Faculty of Dentistry

Faculty Contact:

Dean's Office Tel: 6401000 Ext. 20022 Fax: 6403316 E-mail: <u>tlalkhatib@kau.edu.sa</u> Website: <u>http://dentistry.kau.edu.sa</u>

History:

Establishment of the Faculty of Dentistry was in 1985. The program started in 1987.

Vision:

The faculty is committed to the vision of becoming the best Dental institution in the nation, regionally recognized for innovation and leadesrship in Dentistry and its applications.

Mission:

To graduate dynamic dentists capable of delivering high quality dental care in all dental specialties including Implantology using advanced techniques in oral diagnosis and treatment. To use preventive measures, apply managerial skills and optimally utilize auxiliary personnel in order to achieve high dental health care standards. To demonstrate sensitivity and responsibility towards the social and cultural community and individual patient needs. To provide high standard dental consultation for the public sector.

Faculty of Dentistry

Unique Features

Collaboration with Tufts University

Graduation Requirements

In order to qualify for Bachelor or Dental Medicine and Surgery (B.D.S) degree, students must sucessfully complete 228 credit hours during a time frame of Six (6) years. In addition, student must also complete one obligatory year for clinical practice (Internship Program).

Credit are distributed as follows:

- 1. (14) Credit hours of the university requirements
- 2. (24) Credit hours of preparatory year requirements,
- 3. (190) Credit hours of faculty courses, made up of
 - 29 Credit hours of Joint Courses
 - 46 Credit hoursof compulsory OMR courses
 - 30 Credit hours of compulsory PDS courses
 - 34 Credit hours of compulsory CDS courses
 - 51 Credit hours of compulsory OBCS courses

Faculty Courses:

Students must complete 190 credit hours of the following faculty courses Credit Hours 190

	Course	Course			HOURS		D	
No.	Caode:	No.	Course Litle	Credit	Theory	Lab	Clinic	Prerequisite
1	ANTD	201	Gross Anatomy	5				
2	HIED	201	Histology & Embryology	3				
3	PHYD	201	Physiology	4				
4	BCHD	201	Biochemistry	4				
5	PATD	301	General & Systemic Pathology	4				
6	MICD	301	Microbiology,	2				
7	PHAD	301	Pharmacology	2				
8	MEDD	401	General Medicine	2				
9	SURD	401	General Surgery ENT & Anesthesia)	2				
10	CPHD	501	Pharmatherapeutics	1				
11	OBCS	223	Dental Anatomy & Occlusion	6				
12	OBCS	334	Oral Pathology	8				
13	OBCS	322	Oral Histology	8				
14	OBCS	377	Oral Radiology	4				
15	OBCS	468	Oral Diagnosis & Treatment Planning	3				
16	OBCS	445	Periodontics	4				
17	OBCS	545	Periodontics	4				
18	OBCS	477	Oral Radiology	2				
19	OBCS	411	Oral Biology & Nutrition	4				
20	OBCS	556	Oral Medicine	4				
21	OMR	323	Preclinical Removable Prosthodontics	8				
22	OMR	423	Removable Prosthodontics	4				
23	OMR	523	Removable Prosthodontics	4				
24	OMR	434	Fixed Prosthodontics	6				
25	OMR	534	Fixed Prosthodontics	6				
26	OMR	511	Oral Surgery	4				
27	OMR	611	Oral Surgery	4				
28	OMR	412	Pain Control & Anesthesia	2				
30	PDS	334	Biostatistics & Methods of Scientific Research	4				
31	PDS	411	Pediatric Dentistry	3				
32	PDS	511	Pediatric Dentistry	4				
33	PDS	615	Comprehensive Pediatric Care	4				
34	PDS	422	Orthodontics	4				

Faculty of Dentistry

N	CourseCourseCode:No.	Course	Course Title	Cuadit		HOURS		Proroquisito
INO.		Course Inte	Crean	Theory	Lab	Clinic	rrerequisite	
35	PDS	522	Orthodontics	4				
36	PDS	626	Comprehensive Orthodontic Care	4				
37	PDS	633	Community Dental Practice	4				
38	CDS	311	Pre-clinical Operative Dentistry	8				
39	CDS	411	Operative Dentistry	4				
40	CDS	511	Operative Dentistry	4				
41	CDS	333	Biomaterials	6				
42	CDS	422	Preclinical Endodontics	4				
43	CCC	522	Endodontics	4				
44	CCC	600	Adult & Geriatric Comprehensive Care	16				
			Total	190				

Public Journals:

Publications	:	Life and Health
Publication Name	:	Faculty of Medicine
Contact No.	:	Dr.Abdul-ghani Mira Ext No: 20217
Email	:	<u>amira@kau.edu.sa</u>
Website	:	http://www.kau.edu.sa/amira
Publications	:	Journal of King Abdulaziz University, Medical Science
Publication Name	:	Faculty of Medicine
Contact No.	:	Prof. Tarek Lotfi Alkhateeb
Email	:	tlalkhatib@kau.edu.sa

Affiliated Centers:

Website

Center Name	:	King Fahad Research Centre					
Background	:	Research Programs					
Contact No.	:	64000000 Ext No: 25045					
Email	:	<u>kfmrc@kau.edu.sa</u>					
Website	:	www.kfmrc.kau.edu.sa					
Center Name	:	Tuffs University					
Background	:	Dentistry Collaboration					
Contact No.	:	001-617-6360355					
Email : <u>adel.abu-moustafa@tufts.e</u>							

:

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Department of Conservative Dental Sciences

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<u>History:</u>

The Department was established in 1985.

Vision:

We are committed to reaching the optimal performance level in Dentistry.

Mission:

To develop the student's scientific and technological knowledge, enhance their cognitive research capabilities and advance their clinical skills.

Departmental Requirements:

In order to qualify for a Bachelor of Dental Medicine and Surgery (B.D.S) degree, students must successfully complete 228 credit hours during a time frame of Six years. In addition, students must also complete one obligatory year for clinical practice (Internship Program).

Credit are distributed as follows:

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- 2. (24) Credit hours of preparatory year requirements,
- 3. (190) Credit hours of faculty courses, made up of
 - 29 Credit hours of join programs
 - 46 Credit hoursof compulsory OMR courses
 - 30 Credit hours of compulsory PDS courses
 - 34 Credit hours of compulsory CDS courses
 - 51 Credit hours of compulsory OBCS courses



Department of Conservative Dental Sciences

<u>Department Study Plan:</u>

Department Core Courses (Credit Hours 34)

N	Course	Course	Course Title	Care dit		HOURS		Duovoquisito	
INO.	Code:	No.	Course Thie	Credit	Theory	Lab	Clinic	Prerequisite	
1	CDS	311	Pre-clinical Operative Dentistry	8					
2	CDS	411	Operative Dentistry	4					
3	CDS	511	Operative Dentistry	4					
4	CDS	333	Biomaterials	6					
5	CDS	422	Preclinical Endodontics	4					
6	CDS	522	Endodontics	4					
7	CCC	600	Comprehensive Care	4					
			Total	34					

Course Descriptions:

CDS 311: Pre-clinical Operative Dentistry

A study that helps to assist students in developing the manual skills required to perform basic technical procedures used in restorative dentistry and principles, and familiarizes them with instruments and materials used in various types of cavity preparation and with criteria and techniques.

CDS 411: Operative Dentistry

A study that looks into procedures for performing cavity and tooth preparation and proper selection of restorative material The didactic part of the course will review diagnostic procedures, administration of local anesthetics, use of rubber dam, protection of the dental pulp, and techniques for restoring endodontically treated teeth.

CDS 422: Preclinical Endodontics

A designed study that helps to familiarize dental students with materials and instruments used in endodontics. The objective is to assist students in developing the manual skills required to perform basic technical procedures used in endodontics.

CDS 511: Operative Dentistry

The didactic part of the course will deal with technical details acquired in Dental lab. 2. The syllabus would help to provide motivation for the student to continue independent study and to participate in research.

CDS 522: Endodontics

The study is of two main components. The first is a classroom lecture series, which correlates between clinical and biological principles of endodontics. The second is the clinical experience to perform endodontic treatment for single and multicanaled teeth.

CDS 333: Biomaterials

A study that helps dental students to select, manipulate and evaluate dental materials based on a scientific understanding of their structure and properties, to recognize the limitations of dental materials and the reasons for their clinical failures and to work in a dental laboratory with the different materials.

Department of Conservative Dental Sciences

FACULTY MEMBERS

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Department of Oral Basic and Clinical Sciences

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History:

The Department was established in 1985.

Vision:

We are committed to reaching the optimal performance level in Dentistry.

Mission:

To develop the student's scientific and technological knowledge, enhance their cognitive research capabilities and advance their clinical skills.

Departmental Requirements:

In order to qualify for a Bachelor of Dental Medicine and Surgery (B.D.S) degree, students must successfully complete 228 credit hours during a time frame of Six years. In addition, students must also complete one obligatory year for clinical practice (Internship Program).

Credit are distributed as follows:

- 1. (14) Credit hours of the university requirements
- 2. (24) Credit hours of preparatory year requirements,
- 3. (190) Credit hours of faculty courses, made up of
 - 29 Credit hours of join programs
 - 46 Credit hoursof compulsory OMR courses
 - 30 Credit hours of compulsory PDS courses
 - 34 Credit hours of compulsory CDS courses
 - 51 Credit hours of compulsory OBCS courses



Faculty of DENTISTRY

Department of Oral Basic and Clinical Sciences

Department Study Plan:

Department Core Courses (Credit Hours 51)

No	Course	Course	Course Title	Credit		HOURS		Droroquisito	
190.	Code:	No.	Course Inte	Crean	Theory	Lab	Clinic	Prerequisite	
1	OBCS	223	Dental Anatomy & Occlusion	6					
2	OBCS	334	Oral Pathology	8					
3	OBCS	322	Oral Histology	8					
4	OBCS	377	Oral Radiology	4					
5	OBCS	468	Oral Diagnosis & Treatment Planning	3					
6	OBCS	445	Periodontics	4					
7	OBCS	545	Periodontics	4					
8	OBCS	477	Oral Radiology	2					
9	OBCS	411	Oral Biology & Nutrition	4					
10	OBCS	556	Oral Medicine	4					
11	CCC	600	Comprehensive Care	4					
			Total	51					

Course Descriptions:

OBCS 334: Oral Pathology

Students should be able to identify, discuss and describe pathologic conditions of the soft and hard tissue of the oral cavity and related structures. Each disease and disease category will be considered as to etiology, clinical, radiographic and histological manifestations along with expected prognosis. The topics will include developmental and acquired abnormalities of the teeth and surrounding structures including salivary gland diseases, and malignancies. The course consists of lectures, problem-solving, group discussions, microscopic study and viewing of radiographs.

OBCS 445: Periodontics

The course deals with a review of the histology, ultra-structure, biochemistry, physiology and morphology of the periodontium. The histopathological and radiographic changes in various classes of periodontal disease and their clinical correlation are presented. Dental plaque, claculus, local irritants and systemic conditions as etiological factors in periodontal diseases are discussed. The course also includes an introduction to the basic principles of the immune system of the periodontium in health and its changes in various disease processes. The students will also learn to examine, record and diagnose periodontal diseases, formulate treatment plans and proceed to learn the theory of various methods of treatment.

OBCS 322: Oral Histology

The course deals with histological, ultra structural and developmental aspects of hard and soft, oral and para-oral structures such as teeth, peridontium, salivary glands and oral mucosa. The composition of calcified tissues including enamel and dentine will be considered. The students shall correlate morphological structure with function.

OBCS 377: Oral Radiology

The objectives of this course are to introduce the common characteristics of x-radiation and to make students familiar with the types of x-ray machines and their components, radiation hazards and radiation safety measures. The objectives also include introduction and training of students on the various intraoral, extra oral radiographic exposure procedures and recent specialized radiographic techniques as well as film, processing techniques.

