



# Faculty of Meteorology, Environment and Arid Land Agriculture

## Faculty Contact:

Dean's Office

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## History:

The faculty of Meteorology, Environment and Arid Land Agriculture (MEALA) was first established as a meteorological institute by the ministry of defense and aviation in 1974. In the following academic year 1975-76, the institute was annexed to King Abdul-Aziz University and upgraded and renamed.

## Vision:

Distinction and creativity in the sciences related to meteorology, environment, water resources and arid land agriculture.

## Mission:

Serving society through cultural and academic distinction and pioneering research.

## Tracks / Specializations:

The faculty has four departments.

1. The department of Arid Land Agriculture which offers two tracks: General and Renewable Natural Resources ;
2. The department of Environmental Studies which also offers two tracks: General and Environmental Health;
3. The department of Hydrology and Water Resources provides a in general hydrology;
4. The department of Meteorology provides a in general meteorology.

## Unique Features:

The Faculty represents a unique achievement for King Abdul-Aziz University since it is the only institution in the region that combines four specializations;

- I. Arid land agriculture,
- II. Meteorology,
- III. Hydrology and Water Resources Management, and
- IV. Environmental Sciences.

# Faculty of Meteorology, Environment and Arid Land Agriculture

## **Graduation Requirements:**

In order to qualify for a Bachelor of Science (B.Sc.) degree, students must successfully complete 128 credit hours, distributed as follows:

- (26) Credit hours of the university requirements
- (15) Credit hours of preparatory year requirements
- (11) Credit hours of faculty courses,
- (59) credit hours of department courses
- (12) credit hours of elective courses
- (5) credit hours of free courses

## **Faculty Requirements:** Credit Hours 11

All students enrolled in the faculty must successfully complete 11 credit hours in their first academic year (first and second levels/semesters) consisting of the following: Credit Hours 11

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Practical	
1	MET	200	Intro. to Meteorology	2	2			
2	ENS	200	Intro. to Environment	2	2			
3	AGR	200	Intro. to Agriculture	2	2			
4	HWR	200	Intro. to Hydrology	2	2			
5	BIO	281	General Biology Lab	1		3		
6	PHYS	281	General Physics Lab	1		3		
7	CHEM	281	General Chemistry Lab	1		3		
<b>Total</b>				<b>11</b>	<b>8</b>	<b>9</b>		

## **Departments and Academic Degrees:**

The Faculty comprises four departments: Meteorology, Environmental Sciences, Hydrology and Water Resources Management, and Arid Land Agriculture. All four departments lead to Bachelor of Science (B.Sc.) and Master of Science (M.Sc.) certificates. A PhD program is available at the Department of Arid Land Agriculture.

Department / Program	Academic Degree
Arid Land Agriculture/General and Natural Resources	B.Sc., M.Sc., and PhD.
Meteorology/General Meteorology	B.Sc. and M.Sc.
Environmental Sciences/General and Environmental Health	B.Sc. and M.Sc.
Hydrology and Water Resources Management /General Hydrology	B.Sc. and M.Sc.

## **Publications Journals:**

Publication Name : Journal of Meteorology, Environ, and Arid Land Agriculture.  
 Tel No. : 6952000 Ext No. 52394  
 Email : [mshaheen@kau.edu.sa](mailto:mshaheen@kau.edu.sa)  
 Website : <http://meteorology.kau.edu.sa>

## **Affiliated Centers:**

Center Name : Agriculture Research Station (Hada Al-Sham)  
 Background : The basic objective of the Agriculture Research Station (Hada Al-Sham) is to enhance scientific research in Agriculture, Environment, Hydrology, and Meteorology. It also provides enhanced training for students.  
 Contact No. : 02-5960387 Ext No: 60387  
 Email : [shindi@kau.edu.sa](mailto:shindi@kau.edu.sa)  
 Website : <http://http://meteorology.kau.edu.sa>

# Department of Arid Land Agriculture

## Department Contact:

Chairman's Office

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## History:

The department of Arid Land Agriculture was established in 1975 as one of the four departments in the Faculty of Meteorology and Environmental Studies. In 1985 the Faculty was renamed the Faculty of Meteorology, Environment and Arid Land Agriculture in order to include the new discipline of Arid Land Agriculture. The interest in cultivating arid land stems from the nature of the environment of Saudi Arabia in which water, temperature, and salinity are the most important factors affecting agricultural production.

## Vision:

Distinction and creativity, locally and regionally, in the field of arid land agriculture.

## Mission:

Preparation of specialized personnel in the field of arid land agricultural sciences for the benefit of society.

## Tracks / Specializations:

There are two main tracks;

1. General Arid Land Agriculture and
2. Renewable Natural Resources,

They both offer the following:

- Field Crops and Soil
- Horticulture
- Economic and Agricultural Extension
- Plant Protection
- Renewable Natural Resources
- Animal Production.

## Departmental Requirements:

In order to earn a B.Sc. degree in Arid Land Agriculture, students must complete 128 credit hours distributed as follows:

- 26 credit hours of university requirements,
- 14 credit hours of preparatory year courses,
- 12 credit hours of faculty requirements,
- 59 credit hours of compulsory core courses for the general track and renewable natural resources track,
- 12 credit hours of electives for both tracks and
- 5 free elective courses.



# Department of Arid Land Agriculture

## Department Core Courses: General Program (Credit Hours 59)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	AGR	200	Introduction to Agricultural Science	2	2			
2	AGR	202	Agricultural Botany	3	2	3		
3	AGR	204	Agricultural Genetics	3	2	3		
4	AGR	222	Principles of Horticulture	3	2	3		AGR 200
5	AGR	232	Economics and Agric. Extension	3	3			
6	AGR	262	Principles of Farm Animals Husbandry	3	2	3		
7	AGR	304	Agricultural plant physiology	2	1	3		AGR 202
8	AGR	306	Principles of Statistics and Experimental Design	3	3			
9	AGR	311	Principles of Soil	3	2	3		K 110
10	AGR	312	Principles of Field Crop Production	3	2	3		AGR 202
11	AGR	322	Vegetable Production	2	1	3		AGR202,AGR 222
12	AGR	324	Ornamental Plants and Landscape Gardening	2	1	3		AGR 202,AGR 222
13	AGR	341	Principles of Plant Diseases	3	2	3		AGR 202
14	AGR	343	Agricultural Insects	3	2	3		AGR 202
15	AGR	351	Renewable Natural Resources	2	2			AGR 202
16	AGR	364	Principles of Farm Animals Nutrition	3	2	3		
17	AGR	400	Job Training	2			6	AGR 306
18	AGR	407	Principles of Plant Breeding	2	2			AGR 204
19	AGR	413	Soil Fertility and Fertilization	2	1	3		AGR 311
20	AGR	416	Agric. Irrigation in Arid Land	3	2	3		AGR 311
21	AGR	425	Principles of Unconventional Agriculture	2	2			AGR 422
22	AGR	426	Fruit Production	2	1	3		AGR 202,AGR 222
23	AGR	465	Principles of Farm Animal Physiology	3	2	3		
24	AGR	480	Undergraduate research	2		6		AGR 306
<b>Total</b>				<b>61</b>	<b>41</b>	<b>54</b>	<b>6</b>	

## Renewable Natural Resources: Credit Hours 59

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	AGR	200	Introduction to Agricultural Science	2	2			
2	MET	441	Agricultural Meteorology	3	2	3		
3	AGR	202	Agricultural Botany	3	2	3		
4	AGR	222	Principles of Horticulture	3	2	3		AGR 200
5	AGR	232	Economics and Agricultural Extension	3	3	3		
6	AGR	262	Principles of Farm Animals Husbandry	3	2	3		
7	AGR	304	Agricultural Plant Physiology	2	1	3		AGR 202
8	AGR	306	Principles of Statistics and Experimental Design	3	3			
9	AGR	324	Ornamental Plants and Landscape Gardening	2	1	3		AGR 202,AGR222
10	AGR	311	Principles of Soils	3	2	3		K110
11	AGR	341	Principles of Plant Diseases	3	2	3		AGR 202
12	AGR	343	Agricultural Insects	3	2	3		AGR 202
13	AGR	351	Renewable Natural Resources	2	2			AGR 202
14	AGR	352	Principles of Forestry	2	1	3		AGR 351
15	AGR	354	Principles of Natural Ranges	2	1	3		AGR 351
16	AGR	400	Job Training	2			6	AGR 306
17	AGR	451	Range Ecology and Management	3	2	3		AGR202
18	AGR	452	Desertification and Sand-dunes fixation	3	2	3		
19	AGR	453	Forest Mensuration	2	1	3		AGR 352
20	AGR	454	Range Survey and Classification	2	1	3		AGR351
21	AGR	455	Wood Technology	2	1	3		AGR352
22	AGR	456	Forest Products Utilization	2	1	3		AGR355
23	AGR	458	Aforestation in Arid lands	2	1	3		AGR352
24	AGR	459	National Parks and Wildlife	2	2			AGR 352
25	AGR	480	Undergraduate research	2			6	AGR 306
<b>Total</b>				<b>61</b>	<b>39</b>	<b>57</b>	<b>12</b>	

# Department of Arid Land Agriculture

**Elective Courses:** Students select 12 credit hours from the following courses:

Credit Hours: 12 General Arid Land Agriculture

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	AGR	302	Agricultural Biochemistry	3	3			
2	AGR	303	Farm Machinery	3	3			
3	AGR	310	Seed Testing	3	2	3		AGR202
4	AGR	313	Dry Land Agriculture	3	2	3		AGR202
5	AGR	314	Forage Crops Production	3	2	3		AGR202
6	AGR	315	Production and Technology of Medicinal Plants	3	2	3		AGR202
7	AGR	326	Nurseries of Horticulture	3	2	3		AGR 222
8	AGR	328	Vegetable production in Greenhouse	3	3			AGR 222
9	AGR	333	Farm Management	3	3			
10	AGR	344	Honeybee Breeding	3	2	3		AGR 343
11	AGR	362	Health of Farm Animals	3	3			
12	AGR	402	Molecular Genetics	3	3			AGR 204
13	AGR	404	Crop Ecology	3	3			AGR 304
14	AGR	410	Breeding and Improvement of Cereal and Forage Crops	3	2	3		AGR 202,AGR407
15	AGR	411	Cereal Technology	3	2	3		AGR 202,AGR312
16	AGR	412	Soil Chemistry	3				AGR 311
17	AGR	414	Soil Reclamation	3	2	3		
18	AGR	421	Vegetable Production Technology	3	-			AGR 222,AGR322
19	AGR	424	Response of Horticultural Crops To Environment	3	2	3		AGR 222
20	AGR	427	Post Harvest Physiology	3	3			
21	AGR	428	Introduction to Seed Technology	3	3			
22	AGR	452	Desertification and Sand-dunes fixation	3	3			
23	AGR	462	Management of Animal Production Projects	3	2	3		
24	AGR	466	Principles of Farm Animal Breeding	3	3			
25	AGR	482	Special Topics	3	3			AGR 306
26	MET	411	Remote Sensing For Earth Planet	3	3			MET 200
27	MET	462	Agricultural Meteorology	3	2	3		MET 411,AGR200
28	ENS	306	Agricultural Pollution	3	3			ENS 200
29	HWR	333	Principles of Irrigation and Drainage	3	3			HWR200
<b>Total</b>				<b>87</b>	<b>69</b>	<b>36</b>		

