الجزء الثاني: اللائحة باللغة الإنجليزية

ENGLISH PART

Course Codes

All the courses described here have a course code number. The various code letters used by departments are given below

1- Department Code

No	Code	Department	Faculty
1	BSM	Basic Sciences and Engineering mathematics	Faculty of Petroleum and Mining Engineering
2	ECE	Electric and Computer Engineering	The Engineering Departments Staff In the University
	MPE	Mechanical Power Engineering	
	MDP	Mechanical Design & Production	
3	PE	Petroleum Engineering	Faculty of Petroleum and Mining Engineering
4	PRE	Petroleum Refining and Petrochemical Engineering Department	
5	MME	Metallurgical and Materials Engineering	
6	ME	Mining Engineering	
7	GGE	Geological and Geophysical Engineering	
8	HUM	Humanities	

2- Years codes:

Code	Year	Level No.
0	Preparatory year	Zero level
1	First year	First level
2	Second year	Second level
3	Third year	Third level
4	Fourth year	Fourth level

Example:

Corse Code: PE 431

PE: Department Code (Petroleum Engineering Department)

4: Year Code (4th Year)

3: This Course belongs to Petroleum Engineering Department courses

1: Course No.

3- Courses Classification codes:

Code	Classification
HUM	Humanities
FSC	Fundamental Sciences
EBS	Engineering Basic Sciences
SPE	Specialized Engineering

CHAPTER 5

Tables of the Undergraduate Courses

Preparatory year (Level: 0)

1st Term -Table No. (1)

Course Code	Course Name	Contact Hrs.		Total	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 011	Physics 1 (Properties of Matter & thermodynamics)	3	2	5	30	30	90	150	3	FSC
BSM 012	Mathematics 1 (Differential Calculus + Algebra)	3	2	5	50	-	100	150	3	FSC
BSM 013	Mechanics 1 (statics)	2	2	4	50	-	100	150	3	FSC
BSM 014	General Chemistry	3	2	5	30	30	90	150	3	FSC
MDP 021	Engineering Drawing and Projection 1	2	2	4	10	30	60	100	3	EBS
HUM 082A	Elective Humanities 1	2	-	2	15	-	35	50	2	HUM
	Sum of contact hours	15	10	25	Total = 750					

2nd Term - Table No. (2)

Course Code	Course Name	Contact Hrs.		Total	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 015	Physics 2 (Electricity , Magnetism & Optics)	3	2	5	30	30	90	150	3	FSC
BSM 016	Mathematics 2 (Integral calculus & Analytical Geom.)	3	2	5	50	-	100	150	3	FSC
BSM 017	Mechanics 2 (dynamics)	2	2	4	50	-	100	150	3	FSC
MDP 022	Engineering Drawing and Projection 2	2	4	6	30	30	90	150	3	EBS
MDP 023	Production Technology	2	1	3	20	20	60	100	3	EBS
HUM 083	Technical English 1	2	-	2	15	-	35	50	2	HUM
	Sum of contact hours	15	10	25	Total = 750					

Notice: Preparatory year students have to fulfill one-month training summer program at workshop on production technology after the second term examinations, 25 Hrs. /Week.

Petroleum Engineering Department (PE)

Undergraduate Courses

First year (Level:1)
3rd Term -Table No. (3)

Course Code	Course Name	Contact Hrs.		Total	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 111	Mathematics 3 (Differential Equations +Multi Variable Calculus)	3	2	5	50	-	100	150	3	FSC
BSM 112	Physical Chemistry	2	2	4	30	30	90	150	3	SPE
BSM 113	Earth Sciences and Engineering	2	1	3	20	20	60	100	3	SPE
MDP 121	Mechanical Drawing	2	3	5	20	20	60	100	3	EBS
MDP 122	Introduction to Materials Science and Engineering	2	2	4	15	15	70	100	3	SPE
PE 131	Introduction to Petroleum Engineering	2	2	4	20	20	60	100	3	SPE
PE	Workshop Training on Production Technology	-	-	-	-	-	-	50	-	-
	Sum of contact hours	13	12	25	Total = 750					

4th Term - Table No. (4)

Course Code	Course Name	Contact Hrs.		Total	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 115	Physics 3 (Introduction to Modern & Nuclear Physics)	3	2	5	30	30	90	150	3	FSC
BSM 116	Mathematics 4 (Numerical analysis)	2	2	4	30	-	70	100	3	FSC
BSM 118	Organic Chemistry	2	2	4	30	30	90	150	3	SPE
ECE 223	Computer Programming 1	2	2	4	20	20	60	100	3	EBS
MDP 124	Properties and Strength of Materials	2	1	3	20	20	60	100	3	SPE
MPE 125	Fluid Mechanics	3	2	5	30	30	90	150	3	EBS
	Sum of contact hours	14	11	25	Total = 750					

Notice: First year students have to fulfill one-month training summer program in drawing and Elements of Machine Design after the fourth term examinations, 25 Hrs... /Week

Second year (Level:2)

5th Term -Table No. (5)

Course Code	Course Name	Contact Hrs...		Total	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 211	Mathematics 5 (Applied statistics)	2	2	4	30	-	70	100	3	FSC
BSM 215	Sedimentology, Paleontology, and Stratigraphy	2	1	3	20	20	60	100	3	SPE
MDP 221	Mechanical Design	2	3	5	20	20	60	100	3	EBS
ECE 223	Computer Programming 2	2	2	4	20	20	60	100	3	EBS
PE 231	Oil Well Drilling Engineering 1	3	1	4	30	30	90	150	3	SPE
ME 265	Plane Survey & Topography	2	1	3	30	30	90	150	3	SPE
HUM 281	Risk Management and Environmental Eng.	2	-	2	15	-	35	50	2	HUM
	Sum of contact hours	15	10	25	Total = 750					

6th Term - Table No. (6)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 217	Structural Geology	2	2	4	30	30	90	150	3	SPE
MPE 223	Thermodynamics	3	2	5	30	30	90	150	3	EBS
MDP 224	Quality Control	2	2	4	20	20	60	100	3	EBS
ECE 223	Electrical Engineering and Electronic	2	2	4	20	20	60	100	3	EBS
PE 232	Reservoir Fluid Properties	2	2	4	30	30	90	150	3	SPE
HUM 282	Preparation and Presentation of Reports	2	-	2	15	-	35	50	2	HUM
HUM 283	Risk Analysis	2	-	2	15	-	35	50	2	HUM
	Sum of contact hours	15	10	25	Total = 750					

Third year (Level:3)
7th Term -Table No. (7)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MDP 321	Measurement Instruments and Automatic Control	2	2	4	20	20	60	100	3	EBS
PE 331	Reservoir Rock Properties	2	2	4	30	30	90	150	3	SPE
PE 332	Petroleum Geology	3	2	5	30	30	90	150	3	SPE
PE 333	Production Equipment and Machinery	2	2	4	30	30	90	150	3	SPE
PE 334 A	Elective Course 1	2	2	4	20	20	60	100	3	SPE
HUM 381B	Elective Humanities 2	2	-	2	15	-	35	50	2	HUM
HUM 382C	Elective Humanities 3	2	-	2	15	-	35	50	2	HUM
	Sum of contact hours	15	10	25	Total =750					

8th Term - Table No. (8)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
PE 335	Computer Applications in Petroleum Engineering	2	2	4	20	20	60	100	3	SPE
PE 336	Applied Reservoir Engineering	3	2	5	30	30	90	150	3	SPE
PE 334 B	Elective Course 2	2	2	4	20	20	60	100	3	SPE
GGE 371	Applied Geophysics	3	2	5	30	30	90	150	3	SPE
PE 337	Petroleum Production Engineering1	2	2	4	20	20	60	100	3	SPE
PE 338	Drilling Equipment and Machinery	2	2	4	30	30	90	150	3	SPE
	Sum of contact hours	14	12	26	Total = 750					

Notice: Third year Students have a field training after the eighth term examinations in companies under joint supervision between faculty and the company for one month at least or as determined by the College Board according to the training opportunities.

Fourth year (Level:4)
9th Term -Table No. (9)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
PE 431	Petroleum Production Engineering 2	3	2	5	30	30	90	150	3	SPE
PE 432	Oil Well Drilling Engineering 2	2	2	4	30	30	90	150	3	SPE
PE 434 A	Elective Course 3	2	2	4	20	20	60	100	3	SPE
PE 435	Project	-	4	4	-	-	-	-	-	SPE
PE 436	Well Logging	2	2	4	20	20	60	100	3	SPE
PE 437	Well Testing	2	2	4	30	30	90	150	3	SPE
HUM 481	Communication Skills	2	-	2	15	-	35	50	2	HUM
PE	Industrial (Field) Training	-	-	-	-	50	-	50	-	PE
	Sum of contact hours	13	14	27	Total = 750					

Table No. (10) - 10th Term

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
PE 438	Natural Gas Engineering	3	2	5	30	30	90	150	3	SPE
PE 434 B	Elective Course 4	2	2	4	20	20	60	100	3	SPE
PE 439	Well Completion and Workover	3	2	5	30	30	90	150	3	SPE
PE 4310	Enhanced Oil Recovery	2	2	4	20	20	60	100	3	SPE
PE 435	Project	-	4	4	40	40	120	200	-	SPE
HUM 482	Engineering Economics and Project Management	2	-	2	15	-	35	50	2	HUM
HUM 483	Human Rights & Labor Law	2	-	2	15	-	35	50	2	HUM
	Sum of contact hours	14	12	26	Total = 750					

Remark: The bachelor degree project in Petroleum Engineering lasts within four weeks after the tenth term exams and judged by a public oral discussion.