OBCS 477: Radiology

The objectives of this course are to familiarize students with the requirements of an acceptable diagnostic radiograph, to study intraoral and extra oral normal radiographic anatomical landmark, photography in dental practice, as well as the interpretation of radiographic changes associated with various local systemic diseases.

OBCS 468:Oral Diagnosis and Treatment Planing

This course prepares the students for handling patients in the clinic, thorough history taking, clinical examination both extra and intra oral as general assessment of the patient conditions. Also, the primary course includes different laboratory investigations and their applications in the field of dentistry, together with handling of medically involved patients. The course also prepares students to formulate and rationalize a preliminary treatment planning for their patients. The lectures will be reinforced with demonstration and clinical training and the student should demonstrate skill in applying local anesthesia for dental patients.

OBCS 411: Oral Biology and Nutrition

The course will correlate basic science information relevant to the clinical practice of dentistry. The disease processes that the dentist is diagnosing and treating will be discussed in terms of basic biological phenomena through case presentations and problem solving. Students will attend lectures on food and nutrition as applied to clinical dentistry in order to give appropriate dietary advice.

OBCS 545: Periodontics

The relationship between periodontal diseases with other clinical disciplines of dentistry will be presented. Students will also be expected to learn more advanced aspects of the relationship between periodontal diseases and systemic conditions. The students should be aware of the objectives, indications and contraindications of the various surgical periodontal procedures. The course shall depend on lectures and clinical experiences in the treatment of advanced non-complicated periodontal cases.

Department of Oral Basic and Clinical Sciences

OBCS 223: Dental Anatomy & Occlusion

This course deals with anatomy and morphology of primary and permanent dentition as well as the sequence of tooth eruption and surface anatomy of the oral cavity. The course includes study of static occlusion and these factors concerned with the development and stability of masticatory system. Student will relate morphology to function and will exercise their technical abilities to develop skills needed for practice.

OBCS 556: Oral Medicine

The students shall acquire the clinical skills to differentiate between various types of oral diseases and the ability to correlate radiographic and histopathological features with the clinical findings. Students shall also be able to relate oral disease to systemic conditions.

FACULTY MEMBERS

Professors

Azza Abbas Elsisi

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Hakem Hussain Elsayed Periodontics

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Hisham Ibrahim Othman Oral Biology 1990 Alexandria, Egypt <u>hothman@kau.edu.sa</u> <u>http://hothman.kau.edu.sa/</u>

Hussain Ali Alshennawi Periodontics 1979 Alexandria, Egypt

Mohammed Salim Alzahrani Periodontics

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Magda Kamal Marai Periodontics

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Associate Professors

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Assistant Professors

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Prof. Adel M. Abdel Azeem

Suzan Saifallah Ibrahim Oral Medicine 1995 Ein Shams, Egypt

Dr. Emam M. Helmi

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Oral Medicine 2003 American Academy, USA <u>salattass@kau.edu.sa</u> <u>http://salattass.kau.edu.sa/</u>

Sahar Mohammed Bukhary Oral Biology 2006 London, UK sbukary@kau.edu.sa http://sbukary.kau.edu.sa/

Hind Ahmed Algohani (Lecturer) Periodontics 2002 Tufts, USA haalgehani@kau.edu.sa http://haalgehani.kau.edu.sa/

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Department of Oral and Maxillofacial Rehabilitation

Department Contact:

Chairman's Office Tel: 6401000 Ext. 20090 Fax: 6403316 E-mail : *tmarghalani@kau.edu.sa* Website : *http://dentistry.kau.edu.sa*

<u>History:</u>

The Department was established in 1985.

Vision:

We are committed to reaching the optimal performance level in Dentistry.

Mission:

To develop the student's scientific and technological knowledge, enhance their cognitive research capabilities and advance their clinical skills.

Departmental Requirements:

In order to qualify for a Bachelor of Dental Medicine and Surgery (B.D.S) degree, students must successfully complete 228 credit hours during a time frame of Six years. In addition, students must also complete one obligatory year for clinical practice (Internship Program).

Credit are distributed as follows:

- 1. (14) Credit hours of the university requirements
- 2. (24) Credit hours of preparatory year requirements,
- 3. (190) Credit hours of faculty courses, made up of
 - 29 Credit hours of join programs
 - 46 Credit hoursof compulsory OMR courses
 - 30 Credit hours of compulsory PDS courses
 - 34 Credit hours of compulsory CDS courses
 - 51 Credit hours of compulsory OBCS courses



Department of Oral and Maxillofacial Rehabilitation

Department Study Plan:

Department Core Courses (Credit Hours 46)

No	Course	Course	Course Title	Credit		HOURS		Droroquisito
190.	Code: No.	No.		Crean	Theory	Lab	Clinic	rrerequisite
1	OMR	323	Preclinical Removable Prosthodontics	8				
2	OMR	423	Removable Prosthodontics	4				
3	OMR	523	Removable Prosthodontics	4				
4	OMR	434	Fixed Prosthodontics	6				
5	OMR	534	Fixed Prosthodontics	6				
6	OMR	511	Oral Surgery	4				
7	OMR	611	Oral Surgery	4				
8	OMR	412	Pain Control & Anesthesia	2				
9	CCC	600	Adult & Geriatric Comprehensive Care	8				
			Total	46				

Course Descriptions:

OMR 323: Preclinical Removable Prosthodontics

The students will gain experience in the fabrication of maxillary and mandibular complete dentures. The clinical and laboratory procedures will be taught and their interdependence stressed.

OMR 423: Preclinical Prosthodontics

The first part the student will study the partial denture components, and principles of partial denture design. The students will do all the necessary steps for construction of chromium-cobalt metallic framework as well as acrylic partial dentures. The second part The student will be taught how to manage and treat fully edentulous patients following standardized techniques.

OMR 412: Pain Control and Anesthesia

The course will provide a review of applied anatomy and it includes theoretical and practical aspects in the selection and use of different anesthetic agents and sedative. The lectures will be reinforced with demonstration and clinical training and the student should demonstrate skill in applying local anesthetic agents and sedative.

OMR 534: Fixed Prosthodontics

This course allows transition of the previous preclinical course, and provides clinical involvement that is critical to upgrade the abilities of diagnosis, treatment planning, preparation, construc tion, cementation and follow up of the Fixed Prosthodontics cases.

OMR 434: Fixed Prosthodontics

The objective is to assist students in developing the manual skills required to perform basic technical procedures used in fixed prosthodontics. The course includes study of masticatory system and occlusion and its relation to fixed prosthodontics.

OMR 511: Oral Surgery

The student will practice diagnosis, extraction of teeth, removal of remaining roots, impacted teeth, epicoectomy and removal of cysts. The course will also provide a review of applied anatomy and different methods of pain control.

OMR 523: Removable Prosthodontics

The student will be able to complete all stages concerning various laboratory and clinical procedures. This is the first clinical course in removable partial dentures. The students will be taught how they manage and treat partially edentulous patients following standardized techniques.

OMR 611: Oral Surgery

The student will participate in diagnosis, observe and assist in treatment of facial bone fractures, preprosthetics surgery, orthognathic and tempromandibular joint surgery. Students will attend lectures and perform minor oral surgical procedures as well as attend major oral surgical operations.

Department of Oral and Maxillofacial Rehabilitation

FACULTY MEMBERS

Professors

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Associate Professors

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Department of Preventive Dental Sciences

Department Contact:

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History:

The Department was established in 1985.

Vision:

We are committed to reaching the optimal performance level in Dentistry.

Mission:

To develop the student's scientific and technological knowledge, enhance their cognitive research capabilities and advance their clinical skills.

Departmental Requirements:

In order to qualify for a Bachelor of Dental Medicine and Surgery (B.D.S) degree, students must successfully complete 228 credit hours during a time frame of Six years. In addition, students must also complete one obligatory year for clinical practice (Internship Program).

Credit are distributed as follows:

- 1. (14) Credit hours of the university requirements
- 2. (24) Credit hours of preparatory year requirements,
- 3. (190) Credit hours of faculty courses, made up of
 - 29 Credit hours of join programs
 - 46 Credit hoursof compulsory OMR courses
 - 30 Credit hours of compulsory PDS courses
 - 34 Credit hours of compulsory CDS courses
 - 51 Credit hours of compulsory OBCS courses

Department of Preventive Dental Sciences

Department Study Plan:

Department Core Courses (Credit Hours 30)

No	Course Code:	Course	Course Title	Credit		HOURS		Duouoquisito
190.		No.		Crean	Theory	Lab	Clinic	rrerequisite
1	PDS	334	Biostatistics & Methods of Scientific Research	4				
2	PDS	411	Pediatric Dentistry	3				
3	PDS	511	Pediatric Dentistry	4				
4	PDS	615	Comprehensive Pediatric Care	4				
5	PDS	422	Orthodontics	3				
6	PDS	522	Orthodontics	4				
7	PDS	626	Comprehensive Orthodontic Care	4				
8	PDS	633	Community Dental Practice	4				
			Total					

Course Descriptions:

PDS 334: Biostatistics & Methods of Scientific Research

A study that aims to teach students principles of biostatistics and its application in dentistry as well as research methodology and retrieval of medical data using electronic means such as bit net, gulf net and internet.Student will be able to conduct applied research projects in dentistry.

PDS 511: Pediatric Dentistry

A study that focuses on the theory and practice of effective child management, preventive dental practices and maintenance of primary dentition in good health. Another objective of this course includes care for special patients beyond the age of adolescent, who demonstrate mental, physical or emotional problems.

PDS 422: Orthodontics

Enables students to recognize the importance of coordinating treatment timing as it coincides with facial, dental and somatic growth.

PDS 626: Comprehensive Orthodontic Care

Focuses on the orthodontic practices applicable to the general dental practices. Students are trained in the values of dental and medical consultation, referral system as well as patient auditing and recall system to be able to apply the principles of children's dentistry and orthodontics to a good standard in general practice and to have a sound foundation for continuing postgraduate education.

PDS 615: Comprehensive Pediatric Care

This course aims to discover the clinical judgment, technical knowledge and skills each student in the final year of study has acquired in terms of the ability to deliver high quality dental care to children.

PDS 633: Community Dental Practice

This course designed to prepare students for the practice of dentistry by introducing the environment (population, dental practices, organizations and community agencies) in which they will fulfill their professional role.



Department of Preventive Dental Sciences

FACULTY MEMBERS

Professors

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Faculty of Earth Science

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<u>History:</u>

The Ministry of Petroleum established the Center of Applied Geology in 1970. This was later changed to the Institute of Applied Geology in 1975 when it became part of King Abdul Aziz University. The department of Geology, Faculty of Sciences merged it into one of its departments and renamed it the Faculty of Earth Science in 1978.

Vision:

The faculty is committed to becoming a leading center in Earth Sciences and their applications. FES aims to promote the field's general awareness, to offer technical services to the community and to contribute to the developmental plans of Saudi Arabia and to utilize the full potential of its natural resources.

Mission:

The principal aims of the FES are to provide educational opportunities in all fields of Earth Sciences, to conduct applied research that meets the needs of Saudi Arabia by collaborating with public and private institutions, to keep abreast of new developments in the field especially in the environmental area, and to offer technical assistance.

Unique Features:

The faculty has succeeded in becoming an outstanding research centre in earth sciences at both national and international levels.