**Elective Courses:** Renewable Natural Resources (Credit Hours 12) Students select 12 credit hours from the following courses:

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	HWR326		Introduction to GIS Applications	3	2	3		AGR 351
2	AGR 204		Agricultural Genetics	3	2	3		
3	AGR310		Seed Testing	3	2	3		AGR 202
4	AGR326		Nurseries of Horticulture	3	2	3		AGR 222
5	AGR353		Physiology of Trees and Wood Formation	3	2	3		
6	AGR355		Research Planning Methodology	3	3			AGR 306
7	AGR356		Trees and Shrubs of Saudi Arabia	3	2	3		AGR 351
8	AGR357		Principles of Inspection of Imported Wood in Saudi Arabia	3	3			
9	AGR358		Forest Management and Silviculture	3	2	3		AGR 351
10	AGR 450		Agroforestry	3	3			AGR 351
11	AGR 457		Range Management	3	3			AGR 354
12	AGR 482		Special Topics	3	3			AGR 306
13	MET462		Agricultural Meteorology	3	3			AGR200,MET200
<b>Total</b>				<b>39</b>	<b>32</b>	<b>21</b>		

# Department of Arid Land Agriculture

## Course Descriptions:

### **AGR 200: Introduction to Agriculture Science**

History of agriculture – importance of agriculture in human life – the different agriculture fields and horticulture (vegetables, fruits, beautifying horticulture, and landscaping medicinal and aromatic plants) – soil sciences – plant protection (economic insects, plant diseases, pest control) – agricultural extension – agricultural economics – animal production – poultry – natural resources (forests and forages).

### **AGR 202: Agricultural Botany**

This course aims at familiarizing students with the morphology of plants, modification and plant anatomy in both monocotyledons and dicotyledon plants.

### **AGR 204: Agricultural Genetics**

This course includes the interpretation of the basic rules of inheritance, through the study of the components of cell division and, Mendelian genetics, chromosome structure, linkage and crossing over, genetic code, the genetic material and how to transition between different generations and the genetic changes and their consequences. The course introduces the development of genetics and realities in a clear and accessible format to students so as to ensure accuracy and precision in the use of genetic terminology.

### **AGR 222: Principles of Horticulture**

The course aims at introducing students to horticultural science and its relation to other agricultural sciences, and acquainting them with climatic effects on horticultural crops, the different propagation methods, the agricultural practices operations i.e. pruning, irrigation, fertilization, and harvesting and handling of the Horticultural crops.

### **AGR 232: Economics and Agricultural Extension**

This course aims to introduce students to production, demand and supply. Topics include Marketing; capital investment and labor market; Economic and socio-agricultural problems in urban and industrial communities; Principles of agricultural extension, and its role in agricultural development; The relationship between agricultural extension and other agricultural sciences; Communication procedures of agricultural extension, methods of training rural leaderships and planning agricultural extension programs; Evaluation of agricultural work.

### **AGR 262: Principles of Farm Animals Husbandry**

Description of the different types of agricultural farm animals (Dairy, Beef) and their distribution throughout the world and especially in Saudi Arabia. Overview of the different types of poultry (Broilers – Layers). Detailed look at the improvement in the production of livestock in Saudi Arabia. Diurnal activities in poultry and animal farms (Nutrition-Husbandry-Reproduction.....) Systems of production in poultry and farm animals. General Assessment of poultry and farm animals.

### **AGR 302: Agricultural Biochemistry**

Nutrients and their structures and uses. Vitamins and plant pigments. Synthesis of nutrients in animal and plant. Enzymes in plant and animals

### **AGR 303: Farm Machinery**

The course introduces students to the different types of farm machineries used in agricultural operations. It teaches them how to use them safely, efficiently and their management in modern and traditional agriculture.

### **AGR 304: Agricultural Plant Physiology**

This course focuses on the importance of crop physiology and its role in improving crop yield and desirable traits in crops and their efficiency in biomass. Topics include: Accumulation, the role of photosynthesis, evaporation, transpiration, and osmosis mineral nutrition in crop growth and development, the role of environmental factors in the various physiological processes, analysis of crop growth accumulation and transportation of biomass to various plant parts.

#### Prerequisites:

AGR 202

### **AGR 306: Principles of Statistics and Experimental Design**

This course aims to teach students the main practical concepts of statistics and experimental design, in addition to the handling, processing, description of the data and inference of the results using correct experimental designs and scientific methods.

#### Prerequisites:

### **AGR 310: Seed Testing**

The course is intended to cover:

Importance of seed testing and methods of seed testing in seed propagation centre.

Methods of seeds evaluation in relation to purity, germination, storage.

Methods of seed rate determination in relation to seed price.

#### Prerequisites:

AGR 202

### **AGR 311: Soil Principles**

Study of the physical and chemical properties of soil; soil formation and classification. Topics include the essential plant nutrients and their availability in soil. Balances theoretical and practical aspects of soil fertility and includes soil testing and fertilizer products.

#### Prerequisites:

K 110 (General Chemistry)

### **AGR 312: Principles and Production of Field Crops**

The course investigates the basic principles in relation to field crop production, cultural practices related to field crop production in arid land environments, in addition to determination of appropriate crop system for the arid land condition.

#### Prerequisites:

AGR 202

### **AGR 313: Dry land Agriculture**

The course aims at studying the environment, plant covering and cropping systems in arid lands, in addition to the cultural practices of selecting suitable field crops in arid lands.

#### Prerequisites

: AGR 202

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## **AGR 314: Forage Crops Production**

This course aims at defining the importance of forage crops and their distribution in the world and in Saudi Arabia – classification of forage crops and study of their environmental requirement, and knowledge of the different cultivation practices. Study of the important forage crops that can be grown in Saudi Arabia under the available conditions (water, soil, environmental conditions) and storage of these crops.

**Prerequisites:** AGR 202

## **AGR 315: Production and Technology of Medical Crops**

This course aims to introduce students to medical and veterinary insects and their relationship to human health, animals and the reasons for their deployment and proliferation. It also aims at teaching students how to identify these insects and their hosts, the damage caused to animals and humans, and how to combat and control harmful pests.

**Prerequisites:** AGR 202

## **AGR 322: Vegetable Production**

This course focuses on the importance of vegetable crops, climatic requirement, cultural practices, harvesting, post harvest handling and the important vegetable families under dry land condition.

**Prerequisites:** AGR 202 AGR 222

## **AGR 324: Ornamental Plants and Landscape Gardening**

Provides a brief history of the coordination models and where and how they emerged. Outlines the coordination of parks and gardens and specifies what should be avoided in the coordination and processing of land for the establishment of parks. Definition of plants used to ornament gardens including annuals, long-lived trees and shrubs (climbers, creepers and palm trees, plants and other succulents). Methods of service and– maintenance of plants.

**Prerequisites:** AGR 222

## **AGR 326: Nurseries of Horticulture**

The course aims at introducing students to the basic measures that should be considered when establishing a nursery, including the greenhouses, the nursery beds either covered or uncovered, and the tools used in the nursery. How to practice sexual propagation and how to overcome the problems of germination. How to practice vegetative propagation (cutting – layering – grafting – tillering – rhizomes – plant tissues culture), and also to familiarize students with the importance of nurseries and their economic value.

**Prerequisites:** AGR 202

## **AGR 328: Vegetable Production in Greenhouse**

The economy of greenhouse production, greenhouse construction and design, greenhouse management, control environment of greenhouse, heating and cooling methods, adding fertilizer and planting vegetables, soilless and hydroponics culture.

**Prerequisites:** AGR 202

## **AGR 333: Farm Agriculture Administration**

This course focuses on the concept of farm administration, scientific approaches to methods of farm planning depending on principle applications and on economy – investment in agriculture

and how to control farm activities and methods of farm resource management in an attempt to obtain the highest possible profit.

## **AGR 341: Principles of Plant Diseases**

Identification of plant diseases through:

- The identification of the symptoms and the apparent changes in the various anatomical and infected plants.
- The identification of the causes and types of diseases and ways of isolating them from soil and plants.
- The identification of physiological changes in infected plants compared with healthy plants.
- General concepts of plant disease control methods and integrated pest management.

- Plant diseases: such as Bacterial , Fungal, Nematodes and Viral, the most prevalent in the world

**Prerequisites:** AGR 202

## **AGR 343: Agriculture Insects**

The aim of this course is to introduce students to insects and their relationship to human beings and animals, their reproduction and spread, their causes and effects and benefits. It also aims to teach students how to identify these insects and hosts and the damage they cause, and identification of methods of control.

## **AGR 344: Honeybee Breeding**

Honey bee breeding as a science, knowledge of the honeybee contained in the holy Qur'an. The role of the honeybees for pollination and their importance to modern agricultural system in increasing crop production in quantity and in quality

**Prerequisites:** AGR 343

## **AGR 351: Renewable Natural Resources**

The objective of this course is to introduce students to the overview of the basic types of renewable natural resources and concepts of interdisciplinary natural resources conservation and management. It focuses on conservation and protection of forest and range natural resources in Saudi Arabia and their role in combating desertification and sand dunes stabilization.

**Prerequisites:** AGR 202

## **AGR 352: Principles of Forestry**

The objectives of this course are to introduce students to the fundamentals and general principles of forestry science, forest establishment, management and organization. It describes the difference between forest and forestry science, relationship of forestry science to other sciences. Highlights the historical background of forests, forest distribution in the World and forest products, benefits and services

**Prerequisites:** AGR 351

## **AGR 353: Physiology of Trees and Wood Formation**

The objective of this course is to provide students with the basic knowledge of physiological processes that regulate tree growth and wood formation. The course explains tree water relations, nutrients uptake, apical and lateral growth of trees and physiological and environmental factors that regulate tree growth and wood formation.

# Department of Arid Land Agriculture

## **AGR 354: Principles of Natural Ranges**

The objectives of this course is to provide students with the fundamental concepts of range management whether natural or artificial, range areas and their status in Saudi Arabia range communities, animal wealth and the secondary uses of ranges.