Elective Courses

Third Level

7th Term		8th Term	
Code	**PE 334A Elective Course 1**	**Code**	**PE 334B Elective Course 2**
A1	Evaluation of Crude oil	**B1**	Petroleum Development Geology
A2	Rocks Mechanics	**B2**	Petroleum Refining Engineering
A3	Corrosion in Petroleum Industry		

Fourth Level

9thTerm		10th Term	
Code	**PE 434A Elective Course 3**	**Code**	**PE 434B Elective Course 4**
A1	Formation Stimulation	**B1**	Petroleum Production Technology
A2	Horizontal Oil Well Drilling Technology	**B2**	Water and Gas Shutoff Techniques
A3	Natural Gas Well Technology and Development	**B3**	Natural Gas Processing Operations
A4	Formation Evaluation	**B4**	Well Production Logging
A5	Transportation and Storage of Petroleum	**B5**	Reservoir Simulation

Petroleum Refining and Petrochemical Engineering Department (PRE)

Undergraduate Courses

First year (Level:1)

3rd Term - Table No. (11)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 111	Mathematics 3 (Differential Equations +Multi variable Calculus)	3	2	5	50	-	100	150	3	FSC
BSM 112	Physical Chemistry	2	2	4	30	30	90	150	3	SPE
MDP 121	Mechanical Drawing	2	3	5	20	20	60	100	3	EBS
MDP 122	Introduction to Materials Science and Engineering.	2	2	4	15	15	70	100	3	SPE
PRE 141	Introduction to Refinery and Petrochemical Engineering	2	2	4	20	20	60	100	3	SPE
PRE 142	Principles of Chemical Engineering	2	2	4	20	20	60	100	3	SPE
PRE	Workshop Training on Production Technology	-	-	-	-	-	50	50		SPE
	Sum of contact hours	13	13	26	Total = 750					

4th Term - Table No. (12)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 115	Physics 3 (Introduction to Modern &Nuclear physics)	3	2	5	30	30	90	150	3	FSC
BSM 116	Mathematics 4 (Numerical analysis)	2	2	4	30	-	70	100	3	FSC
BSM 118	Organic Chemistry	2	2	4	30	30	90	150	3	SPE
ECE 223	Computer Programing 1	2	2	4	20	20	60	100	3	EBS
MDP 124	Properties and Strength of Materials	2	1	3	20	20	60	100	3	SPE
MPE 125	Fluid Mechanics	3	2	5	30	30	90	150	3	EBS
	Sum of contact hours	14	11	25	Total = 750					

Notice: First year students have to fulfill one-month training summer program in drawing and Elements of Machine Design after the fourth term examinations, 25 Hrs... /Week

Second year (Level:2)

5th Term -Table No. (13)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 211	Mathematics (5) (Applied statistics)	2	2	4	30	-	70	100	3	FSC
BSM 212	Analytical Chemistry	2	2	4	20	20	60	100	3	SPE
MDP 221	Mechanical Design	2	3	5	20	20	60	100	3	EBS
ECE 224	Computer and Programing 2	2	2	4	20	20	60	100	3	EBS
PRE 241	Evaluation of Crude oil	2	2	4	30	30	90	150	3	SPE
PRE 242	Petroleum Refining Engineering 1	2	2	4	30	30	90	150	3	SPE
HUM 281	Risk Management and Environmental Eng.	2	-	2	15	-	35	50	2	HUM
Sum of contact hours		14	13	27	Total = 750					

6th Term - Table No: (14)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MPE 223	Thermodynamics	3	2	5	30	30	90	150	3	EBS
MDP 224	Quality Control	2	2	4	20	20	60	100	3	EBS
ECE 223	Electrical Engineering and Electronics	2	2	4	20	20	60	100	3	EBS
PRE 243	Unit Operation 1	2	2	4	30	30	90	150	3	SPE
PRE 244	Industrial Water Treatment	2	2	4	30	30	90	150	3	SPE
HUM 282	Preparation and presentation of reports	2	-	2	15	-	35	50	2	HUM
HUM 283	Risk Analysis	2	-	2	15	-	35	50	2	HUM
Sum of contact hours		15	10	25	Total = 750					

Third year (Level:3)

7th Term -Table No. (15)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MDP 321	Measurement Instruments and Automatic Control	2	2	4	10	30	60	100	3	EBS
PRE 341	Petrochemical Industries 1	2	1	3	20	20	60	100	3	SPE
PRE 342	Unit Operation 2	2	2	4	30	30	90	150	3	SPE
PRE 343	Chemical Reactions Engineering	2	1	3	20	20	60	100	3	SPE
PRE 344	Corrosion in Petroleum Industries	2	1	3	20	20	60	100	3	SPE
PRE 345A	Elective Course 1	2	2	4	20	20	60	100	3	SPE
HUM 381B	Elective Humanities 2	2	-	2	15	-	35	50	2	HUM
HUM 382C	Elective Humanities 3	2	-	2	15	-	35	50	2	HUM
	Sum of contact hours	16	9	25	Total = 750					

8th Term - Table No. (16)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
PRE 346	Heat Transfer in Chemical Operations	2	2	4	30	30	90	150	3	SPE
PRE 347	Petroleum Product Testing	2	2	4	20	20	60	100	3	SPE
PRE 348	Computer Application in Chemical and Electrochemical Industries	2	2	4	20	20	60	100	3	SPE
PRE 349	Unit Processes	3	2	5	30	30	90	150	3	SPE
PRE 3410	Transportation and Storage of Crude Oil Petroleum	3	1	4	30	30	90	150	3	SPE
PRE 345B	Elective course 2	2	2	4	20	20	60	100	3	SPE
Sum of contact hours		14	11	25	Total = 750					

Notice: Third year students should be trained at least one-month summer practical training from the eighth term in industry, and technical reports should be submitted at the end of the training.

Fourth year (Level:4)

9th Term -Table No. (17)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
PRE 441	Plant Design	2	1	3	20	20	60	100	3	SPE
PRE 442	Pollution Control	2	1	3	20	20	60	100	3	SPE
PRE 443	Design of Refining Equipments	2	1	3	20	20	60	100	3	SPE
PRE 444A	Elective Course 3	2	2	4	20	20	60	100	3	SPE
PRE 445	Project	-	4	4	-	-	-	-	-	SPE
PRE 446	Automatic Control in Chemical Operations	2	2	4	30	30	90	150	3	SPE
PRE 447	Petroleum Refining 2	2	2	4	20	20	60	100	3	SPE
HUM 481	Communication Skills	2	-	2	15	-	35	50	2	HUM
PRE	Industrial training	-	-	-	-	50	-	50		SPE
	Sum of contact hours	14	13	27	Total = 750					

10th Term - Table No. (18)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
PRE 448	Petrochemical Industries2	3	2	5	30	30	90	150	3	SPE
PRE 449	Petroleum Gases Engineering	2	2	4	20	20	60	100	3	SPE
PRE 4410	Optimization of Chemical Engineering	2	2	4	20	20	60	100	3	SPE
PRE 444 B	Elective course 4	2	2	4	20	20	60	100	3	SPE
PRE 445	Project	-	4	4	40	40	120	200	-	SPE
HUM 482	Engineering Economics and Project Management	2	-	2	15	-	35	50	2	HUM
HUM 483	Human Rights & Labor Law	2		2	15	-	35	50	2	HUM
	Sum of contact hours	13	12	25	Total = 750					

Notice: B.Sc. Project in Petroleum Refining and Petrochemicals Engineering should be submitted after 4 weeks from the tenth term examination

Elective Courses

Third Level

7th Term		8th Term	
Code	**PRE 345A Elective Course 1**	**Code**	**PRE 345B Elective Course 2**
A1	Rheological Properties of Petroleum Products	**B1**	Enhance Oil and Gas Recovery
A2	Introduction to Petroleum Engineering	**B2**	Energy Conservation
A3	Chemical Industries	**B3**	Organic and Inorganic Fertilizers
		B4	Hysys application in Refinery Plants

Fourth Level

9th Term		10th Term	
Code	**PRE 444A Elective Course 3**	**Code**	**PRE 444B Elective Course 4**
A1	Sustainable Energy	**B1**	Synthetic Rubber and Plastic
A2	Chemistry and Technology of Polymers	**B2**	Furnace and Heat exchanger Design
A3	Catalysis in Chemical Engineering	**B3**	Nano Technology and its applications in Chemical Engineering
A4	Operation Research in Chemical Engineering	**B4**	

Metallurgical and Materials Engineering Department (MME)

Undergraduate Courses

First year (Level:1)

3rd Term - Table No. (19)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Test Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 111	Mathematics 3 Differential Equations +Multi variable Calculus	3	2	5	50	-	100	150	3	FSC
BSM 112	Physical Chemistry	2	2	4	30	30	90	150	3	SPE
MDP 121	Mechanical Drawing	2	3	5	20	20	60	100	3	EBS
MDP 122	Introduction to Materials Science and Engineering	2	2	4	15	15	70	100	3	SPE
MME 151	Unit Operations in Metallurgy	2	2	4	15	15	70	100	3	SPE
MME 152	Materials Characterization Techniques	2	1	3	15	15	70	100	3	SPE
MME	Workshop Training on Production Technology						50	50		SPE
Sum of contact hours		13	12	25	Total = 750					

4th Term - Table No. (20)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Test Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 115	Physics 3 (Modern physics and Nuclear physics)	3	2	5	30	30	90	150	3	FSC
BSM 116	Mathematics 4 (Numerical Analysis)	2	2	4	30	-	70	100	3	FSC
ECE 124	Computer Programing 1	2	2	4	20	20	60	100	3	EBS
MDP 124	Properties and Strength of Materials	2	1	3	20	20	60	100	3	SPE
BSE 125	Fluid Mechanics	3	2	5	30	30	90	150	3	EBS
MME 153	Phase Diagrams	2	2	4	30	30	90	150		SPE
Sum of contact hours		14	11	25	Total = 750					