Faculty Requirements

Students must complete 40 credit hours of the following faculty courses

No Course		Course	e Course Title	Credit	I	HOURS		Droroquisito	
190.	Code:	No.	Course Hue	Creun	Theory	Lab	Prac	rrerequisite	
1	EMR	201	Physical Geology	4	3	1	0	N/A	
2	EMR	202	Introduction to Mineralogy	2	1	1	0	N/A	
3	EMR	211	Optical Mineralogy	3	2	1	0	EMR-202	
4	EMR	231	Economic Geology	2	1	1	0	EMR-202	
5	EGP	211	Introduction to Geophysics	2	1	1	0	EMR-201	
6	ESR	211	Introduction to Structural Geology	3	2	1	0	N/A	
7	ESR	231	Introduction to Photogeology and Geomorphology	2	1	1	0	EMR-201	
8	EPS	211	Sedimentation and Stratigraphy	2	1	1	0	EMR-201	
9	EPS	231	Introduction to Paleontology	2	1	1	0	EMR-201	
10	EHG	201	Data Processing and Statistical Geology	2	1	1	0	EMR-201 & MATH-101	
11	EHG	202	Aspects of Scientific Research	1	1	0	0	N/A	
12	EEG	201	Introduction to Environmental and Engineering Geology	2	1	1	0	EMR-201 &CHEM-101	
13	ESR	301	Field Geology	3	0	0	3	ESR-211	
14	ESR	303	Geological Mapping	2	0	0	2	ESR-301	
15	EMR	304	Introduction to Petrology	4	3	1	0	EPS-211 &EMR-211	
16	EMR	241	Principles of Geochemistry	2	2	0	0	EMR201 & CHEM-101	
17	EMR	431	Geology of the Kingdom	2	2	0	0	ESR-301	
			Total	40	23	12	5		

Total credit hours required for graduation from FES (136 Hours)

Requirements	Study Units	Remarks
University requirements	26	
University Preparatory Year requirements	15	
Core Courses Geology (Faculty requirements)	40	
Faculty Preparatory Year requirements	2	
Department requirements	53	See department program
Total	136	

The faculty includes the following 6 departments:

Department / Program	Academic Degree
Department of Mineral Resources & Rocks	B.Sc., M.Sc. & PhD
Department of Hydrogeology	B.Sc., M.Sc. & PhD
Department of Petroleum Geology & Sedimentology	B.Sc., M.Sc. & PhD
Department of Structural Geology & Remote Sensing	B.Sc., M.Sc. & PhD
Department of Engineering & Environmental Geology	B.Sc., M.Sc. & PhD
Department of Geophysics	B.Sc., M.Sc. & PhD

Public Journals

Publications

University

Email

Website

Journal of King Abdul-Aziz University: : Earth Sciences King Abdul-Aziz : Contact No. 6952326 Ext No: 52326 : : ear.spu@kau.edu.sa : http://www.kau.edu.sa/fes



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History:

The Engineering Geology Department was established in 1974. The Environmental Geology option was approved and added to the department in 2001, which was subsequently changed to the Engineering and Environmental Geology Department.

Vision:

We are committed to reaching the highest level in teaching and research, using advanced technology in the fields of Engineering, Environmental Geology and Geological Hazards.

Mission:

Our mission is to apply geology to mining and civil engineering works and environmental aspects. We aim to graduate engineering geology or environmental geology professionals who can perform site investigations and evaluate potential engineering or natural hazards.

Departmental Requirements:

To earn a degree in Engineering Geology and Environmental Geology, students must complete a total of 136 credit hours distributed as follows.

- 49 Credit hours of departmental core courses
- 36 credit hours of compulsory EEG Courses for Engineering Geology
- 33 credit hours of compulsory courses for Environmental Geology.

Specializations:

The department offers two specializations, Engineering Geology and Environmental Geology.

Department Study Plan:

Department Core Courses: (Credit Hours 49)

No	Course	Course	Course Title	Con dia	HOURS			Proroquisito
190.	Code:	No.	Course Thie	Creat	Theory	Lab	Prac	Prerequisite
1	EEG	201	Introduction to Environmental and Engineering Geology	2	2	0	0	EMR 201, CHEM 101
2	EEG	232	Terrain Analysis	2	2	0	0	EMR 201, ESR 431
3	EEG	311	Engineering Properties of Soil	3	2	1	0	EMR 201, MATH 101
4	EEG	312	Soil Mechanics	3	2	1	0	EEG 311, EEG 321
5	EEG	321	Mechanics of Material	2	1	1	0	EMR 201, MATH 101
6	EEG	322	Rock Mechanics	3	2	1	0	EMR 201, MATH 101
7	EEG	331	Rock in Construction	3	2	1	0	EMR 102, MATH 101
8	EEG	341	Engineering Geology	3	2	1	0	EEG 311, EEG 322
9	EEG	342	Geotechnology	3	2	1	0	EEG 311, EEG 322
10	EEG	351	Soil Pollution	3	2	1	0	EEG 201, EEG 311
11	EEG	399	Training in the Specialization	2	0	0	2	EEG 311, EEG 322
12	EEG	408	Seminar	1	1	0	0	EEG 399
13	EEG	441	Site Investigation	2	2	0	0	EEG 312, EEG 322
14	EEG	443	Applications in Engineering Geology	3	2	1	0	EEG 341
15	EEG	451	Waste Disposal in Soil and Rocks	3	2	1	0	EEG 201, EEG 322
16	EEG	452	Environmental Geotechnology	3	2	1	0	EEG 201, EEG 342
17	EEG	454	Geohazards	2	2	0	0	EEG 201
18	EEG	456	Assessment of Geohazards	2	2	0	0	EEG 454
19	EEG	499	B.Sc. Project	4	0	0	4	EEG 399
			Total	49	32	11	6	

Requirements for Engineering Geology: (Credit Hours 36)

No	Course	Course	Course Title	Credit		HOURS		Duouo autoito
110.	Code:	No.	Course Thie	Crean	Theory	Lab	Prac	rrerequisite
1	EEG	232	Terrain Analysis	2	2	0	0	EMR 201, ESR 431
2	EEG	311	Engineering Properties of Soil	3	2	1	0	EMR 201, MATH 101
3	EEG	312	Soil Mechanics	3	2	1	0	EEG 311, EEG 321
4	EEG	321	Mechanics of Material	2	1	1	0	EMR 201, MATH 101
5	EEG	322	Rock Mechanics	3	2	1	0	EMR 201, MATH 101
6	EEG	331	Rock in Construction	3	2	1	0	EMR 102, MATH 101
7	EEG	341	Engineering Geology	3	2	1	0	EEG 311, EEG 322
8	EEG	342	Geotechnology	3	2	1	0	EEG 311, EEG 322
9	EEG	399	Training in the Specialization	2	0	0	2	EEG 311, EEG 322
10	EEG	408	Seminar	1	1	0	0	EEG 399
11	EEG	441	Site Investigation	2	2	0	0	EEG 312, EEG 322
12	EEG	443	Application in Engineering Geology	3	2	1	0	EEG 341
13	EEG	454	Geohazards	2	2	0	0	EEG 201
14	EEG	499	B.Sc. Project	4	0	0	4	EEG 399
			Total	36	22	8	6	

No	Course	Course	Course T:41e	Credit		HOURS		Prerequisite EMR 201, ESR 431 EMR 201, MATH 101 EMR 201, MATH 101 EEG 311, EEG 322 EEG 311, EEG 322 EEG 201, EEG 311 EEG 311, EEG 322 EEG 311, EEG 322 EEG 311, EEG 322 EEG 311, EEG 322 EEG 312, EEG 322 EEG 342, EEG 201 EEG 201 EEG 454 EEG 399
110.	Code:	No.	Course Thie	Creun	Theory	Lab	Prac	rrerequisite
1	EEG	232	Terrain Analysis	2	2	0	0	EMR 201, ESR 431
2	EEG	311	Engineering Properties of Soil	3	2	1	0	EMR 201, MATH 101
3	EEG	322	Rock Mechanics	3	2	1	0	EMR 201, MATH 101
4	EEG	341	Engineering Geology	3	2	1	0	EEG 311, EEG 322
5	EEG	342	Geotechnology	3	2	1	0	EEG 311, EEG 322
6	EEG	351	Soil Pollution	3	2	1	0	EEG 201, EEG 311
7	EEG	399	Training in the Specialization	2	0	0	2	EEG 311, EEG 322
8	EEG	408	Seminar	1	1	0	0	EEG 399
9	EEG	451	Waste Disposal in Soils and Rocks	2	2	0	0	EEG 312, EEG 322
10	EEG	452	Environmental Geotechnology	2	2	0	0	EEG 342, EEG 201
11	EEG	454	Geohazards	2	2	0	0	EEG 201
12	EEG	456	Assessment of Geohazards	3	2	1	0	EEG 454
14	EEG	499	B.Sc. Project	4	0	0	4	EEG 399
			Total	33	21	6	6	

Requirements for Environmental Geology: (Optional) (Credit Hours 33)

Course Descriptions:

EEG 201: Introduction to Environmental and Engr. Geology This course contains environmental concepts and their related fundamentals. Topics covered include geological processes and its relation to the geological hazards; Natural resources (energy, mineral and aggregate); The sources and types of environmental pollution; Types of waste disposal; Soil and rock engineering properties and their problems; geological influence in civil works. **Prerequisites:** EMR201,CHEM101

EEG 232: Terrain Analysis

Introduction to rock physiography, terrain evaluation systems using PUCE techniques, predicting the engineering properties of igneous, metamorphic and sedimentary rocks, case history studies. EMR 201, ESR431 **Prerequisites:**

EEG 311: Engineering Properties of Soil

Geotechnical problems associated with soil, physics and index properties, soil classification systems, permeability capillarity and type of stress, compressibility and shear strength, soil improvement application, field trip.

Prerequisites:

EMR201, MATH101

EEG 312: Soil Mechanics

Types and conditions of foundations, bearing capacity theories in shallow foundations, settlements in cohesive and cohesion less soils, deep foundations, earth pressures and lateral supports, seepage analysis and stability of slopes, field applications, and two field trips. **Prerequisites:** EEG311,EEG321

EEG 321: Mechanics of Material

The course is designed to give students knowledge about principles of statics. Topics include: Unit systems, vectors, resultants, equilibrium of forces, centroids, moments, stress and strain and their relationships, Hookes Law, compound stresses, material failure criteria, Mohr Circle.

Prerequisites:

EMR201, MATH101

EEG 322: Rock Mechanics

Concept of Rock Mechanics. Studying the stress-strain relationships. Studying the engineering properties of both intact rock and discontinuity surfaces. Applying the intact rock and the discontinuity surfaces classification systems. Behavior and classification of Rock Masses. Laboratory sessions (works) for the physical and mechanical behavior of rocks. (2 days Field Trips). EMR201, MAT101 **Prerequisites:**

EEG 331: Rock in Construction

Introduction to geological. Considerations of the source of construction materials, Quarries and their products. Methods of samples and size gradation of aggregate. Classification of aggregate. Testing the physical, chemical and mechanical properties of coarse and fine aggregates. Road Pavement materials. Building and ornamental stones, Building blocks and their types, Riprap and filter, Types of Cements & their materials. Concrete mix design. **Prerequisites:** EMR 201/ MAT101

EEG 341: Engineering Geology

Engineering Descriptions, Engineering geological considerations, description of soils and rock masses. Classification of rock masses for engineering purposes. Engineering geological maps and their applications. Rock and soil improvement such as grouting, drains and reinforcement of ground (2 days Field Trips)

and reinforcement of ground (2 days Field Trips)
Prerequisites: EEG311 EEG322
EEG 342: Geotechnology
General considerations of ground behavior during construction and
maintenance stages. Planning a monitoring program. Instrumentation transducers. Measurements of groundwater level and pressure.
Measurements of total stress and stress changes in soil and rocks.
Measurements of deformation, load and strain in structural elements.
Prerequisites: EEG311,EEG322
EEG 351: Soil Pollution
Study of all aspects in the pollution of soil.

