ignedous rocks.
3) The student is expected to have knowledge in silicate minerals and their relationships to the rock's genesis (petro genesis).
4) Acquaintance of student enrollment in the course to evaluate his performance indicators.
5) Acquaintance of the student enrollment in the course to apply theis knowlrdge in the field .
6) Acquaintance of igneous rocks field's relationship and their impact in identifying the different rocks and minerals types.

(ii) Teaching strategies to be used to develop that knowledge

1) Teaching will be conducted through a continuous and a regular lectures , practical sessions and fieldwork.
2) Encouraging the students to read all the related articles, and other different learning resources.
3) Brainstorming to be run in classroom between the students and the coarse directors.
4) To be acquaint with latest internet information.
5) To run homework scheme to keep student in touch with reading and geared thinking in knowledge of optical mineralogy.

(iii) Methods of assessment of knowledge acquired:

1) Periodical Exams (Exams, qizzes).
2) Positive chemistry should be conducted between the student and course

coordinator via the oral discussion within classroom.

3) Running homework's to maintain the relation between the student and scientific program, and to run lab reports to assess the acquired knowledge on the subject.
4) Oral and written exam in the lab . to test the student's ability to identify minerals under the microscope and also their optical properties.
5) Running final exam.

b. Cognitive Skills (Describing the cognitive to be developed:

1) Student shall be able to gather all the igneous rocks knowledge to solve any problems that might face the student .
2) Student shall be able to apply all optics techniques to determine the diversities of igneous rocks.
3) Students will be able to demonstrate the application of chemistry of the crystallized materials by using microprobe and polarized microscope and some other instrumentation to analyse the rock chemically, .

(ii) Teaching strategies to be used to develop these cognitive skills

1) Helping the students to run the logical analyses to solve problems that they might face by providing all information, and knowledge to identify, demonstrate , to analyse, and to apply the gained skill in future life.
2) Providing the student will all different updated ideas and developed techniques for determining the igneous rocks via its texture, minerals, and structure.

(iii) Methods of assessment of students cognitive skills:

1) Delegating the students ability in telling, and announcing his belief and suggestions towards rocks identification by polarized Microscope.
2) Delegating the student ability in using and dealing with different instrumentations.
3) Delegation the student ability in applying the basics of physics to identify its chemical characters , and by its rock-forming minerals.
4) Delegating and increasing the student ability in dealing and in communicating with his colleagues , i.e. with each others.

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

1) Prompt ing attendance of classes and laboratory sessions in required of the students.
2) Students learn to manage their time in self-study of the Course material.

(ii) Teaching strategies to be used to develop these skills and abilities

1) Positive chemistry should be conducted between the student and course coordinator via the oral discussion within classroom.

2) Running homework's to maintain the relation between the student and scientific program, and to run lab reports to assess the acquired knowledge on the subject.

3) Oral and written exam in the lab . to evaluate the student's achievement

4) Encouraging the student to think self dependent by using all information to build his own knowledge in order to gain experience

5) Provide the appropriate environment either via lectures, resources, and self-learning to meet the learning outcome, and to increase the student abilities to solve and to think positively towards the subject.

6) Provide the student the connection between old knowledge and the present one.

7) Encouraging the student in learning skills to observe, to measure, to act in a row with his knowledge .

8) Increasing the student's deep thinking(Elaborating thinking) built on researches, reports, group discussion .

9) Providing all the necessaries instrumentation to increase the self-learning skills such computers, microscopes, compass, surveying devices, laptops…. Etc.

10) Encouraging the student sel-learning in reading the related articles, and using the internet.

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

1) Methods include self-learning, oral discussion(student engaguement) within the classroom, outside reading for report's purposes, quizzes, homework, tests and examinations.

2) Training in Lab to apply and to solve some problems in defining either the rock type, petrogensis , and mineral creation.

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

1) Directing the student to generate, and to build up their scientific thinking.

2) Guiding the students to build up , and to practice the dialogue and oral communication style in very organised manner.

3) Writing communication skills created via writing report about certain topics related to the course contents.

4) Writing the scientific reports.
5) Using different geological programs by using the IT center in college.
6) Application of the field work.
7) Usages of the geological equipments for construction geological maps.

(ii) Teaching strategies to be used to develop these skills

1. Preparing written reports summarizing one of the topics related to the course materials or content.

2. Assigning one of student to run presentation about an issues related to the course contents.

3. Oral communication skills created by running an oral debate session within the lecture time concerning an issue related to the course contents.