Notice: First year students have to fulfill one-month training summer program in drawing and elements of machine design after the fourth term examinations, 25 Hrs... /Week

Second year (Level:2)

5th Term - Table No. (21)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Test Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 211	Mathematics 5 (Applied Statistics)	2	2	4	30	-	70	100	3	FSC
BSM 213	Analytical Chemistry	2	2	4	20	20	60	100	3	SPE
BSE 221	Mechanical Design	2	3	5	20	20	60	100	3	ESC
ECE 223	Computer Programing 2	2	2	4	20	20	60	100	3	ESC
MME 251	Mechanical Behavior of Materials	2	2	4	30	30	90	150	3	SPE
MME 252	Electrochemistry in Metallurgy	2	2	4	30	30	90	150	3	SPE
HUM 281	Risk Management and Environmental Eng.	2	-	2	15	-	35	50	2	HUM
	Sum of contact hours	14	13	27	Total = 750					

6th Term - Table No. (22)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Test Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MDP 223	Thermodynamics	3	2	5	30	30	90	150	3	ESC
MDP 224	Quality Control	2	2	4	20	20	60	100	3	ESC
ECE 224	Electrical Engineering and Electronics	2	2	4	20	20	60	100	3	ESC
MME 253	Heat Transfer in metallurgy	2	2	4	30	30	90	150	3	SPE
MME 254	Diffusion and Phase Transformations	2	2	4	30	30	90	150	3	SPE
HUM 282	Preparation and Presentation of Reports.	2	-	2	15	-	35	50	2	HUM
HUM 283	Risk Analysis	2	-	2	15	-	35	50	2	HUM
Sum of contact hours		15	10	25	Total = 750					

Third year (Level:3)

7th Term - Table No. (23)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Test Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MDP 321	Measurement Instruments and Automatic Control	2	2	4	20	20	60	100	3	ESC
MME 351	Non-Destructive Materials Testing	2	2	4	30	30	90	150	3	SPE
MME 352	Heat Treatment Technology	3	2	5	30	30	90	150	3	SPE
MME 353	Thermodynamics and Kinetics of Metallurgical Processes	2	2	4	30	30	90	150	3	SPE
MME 359A	Elective Course 1	2	2	4	20	20	60	100	3	SPE
HUM 381B	Elective Humanities 2	2	-	2	15	-	35	50	2	HUM
HUM 382C	Elective Humanities 3	2	-	2	15	-	35	50	2	HUM
Sum of contact hours		15	10	25	Total = 750					

8th Term - Table No. (24)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Test Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MME 354	Corrosion Engineering & Protection	3	2	5	30	30	90	150	3	SPE
MME 355	Metallurgical Furnaces and Refractories	2	2	4	20	20	60	100	3	SPE
MME 356	Destructive Materials Testing	2	2	4	30	30	90	150	3	SPE
MME 357	Welding Metallurgy & Technology	3	2	5	30	30	90	150	3	SPE
MME 358	Ceramics Materials	2	1	3	20	20	60	100	3	SPE
MME 359 B	Elective Course 2	2	2	4	20	20	60	100	3	SPE
Sum of contact hours		14	11	25	Total = 750					

Notice: Third year students should be trained at least one-month summer practical training in industry, after the eighth term and technical reports should be submitted at the end of the training.

Fourth year (Level:4)

9th Term - Table No. (25)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Test Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MME 451	Ferrous Extractive Metallurgy	3	2	5	30	30	90	150	3	SPE
MME 452	Composite Materials	2	1	3	30	30	90	150	2	SPE
MME 453	Casting Engineering	2	2	4	30	30	90	150	3	SPE
MME 454	Modeling and Simulation in Materials Engineering	2	2	4	20	20	60	100	3	SPE
MME 459 A	Elective Course 3	2	2	4	20	20	60	100	3	SPE
MME 458	Project	-	4	4	-	-	-	-	-	SPE
Hum 481	Communication Skills	2	-	2	15	-	35	50	2	Hum
MME	Industrial Training	-	-	-	--	-	50	50	-	
	Sum of contact hours	13	13	26	Total = 750					

10th Term - Table No. (26)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Test Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MME 455	Materials Forming	3	2	5	30	30	90	150	3	SPE
MME 456	Non – ferrous Extractive Metallurgy	3	2	5	20	20	60	100	3	SPE
MME 457	Principals of Alloys Design	3	2	5	20	20	60	100	3	SPE
MME 459B	Elective Course 4	2	2	4	20	20	60	100	3	SPE
MME 458	Project*	-	4	4	40	40	120	200	-	SPE
HUM 482	Engineering Economics and Project Management	2	-	2	15	-	35	50	2	Hum
HUM 483	Human Rights & Labor Law	2	-	2	15	-	35	50	2	Hum
	Sum of contact hours	15	12	27	Total = 750					

Note: B.Sc. Project in Metallurgical and Materials Engineering should be submitted after 4 weeks from the 10th term examinations

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Elective Courses

Third Level

7th Term		8th Term	
Code	**MME 359A Elective Course 1**	**Code**	**MME 359B Elective Course 2**
A1	Nuclear Metallurgy	**B1**	Hydrometallurgy
A2	Powder Metallurgy	**B2**	Polymer Materials
A3	Steel and Cast Irons Processing	**B3**	Smart Materials

Fourth Level

9th Term		10th Term	
Code	**MME 459A Elective Course 3**	**Code**	**MME 459B Elective Course 4**
A1	Failure Analysis	**B1**	Materials Selection and Standards
A2	Surface engineering	**B2**	Nanomaterials
A3	Biomaterials	**B3**	High Temperature Oxidation and Corrosion
A4	Corrosion Testing and Monitoring	**B4**	Codes of Design and Fabrication of Metallic Constructions
A5	Welding Engineering	**B5**	Casting Design
		B6	Design and Applications of Cathodic Protection Systems
		B7	Production of Ferroalloys
		B8	Eco materials

Mining Engineering Department (ME)

Undergraduate Courses

First year (Level:1)

3rd Term - Table No. (27)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 111	Mathematics 3 (Differential Equations +Multivariable Calculus)	3	2	5	50	-	100	150	3	BSC
BSM 112	Physical Chemistry	2	2	4	30	30	90	150	3	SPE
BSM 113	Earth Sciences and Engineering	2	1	3	20	20	60	100	3	SPE
BSM 114	Mineralogy & Crystallography	2	2	4	20	20	60	100	3	SPE
MDP 121	Mechanical Drawing	2	3	5	20	20	60	100	3	BSE
MDP 122	Introduction to Materials Science and Engineering	2	2	4	15	15	70	100	3	SPE
ME	Workshop Training on Production Technology	-	-	-	-	-	50	50	-	SPE
	Sum of contact hours	13	12	25	Total 750					

4th Term - Table No. (28)

course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 115	Physics 3 (Modern physics and Nuclear physics)	3	2	5	30	30	90	150	3	BSC
BSM 116	Mathematics 4 (Numerical analysis)	2	2	4	30	-	70	100	3	BSC
BSM 117	Structure Geology	2	2	4	30	30	90	150	3	SPE
ECE 123	Computer Programing 1	2	2	4	20	20	60	100	3	EBS
ME 161	Introduction to Mining Engineering	2	1	3	15	15	70	100	3	ME
MPE 125	Fluid Mechanics	3	2	5	30	30	90	150	3	EBS
Sum of contact hours		14	11	25	Total 750					

Notice: First year students have to fulfill one-month training summer program in drawing and Elements of Machine Design after the fourth term examinations, 25 Hrs... /Week.

Second year (Level:2)

5th Term - Table No. (29)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 211	Mathematics 5 (Applied Statistics)	2	2	4	30	-	70	100	3	BSC
BSM 214	Analytical Chemistry	2	2	4	20	20	60	100	3	SPE
BSM 216	Petrology	1	1	2	20	20	60	100	3	SPE
MDP 221	Mechanical Design	2	3	5	20	20	60	100	3	EBS
ECE 223	Computer Programming 2	2	2	4	20	20	60	100	3	EBS
ME 261	Rock Mechanics1	2	1	3	20	20	60	100	3	SPE
ME 262	Plane Survey & Topography	2	1	3	20	20	60	100	3	SPE
HUM 281	Risk Management and Environmental Eng.	2	-	2	15	-	35	50	2	HUM
Sum of contact hours		15	12	27	Total 750					

6th Term - Table No. (30)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MDP 223	Thermodynamics	3	2	5	30	30	90	150	3	EBS
MDP 224	Quality Control	2	2	4	20	20	60	100	3	EBS
ECE 224	Electrical Engineering and Electronics	2	2	4	20	20	60	100	3	EBS
ME 263	Geodetic Survey and Astronomy	2	2	4	30	30	90	150	3	SPE
GGE 274	Applied Geophysics	2	2	4	30	30	90	150	3	SPE
HUM 282	Preparation and Presentation of Reports	2	-	2	15	-	35	50	2	HUM
HUM 283	Risk Analysis	2	-	2	15	-	35	50	2	HUM
Sum of contact hours		15	10	25	Total 750					

Third year (Level:3)

7th Term - Table No. (31)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MDP 321	Measurement Instruments and Automatic Control	2	2	4	20	20	60	100	3	BSE
ME 361	Underground Mining Methods	2	2	4	30	30	90	150	3	SPE
ME 362	Mineral Processing 1	2	2	4	30	30	90	150	3	SPE
ME 363	Technology of Surface Mines	3	2	5	30	30	90	150	3	SPE
ME 364A	Elective Course 1	2	2	4	20	20	60	100	3	SPE
HUM 381B	Elective Humanities 2	2	-	2	15	-	35	50	2	HUM
HUM 382C	Elective Humanities 3	2	-	2	15	-	35	50	2	HUM
Sum of contact hours		15	10	25	Total 750					

8th Term - Table No. (32)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MME 35 10	Extractive Metallurgy	2	2	4	20	20	60	100	3	SPE
ME 365	Mineral Processing 2	2	2	4	30	30	90	150	3	SPE
ME 366	Processing of Non-metallic Raw Materials	2	1	3	20	20	60	100	3	SPE
ME 367	Strata Control	3	2	5	30	30	90	150	3	SPE
ME 368	Underground Surveying	3	2	5	30	30	90	150	3	SPE
ME 364B	Elective Course 2	2	2	4	20	20	60	100	3	SPE
Sum of contact hours		14	11	25	Total 750					

Notice: Third year students should be trained at least one-month summer practical training from the eighth term in industry and technical reports should be submitted at the end of the training.