Study of all aspects in the pollution of soil. EEG201, EEG311 **Prerequisites:**

EEG 399: Training in the Specialization

Concepts of engineering geological mapping and site testing. Methods of field classification for soils and the determination of its physical properties such as field density test for soil & size, shape of particles. Classification & the source of Wadi (Valley) soils and natural aggregates. Measurement of the shear strength of soil using field equipment and identification of rock type estimations. Geo-mapping (Field trip for 28 days). EEG311, EEG322 **Prerequisites:**

EEG 408: Seminar

Training in research in geological databases and writing scientific reports. A series of lectures on selected topics representing recent development in the fields of engineering geology or environmental geology. Students are asked to select and study one topic, write a technical report and present it in a public lecture. EEG 408 **Prerequisites:**

EEG 441: Site Investigation

General considerations of planning of a site investigation program. Drilling and boring equipments and its application in investigation for soils and rocks. Disturbed and undisturbed sampling. In-situ testing to determine the strength of the soils or rocks. Laboratory testing of samples collected from the sites. Report writing and interpretation of the site engineering geological characteristics. Four days field trips. **Prerequisites:** EEG312, EEG322

EEG 443: Application in Engineering Geology

Engineering geological considerations while investigating highways, bridges, slopes, dams, tunnels, rivers, beaches, sabkhas, sand dunes, and selected sites for urban areas. Methods of analysis and presentation of engineering geological data. Engineering geological reports. Case studies. **EEG 341 Prerequisites:**

EEG 451: Waste Disposal in Soils and Rocks

General principles of waste disposal and associated problems; landfills impoundment, location, design, and sealing of reposito-

ries, construction of repositories, pollutant migration in soils and rocks, leachates and gas generation, water balance for landfill, waste extraction & in-situ treatment of pollutants, geomembranes and clay liners, collection and removal systems, stability of landfills remediation and monitoring. Field trips to disposal sites. **Prerequisites:** EEG201, EEG322

EEG 452: Environmental Geotechnology

Fundamentals of environmental geotechnology, review of earth materials and geological processes affecting them. Geotechnical design of solid and hazards waste landfills, preliminary groundwater contamination site assessments, contaminant technology and design, field and laboratory hydraulic conductivity, groundwater monitoring. Evaluation of the environmental aspects associated with mineral exploitation, oil and groundwater; impact. **Prerequisites:** EEG201, EEG342

EEG 454: Geohazards

General considerations of hazardous earth processes such as floods, landslides, subsidence, earthquakes and related phenomena, volcanic activities, coastal hazards, desertification, and sand dunes migration. **Prerequisites:** EEG 201

EEG 456: Assessment of Geohazards

Impact of environmental hazards due to floods, desertification, landslides, subsidence, coastal hazards, and urbanization. Discussion on worldwide case studies and their remedial measures, and review of geohazard cases in the Kingdom. Field trips and laboratory sessions. **EEG 454 Prerequisites:**

EEG 499: B.Sc. Project

Topic will be selected within the fields of engineering geology or environmental geology by the student supervised by the department. Students carry out an investigation and perform tests both in the field and laboratory, write a scientific report and present their findings in a public lecture (Field trip for 21 days). **Prerequisites:**

EEG 399

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History:

The Geophysics Department was established in 1987 offering a B.Sc. Program which was soon followed with M.Sc. and Ph.D. programs.

Vision:

Commitment to reaching the highest levels of teaching. Produce professional Geophysicists who can play leading roles in industry, research, teaching, and public services related to exploration.

Mission:

Provide students with the skills required to become independent lifelong learners able to adapt positively to the rapidly changing workplace and world. Develop students' abilities to work individually and in teams. Improve students' critical awareness of the natural world and the role of their chosen discipline.

Departmental Requirements:

To earn a degree in Geophysics, students must complete a total of 136 credit hours distributed as follows:

- 43 credit hours of departmental core courses according to specialization and
- 34 credit hours of compulsory EGP courses.



Department of Geophysics

No	Course	Course	Course Title	Condit		HOURS	<u>.</u>	Duono guicito
NO.	Code:	No.	Course 1 the	Creatt	Theory	Lab	Prac	rerequisite
1	EGP	211	Introduction to Geophysics	2	1	1	0	EMR-201,PHYS-101
2	EGP	312	Physics of the Earth	2	2	0	0	EGP211, Phys101
3	EGP	321	Seismic exploration	3	2	1	0	PHYS202 EGP211, MATH202
4	EGP	331	Geo-electric exploration	3	2	1	0	PHYS202, EGP211, MATH202
5	EGP	341	Magnetic & Gravity Exploration	3	2	1	0	EGP 211, PHYS 202, MATH 202
6	EGP	342	Radiometry and Geothermom- etry	1	1	0	0	EGP211, PHYS101,
7	EGP	371	Seismic Exploration for Petro- leum	2	1	1	0	EGP 211
8	EGP	372	Earthquake Engineering	2	1	1	0	EGP 211
9	EGP	399	TrainingintheSpecialization	2	0	0	2	EGP321, EGP 311,
10	EGP	408	Seminar	1	1	0	0	EGP321,EGP331,EGP341
11	EGP	411	Vibratory System	2	1	1	0	EGP321,MATH203, PHYS203
12	EGP	412	Linear Analysis System	2	1	1	0	EGP321, MATH203
13	EGP	413	Seismology	2	2	0	0	EGP321, EGP411-412, MATH204
14	EGP	421	Reflection Seismology	2	1	1	0	EGP312, EGP321, EGP411-412
15	EGP	431	E.M. Exploration	3	2	1	0	EGP331, EGP341, MATH203, PHYS203
16	EGP	451	Borehole Geophysics	2	1	1	0	EPS211, ESR211, EGP211
17	EGP	471	Geophysical Applications	3	2	1	0	EPS211, EGP211, ESR211
18	EGP	491	Geophysical Data Processing	2	1	1	0	EGP341, EGP331, EGP321, MATH204
19	EGP	499	B.Sc. Project	4	0	0	4	EGP321,EGP331, EGP 399,EGP 408, EGP 341
			Total	43	24	13	6	

Requirements for EGP: (Geophysics) (Credit Hours 34)

No	Course	Course	Course Title	Cradit		HOURS		Droroquisito
190.	Code:	No.	Course Thie	Crean	Theory	Lab	Prac	rrerequisite
1	EGP	312	Physics of the Earth	2	2	0	0	EGP 211, PHYS 101
2	EGP	321	Seismic Exploration	3	2	1	0	PHYS,202 EGP211, MATH202
3	EGP	331	Geo-electric Exploration	3	2	1	0	EGP 202, EGP 211, MATH 202
4	EGP	341	Magnetic and Gravity Exploration	3	2	1	0	EGP 211, PHYS 202, MATH 202
5	EGP	342	Radiometry and Geothermometry	1	1	0	0	EGP211, PHYS101,
6	EGP	399	Training in the Specialization	2	0	0	2	EGP 321 EGP 331 EGP 333
7	EGP	408	Seminar	1	1	0	0	EGP321, EGP331, EGP341
8	EGP	411	Vibratory System	2	1	1	0	EGP321,MATH203,PHYS203
9	EGP	412	Linear Analysis System	2	1	1	0	EGP321,MATH203
10	EGP	413	Seismology	2	2	0	0	EGP321,EGP 411,EGP 412 MATH204
11	EGP	421	Reflection Seismology	2	1	1	0	EGP312,EGP 321,EGP 412, EGP 411
12	EGP	431	E.M. Exploration	3	2	1	0	EGP331, MATH203, PHYS203,EGP341
13	EGP	451	Borehole Geophysics	2	1	1	0	EPS211, ESR211 EGP211
14	EGP	491	Geophysical Data Processing	2	1	1	0	EGP341, EGP 331, EGP 321, MATH204
15	EGP	499	B.Sc. Project	4	0	0	4	EGP321, EGP331, EGP 399, EGP408, EGP 341
			Total	34	19	9	6	

Department of Geophysics

Course Descriptions:

EGP 211: Introduction to Geophysics

Introduction to the physics of the earth including earthquakes, earth gravity, magnetism, plate tectonic theory, introduction to seismic exploration methods, resistivity, gravity and magnetic methods, radiometry and thermal methods, well logging and instrumentation.

Prerequisites:

EMR201, PHYS101

EGP 312: Physics of the Earth

Introduction to field theory, earth gravitational field and its components, methods of measuring absolute value of the gravitational acceleration, earth figure, earth magnetism: source, components and variations. Main geometric field, dipole method. Measurements and computations of fields' intensity. Paleomagnetism, Seismic waves and their propagations; earthquakes; tectonic earthquakes in the Arab world and plate tectonics. **Prerequisites:** EGP211, PHY 101

EGP 321: Seismic Exploration

Properties of elasticity, seismic waves and their propagation, derivation of wave equation, reflection and refraction methods, field acquisition techniques, reflection and refraction digital data processing, sonic logging, shear wave techniques and their applications. Field trip.

Prerequisites: EGP211, PHY202, MATH202

EGP 331: Geo-electric Exploration

Electrical properties of rocks and minerals, field instrumentation of data acquisition, arrays, A.C. and D.C. resistivity measurement systems. Self-potential induced polarization, and telluric. Data presentation and their quantitative and qualitative analyses. Field examples of exploration for groundwater and mineral resources. Selected field studies and field trips.

Prerequisites: PHY202, EGP211

EGP 341: Magnetic and Gravity Exploration

Magnetization effects, elements of magnetic field, geomagetic field, diurnal variations of magnetic field, induced and remnant magnetization, magnetic anomalies of deep buried bodies, instruments for geomagnetic measurements and their calibration. Various magnetic surveys, data reduction, normal and diurnal corrections. Gravitational field, field intensity measurements, instruments and survey methods etc.

Prerequisites: EGP211, PHY202, MATH 202

EGP 371: Seismic Exploration for Petroleum

Theory of seismic methods, geometry of seismic wave paths, field equipment and instruments, land and marine seismic explorations, improvement in data treatments, analysis of seismic sections and their correlation case histories of hydrocarbon reservoir explorations. **Prerequisites:** EGP 211

EGP 372: Earthquake Engineering

Magnitude and intensity of earthquake and mechanics of its occurrence. International seismic zones. Danger and seismic haz-

ards. Groundwater motions and soils liquefaction during the ground shaking. Dynamics of the earthquake-resistant construction and their main characteristics. **Prerequisites:** EGP 211

EGP 399: Training in the Specialization

This course deals with training the students to become more familiar with geophysical survey using different geophysical techniques. Training in specialized companies in geophysics. Students had present a report about the scientific and practical information which they have obtained in this period of time. 30 days field trip.

Prerequisites:

EGP 408: Seminar

Series of scientific papers about selected topics showing the current trends of research and studies in the field of geophysics. Students will be assigned to study such material and prepare the report about the topic for presentation as lecturer using up-todate techniques.

Prerequisites:

EGP321,331,341

EGP,321,331,333

EGP 411: Vibratory System

Principles of vector algebra, Newton's laws of motion, harmonic motions, general motion of three degrees of freedom of a free particle, dynamics of particles with respect to rotational axes. Effects of rotation of earth, Spherical pendulum.

Prerequisites: EGP321, MAT203, PHYS203

EGP 412 : Linear Analysis System

Study of analog systems, Laplace transforms, Fourier transforms, system responses (impulse, amplitude, and phase) filter analyses, emphasis on geophysical applications, and computer use. **Prerequisites:** EGP321,MATH203

EGP 413: Seismology

Introduction to seismology, earthquake monitoring stations and their equipment. Earthquakes, their kinds and source parameters. Seismic waves and travel-time curves. Seismology and the interior structure of the earth. Seismic activity and its risk. Intensity and ground acceleration maps. Earthquake engineering. Geologic and engineering precautions for the mitigation of earthquake risks. General trends of early warning studies.

Prerequisites: EGP321, 411, 412

EGP 431: Electromagnetic Exploration

Principles of electromagnetic theory, mutual inductance, concurrence of electromagnetic fields, phase and amplitude relations, electromagnetic instruments, ground electromagnetic survey systems, time domain electromagnetic, telluric and magneto telluric systems, airborne electromagnetic systems, electromagnetic field procedures, data processing and interpretation, field examples and field trips. **Prerequisites:**

EGP 451: Borehole Geophysics

Principles of well logging. Self-potential, resistivity, sonic rays, density and neuron logs. Relationships between well measure-

Department of Geophysics

ments and rock properties. Dip measurements of shale beds and their problems. Interpretation of water and oil bearing beds.. **Prerequisites:** EPS211,EGP211, ESR211

EGP 471: Geophysical Applications

Study of significance of shallow geophysical exploration methods in determining groundwater aquifers of different kinds and the buried environmental targets. Exploration for oil and ores. Determination of geologic structures. EPS211, EGP211

Prerequisites:

EGP 491: Geophysical Data Processing

Discrete Fourier transform, fast Fourier transform, convolution, auto-correlation and cross-correlation, sampling theorem (aliasing, truncation of analytic signal, Nyquist frequency), Ztransforms, digital filters, 2-D Fourier transform, emphasis on computer applications.