**Prerequisites:** AGR 351

## **AGR 355: Research Planning Methodology**

The objective of this course is to introduce students to the basic knowledge and concepts of decision making based on right research methods and planning. The course will focus on the principles of research design, data collection and interpretation.

**Prerequisites:** AGR 306

## **AGR 356: Trees and Shrubs of Saudi Arabia**

The objective of this course is to develop a solid understanding of taxonomy of common trees and shrubs of Saudi Arabia. It describes and studies selected common economic trees and shrubs and main trees and shrubs grown in salt prone areas. It provides general principles of seed collection, pretreatment, testing and tree propagation and regeneration.

**Prerequisites:** AGR 351

## **AGR 357: Principles of Inspection of Imported Wood in Saudi Arabia**

This course aims to familiarize students with the basic concepts and knowledge of general wood characteristics, the basics of inspection, methods of evaluating wood shipments and business processes concerning lumber contracts. It also aims at studying both general features and anatomical characteristics of softwoods and hardwoods, the chemical composition and physical and mechanical properties of wood, natural wood defects and the symptoms of fungal and insect infections and their different types.

## **AGR 358: Forest Management and Silviculture**

The objective of this course is to introduce students to the fundamental knowledge and skills of silviculture and forest management. It includes aim of silviculture, forest regeneration and forest tending operations, sustainable forest management and forest stocking.

**Prerequisites:** AGR 351

## **AGR 362: Health of Farm Animals**

This course provides students with descriptions, causes of diseases within farm animals and poultry as well as their health, treatments and prevention of such diseases. Description of the symptoms of health and disease in farm animals and poultry. Description of the treatment and prevention of diseases.

## **AGR 364: Principles of Farm Animals Nutrition**

Students are introduced to the definition of nutrition and understanding the reason for studying nutrition. Classification of nutrients and methods of feedstuffs analysis (proximate analysis). Feedstuffs classification (concentrates and roughages). Methods of feeding farm animals (ruminants and poultry). Feeds evaluation procedures.

## **AGR 400: Job Training**

The objective of this course is enable students to practice applied field training in the Faculty research farm in Hada Alsham in the areas of field crops, horticultural crops and animal production.

**Prerequisites:** Department acceptance

## **AGR 402: Molecular Genetics**

Investigation of the chemical basis of heredity - composition of nucleic acid - DNA study and representation of the vital protein - genetic engineering and genetic basis of resistance and disease - the suspension of the organization of the gene.

## **AGR 404: Crop Ecology**

Study of the chemical basis of plant environments, Eco-systems, Environment components i.e. light, temperature, water, soil ,wind etc. in addition to energy and plant production.

**Prerequisites:** AGR 304

## **AGR 407: Principles of Plant Breeding**

This course aims to teach students methods of improving plant yield, yield components and quality through genetic improvement, also genetic variation sources, and methods of plant breeding, production of new varieties and use of biotechnology in breeding stress tolerance in field crops.

**Prerequisites:** AGR 204

## **AGR 410: Breeding and Improvement of Cereal and Forage crops**

This course aims to teach students methods of improving wheat, barley, corn alfalfa yield , yield components and quality through genetic improvement, also genetic variation sources, methods of plant breeding ,production of new varieties and hybrids , using biotechnology in breeding for stress tolerance cereal and forage crops.

**Prerequisites:** AGR 202 AGR 407

## **AGR 411: Cereal Technology**

The course aims at defining important cereal crops in the world and in Saudi Arabia and studying the histological and chemical structure of wheat, rice, barley and corn, and methods of grinding wheat grain and manufacturing flour, and bread industry including dough making processes and characteristics of bread and its products.

**Prerequisites:** AGR 202 AGR 312

## **AGR 412: Soil Chemistry**

This course aims to teach students the chemical and mineralogical structure of soil, characteristics of soil, and the effect of soil pH on chemical properties of soil solution and soil organic matter.

**Prerequisites:** AGR 311

## **AGR 413: Soil Fertility and Fertilization**

The objective of this course is to provide students with a comprehensive understanding of soil fertility, and nutrient management so that they can: 1) Describe the influence of chemical, biological, and physical properties of soil and other growing media on nutrient availability to plants; 2) Identify soil fertility and plant nutrition problems and recommend proper corrective action; 3) Identify soil and nutrient management practices that maximize plant productivity and profitability.

**Prerequisites:** AGR 311

## **AGR 414: Soil Reclamation**

This course aims to provide students with in-depth information on causes of soil degradation (both natural and man-made) and reclamation procedures

**Prerequisites:** AGR 311



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## **AGR 421: Vegetable Production Technology**

Provide students with basic knowledge of vegetable production, agriculture services, such as irrigation, fertilization harvest, transportation and storage.

**Prerequisites:** AGR 222 AGR 322

## **AGR 424: Response of Horticulture Crops to Environment**

Knowledge of plant behavior in response to environmental factors such as temperature, drought, light intensity, winds, humidity, salinity in water soil, deficiency of minerals.... etc

**Prerequisites:** AGR 222 AGR 322

## **AGR 425: Principles of Non-Conventional Agriculture**

History of greenhouse, modern agriculture, greenhouse definition, type of greenhouses covers. Important of greenhouse. Land covers with plastic. Plastic tunnels, introduction to tissue culture, phytotron use and technology, soilless agriculture and hydroponics. Introduction to biotechnology.

**Prerequisites:** AGR 222

## **AGR 426: Fruit Production**

The aim of this course is to familiarize students with pomology and its relation to agricultural sciences in general and horticultural sciences in particular. Topics include the importance of fruit crops – different uses with example to each fruit – classification of fruit crops and their climatic requirements and their positive and negative effects on different fruit crops – detailed study of each fruit crop. In addition, the importance of establishing fruit nurseries – study of the new procedures in agriculture – harvesting and handling horticultural crops and their storage.

**Prerequisites:** AGR 202 AGR 222

## **AGR 427: Postharvest Physiology**

The harvest. Horticulture harvest. Physiology harvest. Methods of harvest. Care before and after harvest. Changes in vegetable and fruits crop after harvest. Climacteric fruits methods of cooling. Storage, type of storage exporting vegetables and fruits. Environment concern.

## **AGR 428: Introduction to Seed Technology**

This course acquaints students with seeds, its production and conditions related to production process, seed quality, purity and freedom from weeds, seed production, vigor and cleaning, hygiene seed, and seed development.

## **AGR 450: Carbon Dynamics Sequestration in Agro forestry**

The objective of this course is to enhance knowledge and skills in basic principles and concepts of agro forestry and demonstrate the principle of competition between trees and agricultural crops. Emphasis is on the role of agro forestry in sustaining the environment and in carbon sequestration. Develops ability to estimate above and below ground biomass and carbon per unit area.

**Prerequisites:** AGR 351

## **AGR 451: Range Ecology and Management**

The study of natural range types, grazing systems, law of forests and ranges in Saudi Arabia, protection of natural ranges, vegetation cover and their types in Saudi Arabia , interactions of range components.

**Prerequisites:** AGR 202

## **AGR 452: Desertification and Sand-dune Fixation**

The course objective is to enable students to understand the basic concepts of deserts, desertification and land degradation. Topics include the context of desertification, climatic and human activities that cause desertification, monitoring and evaluation and means of combating desertification, sand dunes, sand movements, types of sand dunes, and methods of sand dunes fixation.

## **AGR453: Forest mensuration**

The objective of the course is to develop basic knowledge and skills in tree measurements and forest inventory. Topics include tree content estimation, forest sampling, and stand yield and increment prediction, methods and models of tree and log measurements and estimation of the volumes of logs, trees and stands, forest sampling, ground and aerial means of forest inventory and growth rate and increment calculation.

**Prerequisites:** AGR 352

## **AGR454: Range Survey and Classification**

Study of range inventory, range evaluation and distribution in Saudi Arabia , how to design vegetation maps, use of remote sensing in inventory classification

**Prerequisites:** AGR 351

## **AGR 455: Wood Technology**

This course aims to familiarize students with the basic concepts and knowledge of wood science, wood technology and its relationship to the growth of forest trees and their utilization. Topics include the anatomical characteristics of wood, and its physical and mechanical properties in addition to wood drying and wood preservatives.

**Prerequisites:** AGR 352

## **AGR 456: Forest Products and Utilization**

The objective of this course is to enable students to acquire knowledge, skills and values in the development and utilization of wood and non-wood forest products. It describes the main kinds of wood industries and collection, processing and values, and non-wood forest products.

**Prerequisites:** AGR 455

## **AGR 457: Range Management**

Features of range species, their distribution and their palatability. Carrying capa, grazing and animal distribution, study of poisonous plants and their control, overgrazing and its avoidance.

**Prerequisites:** AGR 354

## **AGR 458: Afforestation of Arid Zone**

The objective of this course is to develop knowledge and skills in the basic principles and methods of arid zones afforestation. Definition of arid lands, importance of arid zones afforestation and methods of species selection, seed sources and seed quality tests. Provides knowledge of the best nursery practices for seedlings production, suitable planting and cultural techniques and the best design, structure and management of shelterbelts and tree stands for arid land protection.

**Prerequisites:** AGR 352

# Department of Arid Land Agriculture

## **AGR 459: National Parks and Wildlife**

The objective of this course is to provide students with the basic knowledge and skills of the management and conservation of national parks and wildlife. It also familiarizes students with the role of national parks for wild life conservation, sustainable natural resources development and social benefits. Description of the main national parks of Saudi Arabia and their distribution and wildlife and wild birds habitats.

**Prerequisites:** AGR 352

## **AGR 462: Management of Animal Production Projects**

Provides accurate accounting of the geographical locations of dairy, beef, poultry industries in Saudi Arabia. Describes the general basis of managing (dairy cattle, beef cattle, sheep, Goats and poultry). How to prepare feasibility studies for animal production projects.

## **AGR 465: Principles of Farm Animals Physiology**

Definition of physiology and reasons for studying physiology. Description of the different physiological systems in farm ani-

mals and poultry. Description of the general uses of physiology and its benefits to animals and poultry welfare.

## **AGR 466: Principles of Farm Animals Breeding**

Definition of animal breeding and its contribution to animal science. Description of the new methods in genetic improvement and its application to animal productivity. Selection in farm animals and poultry. Biotechnology as it applies to animal breeding

## **AGR 480: Undergraduate Research**

The objective of this course is to introduce students to the importance of scientific research, how to define research problems, review literature, describe the methodology, analyze the data and write and discuss the results.