Fourth year (Level:4)

9th Term - Table No. (33)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
ME 461	Survey Project	2	2	4	20	20	60	100	3	SPE
ME 462	Mineral Processing 3	2	2	4	30	30	90	150	3	SPE
ME 463	Mine Ventilation and Air Conditioning	2	2	4	30	30	90	150	3	SPE
ME 464	Mining Geology	2	2	4	30	30	90	150	3	SPE
ME 465A	Elective course 3	2	2	4	20	20	60	100	3	SPE
ME 466	Project	-	4	4	-	-	-	-	-	SPE
HUM 481	Communication Skills	2	-	2	15	-	35	50	2	HUM
ME	Industrial Training	-	-	-	-	-	50	50	-	SPE
	Sum of contact hours	12	14	26	Total 750					

10th Term - Table No. (34)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
ME 467	Computer Applications in Mining and survey	2	3	5	20	20	60	100	3	SPE
ME 468	Mine Plant design	3	2	5	30	30	90	150	3	SPE
ME 469	Rock drilling & Blasting Engineering	3	2	5	30	30	90	150	3	SPE
ME 465B	Elective Course 4	2	2	4	20	20	60	100	3	SPE
ME 466	Project	-	4	4	40	40	120	200	-	SPE
HUM 482	Engineering Economics and Project Management	2	-	2	15	-	35	50	2	HUM
HUM 483	Human Rights & Labor Law	2	-	2	15	-	35	50	2	HUM
	Sum of contact hours	14	13	27	Total 750					

Notice: B.Sc. Project in Mining Engineering should be submitted after 4 weeks from the tenth term examinations.

Elective Courses

Third Level

7th Term		8th Term	
Code	**ME 364A Elective Course 1**	**Code**	**ME 364B Elective Course 2**
A1	Mineral Analysis and Evaluation	**B1**	Road Planning and Design
A2	Rock Drilling and Blasting Eng.	**B2**	Material Handling
A3	Photogrammetry and its Applications	**B3**	Rock Mechanics 2
A4	Drainage of Water in Underground Structures	**B4**	Unit Operation in Mineral Processing
A5	Map Projection	**B5**	Modern Surveying Equipment

Fourth Level

9th Term		10th Term	
Code	**ME 465A Elective Course 3**	**Code**	**ME 465B Elective Course 4**
A1	Novel Mining Methods	**B1**	Tunneling and Underground Construction Engineering
A2	Industrial Ventilation	**B2**	Mine Ventilation Networks Design
A3	Geographic Information System GIS	**B3**	Mine Waste Management
A4	Planning and Design of Open Cast Mining	**B4**	Global Positioning System
A5	Solid Fuel Engineering	**B5**	Industrial Minerals and Dimension Stone Technology
		B6	Chemical Processing of ore minerals

Geological and Geophysical Engineering Department (GGE)

Undergraduate Courses

First year (Level:1)

3rd Term - Table No. (35)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM111	Mathematics 3 (Differential Equations +Multi variable Calculus)	3	2	5	50	-	100	150	3	BSC
BSM 113	Earth Sciences and Engineering	2	1	3	20	20	60	100	3	SPE
MDP 121	Mechanical Drawing	2	3	5	20	20	60	100	3	EBS
MDP 122	Introduction to Materials Science and Engineering	2	2	4	15	15	70	100	3	SPE
GGE 171	Introduction to Geological and Geophysical Engineering	2	2	4	30	30	90	150	3	SPE
BSM 119	Analytical Chemistry	2	2	4	20	20	60	100	3	SPE
GGE	Workshop Training on Production Technology						50	50		SPE
	Sum of contact hours	13	12	25	Total 750					

4th Term - Table No. (36)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM 115	Physics 3 (Modern physics and Nuclear physics)	3	2	5	30	30	90	150	3	BSC
BSM 116	Mathematics 4 (Numerical analysis)	2	2	4	30	-	70	100	3	BSC
GGE 172	Physical Properties of Rocks	2	2	4	30	30	90	150	3	SPE
ECE 123	Computer and Programming 1	2	2	4	20	20	60	100	3	EBS
MDP 124	Properties and Strength of Materials	2	1	3	20	20	60	100	3	SPE
MPE 125	Fluid Mechanics	3	2	5	30	30	90	150	3	EBS
	Sum of contact hours	14	11	25	Total 750					

Notice: First year students have to fulfill one-month training summer program in drawing and Elements of Machine Design after the fourth term examinations, 25 Hrs... /Week.

Second year (Level:2)

5th Term - Table No. (37)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
BSM211	Mathematics 5 (Applied Statistics)	2	2	4	30	-	70	100	3	BSC
BSM 215	Sedimentology , Paleontology, and Stratigraphy	2	1	3	20	20	60	100	3	SPE
MDP 221	Mechanical Design	2	3	5	20	20	60	100	3	EBS
ECE 123	Computer Programming 1	2	2	4	20	20	60	100	3	EBS
GGE 271	Theory of Structure	2	2	4	30	30	90	150	3	SPE
ME 262	Plane Survey & Topography	2	1	3	30	30	90	150	3	SPE
HUM 281	Risk Management and Environmental Eng.	2	-	2	15	-	35	50	2	Hum
	Sum of contact hours	14	11	25	Total 750					

6th Term - Table No. (38)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MPE 223	Thermodynamics	3	2	5	30	30	90	150	3	EBS
MDP 224	Quality Control	2	2	4	20	20	60	100	3	EBS
ECE 224	Electrical Engineering and Electronics.	2	2	4	20	20	60	100	3	EBS
ME 263	Geodetic Survey and Astronomy	2	2	4	30	30	90	150	3	SPE
BSM 217	Structure Geology	2	2	4	30	30	90	150	3	BSC
HUM 282	Preparation and Presentation of Reports	2	-	2	15	-	35	50	2	HUM
HUM283	Risk Analysis	2	-	2	15	-	35	50	2	HUM
Sum of contact hours		15	10	25	Total 750					

Third year (Level:3)

7th Term - Table No. (39)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
MDP 321	Measurement Instruments and Automatic Control	2	2	4	20	20	60	100	3	BSE
GGE 371	Geostatistics and Information System	3	2	5	30	30	90	150	3	SPE
GGE 372	Geology of Egypt	3	2	5	30	30	90	150	3	SPE
GGE 373	Soil Mechanics	3	2	5	20	30	90	150	3	SPE
GGE 374A	Elective course 1	2	2	4	20	20	60	100	3	SPE
HUM 381B	Elective Humanities 2	2	-	2	15	-	35	50	2	HUM
HUM 382C	Elective Humanities 3	2	-	2	15	-	35	50	2	HUM
Sum of contact hours		17	10	27	Total 750					

8th Term - Table No. (40)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
GGE 375	Introduction to Concrete Structure.	2	2	4	20	20	60	100	3	SPE
GGE 376	Introduction to Steel Structure	2	1	3	20	20	60	100	3	SPE
GGE 377	Instrumentation in Geological and Geophysical Engineering	2	1	3	20	20	60	100	3	EBS
GGE 378	Geophysics 1	2	2	4	30	30	90	150	3	SPE
GGE 379	Underground Structures	2	1	3	20	20	60	100	3	SPE
ME 366	Survey Project	2	2	4	20	20	60	100	3	SPE
GGE 374B	Elective Course 2	2	2	4	20	20	60	100	3	SPE
Sum of contact hours		14	11	25	Total 750					

Notice: Third year students should be trained at least one-month summer practical training in industry after the eighth term, and technical reports should be submitted at the end of the training.

Fourth Year (Level:4)

9st Term - Table No. (41)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
GGE 471	Rock Engineering	2	1	3	20	20	60	100	3	SPE
GGE 472	Geophysics 2	2	2	4	30	30	90	150	3	SPE
GGE 473	Foundation Engineering	2	1	3	20	20	60	100	3	SPE
GGE 474	Hydrogeology	2	1	3	20	20	60	100	3	SPE
GGE 475	Project	-	4	4	-	-	-	-	-	SPE
GGE 476 A	Elective Course 3	2	2	4	20	20	60	100	3	SPE
GGE 477	Drilling Engineering	2	1	3	20	20	60	100	3	SPE
HUM 481	Communications Skills	2	-	2	15		35	50	2	HUM
GGE	Industrial Training						50	50		SPE
	Sum of contact hours	14	12	26	Total 750					

10th Term - Table No. (42)

Course Code	Course Name	Contact Hrs.		Total C.R.	Marks Distribution				Exam Time	Description
		Lecture	Lab. /Tut.		Year work	Oral / Pract.	Final exam	Total		
GGE 478	Landslides and Slope Stability	2	2	4	20	20	60	100	3	SPE
GGE 479	Earthquake Engineering	3	2	5	30	30	90	150	3	SPE
GGE 4710	Soil and Rock Dynamics	2	2	4	20	20	60	100	3	SPE
GGE 476 B	Elective Course 4	2	2	4	20	20	60	100	3	SPE
GGE 475	Project	-	4	4	40	40	120	200	-	SPE
HUM 482	Engineering Economics and Project Management	2	-	2	15	-	35	50	2	HUM
HUM 483	Human Rights & Labor Law	2	-	2	15	-	35	50	2	Hum
Sum of contact hours		13	12	25	Total 750					

Notice: B.Sc. Project in Mining Engineering should be submitted after 4 weeks from the tenth term examinations.