Prerequisites:

EGP341, 331, 321.

EGP 499: B.Sc. Project

This is a multidisciplinary design course that integrates fundamentals and design concepts in geological, geophysical exploration. Students work in integrated teams consisting of students from each of the disciplines. Multiple open-end design problems in geophysical exploration and field development, including the development of a prospect in an exploration play and a detailed field survey, 21-day field trip.

Prerequisites:

EGP399, 408, 341

FACULTY MEMBERS

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History:

The Department of Mineral Resources and Rocks was established in 1970 under the name of Department of Economic Geology within the framework of the Institute of Applied Geology.

Vision:

Commitment to reaching highest levels of performance in teaching and research.

Mission:

Offering technical assistance and consultations to organizations, companies, and citizens. Graduating qualified and experienced geologists to deal technically with rocks and mineral deposits and construct geologic maps.

Departmental Requirements:

To earn a degree in Mineral Resources & Rocks, students must complete a total of 136 credit hours distributed as follows:

- 56 credit hours of core EMR courses
- 37 hours of compulsory courses according to specialization.



Department Requirements:

Department Core Courses: (Credit Hours 56)

N	Course	Course	Course Tide	Cara dit		HOURS		D
INO.	Code:	No.	Course Inte	Creat	Theory	Lab	Prac	Prerequisite
1	EMR	201	Physical Geology	4	3	1	0	
2	EMR	202	Introduction to Mineralogy	2	1	1	0	
3	EMR	211	Optical Mineralogy	3	2	1	0	EMR 202
4	EMR	231	Economic Geology	2	1	1	0	EMR 202
5	EMR	241	Principles of Geochemistry	2	2	0	0	EMR 201, CHEM 101
6	EMR	304	Introduction to Petrology	4	3	1	0	EPS 211, EMR 211
7	EMR	311	Systematic Mineralogy	2	2	0	0	EMR 211, CHEM 101
8	EMR	321	Volcanology	2	2	0	0	EMR 304
9	EMR	331	Ore Mineralogy	2	2	0	0	EMR 231
10	EMR	332	Geology of Mineral Deposits	3	2	1	0	EMR 231, EMR 241
11	EMR	334	Ore Microscopy	2	0	2	0	EMR 331
12	EMR	341	Geotechnical Techniques	2	2	0	0	EMR 241
13	EMR	399	Training in the Specialization	2	0	0	2	ESR 301, EMR 332
14	EMR	408	Seminar	1	1	0	0	EMR 399
15	EMR	421	Igneous Petrology	3	2	1	0	EMR 304
16	EMR	422	Metamorphic Petrology	2	1	1	0	EMR 304
17	EMR	431	Geology of Saudi Arabia	2	2	0	0	ESR 301
18	EMR	432	Industrial Minerals and Rocks	2	2	0	0	EMR 231
19	EMR	433	Mining Geology	2	1	1	0	EMR 231
20	EMR	434	Mineral Deposits of Saudi Arabia	2	2	0	0	EMR 431
21	EMR	441	Isotopic Geology	1	1	0	0	EMR 241
22	EMR	442	Geochemistry of Mineral Deposits	2	2	0	0	EMR 332
23	EMR	443	Geological and Geochemical Exploration	3	2	1	0	EMR 231, EMR 241
24	EMR	499	B.Sc. Project	4	0	0	4	EMR 399
			Total	56	38	12	6	

Requirements for EMR: (Mineral Resources and Rock) (Credit Hours 37)

No	Course	Course	Course Title	$\begin{array}{ c c c c c c c } \hline \mbox{Hours} & \mbox{Hours} & \mbox{Preequisite} \\ \hline \mbox{Theory} & \mbox{Lab} & \mbox{Prac} \\ \hline \mbox{Preequisite} \\ \hline \mbox{Preequisite} \\ \hline \mbox{2} & \mbox{2} & \mbox{0} & \mbox{EMR 211, CHEM 101} \\ \hline \mbox{2} & \mbox{2} & \mbox{0} & \mbox{EMR 304} \\ \hline \mbox{2} & \mbox{0} & \mbox{2} & \mbox{0} & \mbox{EMR 231, EMR 241} \\ \hline \mbox{2} & \mbox{0} & \mbox{2} & \mbox{0} & \mbox{EMR 331} \\ \hline \mbox{2} & \mbox{2} & \mbox{0} & \mbox{2} & \mbox{EMR 331} \\ \hline \mbox{2} & \mbox{2} & \mbox{0} & \mbox{0} & \mbox{EMR 241} \\ \hline \mbox{2} & \mbox{2} & \mbox{0} & \mbox{0} & \mbox{EMR 331} \\ \hline \mbox{2} & \mbox{2} & \mbox{0} & \mbox{0} & \mbox{EMR 399} \\ \hline \mbox{3} & \mbox{2} & \mbox{1} & \mbox{1} & \mbox{0} & \mbox{EMR 304} \\ \hline \mbox{2} & \mbox{2} & \mbox{1} & \mbox{1} & \mbox{0} & \mbox{EMR 304} \\ \hline \mbox{2} & \mbox{2} & \mbox{1} & \mbox{1} & \mbox{0} & \mbox{EMR 231} \\ \hline \mbox{2} & \mbox{2} & \mbox{2} & \mbox{0} & \mbox{EMR 231} \\ \hline \mbox{bia} & \mbox{2} & \mbox{2} & \mbox{0} & \mbox{0} & \mbox{EMR 431} \\ \hline \mbox{1} & \mbox{1} & \mbox{1} & \mbox{1} & \mbox{0} & \mbox{EMR 332} \\ \hline \mbox{sits} & \mbox{2} & \mbox{2} & \mbox{0} & \mbox{0} & \mbox{EMR 332} \\ \hline \mbox{EMR 332} & \mbox{EMR 332} \\ \hline \m$				
190.	Code:	No.	Course Thie	Crean	Theory	Lab	Prac	rrerequisite
1	EMR	311	Systematic Mineralogy	2	2	0	0	EMR 211, CHEM 101
2	EMR	321	Volcanology	2	2	0	0	EMR 304
3	EMR	331	Ore Mineralogy	2	0	2	0	EMR 231
4	EMR	332	Geology of the Mineral Deposits	3	2	1	0	EMR 231, EMR 241
5	EMR	334	Ore Microscopy	2	0	2	0	EMR 331
6	EMR	341	Geochemical Techniques	2	2	0	0	EMR241
7	EMR	399	Training in the Specialization	2	0	0	2	ESR301, EMR332
8	EMR	408	Seminar	1	1	0	0	EMR399
9	EMR	421	Igneous Petrology	3	2	1	0	EMR 304
10	EMR	422	Metamorphic Petrology	2	1	1	0	EMR 304
11	EMR	432	Industrial Minerals and Rocks	2	2	0	0	EMR 231
12	EMR	433	Mining Geology	2	1	1	0	EMR 231
13	EMR	434	Mineral Deposits of Saudi Arabia	2	2	0	0	EMR 431
14	EMR	441	Isotopic Geology	1	1	0	0	EMR 241
15	EMR	442	Geochemistry of Mineral Deposits	2	2	0	0	EMR 332
16	EMR	443	Geological and Geochemical Exploration	3	2	1	0	EMR 231, EMR 241
17	EMR	499	B.Sc. Project	4	0	0	4	EMR 399
			Total	37	22	9	6	

Course Descriptions:

EMR 201: Physical Geology

This course is designed to introduce the internal and external processes that operate within the Earth. Topics include: Relationship between the earth and the globe. Different spheres of the earth and its zones. Introductory notes about common minerals and different types of rocks. Magma generation and types, Volcanoes, Plate Tectonics, Earthquakes. External processes of the earth.

EMR 202: Introduction to Mineralogy

Topics include: Atoms and ions - Types of chemical Bonds - Introduction to crystal chemistry - Definition and characteristics of crystals - Crystal symmetry (axis of symmetry, plane of symmetry, center of symmetry, complete symmetry formula) - crystallographic axes and axial angles - Intercepts, parameters and Miller indices -Cubic system (Hexoctahedral class) - Tetragonal system.

EMR 211: Optical Mineralogy

Elementary concepts of light, Nature of light, Snell's Law, Polarization of light, and polarizing microscope. Double refraction and index of refraction. Isotropic and anisotropic media, Uni-axial and Biaxial Optical Indicatrix. Optical properties of isotropic, uni-axial and biaxial minerals. Accessory plates and their uses. Interference figures. Optical orientation in uni-axial

and biaxial minerals. Description of the essential rock-form. **Prerequisites:** EMR 202

EMR 231: Economic Geology

An introduction to economic geology and the main aspects of mineral resources and their utilities.

2. The course includes identification of materials (metallic and non-metallic minerals, gemstones and dimensional stones).

3. Definitions of common terms used by economic geologists, and the classifications of economic ores. **Prerequisites:** EMR 202

EMR 241: Principle of Geochemistry

Atoms – Elements – Periodic Table

2. The chemical composition of earth materials and its relation to universe composition

3. Physiochemical basis controlling abundance and distribution of elements in earth

4. Introduction of geochemistry of igneous, sedimentary and metamorphic rocks, hydrosphere and atmosphere

5. Geochemical cycle.

Prerequisites:

EMR 201, CHEM101

EMR 304: Introduction to Petrology

Definition of physical and chemical properties of magma. Occurrences and forms of igneous rocks. Mode of formation of magmatic melts and their relationship to plate tectonics. Mineralogy, textures and classification of igneous rocks. Origin of sedimentary rocks and their mineralogical composition. Classification of sedimentary rocks. Petrographic properties of sedimentary rocks. Definition of metamorphism and metamorphic rocks. **Prerequisites:** EMR 211 EPS 211

EMR 311: Systematic Mineralogy

Introduction to the basis of mineralogy. Basis of chemical and structural classification of minerals. Systematic study of silicate and non-silicate minerals. Study of structural and chemical properties and their relation to physical properties of minerals. Origin of minerals and their occurrences. EMR 211 CHEM101

Prerequisites:

EMR 321: Volcanology

Physical properties of magma. Genesis and ascending of magma. Volcanic activity and plate tectonics. Types and classification of volcanic eruptions. Lavas and pyroclastics. Shape of volcanoes. Succession of old and young volcanicity. Volcanic faces. Volcanic successions in the Arabian shield. Recent volcanicity in Kingdom of Saudi Arabia and Red Sea region. Mineralization related to volcanic activity. Volcanic activity and energy. **Prerequisites: EMR 304**

EMR 331: Ore Mineralogy

Classification of ore minerals and their physical and chemical properties. Stability of ore minerals and their types of equilibrium in binary and ternary systems for some oxides, sulfides, and sulfate salts. Solid solutions and segregation. Ore minerals in aqueous medium; old and recent mineralizing fluids. **Prerequisites:** EMR 231

EMR 332: Geology of Mineral Deposits

Evolution of ideas on ore deposits. Concept of rock nature of ore. Affiliation of ore to mafic, ultramafic, felsic, and acidic rocks. Marine strata bound volcanic sulfide ores. High temperature metamorphic ore. Sedimentary, stratabound, and vein types ores. Ores affiliated to metamorphic rocks. Mineralization and its relation with earth tectonics. Introduction to mineral genesis. Laboratory identification of different ore minerals. Field trip Prerequisites: EMR 231 EMR 241

EMR 334: Ore Microscopy

Fields of mineralogical study using reflected light optics. Basis of optical reflected light. Ore microscope and its components. Preparation of slabs and polished sections. Optical properties of ore minerals. Hardness and reflectivity. Etching with acids, micro chemical methods and contact print. Ore mineral textures, their interpretation and importance in determining mineral genesis. Detailed ore microscopy study of ore minerals. **Prerequisites:** EMR 331