**Prerequisites:** AGR 306

## **AGR 482: Special Topics**

The objective of this course is to offer students the opportunity to study new topics not covered in the curriculum. Topics are decided by the department

## ■ ■ ■ ■ ■ FACULTY MEMBERS ■ ■ ■ ■ ■

### Professors

#### **Ahmed Ahmed Al-Deek**

Poultry  
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#### **Ahmed Ali Zaitoon**

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# Department of Environmental Science

## Department Contact:

Chairman's Office

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## History:

The department of Environmental Sciences was founded in the academic year 1980-1981 along with four other departments. They constituted the main departments of the Faculty of Meteorology and Environmental Studies. The department is considered an outstanding scientific and unique achievement for King Abdulaziz University. No similar department is available in Saudi universities or in other Arab universities. The department focuses on;

- studying environmental pollution hazards, both nationally and internationally;
- investigating ways of combating these hazards using modern scientific and technical means and;
- preserving natural resources.

## Vision:

Distinction and creativity, locally and regionally, in the field of environmental sciences.

## Mission:

Preparing and qualifying specialized and proficient graduates in the field of environmental sciences to meet the community needs and development plans

## Departmental Requirements:

To earn a degree in Environmental Science, students must complete 128 credit hours distributed as follows:

- 25 credit hours of university requirements,
- 14 credit hours of preparatory year courses,
- 12 credit hours of faculty requirements ,
- 58 credit hours of compulsory courses for the general track and
- 54 for the environmental health track,
- 13 credit hours of elective courses for the general track and
- 17 credit hours of elective courses for environmental health track and
- 5 free elective courses.



# Department of Environmental Science

## Department Core Courses: Environmental Sciences (Credit Hours 58)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	CHEM	202	General Chemistry	4	3	3		CHEM110
2	AGR	306	Principles of Statistics and Experimental Design	3	3			
3	PAD	377	Environmental Management	2	2			
4	ENS	296	Noise Pollution	4	3	3		
5	ENS	301	Environmental Chemical Analysis	3	2	3		CHEM202
6	ENS	306	Agricultural Pollution	2	2			
7	ENS	307	Environmental Microbiology	4	3	3		
8	ENS	311	Air Pollution	4	3	3		
9	ENS	314	Air Pollution Control	3	3			ENS 311
10	ENS	326	Water Pollution	3	2	3		
11	ENS	362	Solid Waste Management (1)	4	3	3		ENS 301, 307
12	ENS	370	Environmental Health	3	2	3		ENS 307
13	ENS	400	Job Training	2			6	ENS 326
14	ENS	401	Environmental Impact Assessment (1)	2	2			ENS 311, 326, 362
15	ENS	423	Water Quality and Treatment	3	2	3		ENS 326
16	ENS	424	Liquid Industrial Waste	3	3			ENS 423
17	ENS	427	Sewage Treatment	3	2	3		ENS 326
18	ENS	429	Marine Pollution	2	2			ENS 326
19	ENS	480	Undergraduate Research	2		6		ENS 326
20	ENS	484	Special Topics	2	2			ENS 326
<b>Total</b>				<b>58</b>	<b>44</b>	<b>36</b>		

## Elective Courses: Environmental Sciences ( Students select 13 credit hours from the following courses ) Credit Hours 13

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	ENS	202	Energy and Environment	2	2			
2	ENS	204	Environment and Development	2	2			
3	ENS	230	Food and Environment	2	2			
4	ENS	290	Radiation Pollution	2	2			
5	ENS	308	Environmental Disaster Management	2	2			
6	ENS	312	Industrial Air Pollution	2	2			ENS 311
7	ENS	316	Indoor Air Pollution	2	2			ENS 311
8	ENS	318	Atmospheric Chemistry	2	2			ENS 311
9	ENS	402	Environmental Impact Assessment (2)	3	3			ENS 401
10	ENS	406	Environmental Auditing	2	2			PAD 377
11	ENS	422	Underground Water Pollution	3	3			ENS 326
12	ENS	443	Aquatic Toxicology	2	2			ENS 326
13	ENS	464	Hazardous Waste management	3	3			ENS 362
14	ENS	466	Solid Waste Management (2)	3	3			ENS 362
15	MET	411	Remote Sensing for Earth	3	2	3		MET202
16	HWR	304	Introduction to GIS	3	2	3		STAT200
17	AGR	452	Desertification and Sand Dunes Fixation	3	2	3		
<b>Total</b>				<b>41</b>	<b>38</b>	<b>9</b>		

## Department Core Courses: Environmental Health (credit hours 54)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	CHEM	202	General Chemistry	4	3	3		CHEM 110
2	BIO	201	Cell Biology	3	2	3		BIO 201
3	AGR	306	Principles of Statistics and Experimental Design	3	3			
4	ENS	270	Environmental Biochemistry	4	3	3		
5	ENS	301	Environmental Chemical Analysis	3	2	3		CHEM 202
6	ENS	307	Environmental Microbiology	4	3	3		
7	ENS	311	Air Pollution	4	3	3		CHEM 202
8	ENS	326	Water Pollution	3	2	3		CHEM 202
9	ENS	334	Food Sanitation	3	3			ENS 307
10	ENS	340	Introduction to Environmental Toxicology	3	2	3		BIO 201 ENS 270

# Department of Environmental Science

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
11	ENS	350	Occupational Environment	4	3	3		ENS 311
12	ENS	371	Environmental Epidemiology	3	3			
13	ENS	400	Job Training	2			6	ENS 326
14	ENS	431	Food Quality Control	4	3	3		ENS 307, 334
15	ENS	451	Occupational Safety	3	3			ENS 350
16	ENS	480	Undergraduate Research	2		6		ENS 326
17	ENS	484	Special Topics	2	2			ENS 326
<b>Total</b>				<b>50</b>	<b>40</b>	<b>36</b>	<b>6</b>	

**Elective Courses: Environmental Science (Student select 17 credit hours from the following courses)**

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	ENS	296	Noise Pollution	4	3	3		None
2	ENS	312	Industrial Air Pollution	2	2			ENS 311
3	ENS	316	Indoor Air Pollution	2	2			ENS 311
4	ENS	332	Food Additives	2	2			None
5	ENS	344	Food Poisons	2	2			ENS 307
6	ENS	346	Food from Waste	2	2			ENS 307
7	ENS	352	Occupational Psychology	2	2			None
8	ENS	374	Health Education	2	2			None
9	ENS	430	Food Microbiology	3	2	3		ENS 307
10	ENS	432	Food Service and Catering	2	1	3		ENS 334
11	ENS	433	Food Preservation	3	2	3		ENS 307
12	ENS	434	Food Inspection	2	2			None
13	ENS	437	Food Safety	3	3			ENS 334
14	ENS	438	Food Specifications	2	2			ENS 431
15	ENS	439	Food Chemistry and Analysis	3	2	3		ENS 301
16	ENS	441	Occupational Toxicology	3	2	3		ENS 340
17	ENS	453	Occupational Diseases	2	2			ENS 350
18	ENS	455	Occupational Environment Control	2	2			ENS 350
19	ENS	456	Occupational Biological Monitoring	3	2	3		ENS 441
20	ENS	457	Occupational Laws	2	2			ENS 350
21	ENS	472	Environmental Health in Disasters	2	2			None
22	ENS	477	Vector Control	2	1	3		None
23	MET	411	Remote Sensing for Earth	3	2	3		None
<b>Total</b>				<b>52</b>	<b>46</b>	<b>27</b>		

## Course Descriptions:

### **ENS 200: Introduction to Environmental Sciences**

The course introduces students to principles of environmental sciences - Man and environment- Environmental components cycles - Atmosphere - Pollution concept- Types of pollution: Air pollution, water pollution, soil pollution, food pollution, noise pollution and irradiation pollution- Pollution control.

### **ENS 202: Energy and Environment**

This course is about global patterns in energy production and consumption- Fundamentals of electricity generation- Fossil fuel current reserves- The main pollutants from fossil fuels and the current technology to reduce their emissions from power plants and cars- Nuclear power plants and their environmental effects- Energy flow of the Earth- Alternative sources of energy- The operating principle, current technology and environmental impact of alternative energy sources.

### **ENS 204: Environment and Development**

This course focuses on the concept of development- The main elements in development- Economic growth and development- Population growth and poverty concerning environmental deterioration- Balance between environment and development- Islamic nation, environment and development- Developmental fields and environment- Role of community in environmental protection- Economic and legal obstacles in overcoming the environmental impacts of developmental projects- International agreements.

### **ENS 230: Food and Environment**

This course teaches nutritional requirements- World food problems Food production and food security- Reduction of the waste of food.

### **ENS 270: Environmental Biochemistry**

This course is a study of biomolecules (carbohydrates, fats, proteins) Principles of enzymology (enzymatic activity, enzyme inhibition, enzymes classification) Use of enzymes in, biological vector control, biodegradation of environmental pollutants, detoxification of environmental organic substances.

# Department of Environmental Science

## **ENS 290: Radiation Pollution**

This course focuses on pollution of the environment by particle and electromagnetic radiation from natural and man-made sources. Types of radiation: Radioactivity, half-life, decay chains, radioactive equilibrium- Alfa particles, Beta particles, Gamma rays- Exposure pathways- Biological, ecological, and socio-economic effects- Risk estimation- Radiation protection.

## **ENS 296: Noise Pollution**

A study of noise pollution. Topics include: Wave equation for airborne sounds- Characteristics and analysis of sound waves- Measurement of sound and sound level meter- Frequency analysis of noise- Noise dose- Statistical noise analysis- Speech, hearing and audiometric tests- Effects of noise on people- Outdoor community noise-Transportation noise-Industrial noise- Basic principles of noise control- Acoustical treatment- Hearing protection.

## **ENS 301: Environmental Chemical Analysis**

This is an introduction to environmental analysis. Topics include: Precision and accuracy- Theories of environmental analysis methods including chemical analysis (volumetric and gravimetric analysis) and instrumental analysis: colorimetric analysis, atomic absorption, mass spectrophotometry, chromatography, etc- Practical part aiming at training students on analyzing of environmental pollutants by various instruments.

### **Prerequisites:**

CHEM 202

## **ENS 306: Agricultural Pollution**

An investigation of agricultural systems and the ecosystem- Modern agriculture- The impact of processes and different agricultural practices (irrigation, tillage, agricultural drainage, fertilization, pest resistance) on the environment elements- Methods of treatment of plant and animal agricultural wastes-Protection of groundwater from contamination, as well as different ways to prevent contaminations of food chain- Organic and green house farming.

## **ENS 307: Environmental Microbiology**

This course is about location of microorganisms groups in environmental systems and their impact- Enumeration of microorganisms and fundamentals of microorganism's taxonomy- Nutrition, growth, destruction of microorganisms and factors affecting these topics- Recognition of microbial groups and their relationship with environmental elements- Relationship of microorganisms with environmental elements and environmental wastes and their role in recycling and utilization of these wastes.