Elective Courses

Third Level

7th Term		8th Term	
Code	**GGE 374 A Elective Course 1**	**Code**	**GGE 374B Elective Course 2**
A1	Ore Minerals	**B1**	Near surface Engineering Geophysics
A2	Rock Blasting Engineering	**B2**	Geochemistry Exploration
A3	Remote Sensing	**B3**	Bitumen and Roads Pavement
		B4	Rock Magnetism

Fourth Level

9th Term		10th Term	
Code	**GGE 475 A Elective Course 3**	**Code**	**GGE 475 B Elective Course 4**
A1	Seismic Stratigraphy	**B1**	Engineering of Oil Reservoir and Groundwater Aquifers
A2	Petroleum Related Rock Mechanics	**B2**	Geological Engineering
A3	Reservoir Geomechanics	**B3**	Site Geology and investigation
A4	Well Logging	**B4**	Soil and Rock Improvement
A5	Reservoir Geology	**B5**	Tunneling Engineering

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CHAPTER 6

Syllabuses of the Undergraduate Courses

Petroleum Engineering Department (PE)

Syllabuses of Courses

I. Syllabuses of Mandatories Courses

PE 131 Introduction to Petroleum Engineering	Lecture	Tut/Lab	Total
	2	2	4

Overview and history of the petroleum industry, fundamentals of petroleum geology and geophysics, origin of petroleum, migration and accumulation of oil and gas, nature of oil and gas reservoirs, exploration and drilling, formation evaluation, well completions and production, surface facilities, fundamentals of rock and fluid properties, composition and PVT properties of petroleum fluids, basic physical and chemical properties of petroleum reservoir fluids related to reservoir processes and production, reservoir mechanics, improved oil recovery, environmental considerations.
Prerequisite: None

PE 231 Oil Well Drilling Engineering 1	Lecture	Tut/Lab	Total
	3	1	4

Introduction to drilling systems, rotary drilling rigs components and their types, methods of drilling wells and types of wellbore, wellbore hydraulics, pore pressure, hydrostatic mud pressure and subsurface temperature, mechanical properties of the rocks, well design, drilling fluids, well control, drilling problem; mud loss and pipe sticking, casing, cementing and introduction to directional drilling.
Prerequisite: Introduction to Petroleum Engineering

PE 232 Reservoir Fluid Properties	Lecture	Tut/Lab	Total
	2	2	4

Fundamentals of petroleum chemistry, reservoir fluids components, phase behavior; single, binary, and multi-component phase behaviour, properties of gases; ideal and actual gas, z-factor, gas viscosity, gas solubility, gas compressibility, gas formation volume factor, properties of oil; oil viscosity, oil compressibility, oil formation volume factor, total formation volume factor, interfacial tension, properties of water; water viscosity, water compressibility, water formation volume factor, electrical resistivity of water, reservoir fluid sampling, PVT laboratory analysis of oil.
Prerequisite: Introduction to Petroleum Engineering

PE 331 Reservoir Rock Properties	Lecture	Tut/Lab	Total
	2	2	4

Introduction to reservoir rock; coring and core handling, rock types; sandstone and carbonate rocks, pore types, petro physical properties of reservoir rocks; porosity, fluid saturations, flow regimes, reservoir geometry, permeability concepts; absolute, effective & relative, weighted-average permeability, rock compressibility, routine and special core analysis laboratory (SCAL), capillary pressure, wettability, surface and interfacial tension, electrical properties of the rock, rock-fluid interactions, Laboratory measurements of rock properties.
Prerequisite: Introduction to Petroleum Engineering

ME 265 Plane Survey & Topography	Lecture	Tut/Lab	Total
	2	1	3

Introduction and definitions of plane surveying, linear measurement, Angular measurements, Leveling, Plane table, Contours and contouring, Areas calculations, Volume calculations, Theodolite and practical surveying.
Prerequisite: Mathematics 4

PE 332 Petroleum Geology	Lecture	Tut/Lab	Total
	3	2	5

Fundamentals of petroleum geology; source rock and reservoir, trap types, Migration and accumulation of petroleum, effects of sedimentary environments on reservoir rock properties, mapping and geological correlations, concepts and Geostatistics, geotectonic effects on frac, geophysical tools integrated with geology, correlation principles and exercise, sequence stratigraphy primer and applications, exploration and exploitation and examples, appraisal methods, reservoir mapping and volumetric, unconventional resources, outline of the importance of oil and gas deposits in Egypt.
Prerequisite: Structure Geology, Sedimentology & Paleontology, Earth & Engineering Sciences

GGE 371 Applied Geophysics	Lecture	Tut/Lab	Total
	3	2	5

Physical principles of gravity methods; gravity field of the earth, gravity anomalies, rock densities. Gravity observations and data reduction. Magnetic prospection, earth magnetic field, magnetic properties of rocks and their determination, Elastic waves in layered media, Earthquake mechanism. Physical principles of seismic prospection: seismic instruments, methods, data processing and interpretation. Physical principles of electric methods of prospection, Potential methods, resistivity methods, electromagnetic methods, profiling and sounding. Geothermal methods of prospecting.
Prerequisite: Earth and Engineering Sciences, Structure Geology

PE 333 Production Equipment and Machinery	Lecture	Tut/Lab	Total
	2	2	4

Flowing well equipment, Christmas trees and wellhead, choke types and design, artificial lift equipment, gas compressors, two and three phase separators, crude oil treating systems; emulsion treating equipment, producing water treating system, pumps; centrifugal and reciprocating pumps, packer types and design, tapered tubing, valves, fittings, and piping details.
Prerequisite: Introduction to Petroleum Engineering

PE 335 Computer Applications in Petroleum Engineering	Lecture	Tut/Lab	Total
	2	2	4

The focus of this course is to expose students to software commonly used in the petroleum industry. The student will perform the following activities in the course; create Excel spreadsheets to perform calculations associated with equipment design and well servicing problems; create charts and develop critical paths for petroleum industry projects, utilize petroleum industry software (commercial software), programing oil field problems by computer languages.
Prerequisite: Mathematics 3, Computer Programming 1, and concurrent with Applied Reservoir Engineering

PE 336 Applied Reservoir Engineering	Lecture	Tut/Lab	Total
	3	2	5

Introduction to petroleum reservoirs, driving mechanisms, general material balance (MBE) equation, material balance solution as an equation of a straight line, the Havlena and Odeh method, MBE for volumetric undersaturated and saturated oil reservoirs, MBE for gas cap drive reservoirs, MBE for water drive reservoirs; Pot aquifer, steady-state, modified- steady state, and unsteady-state models, MBE for combination drive reservoirs, predicting oil reservoir performance.
Prerequisite: Reservoir Fluid Properties

PE 337 Petroleum Production Engineering	Lecture	Tut/Lab	Total
	2	2	4

Introduction to petroleum production system, inflow performance relationship (IPR) and reservoir deliverability, vertical lift performance (VLP); Flow Regimes in Vertical and Horizontal Pipelines, bean performance, production optimization by nodal analysis, forecast of well production, production enhancement; formation damage, well stimulation; matrix acidizing and hydraulic fracture.
Prerequisite: Introduction to Petroleum Engineering

PE 338 Drilling Equipment's and Machinery	Lecture	Tut/Lab	Total
	2	2	4

Types of rotary drilling rigs, rig component; mud system equipment, mud pumps, drill bits, drill pipes, drill collars, bottom hole assembly (BHA), and other hardware like blowout preventers and solid control systems, well control equipment, deep water drilling equipment, deflection tools and subsurface mud motors, fishing tools and jobs, instrumentation and new equipment applications.
Prerequisite: Oil Well Drilling Engineering 1

PE 431 Petroleum Production Engineering 2	Lecture	Tut/Lab	Total
	3	2	5

Introduction of artificial lift systems, artificial lift methods; gas lift system; gas lift types, continuous and intermittent gas lift, gas lift design, sucker rod (SR) pumps; SR types, downhole and surface equipment, SR pump design and troubleshooting, electric submersible pumps (ESP); downhole and surface equipment, ESP design and troubleshooting, hydraulic pumps; piston and jet pumps, equipment and design, progressive cavity pump; equipment and design.

Prerequisite: Petroleum Production Engineering 1

PE 432 Oil Well Drilling Engineering 2	Lecture	Tut/Lab	Total
	2	2	4

Drilling problems and their remedy, rig mud hydraulics, factors affecting drill bit performance, vertical and directional oil well drilling and deviation control, oil well cementing, basic horizontal well drilling technology and multi-lateral wells, recent advances for drilling wells (horizontal and multilateral wells), formation units and their lithology, drilling and completing gas wells
Prerequisite: Oil Well Drilling Engineering 1, Drilling Equipment and Machinery

PE 436 Well Logging	Lecture	Tut/Lab	Total
	2	2	4

Introduction to well logging methods, electric resistivity of rocks, measurements zones and environments, open hole logging; spontaneous potential log, gamma ray logs, resistivity logs; conventional electric tools, focused current and induction devices, acoustic properties of rocks; sonic log, density logs, neutron logs, cased hole logging, Interpretation techniques.
Prerequisite: Reservoir Rock Properties, Petroleum Geology, and Applied Geophysics.