EMR 341: Geochemical Techniques

Instrumental techniques for mineral identification such as Xray diffraction, differential thermal analysis, infrared. Staining techniques for microscopic identification. Instrumental methods for determination of the chemical composition including major and trace elements of the geological samples such as atomic absorption,X-ray fluorescence, radiometric and mass spectrometric methods. Correlation between the various analytical methods. **Prerequisites:** EMR 241

EMR 399: Training in Specialization

Field training to recognize mineral deposits, their occurrence in nature and their methods of study. Three weeks training in a specialized company as required by the department. **Prerequisites:** ESR 301EMR 332

EMR 408: Seminar

Series of lectures on selected topics representing modern orientations and studies in the fields of mineral resources, minerals, rocks and geochemistry. Each student will be assigned a topic of current geological interest on which he will be expected to prepare and present a talk using modern techniques. **Prerequisites: EMR 399**

EMR 421: Igneous Petrology

Formation of magma and its relation to plate tectonic. Evaluation and comparison of the components of igneous rocks. Modal and chemical analysis of minerals. Variation diagrams and their significance. Mineralogical and chemical classification of igneous rocks. Rare earth elements and their significance in petrology. Variation in composition or magma components. Groups of igneous rock, description, occurrence and origin. **Prerequisites: EMR 304**

EMR 421: Advanced Metamorphic Petrology

Metamorphic faces and their properties. Phase rule. Graphical representation of metamorphic rocks. Thermodynamic applications in metamorphic rocks. Metamorphic reactions in pellitic, mafic and carbonate rocks. Examples and geologic description of metamorphic areas. Metamorphic rocks in the Arabian shield. **Prerequisites: EMR 304**

EMR 431: Geology of the Kingdom

Groups and rock formations of the Arabian Shield and the sedimentary cover and basis of their classification. Chemical composition and isotopic age of rock units of the shield. The implication of the different orogenic cycles and geologic events on the rocks of the shield and the sedimentary cover such as regional metamorphism, deformation, faulting and igneous plutonic activity accompanying them.

Prerequisites:

ESR 301

EMR 432: Industrial Minerals and Rocks

The course is concerned with the main properties of gemstones, industrial minerals and rocks, their classification according to genesis and their overall economic aspects. Occurrence of industrial minerals and rocks in different geologic environment and mineralogical composition will be also handled. Preparation of industrial mineral and rocks and their suitability for the different uses in addition to economic considerations.

Prerequisites: EMR 231

EMR 433: Mining Geology

Different definitions in this domain. Preparation of subsurface maps, cross-sections and composite maps. Surface mining methods including placer deposits, open pit, solution mining using water pressure. Subsurface mining methods including room and pillar, cut and fill, shrinkage stooping, block caving, mineralogical and structural bottoming of ore. Support, drilling, and ventilation in mines. Laboratory study.

Prerequisites:

EMR 231

EMR 434: Mineral Deposits of the Kingdom

Metallic ores, minerals, and industrial rocks in Saudi Arabia, their classification, their occurrence in the Arabian and sedimentary cover. Geological and structural setting for each occurrence of mineralization separately, its connection to similar sites, relation of mineralization to host rocks, changes in the mineralization and host rocks during the various geologic ages. Mineralogical and geochemical characteristic.

Prerequisites: EMR 431

EMR 441: Isotope Geology

Classification of isotopes. Theory of radioactive decay and its application for age dating of igneous and metamorphic rocks. Uranium-series disequilibrium. Important examples of dating methods. Study of stable isotopes, isotopic fractionation and their applications.

Prerequisites: EMR 241

EMR 442: Geochemistry of Mineral Deposits

Geochemical factors affecting the distribution and concentration of elements of economic importance in the various rocks. Geochemistry of mineralizing fluids and their reactions with surrounding rocks. Geochemical conditions favorable for deposition of minerals of economic importance. Study of the various geochemical environments and their properties in formation of mineral deposits. **Prerequisites:** EMR 332

EMR 443: Geological and Geochemical Exploration

Introduction to the principles of geological and geochemical exploration. Methods of using geological guides in exploration of various mineral deposits. Use of technical and geochemical calculations in geochemical exploration of ore and mineral deposits. Methods of planning and execution of complete exploration programs and examples. Interpretation of geochemical data and preparation of geological and geochemical exploration reports. **Prerequisites:** EMR 231EMR 241

EMR 499: B. Sc. Project

Each student will be assigned a field and laboratory project for at least three weeks. Students must submit a final scientific report and present a talk under the supervision of a staff member of the department. Training in a specialized company.

Prerequisites: EMR 399

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Professors

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History:

The department is an applied division of the Faculty of Earth Sciences. It was established in 1987 with the merger of the department of Petroleum Geology and the department of Sedimentology, Stratigraphy, and Paleontology (both established in 1978).

Vision:

Sustain and develop its identity as a research and teaching body of the highest quality. Provide an outstanding educational environment, supporting study across a broad range of academic disciplines and serving major industrial professions. Graduate students equipped with high personal and professional achievements.

Mission:

To graduate students with a high level knowledge of industrial technology, and its relevance to cultural and commercial contexts. To enhance employment, providing direct evidence of technical, problem-solving, research, and communications ability.

Departmental Requirements:

To earn a degree in Petroleum Geology & Sedimentology, students must complete a total of 136 credit hours distributed as follows:

- 47 credit hours of departmental core courses
- 40 credit hours of compulsory EPS courses according to specialization.



Department Requirements:

Department Core Courses: (Credit Hours 47)

No	Course	Course	Course Title	Credit		HOURS		Dronoguigito
190.	Code:	No.	Course Thie	Crean	Theory	Lab	Prac	rrerequisite
1	EPS	211	Sedimentation and Stratigraphy	2	2	0	0	EMR 201
2	EPS	212	Historical Geology	2	1	1	0	EPS 211, EPS 231
3	EPS	231	Introduction to Paleontology	3	2	1	0	EMR 201
4	EPS	232	Micropaleontology	2	1	1	0	EPS 211, EPS 231
5	EPS	321	Carbonates and Evaporites	2	1	1	0	EPS 211, EPS 201
6	EPS	332	Palaeoecology	2	1	1	0	EPS 231, EPS 232
7	EPS	341	Subsurface Geology	3	2	1	0	EMR 304, ESR 211
8	EPS	342	Petroleum Geology	3	2	1	0	EMR 201, ESR 211
9	EPS	343	Drilling and Formation Evaluation	3	2	1	0	EPS 342
10	EPS	399	Training in the Specialization	2	0	0	2	EPS 321, EPS 341,
11	EPS	408	Seminar	1	1	0	0	EPS 399, 343 , EMR 431
12	EPS	411	Palaeo-sedimentary Environments	3	2	1	0	EMR 304, EPS 321
13	EPS	421	Clastic Sedimentary Petrology	2	1	1	0	EMR 304
14	EPS	441	Petroluem Development Geology	3	2	1	0	EPS 343
15	EPS	442	Middle East Oil and Gas Fields	2	1	1	0	EMR 431, EPS 441
16	EPS	443	Properties of Petroluem Reservoirs	3	2	1	0	EPS 441
17	EPS	444	Seismic Stratigraphy	3	2	1	0	EPS 341, EGP 371
18	EPS	445	Sequence Stratigraphy & Basin Analysis	2	1	1	0	EPS 211
19	EPS	499	B.Sc. Project	4	0	0	4	EPS 408, EPS 421, EPS 441
			Total	47	26	15	6	

Requirements for EPS (Petroleum Geology and Sedimentology) (Cedit Hours 40)

No	Course	Course	Course Title	Credit		HOURS		Duovoquiaito
190.	Code:	No.	Course Thie	Creat	Theory	Lab	Prac	Prerequisite
1	EPS	212	Historical Geology	2	1	1	0	EPS 211, EPS231
2	EPS	232	Micropaleontology	2	1	1	0	EPS 211, EPS 231
3	EPS	321	Carbonates and Evaporites	2	1	1	0	EPS 211, EPS 201
4	EPS	332	Paleoecology	2	1	1	0	EPS 231, EPS 232
5	EPS	341	Subsurface Geology	3	2	1	0	EMR 304 ESR 211
6	EPS	342	Petroleum Geology	3	2	1	0	EMR 201, ESR 211
7	EPS	343	Drilling and Formation Evaluation	3	2	1	0	EPS 342
8	EPS	399	Training in the Specialization	2	0	0	2	EPS 321, EPS 341, EPS 342
9	EPS	408	Seminar	1	1	0	0	EPS 399, EPS 343, EMR 431
10	EPS	411	Palaeo-sedimentary Environments	3	2	1	0	EMR 304, EPS 321
11	EPS	421	Clastic Sedimentary Petrology	2	1	1	0	EMR 304
12	EPS	441	Petroleum Development Geology	3	2	1	0	EPS 343
13	EPS	442	Middle East Oil & Gas Fields	2	1	1	0	EMR 431, EPS 441
14	EPS	443	Properties of Petroleum Reservoirs	3	2	1	0	EPS 441
15	EPS	444	Seismic Stratigraphy	3	2	1	0	EPS 341, EGP 371
16	EPS	499	B.Sc. Project	4	0	0	4	EPS 408, EPS 421, EPS 441
			Total	21	13	6		

Course Descriptions:

EPS 211: Sedimentation and Stratigraphy

Sedimentary processes and sedimentary environments. Textures and structures of the sediments and sedimentary rocks. Stratigraphic description of the sedimentary facies. Stratigraphic columnar section, correlation and classification. EMR 201

Prerequisites:

EPS 212: Historical Geology

Prerequisites:

Chronological classification of the most important sedimentary basins of the tworld. Evolution of configuration of the earth's crust in terms of plate tectonics, and type-sections of the major time-stratigraphic units. Evolution of the principal forms of life through geological time.

EPS211,EPS231

EPS 231:Introduction to Paleontology

Study of the origin of fossils, modes of preservation, and occurrence of fossils. Main classification of animals and plants. Morphological study of different invertebrate phyla. **Prerequisites:** EMR 201

EPS 232: Micropaleontology

Morphological study and classification of microfossils: Foraminifera, Radiolaria, Ostracods, Conddonts, Calcareous and Siliceous Algae. Non-mineralized organic microfossils. **Prerequisites:** EMREPS211, EPS231

EPS 321: Carbonates and Evaporites

Primary constituents of calcium carbonate sediments and their mineralogical composition. Classification of carbonate rocks and petrographic properties of lime stones and dolomites. Identification of carbonate minerals by staining methods. Diagenesis of carbonate sediments. Study of the marine and terrestrial evaporates, their types, conditions of formation and petrographic properties. Geologic significance an economic importance of evaporates.

Prerequisites:

EPS211, EPS201

EPS 332: Palaeoecology

Classification of palaeoecological environments. Environmental factors which affect palaeoecological record. Modes of life in marine environments. Indicators of palaeoecological environments from the fossils record.

Prerequisites: EPS231, EPS232

EPS 341: Subsurface Geology

Introduction to surface and subsurface mapping. Contouring techniques. Geological cross-sections. Log correlation techniques. Integration of geological and geophysical data in subsurface mapping. Faults, structural, and isopach maps. Methodology of field study

Prerequisites:

EPS 211 EMR304

EPS 342: Petroleum Geology

Introduction to physical and chemical properties of oil and gas. Geological, geophysical, and geochemical methods of petroleum exploration (generation, accumulation, and migration of hydrocarbons). Classification of traps and reservoir studies. Timing of trap development relative to petroleum and migration. A brief review of the petroleum geology of Saudi Arabia. EMR201, ESR211

Prerequisites:

EPS 343: Drilling and Formation Evaluation

Rotary drilling and drilling bits. Drilling fluids and hydrostatic pressure in liquid and gas columns. Cements and cement testing. Casing design criteria and design considerations. Well completion design and tubing strings. Perforating oil and gas wells. Directional drilling and deviated wells. Introduction to open-hole logging and spreadsheet programs. Estimation of shale volume from Gamma Ray Logs.