## **ENS 308: Environmental Disasters**

A study of environmental disasters: definition and types- Effects of disasters and public responses that increase impacts- Primary activities to manage environmental disasters- Activities before and after disasters- Main elements of disaster management- Special considerations of chemical and radiological disasters- Psychological elements.

## **ENS 311: Air Pollution**

Introduction to air pollution- Classifications of air pollutants- Natural and man-made air pollution sources- Emissions estimation- Physical and chemical factors- Meteorology and air pollution- Environmental effects- Global air pollution effects- Regulations and standards

## **ENS 312: Industrial Air Pollution**

Classification of industries according to air pollutants- Management of industrial emissions- Pollution control techniques for particulate and gaseous emissions- Case Studies: Sources, characteristics, and control methods of air pollution for different industries.

### **Prerequisites:**

ENS 311

## **ENS 314: Air Pollution Control**

A study of the basic concepts of air pollution control. Topics include: Systems control- Control instruments: Selection and evaluation- Source control by gravity, centrifugal force and filtration- Electrostatic precipitation, abrasion and removal of fog- Adsorption and incineration.

### **Prerequisites:**

ENS 311

## **ENS 316: Indoor Air Pollution**

This course is an introduction to indoor air pollution (The silent killer)- Indoor air quality and its relation to health- Standard criteria for indoor air quality- Systems of heating, ventilation and air conditioning- Basic instruments for indoor air quality- Microbiological pollution and indoor air quality- Hazards of radon and asbestos exposure.

### **Prerequisites:**

ENS 311

## **ENS 318: Atmospheric Chemistry**

Investigation of the structure and composition of the atmosphere- Topics include: Chemical processes and models- Photochemistry of the stratosphere and troposphere- Perturbations in the chemical composition of the atmosphere- Stratospheric ozone and its depletion- The ionosphere- Aerosol chemistry- Photochemical smog- Global climate change.

### **Prerequisites:**

ENS 311

## **ENS 326: Water Pollution**

A study of the water cycle in nature- Water sources, characteristics, and uses- Sources and definition of water pollution, pollutants types, the fate of these pollutants in ecosystem- Biological decomposition of pollutants, specially organic pollutants- Non-biodegradable aquatic pollutants and hazards of the aquatic pollutants on man and environment - Practical component consists of safety in laboratories, methods of pollutants analysis and physical and chemical standards.

## **ENS 332: Food Additives**

A study of food additives definitions and purpose of use- Acceptable limits of food additives- Food additive safety approval- Hazards of food additive abuse- Flavors, sweeteners and coloring additives- Texture improvers- Acidity or alkalinity control agents- Preservatives and antioxidants.

## **ENS 334: Food Sanitation**

A study of the basic principles of food hygiene practices and applications- Topics include: Biological, chemical and physical contaminants in food preparation places and their impacts on consumer health- Safe components used in food production- Applications of hygienic practices in production of dairy products, meat and meat products, fish and fish products and restaurants- Applications of hygienic practices in disposal of solid waste and remaining foods.

### **Prerequisites:**

ENS 307

# Department of Environmental Science

## **ENS 340: Introduction to Environmental Toxicology**

A study of absorption, distribution and excretion of toxic substances. Topics include: Biotransformation-Some toxic effects of environmental exposures on different body systems (hematopoietic, respiratory, liver, kidneys, nervous system) The practical component of this course consists of how to deal with laboratory animals, their exposure to toxic substances, dose calculation, dose-response and dose effect curves, rat dissection, measurement of toxic substances in internal organs.

**Prerequisites:** BIO 201 ENS 270

## **ENS 344: Food Poisons**

This course investigates types of mycotoxins - Factors affecting mycotoxin productions - Health and economic impacts of mycotoxins- Microbial toxins ( types- factors affecting productions - health and economic impacts) - Chemical toxins (types factors affecting productions health and economic impacts) - Pesticides and veterinary drugs - Trace metals ( Pb, As, Hg, Cd)- Dioxins - Chemicals produced during cooking- Toxins of plant origin- Other toxins.

**Prerequisites:** ENS 307

## **ENS 346: Food from Waste**

A study of means of waste utilization to increase international animal feed and human food- Examples of single cell protein production from vegetal and industrial wastes- Conversion of fungi and algae into human food and animal fodder- Methods of protein production from the wastes of slaughters, fish and milk products factories- Influence of social, regional and economical perspective on users of food produced from wastes- Studying of safety, protection methods and nutritional value of food manufactured from wastes.

**Prerequisites:** ENS 307

## **ENS 350: Occupational Environment**

A study of the characteristics of occupational environment- Topics include: Chemical hazards (gases and vapors) and methods of assessment- Physical hazards (heat, noise, radiation) and methods of assessment- Biological hazards (bacteria, viruses, parasites) and methods of assessment- The practical component of this course consists of case-studies of some industries in Saudi Arabia and training in walking - through survey.

**Prerequisites:** ENS 311

## **ENS 352: Occupational Psychology**

Study of the principles of occupational psychology and its relation to behavior- Topics include: Different occupational stresses (psychological, chemical, physical) - Personal interrelationships in the occupational environment (between colleagues, between different members of the hierarchy) - Effect of psychological stressors on workers performance and health- Assessment of workers psychological status.

## **ENS 362: Solid Waste Management**

This course is an overview of regulations related to solid waste management- Analysis of physical, chemical, and biological characteristics of solid waste- Solid waste collection and transportation- Physical, chemical, and biological treatment methods- Disposal method of solid waste by sanitary landfill- Recycling of salvable items and energy recovery.

**Prerequisites:** ENS 301, 307

## **ENS 370: Environmental Health**

A study of chemical, physical and biological pollution of the different components of the environment (air-water-food ... etc.)- Negative impacts of pollution on human health- Damage caused by the different exposures- Prevention and control measures.

**Prerequisites:** ENS 307

## **ENS 371: Environmental Epidemiology**

Definition of epidemiology and its fields-Types of environmental epidemiological studies: experimental, non-experimental, descriptive, analytical, and longitudinal.- Different confounding factors in environmental epidemiological studies - Analysis of the results of environmental epidemiological studies- Interpreting results and clarifying causal relationship between exposure and damage- Case studies.

## **ENS 374: Health Education**

Definitions and terminology- Objectives and principles of health education- Areas or fields of health education- Methods of health education- Management and planning of health education programs- Evaluation of health education programs.

## **ENS 400: Job Training**

Students spend two months training usually during the summer vacation in a formal environment.

**Prerequisites:** ENS 326

## **ENS 401: Environmental Impact Assessment (I)**

This course looks at the principles of environmental impact assessment (EIA) and objectives- Methods of project classification according to probable impacts- EIA methodology with each type- EIA steps- Requirements for EIA- Importance of EIA studies in developing countries and as an integrating element in project establishment- Relations between EIA steps- Problems of EIA studies and their solutions- Involving cost benefit analysis - Steps followed EIA studies implementation.

**Prerequisites:** ENS 311,326,362

## **ENS 402: Environmental Impact Assessment (II)**

This course is a general review of inventories of classified projects- Review of EIA steps- Regulations related to EIA studies- Application of EIA studies on a number of projects, i.e. infrastructure projects as highways, large irrigation projects as building dams, sanitary sewage utilities building, ...etc in addition to a number of varied industries.

**Prerequisites:** ENS 401

## **ENS 406: Environmental Auditing**

A study of environmental auditing (EA) concepts, objectives, and basic types of EA – Topics include: Importance of EA in establishing a program of environmental management- Preparation of plan for auditing, evaluation steps within establishments, preparation and introducing the auditing report and action plan- The stage following auditing and corrective actions- Different alternatives of managing losses- Case studies of EA - Regulations related to EA.

**Prerequisites:** PAD 377

# Department of Environmental Science

## **ENS 422: Ground Water Pollution**

This course is about porosity and permeability- Effective geological formations- Saturation and unsaturation-Confined and unconfined water storage- Water gradient- Direction and flow of ground water- Effect of drawing by pumps- Natural groundwater composition- Wells construction, drilling, and disinfection- Groundwater pollution sources by septic tanks, sanitary landfill, oxidation ponds, underground tanks, fertilizers, pesticides, and mines- Groundwater in the Kingdom.

**Prerequisites:** ENS 326

## **ENS 423: Water Quality and Treatment**

A study of water quality concept and water pollution standards- Topics include: Water pollution treatment methods including removing dissolved gases, iron and manganese, hardness and dissolved solids, turbidity and chemical precipitation, filtration as well as odor, taste and color removal- Disinfection- Practical component includes precipitation, coagulation and filtration methods- Coagulant dose determination- Dissolved gases and hardness removal methods- Disinfection methods.

**Prerequisites:** ENS 326

## **ENS 424: Industrial Liquid Waste**

This course is an investigation of industrial liquid waste management within industry- Topics include: Evaluation of industrial liquid waste standards- Industrial liquid waste treatment methods- Feasibility of industrial liquid waste for biological treatment- Case studies of sources, characteristics, and control methods of industrial liquid wastes for different industries.

**Prerequisites:** ENS 423

## **ENS 427: Waste Water Treatment**

This course is an introduction to wastewater, sources, characteristics, and effects- Topics include: Natural decomposition cycles of wastewater- Wastewater treatment processes: Preliminary, primary, biological, advanced- Disposal methods of treated waste and sludge- Regulations controlling the disposal methods of wastewater treatment products- Practical component includes analysis of parameters to identify the pollution level of wastewater and evaluate the efficiency of treatment.

**Prerequisites:** ENS 326

## **ENS 429: Marine Pollution**

A study of the marine ecosystem- Topics include: Classification of pollutants- The hazards of pollutants and how to avoid- Behavior of aquatic life and pollutants in the ecosystem- Evaluation of the environmental impacts of some projects- The current situations of some marine ecosystems.

**Prerequisites:** ENS 326

## **ENS 430: Food Microbiology**

This course looks at the role of microorganisms in food spoilage- Topics include: Microbial food poisonings by different foodstuffs- Factors affecting microbial growth and survival in different foodstuffs and the controlling methods - Critical control points of microbial growth in foodstuffs- Microbial fermentations and use of microorganisms in food preservation- Practical skills concerning identification of microorganisms in

foodstuffs and controlling methods.

**Prerequisites:** ENS 307

## **ENS 431: Food Quality Control**

A study of quality control and standard specifications of food-quality, quality control and quality assurance- Quality characteristics- Sensory evaluation- Advanced techniques used in food quality control (chromatography techniques, atomic absorption, chemical and microbiological analysis)- Legislations, regulations and relevant bodies to food quality- Different techniques for keeping quality- The role of HACCP system in keeping food quality.