PE 435 Project	Lecture	Tut/Lab	Total
		8	8

Advanced work on some special problem or a capstone project within field of Petroleum Engineering under the supervision of a faculty member, the team develops a complete project including identification of a problem, formulation of design, preparation of specifications, and consideration of alternative feasible solutions both technically and economically. The student team must submit a detailed final project report and present their work to an examining committee.

PE 437 Well Testing	Lecture	Tut/Lab	Total
	2	2	4

Introduction to well testing, well test objectives, overview of the diffusivity equation for well test analysis, pressure buildup tests (PBU); Horner method, PBU test design, fault detection, determination of average reservoir pressure, flow tests; draw down and reservoir limits test, design and implementation, type curve matching and pressure derivatives, multiple well testing; interference testing and pulse testing, injection well testing; injectivity test; falloff test, step-rate test, drill stem test (DST); conventional DST, DST equipment and operational procedures, types of drill stem tests, qualitative DST analysis, well test analysis software.
Prerequisite: Reservoir Rock Properties, and concurrent with Petroleum Production Engineering 2, and Applied Reservoir Engineering.

PE 438 Natural Gas Engineering	Lecture	Tut/Lab	Total
	3	2	5

Introduction to natural gas, properties of natural gas, flow of natural gas in reservoirs, wellbores and gathering systems, estimate gas reserves for volumetric and water-drive gas reservoirs, gas condensate reservoirs, gas re-cyclic, gas reservoir deliverability, wellbore performance, choke performance, well deliverability tests; flow-after flow, isochronal tests, decline curve analysis, gas flow measurements and compressor sizing, separation, dehydration,

compression and cooling, transportation, special problems; liquid loading on gas wells, hydrate prediction and control, pipeline cleaning.
Prerequisite: Reservoir Fluid Properties, and Petroleum Production Engineering 1

PE 439 Well Completion and Workover	Lecture	Tut/Lab	Total
	3	2	5

Introduction to oil well completion, types of completions, types of completion and workover rigs, completion fluids, perforation, completion equipment; subsurface control equipment, well head, production tubing, packers, packer types, unstable formations and sand control; mechanical and chemical, gravel pack types, Frac-Pack, intelligent completion: smart well, field examples.
Prerequisite: Petroleum Production Engineering 1, and Petroleum Production Equipment and Machinery

PE 4310 Enhanced Oil Recovery	Lecture	Tut/Lab	Total
	2	2	4

Introduction to enhanced oil recovery (EOR) and screening criteria, primary, secondary, and tertiary (EOR) recoveries, principles of water flooding; optimum time to water flood, flooding patterns, overall recovery efficiency, displacement efficiency, Buckley - Leveret theories; fractional flow and frontal advance equations, areal sweep and vertical sweep efficiencies; stiles' and Dykstra – Parsons methods, methods of predicting recovery; Dykstra–parsons and Craig–Geffen – Morse methods, chemical EOR; polymer, surfactant, alkaline and ASP flooding, thermal EOR; steam flooding; huff and puff , steam drive, steam assisted gravity drainage (SAGD), and in-situ combustion; forward, reverse combustion, and toe-to heel air injection (THAI), miscible/immiscible EOR; CO2 flooding, microbial EOR, technical challenges and futures techniques.
Prerequisite: Reservoir Fluid Properties, Applied Reservoir Engineering.

II- Syllabuses of Elective Courses

PE 334A1 Evaluation of Crude Oil	Lecture	Tut/Lab	Total
	2	2	4
Crude and petroleum products physical properties with the study of its curves – preparation of crude for refining operations – atmospheric and vacuum distillation operation and its calculations – the standard specifications for petroleum products. Prerequisite: Organic Chemistry			

PE 334A2 Rocks Mechanics	Lecture	Tut/Lab	Total
	2	2	4
Stress analysis, strain analysis, stress - strain relations, some important problems in rock mechanics. Borehole stability, Rock mass structures, physical rock properties, mechanical rock properties, technological rock properties. Rock behavior and loads, theories of rock failures, effect of discontinuities on rock properties, Laboratory tests and rock properties determination. Prerequisite: Structure Geology			

PE 334A3 Corrosion in Petroleum Industry	Lecture	Tut/Lab	Total
	2	2	4
E.M.F. And galvanic series - polarization - mixed potential theory - general and local corrosion - passivity - Cathodic reactions - types of corrosion - protection methods. Prerequisite: Physical Chemistry			

PE 334B1 Petroleum Development Geology	Lecture	Tut/Lab	Total
	2	2	4
The objectives of development geology, examination of rotary well cuttings, Analysis of cores, Mud logging, electrical and other wire-line logs, Environments where reservoir sandstone are deposited, Oil fields in different types of sand bodies, Reservoir properties of sandstone, Geology of carbonate reservoirs, Oil field in carbonate reservoirs, Oil and gas, Oil-field waters, Sub-surface pressures, drill stem and transient testing, Fluid behavior in reservoirs, Application of reservoir geology to water flooding and enhanced recovery operations, Evaluation of an oil discovery, Examples of applications of development geology. Prerequisite: Petroleum Geology			

PE 334 B2 Petroleum Refining Engineering	Lecture	Tut/Lab	Total
	2	2	4
Conversion processes in petroleum industry (thermal and catalytic cracking - thermal and catalytic reforming - isomerization – hydrogenation- alkalization- polymerization) Prerequisite: None			

PE 434A1 Formation Stimulation	Lecture	Tut/Lab	Total
	2	2	4
Introduction to reservoir stimulation, reservoir justification of stimulation treatments, types of formation damage, damage mechanisms, skin effects, stimulation techniques; matrix acidizing; matrix acidizing of sandstones, carbonate rock acidizing, design and analysis			

of sandstone and carbonate matrix acidizing, matrix acidizing treatment evaluation, hydraulic fracture; fracture fluids, proppant, design and analyze hydraulic fracture, modeling of hydraulic fractures, principles of acid fracturing, HSE and stimulation. Prerequisite: Petroleum Production Engineering 1			
PE 434A2 Horizontal Oil Well Drilling Technology	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Reasons for horizontal well drilling and drain holes, types of horizontal wells and drain holes, design of horizontal well path, drill string and BHA design for horizontal wells and drain holes, drilling problems associated with drilling horizontal wells and drain holes, basic horizontal well casing program, horizontal well completion, drilling multilateral holes, applications of drilling underbalanced techniques for horizontal wells and drain holes, optimized torque and drag during drilling horizontal wells, instrumentation and mechanical aspects of steerable motors and their effect, applications of coiled tubing and new equipment in horizontal drilling, case histories of horizontal well drilling worldwide. Prerequisite: Oil Well Drilling Engineering 1			
PE 434A3 Natural Gas Well Technology and Development	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Formation units and their lithology for Nile Delta, offshore Mediterranean, Western desert drilling areas that are related to drilling gas wells in these areas-Egypt, Gas well drilling techniques in onshore and offshore drilling areas, Practical well control and drilling problems associate with drilling gas wells in Nile Delta, offshore Mediterranean basins in Egypt and how these problems can be treated, Gas well completion, Development and exploitation gas and gas-condensate reservoirs, Theoretical considerations and practical elements of gas reservoir development, Equipment and exploitation of gas wells, Gathering gas in gas fields, Primary treatment of gas, Transportation, storage and utilization of gas, Development, exploitation of gas condensate reservoirs, Egyptian national network of natural gas liquefaction and case histories of gas wells worldwide with highlights of new equipment applications. Prerequisite: Reservoir Fluid Properties			
PE 434A4 Formation Evaluation	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction, Coring and core analysis, drilling fluid and cuttings analysis logging, Mud logging, Electric logging, Radioactive logging, Acoustic logging, Drill stem testing RFT, Other evaluation methods. Subsurface maps and correlations. Prerequisite: Oil Well Drilling Engineering 1, Concurrent with Well Testing, and Well Logging			
PE 434A5 Transportation and Storage of Petroleum	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction, Transportation methods; Pipelines, Types of pipelines, Marine tankers and barges, Pipeline design; Hydraulic design, Pressure head loss calculation, Total line			

pressure drop, Pumps, boosting stations, Location of pumping station, Horsepower required, Minor losses, Natural gas transportation, Design, Sizing pipelines, General flow equation, Pressure drop in gas pipelines, Gas flow measurement, Gas pipe line automation, Technology and Security, Hydrate forming and control conditions, Two phase pipeline, Storage tanks, types, Tank corrosion protection, Design, Firewalls or Dikes, Tank losses, Underground storage.
Prerequisite: Fluid Mechanics, Production Equipment and Machinery

PE 434B1 Petroleum Production Technology	Lecture	Tut/Lab	Total
	2	2	4

Well completion and operations, subsea completion and early production system, well productivity and formation damage, well servicing fluids, perforating, production logging, fracturing, sand production, sand control, well diagnosis, workover, gas lift, submersible pumping, sucker rod pumping, oil and gas gathering systems, oil and gas separators, oil treatment facilities, emulsion treatment, desalting units and crude oil stabilization and hydrogen sulfide removal, gas treatment facilities, storage tanks of crude oil.
Prerequisite: Petroleum Production Engineering 2