4. Utilizing of an updated instrumentation.

5. Student's evaluation leads to increase the different skills.

(iii) Methods of assessment of students numerical and communication skills

1) Via written reports.
2) Via topics presentation.
3) Via the dialogue session.
4) Via creating knowledge, communication, sharing, and self-learning skills.
5) Via Quizzes, oral and written exams, and final exam.
6) Via Assignments, Group projects, and Field work s.

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required

– Field work, Group work(Team Work), Cooperation with others, and sharing projects.

(ii) Teaching strategies to be used to develop these skills

1. Participating in physical development activities and demonstrate an appropriate level of coordination, strength, and general physical within the course and inthe

field trip.

2. Participating in physical activities and demonstrate an appropriate level of proficiency.

3. Participate in one or more team sports and demonstrate an appropriate level of proficiency.

4. Demonstrating a working proficiency in entering data on a keyboard.

5. Demonstrate success in using equipment (scientific, etc.) and tools in accomplishing the task or experiment for which the equipment is designed and in avoiding damage or injury.

6. Collective learning and shear of information.

(iii) Methods of assessment of students psychomotor skills

Within the mid-term and final exams, including the assessment of the term paper

5. Schedule of Assessment Tasks for Students During the Semester.

S.No.	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Homework's	11 - 13	5
2	Students participation in presentation discussion	During the course session	5
3	Quizzes	10 11- 13	5
4	Students Assignments	During the course session	5
5	First assessment exam		15
6	Second assessment exam		15
7	Final Exam		50
	Total		100

D. Student Support

1. Arrangements and availabilities for student's consultations and academic advice. (include amount of time faculty are available each week)

- Each faculty member is instructed to put a timetable shows the time of actual teaching hours and office hours for each week. This timetable should be placed in front of the door of the academic staff member office's door.

E Learning Resource

Required Text(s):

Due to the multidisciplinary nature of this course, no single reference has been assigned to the course. However this reference is closely consulted

1- Required Text(s) :

- حسن عثمان سندي ، 1910. علم الصخور النارية . الطبعة الأولى . تحت الطبع . 470 صفحة

- محمد كمال العقاد ، 1967. علم الصخور النارية. الطبعة الثانية. جامعة أسيوط. الهيئة العامة لشئون المطابع الأميرية . القاهرة . مصر. 270 صفحة .

2. Essential References :

- Turner, F.J. and Verhoogen, J. 1960. Igneous and Metamorphic Petrology. Second Edition. McGraw-Hill Book Company. Inc., London. P.1-450.

- Best, M.G. 1982. Igneous and Metamorphic Petrology. W.H. Freeman Company, New York. P. 1-340 Henderson P., 1982. Inorganic Geochemistry . 1st Edition Pergamon Press, Oxford, U.K. 354 p.

3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)

Journal of Petrology

Chemistry of Minerals

4-.Electronic Materials, Web Sites etc

Space Geology and geochemistry,

Volcanoes, earthquakes and tectonics,

Environmental and global weather changing,

Igneous rocks and their geochemistry,

Tectonic process.

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

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

1) Lecture room equipped with a blackboard, overhead projector , and internet connection.

2) The classroom with more than 30 students.

3) The lab . facilitated with a blackboard, overhead projector and seating arrangement for the students.

2. Computing resources

1) The classrooms have been equipped with data show device. And internet source..

1. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- The lab is equipped with polarized microscope.
- A workshop is equipped with the necessary equipments for preparing the mineral's slides for optic and petrology studies.

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- The student's feedback on the effectiveness Teaching will be done via a will prepared questionnaire. This questionnaire will be circulated to students. It will be used for evaluating the course by students at the end of the course.

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department:

- In regular basis the study plan committee revises the course contents to make sure that all the content fits the outcomes of the course>
- Faculty assessment of the course and effectiveness of teaching delivery.

- Periodic self- assessment of the program.
- Review of **the course material by relevant departmental committee(s)**.

3 Processes for Improvement of Teaching *******

- Undergraduate Committee will review deficiencies based on the student evaluation, faculty input, course file, and program assessment.
- Feedback from employers and and graduating students' input are used to identify any deficiencies in students' ability in applying mineral optics knowledge.
- Organize workshop on effective teaching methods to enable instructors to improve their teaching skill.
- Teaching method will focus on students' learning and on course learning outcomes

4 Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- Undergraduate Committee will review samples of student work in this course to check on the standard of grades and achievements
- A faculty member from a reputable university will evaluate the course material and the students' work to compare the standard of grades and achievements with those at his university. This evaluator will also comment on the laboratory facilities and the adequacy of the equipment used in the lab.

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Self- assessment will be carried out every two years. The external evaluation will be run every four years by invited the Evaluating Examiner by program coordinat.. The feedback received of these assessments will be used to modify studies plans courses for seeking further improvement of the course syllabus, teaching method, and delivery of course materials>