**Prerequisites:** ENS 307, 334

## **ENS 432: Food Service and Catering**

This course investigates the scope and importance of catering and food services- Preparation of foods for airplane travelers, students and other different groupings- Quality and safety of food served in different restaurants- Importance of packaging techniques in catering and food services- Hygienic requirements and specifications of the production places and workers in different food services- Student field visits to some of the food catering and food services companies.

**Prerequisites:** ENS 334

## **ENS 433: Food Preservation**

This course looks at the historical outlook of food preservation by cooling, drying, smoking and salting. Students learn about food preservation by fermentation- Chemical, physical, and microbiological principles of food preservation- Roles of enzymes and microorganisms in food spoilage- Scientific visits to the food processing plants- Laboratory training on preservation of some food products.

**Prerequisites:** ENS 307

## **ENS 434: Food Inspection**

This course focuses on responsibility and organization of food control system (Municipalities, Ministry of Health, Ministry of Commerce and Industry)- Responsibility of food inspector- Samples collection- Concepts of expiration date- Requirements of food handling and food processing places- General methods of inspections of food handling places (airports, harbors, food production plants, restaurants, markets, school canteens, hospitals, and clubs)- Procedures of food dispatch.

## **ENS 437: Food Safety**

This course provides an overview of the concept of food safety for human consumption- Topics include: Food spoilage- Microbial contamination of food- Trace metals contamination of food- Residues of antibiotics and other food additives- Control of food borne diseases and food poisoning- Food borne diseases (botulism, salmonellosis, mycotoxicosis, diseases caused by parasites)- Control of food borne disease by application of Hazard Analysis and Critical Control Points System (HACCP).

**Prerequisites:** ENS 334

## **ENS 438: Food Specifications**

Students are exposed to the measurements (definitions, objectives, importance, levels, measurements and quality assurance. Standards (definitions, type's items and importance of standards) - Food standards -International code of specification ICS (objectives and use)- National



# Department of Environmental Science

and international agencies responsible for issuing standards- Samples of some food standards- Legislations and regulations of food handling and food safety.

**Prerequisites:** ENS 431

## ENS 439: Food Chemistry and Analysis

An investigation of the basic constituents of foods- Sampling and sample preparation- Principles of techniques used in food analysis- Instrumental modern methods of food analysis including spectroscopic methods (Atomic absorption- Atomic emission) and chromatography methods (Gas chromatography (GC)- High Performance Liquid Chromatography (HPLC)- Gas Chromatography Mass Spectroscopy (GC-MS)- Electrophoresis- Immunochemical methods)- Quality assurance in food analysis laboratories.

**Prerequisites:** ENS 301

## ENS 441: Occupational Toxicology

A study of toxic exposures in oil industries and their effect- Toxic exposures in the agricultural environment and their effects- Toxic exposures in chemical industries and their effect- Exposure to heavy metals and their effect- The practical component consists of exposing experimental animals to some occupational toxic substances and measuring their effect on biological functions.

**Prerequisites:** ENS 340

## ENS 443: Aquatic Toxicology

A study of chemical reactions of pollutants in the lentic ecosystems- Chemical reactions of the pollutants in the lotic ecosystems- Interactions between sediments, pelagic and benthic organisms.

**Prerequisites:** ENS 326

## ENS 451: Occupational Safety

This course aims to provide a definition of safety- Activities for accidents and injury prevention- Methods for occupational safety- Machines and tools- Inspection of work location- Study of occupational accidents and diseases.

**Prerequisites:** ENS 350

## ENS 453: Occupational Diseases

An investigation of principles of early detection of occupational diseases- Topics include: Inputs of early detection of main occupational diseases- Pneumoconiosis - Occupational asthma- Diseases resulting from exposure to toxic compounds- Diseases from asphyxiants- Hearing impairment resulting from noise- Diseases of vibration- Compression and decompression diseases- Ionizing radiation diseases- Occupational dermatosis- Primary epitheliomatous cancer- Infectious and parasitic diseases.

**Prerequisites:** ENS 350

## ENS 455: Occupational Environment Control

A study of the types of occupational hazards- Threshold limit values- Types of control from the source to the worker- Ventilation systems- Personal protective equipments.

**Prerequisites:** ENS 350

## ENS 456: Occupational Biomonitoring

A study of the essentials of biological monitoring- Topics include: Biological monitoring of different occupational exposures (metals, or-

ganic solvents, carcinogens and mutagens)- Biological threshold limit values- The practical part deals with some techniques of biological monitoring in some biological fluids especially blood, urine and saliva.

**Prerequisites:** ENS 441

## ENS 457: Occupational Laws

This course is a study of international work systems- Comparison of occupational legislation- Disabilities insurance.

**Prerequisites:** ENS 350

## ENS 464: Hazardous Waste Management

A study of regulations related to hazardous waste management- Topics include: Methods of identifying hazardous waste- Analysis of physical, chemical, and biological characteristics of hazardous waste- Hazardous waste collection and transportation- Physical, chemical, and biological treatment methods- Disposal method of hazardous waste- Recycling and energy recovery.

**Prerequisites:** ENS 362

## ENS 466: Solid Waste Management (II)

This course provides an overview of municipal solid waste characteristics- Composting and anaerobic digestion- Incineration- Selection methods of sanitary landfill sites- Establishing sanitary landfill- Using material balance in municipal solid waste management.

**Prerequisites:** ENS 462

## ENS 472: Environmental Health in Disasters

This course is a study of environmental disasters- Topics include: Natural disasters- Disasters caused by human activities (sinking oil tankers and pollution of streams, water bodies) - Dealing with anticipated problems during and immediately after the disaster- Securing water, food, and shelter during disasters- Control of the spread of diseases and epidemics during disasters- Decision making during and after the disaster in order to maintain a healthy environment.

## ENS 477: Vector Control

This course includes definitions and terminology of insects related to public health- Topics include: Classification of vectors- Effectiveness of vectors- Routes of disease transmission- General methods of pest control- Definition and classification of pesticides- Tools and equipment of pesticides' usage- Pesticide concentration calculation or use rate- Control of vectors related to public health (cockroaches - mites - rodents - molluscs).

## ENS 480: Undergraduate Research

This course focuses on the importance of scientific research in the area of environment- Topics include: Definition of various environmental problems- Steps of scientific research and carrying out experiments (determining the theoretical hypothesis- collecting literature- preparation and processing of materials and methods of research- design and conduct statistical research, measurement, analysis, and interpretation of results) - Writing research in its finalized form.

**Prerequisites:** ENS 326

## ENS 484: Special Topics

Course content vary according to topic under study

**Prerequisites:** ENS 326

# Department of Environmental Science

## ■ ■ ■ ■ ■ FACULTY MEMBERS ■ ■ ■ ■ ■

### Professors

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Industrial Pollution  
1972, Istanbul University, Turkey  
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# Department of Hydrology and Water Resources Management

## Department Contact:

Chairman's Office

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## History:

The Department of Hydrology and Water Resources Management was established in 1977. The department teaches surface water hydrology and groundwater hydrology, management of water resources, irrigation and drainage, urban hydrology and statistical hydrology.

## Vision:

Distinction and creativity, locally and regionally, in the field of hydrology and water resources management.

## Mission:

To prepare specialized and qualified graduates and to contribute in community services via demonstrating distinct scientific research, applied and prospective studies, and through training programs in the department's scientific fields in Arid Zones.

## Tracks / Specializations:

General Hydrology

## Admission Requirements:

Admission to the department requires students to pass 12 credit hours of faculty core courses.

## Departmental Requirements:

To earn a B.Sc degree in Hydrology, students must complete 128 credit hours distributed as follows:

- 26 credit hours of university requirements,
- 14 credit hours of preparatory year courses,
- 12 credit hours of faculty requirements ,
- 59 credit hours of compulsory departmental courses,
- 12 elective courses and
- 5 free elective courses.

# Department of Hydrology and Water Resources Management

## Department Core Courses Hydrology and water resources management (Credit Hours 59)

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	HWR	222	Prin. of Surface Water Hydrology	3	3			MATH 110, PHYS 110
2	HWR	232	Soil-Water Relationship	3	2		2	MATH 110, PHYS 110
3	HWR	282	Special Topics (1)	1	1			
4	HWR	301	Fluid Mechanics	3	2		2	MATH 110, PHYS 110
5	HWR	302	Hydrology & Water Resources in The Kingdom	2	1	2		HWR 222, HWR 311
6	HWR	311	Prin. of Groundwater Hydrology	3	3			MATH 110, PHYS 110
7	HWR	322	Open Channel Flow	3	2		2	HWR 301
8	HWR	323	Watershed Hydrology	3	2		2	HWR 222
9	HWR	333	Prin. of Irrigation & Drainage	3	2		2	HWR 232
10	HWR	342	Urban Hydrology	3	3			HWR 301
11	HWR	352	Statistical Hydrology	3	2	2		STAT 110, HWR 222
12	HWR	383	Special Topics (2)	1	1			
13	HWR	400	Job Training	2		6		HWR 302
14	HWR	401	Numerical Methods in Hydrology	3	2	2		HWR 222, HWR 311
15	HWR	402	Integrated Water Resources Management	3	3			HWR 222, HWR 311
16	HWR	412	Applied Groundwater Hydrology	2	2			HWR 311
17	HWR	421	Application of GIS in Hydrology	3	2	2		CPIT 100, HWR 222
18	HWR	422	Hydraulic Structures	2	2			HWR 322
19	HWR	434	Design of Irrigation and Drainage Systems	3	2	2		HWR 301
20	HWR	443	Design of Urban Water Networks	2	1		2	HWR 342
21	HWR	480	Undergraduate Research	2			6	HWR 302
22	MATH	202	Calculus II	3	3			MATH 110
23	ENS	326	Water Pollution	3	2		2	ENS 200
<b>Total</b>				<b>59</b>	<b>43</b>	<b>16</b>	<b>20</b>	

## Elective Course: Students select 12 credit hours from the following courses: Credit hours 12

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	HWR	442	Urban Drainage Network	3	2	2		HWR 342
2	HWR	451	Hydrological Spatial Statistics	3	2	2		HWR 352
3	MET	214	Meteorological Instruments	3				MET 200
4	MET	411	Remote Sensing for Planet Earth	3				MET 200
5	AGR	202	Agricultural Botany	3	2	3		
6	AGR	306	Principles of Statistics and Experimental Design	3	3			
7	AGR	311	Soil Principles	3	2	1		CHEM 110
8	AGR	312	Principles of Field Crop Production	3	2	1		AGR 202
9	AGR	313	Dry Land Agriculture	3	2	3		AGR 202
10	AGR	412	Soil Chemistry	3	2	3		AGR 311
11	ENS	422	Groundwater Pollution	3	3			ENS 326
12	ENS	423	Water Quality and Treatment	3	2	3		ENS 326
13	ENS	427	Waste Water Treatment	3	2	3		ENS 326
14	EMR	101	General Geology	4				
15	EHG	414	Intro. To Watershed Modeling	2	2			
16	CS	102	Intro. To Structured Prig.	4				CPIT 100
17	MATH	203	Calculus III	4				MATH 202
18	GEOG	231	Prin. Of Cartography	3	2	2		
19	GEOG	233	Prin. Of Surveying and Field Work	3	2	2		
20	GEOG	471	Reading and Analysis of Maps	3	2	2		
<b>Total</b>				<b>62</b>	<b>32</b>	<b>27</b>		

# Department of Hydrology and Water Resources Management

## Course Descriptions:

### **HWR 200: Introduction to Hydrology**

Importance of water; properties of water; distribution of water in the earth; hydrologic cycle; introduction to surface water; introduction to groundwater; introduction to water resources planning and management; introduction to irrigation and drainage.