PE 434B2 Water and Gas Shutoff Techniques	Lecture	Tut/Lab	Total
	2	2	4

Reasons for increasing water and gas production in oil wells, mechanisms of unwanted water production, future prediction of water and gas production in oil wells, oil displacement by water flooding, areal and vertical sweep efficiencies, Introduction to Polymer Gels, polymer types; sealing gels, relative permeability modifying (RPM), new micro gel technology; Brightwater, colloidal dispersion gel, water shutoff (WSO) techniques; chemical and mechanical methods.
Prerequisite: Enhanced Oil Recovery

PE 434B3 Natural Gas Processing Operations	Lecture	Tut/Lab	Total
	2	2	4

Phase behavior of hydrocarbons gas systems - thermodynamic and physical properties of gases - equations of state - gas fractionation methods (compression - adsorption - absorption - rectification processes). Gas liquefaction (refrigeration system- cascade liquefaction - expander cycle) - storage of liquid natural gas (LNG). Field separation processing (vapor–liquid separation – design of separators – gas conditioning and cleaning – dust filters and scrubbers) – water-hydrocarbon system (presence of water in natural gas – determination of water in natural gas – gas hydrates) – dehydration of natural gas (dehydration by : cooling – absorption – adsorption methods) – processes and design – gas sweetening (physical and chemical methods design in details) – methods and principals of natural gas liquefaction (classic methods – modern improved methods).
Prerequisite: Natural Gas Engineering

PE 434B4 Well Production Logging	Lecture	Tut/Lab	Total
	2	2	4
Introduction to production logging, major applications of production logging, PLT tools; thermometer, gradiomanometer, flowmeter spinners, manometer, caliper, noise, and radioactive tracer, typical production problems, pulsed neutron sigma log, thermal decay time (TDT) log, Activation logs, reservoir saturation tool (RST) log, RFT LOG, sonic and acoustic techniques, fluid movement, bulk flow rate measurement, spinner-flow-meter logging, fluid identification and multiphase flow, fluid density and noise tools, well integrity, temperature logs, cement evaluation - cement bond log interpretation, ultrasonic imager (USI). Prerequisite: Petroleum Production Engineering 2, and Well Logging			
PE 434B5 Reservoir Simulation	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
An overview of reservoir simulation, Recent advance, General introduction, Reservoir rock and fluid properties in simulation, Mathematical modeling of fluid flow dimensions, Single porous media, Flow geometries and dimensions, Single phase flow equation, Multiphase flow equations, Boundary and initial conditions, Setting up the numerical model, grid types and grid selection, Finite difference approximation, Solution of the flow equation (the computer model, single phase flow equations, multiphase flow equations, solutions of the matrix equations), Getting started on a field study (constructing the reservoir model, data collection, data preparation), Special purpose simulators, Water coning, Thermal recovery, Chemical and polymer flooding simulators, Practical applications of reservoir simulators, History matching, forecasting and updating. Prerequisite: Applied Reservoir Engineering, and concurrent with Enhanced Oil Recovery			

Petroleum Refining and Petrochemical Engineering Department (PRE)

Syllabuses of Courses

I- Syllabuses of Mandatories Courses

PRE 141 Introduction To Refinery and Petrochemical Engineering	Lecture	Tut/Lab	Total
	2	2	4

Petroleum definition- origin of petroleum - Chemical composition and classification of crude oil - evaluation of crude oil - physical properties for crude oil and its derivatives - the atmospheric and vacuum distillation and their products – conversion processes (cracking, thermal and catalytic reforming) – raw material production for petrochemical industry- introduction to polymerization- polypropylene production.
Prerequisite: General Chemistry

PRE 142 Principles of Chemical Engineering	Lecture	Tut/Lab	Total
	2	2	4

Introduction to chemical engineering- units and dimension- Material balances with and without reaction - energy balances with and without reaction - combined material and energy balances for unsteady state - industrial applications.
Prerequisite: General Chemistry

PRE 241 Evaluation of Crude Oil	Lecture	Tut/Lab	Total
	2	2	4

Crude and petroleum products physical properties with the study of its curves – preparation of crude for refining operations – atmospheric and vacuum distillation operation and its calculations – the standard specifications for petroleum products.
Prerequisite: Introduction to Petroleum Refining , Organic Chemistry

PRE 242 Petroleum Refining Engineering 1	Lecture	Tut/Lab	Total
	2	2	4

Conversion processes in petroleum industry (thermal and catalytic cracking - thermal and catalytic reforming - isomerization – hydrogenation- alkalization- polymerization).
Prerequisite: Introduction to Petroleum Refining

PRE 243 Unit Operation 1	Lecture	Tut/Lab	Total
	2	2	4

Settling - gas purification - filtration - mixing - flow of fluids through fixed solid bed - fluidization - drying - crystallization - crushing operation - leaching - hydrolysis - separation - electrical separation.
Prerequisite: Chemical Engineering Principals

PRE 244 Industrial Water Treatment	Lecture	Tut/Lab	Total
	2	2	4

Study of pollutants in water- Effect of pollutants on water supplies- industrial water primary treatments - advanced waste water treatments.
Prerequisite: Organic Chemistry

PRE 341 Petrochemical Industries 1	Lecture	Tut/Lab	Total
	2	1	3
Raw materials of petrochemical industries - preparation of gaseous hydrocarbons - fractionation of gases - preparation of liquid hydrocarbons - separation of paraffin's - separation of aromatics - separation of xylenes - syntheses and reactions of h2-co2 mixture - production of methanol - production of alcohols - production of ammonia - production of Sulphur and sulphuric acid. Prerequisite: Organic Chemistry			
PRE 342 Unit Operation 2	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Mass transfer: mechanism - driving force - diffusion in solids - mass transfer operations. Distillation: two components and multicomponent - extraction - phase equilibria - absorption in packed towers - overall mass transfer coefficient. Prerequisite: Principles of Chemical Engineering , Introduction to Petroleum Refining1			
PRE 343 Chemical Reactions Engineering	**Lecture**	**Tut/Lab**	**Total**
	2	**1**	**3**
Chemical thermodynamics - chemical kinetics - factors affecting the rate of chemical reactions - the use of kinetic equation to predict reaction mechanism - types of chemical reactors - bases of chemical reactor design. Prerequisite: General Chemistry			
PRE 344 Corrosion in Petroleum Industry	**Lecture**	**Tut/Lab**	**Total**
	2	**1**	**3**
E.M.F. And galvanic series - polarization - mixed potential theory - general and local corrosion - passivity - cathodic reactions - types of corrosion - protection methods. Prerequisite: Physical Chemistry- Properties and Strength of Materials			
PRE 346 Heat Transfer in Chemical Operations	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Heat conduction, convection and radiation (for steady and unsteady states) and its applications in chemical operations. Prerequisite: Physics 1 and Thermodynamics			
PRE 347 Petroleum Products Testing	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Study the properties of the following products and study the experiments of each property: Gasoline- Kerosene-Synthetic Naphtha-Diesel Fuel- Lube Oils –Thermal Oils. Prerequisite: Evaluation of crude oil - Organic Chemistry			
PRE 348 Computer Applications in Chemical Engineering	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Using Computer Programming in Petroleum and Chemical Engineering Fields to Study Mass and Heat Transfer Processes – To Design Equipment and Chemical Reactors- study of HYSYS.			

Prerequisite: Mathematics 3 ,Computer programming 2, Unit Operation 2			
PRE 349 Unit Processes	**Lecture**	**Tut/Lab**	**Total**
	3	**2**	**5**
Importance of unit processes in organic industry - chemistry and technology of the reactions: halogenation - alkylation - suffocation - nitration - oxidation - hydrogenation and dehydrogenation. Prerequisite: Organic Chemistry			
PRE 34 10 Transportation and Storage of crude Petroleum oil	**Lecture**	**Tut/Lab**	**Total**
	3	**1**	**4**
Cold pipeline - hot pipelines - gas transportation - multiphase problems - centrifugal pumps - storage of oil and its products - storage capacities - optimum proportions and design of tanks - transportation and storage of natural gas - equipment of loading, transport and measurements. Prerequisite: Fluid Mechanics			
PRE 441 Plant Design	**Lecture**	**Tut/Lab**	**Total**
	2	**1**	**3**
Optimum design – one variable – two variables – stages of plant design – applications in chemical engineering units. Management principals in chemical industry – supervision and management – production performance levels – maintenance. Prerequisite : Petroleum Refining 1			
PRE 442 Pollution Control	**Lecture**	**Tut/Lab**	**Total**
	2	**1**	**3**
Sources of pollution in petrochemical and petroleum industries – air pollution - water pollution – its treatment Prerequisite : Organic Chemistry			
PRE 443 Design of Refining Equipments	**Lecture**	**Tut/Lab**	**Total**
	2	**1**	**3**
Design principals – design codes – pressure vessels of small and high thickness – furnace design- cooling towers design – evaporators – turbines and gas compressors – design and calculations of natural gas liquefaction equipment. Prerequisite : Unit Operation 2 .Petroleum Refining 1			
PRE 445 Project	**Lecture**	**Tut/Lab**	**Total**
	-	**8**	**8**
The goal of this project is to prepare students for the practice of the engineering profession and work with the team, and to prepare for the implementation of the project based on the knowledge and skills acquired in the academic work of previous levels. Students learn how to develop ideas for projects and implementation plan and write scientific report and defend it when discussing.			

PRE 446 Automatic Control in Chemical Operations	Lecture	Tut/Lab	Total
	2	2	4

Introduction to automatic control system (ACS) – methods of analysis and synthesis of acs – stability and quality of acs – mathematical description of controlled member (plant) of acs – automatic control equipment (principals of automatic check – measurement of temperature , pressure , quantity , flow and level – transmission of instruments readings – process control systems (methods of automatic control of petroleum refining and petrochemical equipment – process control schemes).