Prerequisites:

EPS 399: Training in the Specialization

Students will be trained for two months during summer period; they will apply various tasks, related to petroleum geology in one of the national oil companies. Duties include most of the surface geological tasks and lab training. The subsurface geological analyses include the analysis of drilling, cutting, well long evaluation, interpretation of seismic cross sections, and the methods of reservoir development and production operations. **Prerequisites:** EPS321,341, 342

EPS 408: Seminar

The focus is on a series of talks on selected topics representing the latest orientations and studies in the fields of petroleum geology and sedimentology. Every student will be assigned a topic relevant to the current geological interest on which he will be expected to prepare and present a talk using up to date techniques. EPS-399, 343 **Prerequisites:**

EPS 411: Palaeo-Sedimentary Environments

Environment and facies recognition. Physical, chemical and biological parameters controlling the environment and the facies. Recent environments as a key to identify the ancient counterparts, including continental, transitional and marine environments.

Prerequisites:

EMR408, EPS 321

EPS 421: Clastic Sedimentary Petrology

Origin of clastic sedimentary rocks. Classification and mineralogical composition. Petrographic features and diagenetic processes for different types of clastic rocks (one day field excursion around Jeddah in working days).

EMR 304 **Prerequisites:**

EPS 441: Petroleum Development Geology

Systems of units and the basic calculations required for the petroleum geologists. Introducing some computer software relevant to petroleum development calculations. Subsurface pressures and abnormally high pressures. Rock properties including lithology, porosity, permeability and compressibility. Fluid properties and phase behavior. Mutual properties of rocks and fluids including relative permeability and capillary pressure. **Prerequisites: EPS 343**

EPS 442: Middle East Oil and Gas Fields

General review of geology, stratigraphy, and tectonics of the Middle East region. Evaluation of sedimentary basins related to the entrapment of hydrocarbons. History, formation and development of hydrocarbon accumulations in the region. Study and discussion of hydrocarbon reserves and their future prospects. Case studies of fields and related subjects. **Prerequisites:**

EMR 431, EPS441

EPS 443: Properties of Petroleum Reservoirs

Overview of reservoirs rock, fluid, and rock-fluid properties. Fluid flow through porous media and Darcy's law. Material balance calculations for oil and gas reservoirs. Basic concepts of petroleum reservoir simulation. A closer look at the simulation

process. Data gathering and input for reservoir simulators. Analysis of simulation results. Term Project. <u>Prerequisites:</u> EPS 441

EPS 444: Seismic Stratigraphy

Seismic reflection principles, application of seismic parameters and attributes to determine the depositional environment and fluid contents of the strata with emphasis on applied general principles of analysis of seismic attributes. <u>Prerequisites:</u> EPS 341, EGP371

EPS 445: Sequence Stratigraphy and Basin Analysis

Seismic geometries. Unconformities. Relative sea level. Parasequences and their stacking patterns and as a correlation tool. Relationship of stratigraphic patterns to changes in subsidence rates as driven by regional and earth scale tectonic processes. The sequence stratigraphic model. Sequence boundaries, diagenesis related to unconformities, incised valleys, slope fans, basin floor fans and prograding complexes. Incised valley fills. **Prerequisites:** EPS 211

EPS 499: B.Sc. Project

As a partial fulfillment of the B.Sc. degree in Petroleum Geology and Sedimentology, every student is asked to study one of the national oil or gas fields or to study the sedimentary succession that has a major impact on petroleum generation, migration, and accumulation. A full report must be written and findings must be presented.

Prerequisites:

EPS 408, 441

FACULTY MEMBERS

Professors

Mahmoud Ahmed Aref

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Mohamed Khalil Mohamed

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Assistant Professors

Abdul-Rahman Mohammed Alisaa

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Lecturer

Khalid A. Bagabas Microfossils 1986 King Abdul-Aziz, Saudi Arabia <u>kbagabas@kau.edu.sa</u> <u>http://kbagabas.kau.edu.sa</u>

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History:

The Department of Structural Geology was established in 1978 as one of the departments in the Faculty of Earth Sciences. It was later renamed the Department of Structural Geology and Remote Sensing.

Vision:

Commitment to deal with the geologic and environmental conditions as envisaged from aerial photographs and satellite images.

Mission:

Qualifying students in the fields of structural geology, photogeology, and Remote Sensing and GIS techniques. Applications of remote sensing and GIS techniques in different areas of earth Sciences. The utilization of Remote Sensing and GIS techniques in structural geology and in solving some environmental problems and in urban planning.

Departmental Requirements:

To earn a degree in Structural Geology & Remote Sensing, students must complete a total of 136 credit hours distributed as follows:

- 47 credit hours of departmental core courses
- 34 credit hours of compulsory ESR courses according to specialization.



Department Requirements:

Departmental Core Courses: (Credit Hours 47)

N	Course	Course	Course Title	Caral!4		HOURS		D
INO.	Code:	No.	Course fine	Credit	Theory	Lab	Prac	Prerequisite
1	ESR	211	Introduction to Structural Geology	3	2	1	0	EMR 201
2	ESR	231	Introduction to Photogeology and Geomorphology	2	2	0	0	EMR 201
3	ESR	301	Field Geology	3	0	0	3	ESR 211
4	ESR	302	Geologic Surveying	3	2	1	0	ESR 211, ESR 231
5	ESR	303	Geological Mapping	2	0	0	2	ESR 301
6	ESR	311	Analysis of Directional Data	2	1	1	0	ESR 301
7	ESR	313	Fracture Analysis	2	1	1	0	ESR 301
8	ESR	321	Analysis of Map Data	3	2	1	0	ESR 301
9	ESR	331	Introduction to Photogrammetry	2	1	1	0	ESR 231
10	ESR	332	Photogeology	2	1	1	0	ESR 301
11	ESR	399	Training in the Specialization	2	0	0	2	ESR 301 ESR 331
12	ESR	401	Selected Topic in Structure. Geology & Remote Sensing	1	1	0	0	ESR 399
13	ESR	408	Seminar	1	1	0	0	ESR 399
14	ESR	411	Advanced Structural Geology	3	2	1	0	ESR 399
15	ESR	412	Geotectonics	2	2	0	0	ESR 211
16	ESR	421	Principles in Remote Sensing	3	2	1	0	ESR 231 ESR 331
17	ESR	423	Computer Processing of Satellite Data	2	1	1	0	ESR 301 ESR 421
18	ESR	424	Remote Sensing in Environmental Geology	3	2	1	0	ESR 301
19	ESR	431	Geomorphology	2	2	0	0	ESR 301 ESR 399
20	ESR	499	B.Sc. Project	4	0	0	4	ESR 301, ESR 399
			Total	47	25	11	11	

Requirements for ESR: (Structural Geology and Remote Sensing) (Credit Hours 34)

No	Course	Course	Course Title	Cuadit]	HOURS		Duovoquiaito
190.	Code:	No.	Course Inte	Crean	Theory	Lab	Prac	rrerequisite
1	ESR	302	Geologic Surveying	3	2	1	0	ESR 211, ESR 231
2	ESR	311	Analysis of Directional Data	2	1	1	0	ESR 301
3	ESR	313	Fracture Analysis	2	1	1	0	ESR 301
4	ESR	321	Analysis of Map Data	3	2	1	0	ESR 301
5	ESR	331	Introduction to Photogrammetry	2	1	1	0	ESR 231
6	ESR	332	Photogeology	2	1	1	0	ESR 301
7	ESR	399	Training in the Specialization	2	0	0	2	ESR 301, ESR 331
8	ESR	401	Selected Topics in Structural Geolology & Remote Sensing	1	1	0	0	ESR 399
9	ESR	408	Seminar	1	1	0	0	ESR 399
10	ESR	411	Advanced Structural Geology	3	2	1	0	ESR 399
11	ESR	412	Geotectonics	2	2	0	0	ESR 211
12	ESR	421	Principles of Remote Sensing	3	2	1	0	ESR 231, ESR 331
13	ESR	423	Computer Processing of Satellite Data	2	1	1	0	ESR 301, ESR421
14	ESR	431	Geomorphology	2	2	0	0	ESR 301
15	ESR	499	B.Sc. Project	4	0	0	4	ESR 301, ESR 399
			Total	34	19	9	6	

Course Descriptions:

ESR 211: Introduction to Structural Geology

Definition and scope of structural geology. Classification and uses of primary structures. Mechanical behavior of rocks during deformation; folding, faulting and jointing. Planar and linear structures. Emplacement of igneous bodies. Introduction to deformation of lithosphere.

Prerequisites:

ESR 231: Introduction Photogeology and Geomorphology Basic concepts of aerial photographs, types and specification of aerial photographs. Basic fundamentals of landforms. Summary of the processes that shape the earth's surface. Fundamentals of photogeologic interpretation. Lithologic interpretation, structural interpretation. Basics of geologic mapping using aerial photographs. **Prerequisites: EMR 201**

ESR 301: Field Geology

Recognition and description of rocks in the field and their plotting in geologic maps. The use of compass and aerial photographs in location, measuring stratigraphic sections and geologic parameters. Preparation of geologic maps by mapping a small area and training the students on how to write a geologic report. **Prerequisites: ESR 211**

ESR 302: Geologic Surveying

An introduction to geologic surveying. Preparation of contour maps, leveling instruments and surveys. Theodolite: principles, features, adjustment and distance measurements. Traversing: Triangulation and trigonometric nets. Compass and Plane Table Surveying, tachometry and construction of topographic maps. Simple location surveys. Electronic distance measurement. **Prerequisites:** ESR211, ESR231

ESR 303: Geological Mapping

The course covers in detail the basic techniques of geologic mapping. It considers in brief the standard scales of geologic maps and the used universal and local coordinate systems. Topics include: procedures followed in the different mapping techniques, preparation of base maps, steps of field work and construction of geological cross-sections, use of recent equipments and techniques to facilitate the process of mapping. **Prerequisites:** ESR 301

ESR 301: Analysis of Directional Data

The artesian/stereographic analysis of directional data, classification and symmetry, calculation of mean vector and fold axes. Correction of measurement of elementary data. Applications of descriptive geometry in solving some of the faulting and fault intersection problems.

Prerequisites:

ESR 301

ESR 313: Fracture Analysis

Analysis and classification of fracture data. The effect of fracture on the physical and mechanical behavior of rocks. The relationships between shear planes and stress axes. The effect of external agents such as pressure and temperature on the mechanical behavior of rocks. **Prerequisites:** ESR 301

ESR 321: Analysis of Map Data

Converting maps into digital forms. The use of computer applications in documenting and processing map data and preparation of compiled maps. Uses of compiled maps for geological mapping and exploration of natural resources. Geographic Information Systems (GIS) and their applications in earth sciences. **Prerequisites: ESR 301**

ESR 331: Introduction to Photogrammetry

Mathematical, geometric and optical foundations of photogrammetry. Airborne cameras and topographic parameters. Aerial surveys planning. Ground triangulation and control points. Stereoscopic vision and stereo-observation equipment. Aerial photo-drafting equipment. Relative and absolute orientation. Analytical drafting equipment. Fundamentals of aerial triangulation

correction and mosaicking. **Prerequisites:**

ESR 231

ESR 332: Photogeology

The use of aerial photographs in deducing or inferring qualitative and quantitative information. Geometric parameters for measuring of relief, displacement and parallax measurements of slops, relief pattern and inclination of beds by parallax bar. Analysis of lineament, drainage systems, analysis and classification of soil. Construction of photogeologic maps. ESR 301

Prerequisites:

ESR 399: Training in the Specialization

Field study of geologic structures. Classification of structures. Timing of successive generations of structural elements. Structural and geometric analyzes. Drawing structural maps of some selected areas. The use of stereographic projection in structural analysis. Performing a structural study of a selected area and submission of a structural map and a report on the area. **Prerequisites:** ESR301, ESR331

ESR 401: Selected Topic in Structural Geology & Remote Sensing A research study on a topic in structural geology or Remote Sensing, which conforms to the needs and requirements of the student's field of specialization.

