



Course Specifications

Course Title:	Mineralogy
Course Code:	Geo 221
Program:	Geology
Department:	Geology and Geophysics
College:	Science
Institution:	King Saud University

Table of Contents

A. Course Identification.....	3
6. Mode of Instruction (mark all that apply)	3
B. Course Objectives and Learning Outcomes.....	3
1. Course Description.....	3
2. Course Main Objective.....	3
3. Course Learning Outcomes	3
C. Course Content	4
D. Teaching and Assessment	5
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods.....	5
2. Assessment Tasks for Students	5
E. Student Academic Counseling and Support	6
F. Learning Resources and Facilities.....	6
1. Learning Resources	6
2. Facilities Required.....	6
G. Course Quality Evaluation	7
H. Specification Approval Data	7

A. Course Identification

1. Credit hours: 3 (2 + 1)			
2. Course type			
a.	University ☐	College ☐	Department ☒
b.	Required ☒	Elective ☐	Others ☐
3. Level/year at which this course is offered: 4			
4. Pre-requisites for this course (if any): Geo 100			
5. Co-requisites for this course (if any):			

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description

This course is an introduction to fundamental mineralogy and mineralogical principles.

2. Course Main Objective

Identify common rock-forming minerals in hand specimen and in thin section using diagnostic physical, optical, and chemical properties

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Identify minerals and their textures in hand specimens and under the polarizing microscope.	Acquire knowledge about crystallography and mineralogy

CLOs		Aligned PLOs
1.2	Develop basic knowledge in crystallography and mineralogy.	
1.3		
1...		
2	Skills :	
2.1	Demonstrate crystallography and symmetry	Acquire skills about mineralogy techniques
2.2	Identify the main minerals in hand specimen and under polarizing microscope.	
2.3		
3	Values:	
3.1	Calculate minerals formula and apply diagrams	Communicate appropriately, oral and written as individual and in groups. Use of internet facility as means of communication and a source of information. Use of field and lab instruments as well as software in mineral exploration.
3.2	Illustrate using of field and lab instruments to identify minerals	
3.3	Demonstrate field work in groups	
3...	Employ different field and lab instruments	

C. Course Content

No	List of Topics	Contact Hours
1	Electronic configuration of atoms and ions, bonding and periodic table	1
2	Crystallography I: Symmetry elements and operations; crystal systems and crystallography notation (crystal classes); unit cells	5
3	Crystallography II: Miller indices; crystal forms stereographic projection of crystals; point groups;	5
4	Physical Properties of minerals	3
5	Mineral species, groups, families, classes – non silicates and silicate	6
6	Introduction to microscopy (Part I) – interaction of light with minerals, polarization, refraction	5
7	Introduction to microscopy (Part II) – birefringence and retardation, color and pleochroism, extinction angles	5
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Recognize symmetry elements in crystal's external form and describe how those elements are controlled by a mineral's unit cell geometry and crystal structure	In-class lecturing Homework assignments Open discussion in class	Short quizzes Midterm tests Final exams
1.2	Describe common rock-forming minerals on the basis of chemical bonding, physical properties, crystal structure, structural formula, and occurrence		
1.3	Explain correlations between relevant chemical concepts (e.g., substitution, solid solution) and the parts of chemical formulas that control the properties and classification of the major mineral classes on Earth.		
2.0	Skills		
2.1	Utilize common optical microscopy techniques to characterize mineral assemblages in thin section and name rocks using accepted naming conventions	Brain storming In class-lecturing Homework assignments Open discussion in class	Final exams Midterm tests
2.2	Describe and measure properties of hand specimens to confidently identify minerals and to place them in groups		
...			
3.0	Values		
3.1	Describe the theory behind common mineral analysis techniques, as well as manipulate mineral chemistry data to produce common data products and mineral formulas.	Brain storming In class-lecturing Open discussion in class	Final exams Midterm tests
3.2			
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments (class quizzes, scientific reports, field trip)	weekly	10%
2	First mid-term exam	6 th	10%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Second mid-term exam	11 th	10%
4	Practical exam	12 th	30%
5	Final exam	16 th	40%
6			
7			
8			

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Office hours allocated for students of this course are on average 3 hours per week for consultation and academic advice, with more time available in the period just before the final exams.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Perkins, D. 2011. Mineralogy (3rd ed.). Prentice Hall. 504 pp
Essential References Materials	Klein, C. and Philpotts, A. 2017. Earth Materials: Introduction to Mineralogy and Petrology (2nd ed.).
Electronic Materials	USGS Minerals Information
Other Learning Materials	Instructor will provide adequate learning resources based on his experience.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room equipped with a black board, overhead projector, computer and internet connection. The laboratory will have a blackboard, overhead projector with computer connection and seating arrangement for the students.
Technology Resources (AV, data show, Smart Board, software, etc.)	Classroom with PC connected to Data show and Smart board.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Software related to mining subjects should be provided.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student course evaluation	Students	Direct
Peer-to-peer review	Faculty member	Direct
Periodic self- assessment of the program	Program coordinator	Direct
Faculty assessment of the course and effectiveness of teaching delivery	Instructor	Direct

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department of Geology and Geophysics
Reference No.	
Date	Jan. 12 st 2021