### **HWR 222: Principle of Surface Water Hydrology**

Hydrologic cycle; precipitation, interception, infiltration; evaporation, Surface runoff, Rainfall-runoff relations; hydrograph analysis.

**Prerequisites:** MATH110-PHYS110

### **HWR 232: Soil-water Relationship**

Definition of soil; physical properties of soil; water movement in soil; moisture retention; hydraulic conductivity of soil.

**Prerequisites:** MATH110-PHYS110

### **HWR 282: Special Topics (1)**

Topics to be chosen by the department.

### **HWR 301: Fluid Mechanics**

Fluid properties, hydrostatics; fluid flow concepts and basic equations; viscous effects and fluid resistance; steady flow in closed conduits; dimensional analysis.

**Prerequisites:** MATH110-PHYS110

### **HWR 302: Hydrology & Water Resources in the Kingdom**

Watershed, rainfalls, dams, aquifers, desalination, water uses, water conservation.

**Prerequisites:** HWR222 - HWR311

### **HWR 304: Introduction to GIS applications**

GIS techniques, GIS software, GIS applications in meteorology, environment and natural resources, spatial data, analysis, producing maps, DEMs, digitizer, scanner, GPS.

**Prerequisites:** CPIT 100

### **HWR 311: Principles of Groundwater Hydrology**

Groundwater occurrence; distribution and movement; steady and unsteady saturated flow; well hydraulics and recharge to aquifers.

**Prerequisites:** MATH110-PHYS110

### **HWR 322: Open Channel Flow**

Fundamentals of free-surface flow; steady uniform and non-uniform flows in open channels; control sections; non-uniform flow and flood routing.

**Prerequisites:** HWR 301

### **HWR 323: Watershed Hydrology**

Determination of watershed parameters; topographic characteristics; mapping techniques; introduction to geomorphology.

**Prerequisites:** HWR 222

### **HWR 333: Principles of Irrigation and Drainage**

Definition of irrigation and drainage processes; Soil-Water relationship, crop water requirements in Saudi Arabia; Irrigation scheduling of different crops; Irrigation systems; drainage systems; Irrigation and drainage networks and works.

**Prerequisites:** HWR 232

### **HWR 342: Urban Hydrology**

Development of Urban water supplies; urban water requirements; stormwater and wastewater volumes; transportation, storage and distribution of water; collection and disposal of storm and wastewaters.

**Prerequisites:** HWR 301

### **HWR 352: Statistical Hydrology**

Probabilistic nature of hydrologic phenomena; probability density functions in hydrology; frequency analysis, estimation, regression and Correlation of hydrologic variables; Introduction to stochastic hydrology.

**Prerequisites:** STAT 110-HWR 222

### **HWR 383: Special Topics (2)**

Topics to be chosen by the department.

### **HWR 400: Job Training**

Students undergo training in public or private firms specialized in their major study area.

**Prerequisites:** HWR 302

### **HWR 401: Numerical Methods in Hydrology**

Differential equations and finite difference techniques; numerical integration, algebraic and numerical computation in Hydrology.

**Prerequisites:** HWR 222-HWR 311

### **HWR 402: Integrated Water Resources Management**

The problem of water and the need for integrated management, concepts, definitions, principles in integrated management, government and community participation, planning and management, Practical examples.

**Prerequisites:** HWR 222-HWR 311

### **HWR 412: Applied Groundwater Hydrology**

Review of chemistry basics, units of concentration, introduction to groundwater chemistry, means of groundwater pollution, types of pollutants, transport in groundwater, well hydraulics Fundamentals of groundwater modeling.

**Prerequisites:** HWR 311

### **HWR 421: Applications of GIS in Hydrology**

Spatial data and digital maps; Geographic information systems(GIS), Direct applications of GIS, Digital Elevation Model (DEM), and Extraction of basins properties; Introduction of GIS and Hydrology Models of surface and ground water.

**Prerequisites:** CPIT 100-HWR 222

### **HWR 422: Hydraulic Structures**

Hydraulic design of dam's reservoir; conveyance, regulation and measurement structure; energy dissipaters; pipes.

**Prerequisites:** HWR 322

### **HWR 434: Design of Irrigation & Drainage Systems**

Irrigation and drainage Systems; Design of surface system; Design of sprinkler system; Design of drip system; Design of tile drainage system; Design of canals and drains networks.

**Prerequisites:** HWR 301

Department of  
**Hydrology and Water Resources  
Management**

**HWR 442: Urban Drainage Network**

Basic hydraulics, open channel networks, Modeling water networks, Sewer CAD program, Simulation, calibration, generation scenarios.

**Prerequisites:** HWR 342

**HWR 443: Design of Urban Water Network**

Computer models for water distribution; storm water and wastewater collection systems; and computer aided design and operation of urban water systems; case studies.

**Prerequisites:** HWR 342

**HWR 480: Undergraduate Research**

Research topic to be arranged with a staff member, and procedures of writing research, results and findings are presented in a report. The results are presented in a seminar.

**Prerequisites:** HWR 302

**HWR 451: Hydrological Spatial Statistics**

Spatial data, Spatial relationships, Modeling of variogram, Programs used for spatial analysis and applications.

**Prerequisites:** HWR 352

■■■■■ **FACULTY MEMBERS** ■■■■■

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**Lecturers**

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# Department of Meteorology

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## History:

The Department of Meteorology was established in 1975 as one of the four main departments of the Faculty. The Department offers Bachelor as well as Master degrees in Meteorology.

## Vision:

Distinction and creativity, locally and regionally, in the field of meteorology.

## Mission:

Preparation of qualified graduates in the field of meteorology with practical and research skills to meet societal needs and contribute to sustainable development.

## Tracks / Specializations:

General Meteorology

## Admission Requirements:

Admission to the department requires students to pass 12 credit hours of faculty core courses.

## Departmental Requirements:

To earn a B.sc degree in Meteorology, students must complete 128 credit hours distributed as follows:

- 27 credit hours of university requirements,
- 14 credit hours of preparatory year courses,
- 11 credit hours of faculty requirements ,
- 76 credit hours of departmental requirements divided into
- 59 credit hours of compulsory courses,
- 12 elective courses and
- 5 free elective courses.

# Department of Meteorology

## Department Core Courses: Credit Hours 59

Out of the 76 credit hours, there are 59 compulsory credit hours which are distributed according to the following: 48 credit hours from within the department, and 11 credit hours from outside the department.

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	MATH	202	Calculus (II)	4	4			MATH 110
2	PHYS	203	General Physics III	4	3	3		MATH 110, PHYS 110
3	MATH	204	Differential Equation (I)	3	3			MATH 202
4	MET	214	Meteorological Instruments & Methods of Observations	3	3			MET 200
5	MET	242	Atmospheric Radiation	3	3			PHYS 110
6	MET	300	Field Training	2			6	MET 214
7	MET	322	Physical Climatology	3	3			MET 242
8	MET	331	Dynamic Meteorology (I)	3	2	3		MATH 110, MATH 202
9	MET	332	Dynamic Meteorology (II)	3	2	3		MATH 204, MET 331
10	MET	343	Atmospheric Thermodynamics	3	3			MET 242, PHYS 203
11	MET	344	Physical Meteorology	3	3			MET 343
12	MET	351	Weather Analysis	3	2	3		MET 200, MET 214
13	MET	352	Synoptic Meteorology	3	2	3		MET 351
14	MET	381	Special Topics (I)	1	1			MET 351
15	MET	382	Special Topics (II)	1	1			MET 381
16	MET	400	Job Training	2			6	MET 300, MET352
17	MET	413	Principles of Atmospheric Remote Sensing	3	2	3		MET 214, MET 242
18	MET	414	Satellite Data in Meteorology	3	2	3		MET 413
19	MET	431	Fundamentals of Atmospheric Modeling	3	2	3		MET 332, MET 352
20	MET	451	Weather Briefing (I)	1			3	MET 352
21	MET	452	Weather Briefing (II)	1			3	MET 400 , MET 451
22	MET	454	Weather Forecasting	3	2	3		MET 431
23	MET	480	Undergraduate Research	2		6		MET 400
<b>Total</b>				<b>58</b>	<b>43</b>	<b>33</b>	<b>18</b>	

## Elective Courses: (Credit Hours 12)

Students must select 12 credit hours from the following elective courses.

No.	Course Code:	Course No.	Course Title	Credit	HOURS			Prerequisite
					Theory	Lab	Prac	
1	MATH	203	Calculus (III)	4	3	2		MATH 202
2	HWR	304	Introduction of GIS applications	3	2	2		CPIT 100
3	AGR	306	Principles of Statistics and Experimental Design	3	3			
4	ENS	311	Air Pollution	3	3			CHEM 110
5	MET	415	Radar Meteorology	3	2	3		MET 413
6	MET	424	Climate Change	3	3			MET 322
7	MET	433	Numerical Weather Prediction	3	2	3		MET 431
8	MET	434	Meteorological Computer Applications	3	2	3		CPIT 100
9	MET	436	Air- Sea Interaction	3	3			MET 332, MET 352
10	MET	441	Cloud Physics	3	3			MET 344
11	MET	444	Upper Atmosphere	3	3			MET 344
12	MET	456	Tropical Meteorology	3	3			MET 332, MET 352
13	MET	458	Aviation Meteorology	3	3			MET 332, MET 352
14	MET	461	Atmospheric Boundary Layer	3	3			MET 332, MET 352
15	MET	462	Agriculture Meteorology	3	3			MET 200, AGR 200
16	MET	463	Air Pollution Meteorology	3	3			MET 332, MET 352
17	MET	465	Statistical Meteorology	3	3			MET 322
18	MET	466	Statistical Weather Prediction	3	2	3		MET 465
<b>Total</b>				<b>55</b>	<b>49</b>	<b>16</b>		



# Department of Meteorology

## Course Descriptions:

### **MET 200: Introduction to Meteorology**

An introduction to the fundamentals of weather and climate, Concepts and fundamentals of meteorology, The role of meteorology in science, environment, agriculture and water resources.