Prerequisites: ESR 399

ESR 408: Seminar

A series of scientific seminars on selected topics that represent modern research fields in structural geology and remote sensing. Each student will be assigned a research topic on which he will be expected to prepare and present a talk using up to date techniques. **Prerequisites: ESR 399**

ESR 411: Advanced Structural Geology

Definition of stress/strain fields, mechanical properties of rocks and the different factors affecting these properties. Analysis of brittle structures. Mohr circle. Mohr envelope. Theories of rock failure. Fault surface striations and their relationship to stress fields. Analysis of ductile structures, deformed pebbles, deformed grains, deformed fossils and their relationship to the infinitesimal strain field.

ESR 399 **Prerequisites:**

ESR 412: Geotectonics

Theory of continental drift, sea floor spreading paleomagnetism, plate tectonic theory. Orogenic and related processes. Regional depressions. **Prerequisites:** ESR 211

ESR 421: Principles of Remote Sensing

Basic concepts of Remote Sensing including electromagnetic spectrum and the energy interactions. Resolutions in satellite images, space platforms and sensors. Acquisition of satellite data. Rectification of digital satellite images, processing, analysis and interpretation of data.

Prerequisites:

ESR 423: Computer Processing of Satellite Data

Remote sensing systems characteristic and orbits. Processing of satellite images in geological applications. Pre-processing treatments comparison and rectification of digital scenes, computer classification of satellites digital data and construction of thematic maps. **Prerequisites:** ESR 301/ESR 421

ESR 424: Remote Sensing in Environmental Geology Aspects dealing with engineering geology and environment. Remote sensing view. **Prerequisites:** EEG201, ESR301

ESR 431: Geomorphology

Methods and objectives of geomorphologic studies. Discussion on various aspects of geomorphologic features and methods of control. Analysis of earth shaping processes, slope and deformation of drainage systems, types of peneplains. Eolian landforms, arid land cycle, and coastal shaping earth processes, Volcanic and glacial landforms. **Prerequisites:** ESR 301

ESR 499: B.Sc. Project

Students will perform a detailed structural study of a selected area; draw a detailed structural map in which small-scale structural elements would be studied; delineate structural patterns and represent them in 3-D diagrams and analyze them stereographically, compare and relate them to regional structural pattern. Students will also be required to explain the chronological relationships between stratigraphy and structural events,... **Prerequisites:**

ESR 301/ESR 399

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Professors

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Faculty of EARTH SCIENCE



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History:

The Hydrogeology department was established in 1970 as an independent department in the center of Applied Geology for graduate studies offering B.Sc, Higher Diploma, M.Sc, and PhD. Degrees. The center joined King Abdul-Aziz University in 1975 to become the Institute of Applied Geology and subsequently the Faculty of Earth Sciences.

Vision:

The main objective of the Department of Hydrogeology is to provide students with the latest developments in hydrogeology assisted by integration with modern technology such as remote sensing, GIS, geophysics, computer programming and statistics.

Mission:

Graduating highly qualified students and improving their skills in subjects related to the field of Hydrogeology to make more competitive in the job market. Contributing towards the development of Saudi Arabia. Becoming a notable department in research and consultations

Departmental Requirements:

To earn a degree in Hydro-Geology, students must complete a total of 136 credit hours distributed as follows:

- 48 credit hours of departmental core courses
- 39 credit hours of compulsory EPS courses according to specialization.



Department of Hydrogeology

Department Requirements:

Department Core Courses: (Credit Hours 48)

No	Course	Course	Course T:41e	Cuadit		HOURS		Duovo quicito
INO.	Code:	No.	Course Thie	Creat	Theory	Lab	Prac	Prerequisite
1	EHG	201	Data Processing and Statistical Geology	2	2	0	0	EMR 201, MATH 101
2	EHG	202	Aspects of Scientific Research	1	1	0	0	None
3	EHG	311	Applied Hydrology	3	2	1	0	MATH 101, EMR 201
4	EHG	312	Elements of Flow Through Porous Media	3	2	1	0	MATH 101, EMR 201
5	EHG	313	Groundwater Geology	3	2	1	0	ESR 211, EHG 311
6	EHG	314	Introduction to Groundwater Hydro- chemistry	3	2	1	0	CHEM 101, EMR 241
7	EHG	315	Groundwater Hydraulics	3	2	1	0	EHG 312
8	EHG	316	Introduction to Hydrogeology	3	2	1	0	MATH 101, ESR 211
9	EHG	399	Training in the Specialization	2	0	0	2	EHG 315, EGP 471
10	EHG	401	Statistical Geology	2	2	0	0	EHG 201
11	EHG	408	Seminar	1	1	0	0	Dept. Approval
12	EHG	411	Technology of Water Wells	3	3	0	0	EHG 315
13	EHG	412	Management and Planning of Groundwa- ter Resources	3	2	1	0	EHG 315
14	EHG	413	Hydrogeology of the Saudi Arabia	2	2	0	0	EHG 399
15	EHG	414	Isotope Hydrology	2	2	0	0	EHG 314
16	EHG	415	Groundwater Pollution	3	2	1	0	CHEM 101, EHG 314
17	EHG	416	Introduction to Groundwater Modeling	2	1	1	0	EHG 315
18	EHG	418	Environmental Hydrology	3	2	1	0	EEG 201
19	EHG	499	B. Sc. Project	4	0	0	4	EHG 399
			Total	48	32	10	6	

Requirements for Hydrogeology (Credit Hours 39)

No	Course	Course	Course Title	Credit		HOURS		Duouoquicito
190.	Code:	No.	Course Thie	Crean	Theory	Lab	Prac	rrerequisite
1	EHG	311	Applied Hydrology	3	2	1	0	MATH 101, EMR 201
2	EHG	312	Elements of Flow Through Porous Media	3	2	1	0	MATH 101, EMR 201
3	EHG	313	Groundwater Geology	3	2	1	0	ESR 211, EHG 311
4	EHG	314	Introduction to Groundwater Hydro- chemistry	3	2	1	0	CHEM 101, EMR 241
5	EHG	315	Groundwater Hydraulics	3	2	1	0	EHG 312
6	EHG	399	Training in the Specialization	2	0	0	2	EHG 315, EGP 471
7	EHG	401	Statistical Geology	2	2	0	0	EHG 201
8	EHG	408	Seminar	1	1	0	0	Dep. Approval
9	EHG	411	Technology of Water Wells	3	3	0	0	EHG 315
10	EHG	412	Management and Planning of Groundwa- ter Resources	3	2	1	0	EHG 315
11	EHG	413	Hydrogeology of the Saudi Arabia	2	2	0	0	EHG 399
12	EHG	414	Isotope Hydrology	2	2	0	0	EHG 314
13	EHG	415	Groundwater Pollution	3	2	1	0	EHG 314 CHEM 101
14	EHG	416	Introduction to Groundwater Modeling	2	1	1	0	EHG 315
15	EHG	499	B.Sc. Project	4	0	0	4	EHG 399
			Total	39	25	8	6	

Course Descriptions:

EHG 201: Data Processing and Statistical Geology

Definition of terms, measure of central tendency, measure of dispersion, linear regression, time series, preparation of geological data, data processing utilizing computer software.

Prerequisites: MATH101,EMR 201

EHG 202: Aspects of Scientific Research

General principles and procedure used in scientific research including defining the problem and how to solve it through the necessary studies. Analysis and interpretation of laboratory tests, report writing. More emphasis will be directed toward how to write a research proposal and a research paper.

Department of Hydrogeology

EHG 311: Applied Hydrology

Hydrologic Cycle - Precipitation - Surface Runoff – Hydrographic analysis and its components – Flood Prediction – Field trip for one day in Jeddah District. <u>Prerequisites:</u> MATH101,EMR201

EHG 312: Elements of Flow Through Porous Media

Concept of porous media, hydraulics and engineering properties, laboratory and field measurement, and methods. Darcy law and application, steam-flow. **Prerequisites:** MAT101, EMR201

EHG 313: Groundwater Geology

Groundwater occurrence in igneous, metamorphic and sedimentary rocks-Influence of the geological structure on groundwater flow- Aquifers types and their characteristics. **Prerequisites:** ESR 211,EHG 311

EHG 314: Introduction to Groundwater Hydrochemistry

Physical and chemical characteristics of water, water types, water sources, salinity, chemical composition of groundwater, general processes affecting the water quality, representing the water analysis of data graphically (manually and by using computer programs

Prerequisites:

CHEM101, EMR 241

EHG 315: Groundwater Hydraulics

Basic definition, steady and unsteady state flow. Groundwater flow towards wells. Pumping tests and evaluating their data using various techniques. Recovery tests. Well interfering. This course includes a 3-day field trip

Prerequisites:

EHG 312

EHG 316: Introduction to Hydrogeology

Hydrological cycle: parts and its engineering importance of ground water, its movement and distribution, steady and unsteady flow. Aquifer constants. Pumping Tests. Well hydraulics. Water quality.

Prerequisites:

MATH101,ESR211

EHG 399: Training in Specialization

Methods of field investigation of groundwater resources, well inventory, chemical and physical properties of groundwater. Measurements of surface water discharge. Soil infiltration, porosity and permeability. Pumping and recovery tests. Writing scientific report and drawing hydro geological maps for the studied area (field trip 21 days).

Prerequisites:

EHG 315/EGP471

EHG 401: Statistical Geology

The development of statistical methods useful in geology, including principal concepts, descriptive statistics, multiple regression, random variables, probability distributions, and estimation and testing hypotheses.

Prerequisites:

EHG 201

EHG 408: Seminar

Series of lectures on selected topics representing modern orientations and studies in the field of hydrogeology. Each student will be assigned a topic of current hydro geological interest on which he will be expected to prepare and present a talk using modern techniques.

Prerequisites:

Prerequisites:

DEP. APPROVAL

EHG 411: Technology of Water Wells

Determining the suitable well location, well design characteristics, well completion and well development, large diameter wells, well screens types and gravel packs, well efficiency and well losses, well maintenance and rehabilitation. <u>Prerequisites:</u> EHG 315

EHG 412: Management and Planning of Groundwater Resources

Groundwater planning and management, definition of management and planning, water systems, concepts and fields of water management, data needed for management and its elements, planning principles and steps applied to groundwater resources, optimization analysis, optimal management and sensitivity analysis, cost-benefit analysis, multi-objective project analysis, financial and economic analysis.

EHG 315

EHG 413: Hydrogeology of Saudi Arabia

Introduction to, hydrology of Saudi Arabia, factors controlling the natural resources types, aquifers, hydro geological classification of sedimentary aquifers and their characters, water problems, case studies. **Prerequisites:** EHG 399

EHG 414: Isotope Hydrology

Atomic Structure, radiation activity in elements and measurements, isotopes types, environmental isotopes, application of environmental isotopes in groundwater. <u>Prerequisites:</u> EHG 314

EHG 415: Groundwater Pollution

Introduction and definition of pollution, Water contamination sources (surface – subsurface). This includes types of contamination, characteristics of contamination sources, radioactive contamination, trace and heavy metals contamination, solute plume shape in different media, watching of contamination, numerical and analytical methods of solute transport, contamination remediation and control, case studies..

Prerequisites:

EHG 418: Environmental Hydrology

The water cycle and its different elements and the importance of hydrology to society and the environment in which we live, and a statistical analysis of hydrological data. Mobile mechanical sediment rivers and the calculation methods of sedimentation rate. Analysis of the curves of water, the risk of flooding and ways to avoid. This course contains the environmental concepts and its related basic fundamentals.

Prerequisites:

CHEM101, EHG314

Department of Hydrogeology

EHG 416: Introduction to Groundwater Modeling Types of models. Basic groundwater flow equations. Mathematical background. Types of groundwater models and solutions. Applications.

Prerequisites:

EHGF 315

EHG 499: B.Sc. Project

Each student is required to conduct outfield study of a certain area for a period of at least ten days supervised by the department staff. At the end of the project, students must submit a report and give a short lecture in which they explain the details of their study. The project encompasses two essential parts: field and lab work. **Prerequisites:** EHG 399

FACULTY MEMBERS

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