### **MET 201: General Meteorology**

Introduction to the fundamentals of meteorology, Overview of the earth's atmosphere, Methods of meteorological observations, Motion of the atmosphere, fronts and cyclones, Atmospheric stability; clouds and precipitation, General circulation of the atmosphere, Weather forecasting and introduction to climate.

### **MET 214: Meteorological Instruments and Methods of Observation**

The basics of meteorological instruments and measurement techniques, Operation and maintenance of meteorological instruments, Calibration of meteorological instruments, Description of the location of meteorological station, Automatic weather observing system, 6. Measurements of surface and upper air meteorological parameters.

**Prerequisites:** MET 200

### **MET 242: Atmospheric Radiation**

The physical principles of solar radiation, The sun as a source of energy, Solar and terrestrial radiation and their application to earth atmosphere, Scattering and optical phenomena of the atmosphere, Radiation in the upper atmosphere and its relation to ozone, Energy budget, Measurements of solar radiation.

**Prerequisites:** PHYS 110

### **MET 300: Field training**

Students undergo training in the use of meteorological instruments, Training in data quality control.

**Prerequisites:** MET 214

### **MET 322: Physical Climatology**

Radioactive processes controlling the earth's temperature, difference between weather and climate and general wind, physical factors determining climate circulation, description of world climate and climatic classifications, Climate models and climatic change, The effect of topography on climate, Energy budget of the earth.

**Prerequisites:** MET 242

### **MET 331: Dynamic Meteorology (I)**

Units and dimensions, the fundamental forces affecting atmospheric motion, Equations of motion, Pressure coordinate Scale analysis of the equations of motion, Mass continuity and energy conservation.

**Prerequisites:** MATH 110, MATH 202

### **MET 332: Dynamic Meteorology (II)**

An application of the fundamental equations of motion, Circulation and vorticity, Frontogenesis and frontolysis, Methods of calculating vertical motion, Atmospheric waves, Kinetic and potential energy, Angular momentum.

**Prerequisites:** MATH 204, MET 331

### **MET 343: Atmospheric Thermodynamics**

Fundamentals of atmospheric thermodynamic, Thermodynamic of dry and moist air, Atmospheric stability, Thermodynamic diagrams and their applications.

**Prerequisites:** MET 242, PHYS 203

### **MET 344: Physical Meteorology**

The origin and composition of the atmosphere. Topics include: Structure of the atmosphere, Temperature distribution in the atmosphere, The equation of state, Electromagnetic radiation, Fundamentals of thermodynamic, Thermodynamic of water vapor and moist air, The hydrostatic equation and its applications, Static stability and convection.

**Prerequisites:** MET 343

### **MET 351: Weather Analysis**

The code of surface and upper air meteorological station, Meteorological plotting of surface and upper air synoptic data, Analysis of surface and upper air synoptic maps, Measurement standards following WMO, Main atmospheric pressure systems, Types of atmospheric cyclones, Motion scale in the atmosphere, Types of local wind in the atmosphere, Measurements and communications system.

**Prerequisites:** MET200, MET 214

### **MET 352: Synoptic Meteorology**

Revision of scales of motion and types of local wind in the atmosphere, General wind circulation, Climate of pressure system and surface wind, Air masses and fronts, Polar front theory, Development of cyclonic and anticyclonic in the atmosphere, Jet streams, Thunderstorms, Tropical meteorology and equatorial cyclones, El Nino phenomena, Atmospheric phenomena affecting aviation, Application on the use of weather maps and thermodynamic diagrams

**Prerequisites:** MET 351

### **MET 381: Special Topics (I)**

Meteorological topics defined by the department, Student participation in data collection.

**Prerequisites:** MET 351

### **MET 382: Special Topics (II)**

Meteorological topics defined by the department, Student participation in data collection.

**Prerequisites:** MET 381

### **MET 400: Job training**

Students undergo training in a meteorological center for eight weeks.

**Prerequisites:** MET 300, MET 352

### **MET 413: Atmospheric Remote Sensing**

The basics of remote sensing, Atmospheric Remote Sensing, Revision of the principles characters, Description of remote sensing instruments and types of collected data, Characteristics of visible, infra-red, water vapor and microwave images, Application of remote sensing images in meteorology, Rainfall measurements using radars.

**Prerequisites:** MET 214, MET 242

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## **MET 414: Satellite Data In Meteorology**

Dynamics of Satellite orbits, Programs of meteorological satellite, Applications of satellite data in the description of atmospheric structure and in weather forecasting, Recent remote sensing research studies in the analysis of weather elements, Future meteorological satellite programs.

**Prerequisites:** MET 413

## **MET 415: Radar Meteorology**

The basic theory and use of radars. Students learn how to use radar images to follow the development of meteorological phenomena such as clouds, storms and rainfall.

**Prerequisites:** MET 413

## **MET 424: Climate Change**

Historical introduction to climate change. Topics include: Global climate system with focus on the climate of the Arabian Peninsula, Climatic systems and their interactions, Anthropogenic climate change, The greenhouse effects, Astronomical effect on climate change, General circulation models and their use to study climate change.

**Prerequisites:** MET 322

## **MET 431: Fundamentals of Numerical Atmospheric Modeling**

Review of atmospheric constituents, Structure and dynamics; scale analysis of atmospheric motion, Physical basics of weather and climate models, Vertical coordinate systems, Numerical solution of differential equations; grid points, Finite difference schemes and their applications to the equations of motion, Numerical representation of the physical and dynamical equations, Application to weather.

**Prerequisites:** MET 332, MET 352

## **MET 433: Numerical Weather Prediction**

Reviews of atmospheric waves and filtering of sound and gravity waves, Scale analysis of atmospheric motion, Grid points and finite difference method, Stability analysis; boundary conditions and implicit method, barotropic and baroclinic models, Physical parameterization and limit of predictability.

**Prerequisites:** MET 431

## **MET 434: Meteorological Computer Applications**

The basics of computer program languages, Training on recent meteorological software packages in meteorology, Computer application in meteorology.

**Prerequisites:** CPIT 100

## **MET 436: Air-Sea Interaction**

The physical laws governing air-sea interaction, Wind waves and the mechanics of air-sea transfer, Perturbation in the mixing layer, Maritime weather.

**Prerequisites:** MET 332, MET 352

## **MET 441: Cloud Physics**

Revision of dry and moist air thermodynamics. Topics include: Stability in the atmosphere, Mixing and convection, Formation and growth of cloud droplets, Atmospheric phenomena accompanying clouds, Methods of cloud seeding.

**Prerequisites:** MET 344

## **MET 444: Upper Atmosphere**

Constituent and variability of upper air atmosphere, Ozone layer and photo-chemical reactions, Wind variation and its effect on the troposphere-stratosphere interaction.

**Prerequisites:** MET 344

## **MET 451: Weather Briefing (I)**

Investigation of past, present and future weather through the use of surface and upper air weather maps, dynamic thermal contours, and pictures of meteorological satellite.

**Prerequisites:** MET 352

## **MET 452: Weather Briefing (II)**

Advanced discussions on the past, present and future weather through the use of surface and upper air weather maps, dynamic thermal contours, pictures of meteorological satellite.

**Prerequisites:** MET 400, MET 451

## **MET 454: Weather Forecasting**

Types of weather forecasting regarding spatio-temporal scales, Revision of principal dynamical equations of motion in different coordinates, Diagnostic analysis of synoptic systems, Frontogenesis and frontolysis, Synoptic methods for weather forecasting, Statistical weather forecasting, Follow-up daily weather forecast.

**Prerequisites:** MET 431

## **MET 456: Tropical Meteorology**

General wind circulation in the tropics, Characteristics and dynamics of the tropics, Seasonal and non-seasonal variability in the tropics, Monsoon and tropical storms.

**Prerequisites:** MET 332, MET 352

## **MET 458: Aviation Meteorology**

Ice formation and growth on aero planes, Weather perturbations, Wind gusts and their effect on aviation, Visibility, Decoding meteorological codes, Meteorological reports for aviation.

**Prerequisites:** MET 332, MET 352

## **MET 461: Atmospheric Boundary Layer**

Turbulent air motion and turbulence equations. Topics include: Vertical distribution of atmospheric constituents in the turbulent boundary layer, Ekman layer, secondary circulation and spiral motion, Surface fluxes and vertical distribution of fluxes, Boundary layer height for stable and unstable conditions, Equations and numerical methods of pollutant dispersion in the atmosphere.

**Prerequisites:** MET 332, MET 352

## **MET 462: Agricultural Meteorology**

Air-plants interaction, Physical conditions affecting crop production, Geometry of solar radiation on plant canopy, Radioactive characteristics of natural surfaces, Momentum, Heat and mass transfer on flat and non-flat surfaces, Crop production resulting from severe weather conditions, Introduction to crop and economic growth models.

**Prerequisites:** MET 200, AGR 200

## **MET 463: Air Pollution Meteorology**

Wind distribution in the atmospheric boundary layer. Topics include: Mixing layer and thermal inversion, Intensity of vorticity

# Department of Meteorology

perturbation in the boundary layer, Meteorological factors affecting pollutant dispersion, Dispersion theory and numerical models for pollutant.

**Prerequisites:** MET 332, MET 352

## **MET 465: Statistical Meteorology**

Fundamentals of statistical methods, Sampling theory, two variant analyses and their extension to more than two variables; time series.

**Prerequisites:** MET 322

## **MET 466: Statistical Weather Prediction**

Reviews of basic statistical methods on the relationship between two or more variables, sampling theory and spectral analysis, Selection of prediction weather variables, Short range statistical weather forecasting, Long range statistical weather forecasting, Verification

of statistical forecasting methods.

**Prerequisites:** MET 465

## **MET 480: Undergraduate Research**

Students choose a topic under supervision by an academic staff member. They are trained in methods of scientific research, data collection and analysis, Students are taught dissertation writing and seminar preparation and presentation.

**Prerequisites:** MET 400

## ■ ■ ■ ■ ■ FACULTY MEMBERS ■ ■ ■ ■ ■

### Professors

#### **Abdul-Rahman Khalaf**

##### **Al-Khalaf**

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#### **Hosny Mohammed Hasanean**

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### Associate Professors

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#### **Mansour Attieh Almazroui**

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#### **Ahmad Ahmad Azhari**

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### Lecturer

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