Prerequisite: Petroleum Refining 1

PRE 447 Petroleum Refining 2	Lecture	Tut/Lab	Total
	2	2	4

Catalytic cracking- hydrocracking-hydro treating (sulfur removal-aromatic compounds removal-hydro finishing-reforming)-types and performance of catalysis- catalytic dewaxing-petroleum additives-additives to oils and fuels- liquefaction and gasification of coal- rock oil and tar sand (source-extraction-refining)- alternate fuels- fisher tropsch synthesis.

Prerequisite: Petroleum Refining 1

PRE 448 Petrochemical Industries 2	Lecture	Tut/Lab	Total
	3	2	5

Production of detergents and their raw materials – production of plastics and resins – production of synthetic rubber – production of industrial fibers- natural and mechanical properties of polymers.

Prerequisite: Petrochemical Industry 1

PRE 449 Petroleum Gases Engineering	Lecture	Tut/Lab	Total
	2	2	4

Phase behavior of gas systems - physical properties of gases - gas fractionation methods (compression - adsorption - absorption - rectification processes). Gas liquefaction (refrigeration system- cascade liquefaction - expander cycle). Field separation processing (vapor–liquid separation – design of separators – gas conditioning and cleaning – dust filters and scrubbers) – dehydration of natural gas (cooling – absorption – adsorption) – gas sweetening (physical and chemical methods design) – classic and modern improved methods of natural gas liquefaction.

Prerequisite: Petroleum Refining 1 , General Chemistry

PRE 4410 Optimization in Chemical Engineering	Lecture	Tut/Lab	Total
	2	2	4

Optimum design and different methods for solution-linear programming-nonlinear programming-kinetic programming-application of separation process – fluid movement system-water and energy conservation.

Prerequisite :Unit Operation 2 , Computer Programming 2

II- Syllabuses of Elective Courses

PRE 345A1 Rheological Properties of Petroleum Products	Lecture	Tut/Lab	Total
	2	2	4

Emotion – formation-pressure-different types of fluids-different methods for viscosity measurement-effect of temperature and pressure on the rheological properties- improving methods the rheological properties
Prerequisite : Fluid Mechanics

PRE 345A2 Introduction to Petroleum Engineering	Lecture	Tut/Lab	Total
	2	2	4

Geological (suitable and type of metals)- formation and petroleum movement from rocks- oil and gas reservoir- Methods of exploration (Seismic reflection)-Hydrocarbons formation by pressure - Production mechanisms - Enhanced oil recovery- Industrial lifting methods- Drilling operations- application and interpretation of the ground response for nuclear, electric and natural sources- Estimate of oil reserves-Phase behavior and Reservoir fluid properties- Raw materials in the oil and gas place- Separation and fluid handling producing surface facilities.
Prerequisite: None

PRE 345A3 Chemical Industries	Lecture	Tut/Lab	Total
	2	2	4

Petrochemicals industries (organic and non-organic industries- Detergents- Dyes- Fertilizer-Black coal- Sulfuric acid production)
Prerequisite: Organic Chemistry

PRE 345B1 Enhance Oil and Gas Recovery	Lecture	Tut/Lab	Total
	2	2	4

Determine enhanced oil recovery(EOR)- Enhanced recovery of coalbed methane (ECBM)- Theory of enhanced oil- Check reservoirs to choose EOR methods of ECBM- Sweep efficiency-Estimate the saturation of oil detainee- Polymer flooding- Surface torrents- Immiscible gas flooding and miscible/ Semi-miscible- Steam flooding- Application of fractional flow theory- miscible displacement of CH4 by CO2 in depleted gas reservoir- Displacement of CH4 in coal seams by N2 and CO2- Carbon capture and storage in geological formations underground.
Prerequisite: None

PRE 345B2 Energy Conservation	Lecture	Tut/Lab	Total
	2	2	4

All methods and ideas for energy saving- Energy recovery and Rationalization of Fuel- Optimized design of the steam system- Isolation-Energy saving by re-use of heat
Prerequisite: Thermodynamics

PRE 345B3 Organic and Inorganic Fertilizers	Lecture	Tut/Lab	Total
	2	2	4

Nitrogen – Phosphate- Illustrations of potassium fertilizers - Operating conditions and instruments design.
Prerequisite: Petrochemical Industries 1

PRE 345B4 Hysys Application in Refinery Plants	Lecture	Tut/Lab	Total
	2	2	4
Design of heat exchanger- Design of Furnace-Design of distillation Tower-Reactor design-Improve the performance of the unit and Retrofits-Simulation of dynamic process. Prerequisite: Unit Operation 2, Computer Programming 2 , Physics 3			
PRE 444A1 Sustainable Energy	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Solar Energy-Wind Energy-Nuclear Energy-Unusual systems- Biomass energy Prerequisite: Thermodynamics			
PRE 444A2 Chemistry and Technology of Polymers	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Classification of heavy Polymers-Production methods of heavy polymers- Polymerization by free Cracks-Ionic Polymerization-Conversion of cyclic polymers into linear polymers-Co polymer Production-General Characteristics of Polymers-Physical and chemical properties of polymers. Prerequisite: Organic Chemistry , Petrochemical Industries 1			
PRE 444A3 Catalysis in Chemical Engineering	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Factors stimulated Desorption-Catalyst Carrier-Selective Catalyst-Rate equation for Catalysis-Spreading Reaction-Physical and chemical Adsorption-Design of catalytic reactor. Prerequisite: Physical Chemistry , Physics 3			
PRE 444A4 Operation Research in Chemical Engineering	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Nature of operation Research-Linear Programming Model-Simple Put-Transport Model-Method of network analysis- Optimum benefit from the industrial processes- Probability Models. Prerequisite: Principles of Chemical Engineering, Math.5			
PRE 444B1 Synthetic Rubber and Plastic	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Rating compositional characteristics of industrial Rubber-Raw materials for synthetic rubber and Plastic-Production of butadiene rubber- The production of Styrene-Butadiene-The production of nitrile Rubber-Thermoplastics-Production methods of plastics. Prerequisite: Petrochemical Industries 1			
PRE 444B2 Furnace and Heat Exchanger Design	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Design different kinds of furnaces, heat exchangers- Network heat exchangers for oil refining operations design Prerequisite: Thermodynamics			

PRE 444B3 Nano Technology and its Applications in Chemical Engineering	Lecture	Tut/Lab	Total
	2	2	4
Introduction to nanotechnology and its applications - Basic concepts and definitions of nanomaterials - nanomaterials properties on the basis of proportion of surface/volume - scanning technology and electron probe on nanomaterials characterization - Introduction to ultraviolet spectroscopy and infrared -Nano membrane technology techniques - stimuli Nano engineered - polymers Nano engineered -nanotubes manufacturing - nanoparticles - quantum dots - Micro wire micro - Formulation of nanoparticles –manufacturing of nanoparticles in biotechnology industries. Prerequisite: Physics 3			

Metallurgical and Materials Engineering Department (MME)

Syllabuses of Courses

I- Syllabuses of Mandatories Courses

MME 151 Unit operations in Metallurgy	Lecture	Tut/Lab	Total
	2	2	4

Different methods of ores preparation for metallurgical processes, roasting of ores, Pelletizing process, Calcination process, Sintering process, Coal coking process, Production process of refractory bricks.
Prerequisite: None

MME152 Materials Characterization Techniques	Lecture	Tut/Lab	Total
	2	1	3

Metallographic techniques and sample preparation: sectioning; mounting; grinding; polishing; etching; electro-polishing. Introduction to materials characterization techniques covers the general principles techniques used in characterization of materials including chemical, microstructural, and surface analysis of material. X-ray diffraction methods for the determination of crystalline structures. Light microscopy: principles and applications. Scanning electron microscopy: principles and applications. Chemical analysis Techniques: principles and applications. Principles of quantitative characterization of microstructure.
Prerequisite: None

MME 153 Phase Diagrams	Lecture	Tut/Lab	Total
	2	2	4

Electron theory of metals and its applications, bonding types and binding energy. Crystallography, crystalline imperfections: point defects, dislocation theory, grain boundary, volume defects. Theory of alloying, Free energy equilibrium diagrams, binary diagrams and their applications, Fe-C system, Ternary diagrams.
Prerequisite: Introduction to Materials Science and Engineering

MME 251 Mechanical Behavior of Materials	Lecture	Tut/Lab	Total
	2	2	4

State of stress, Principle stresses, Theory of elasticity, Theory of plasticity, Yielding criteria. Plastic deformation mechanisms of single crystals and polycrystalline. Strain hardening theories in single crystal and polycrystalline. Mechanical behavior under normal and shear stress. High temperature and high strain rate deformations, materials behavior under creep conditions, Cyclic materials deformation behavior, Facture of materials (Mechanics and mechanisms).
Prerequisite: Phase Diagrams

MME 252 Electrochemistry in Metallurgy	Lecture	Tut/Lab	Total
	2	2	4

Origin of electrochemistry, Electrolytes and conductivity, Electrochemical cells, Faraday's laws, Thermodynamics and kinetics of electrochemical reactions, Dissociation

of electrolytes and solubility product, Electrolysis of molten salts, Electroplating from aqueous solutions and from ionic liquids, Electro wining, Electro thermic and its applications.
Prerequisite: Physical Chemistry

MME 253 Heat Transfer in Metallurgy	Lecture	Tut/Lab	Total
	2	2	4

Basic modes of heat transfer (conduction, convective, radiation). One dimensional steady state heat conduction: Composite Medium – Critical thickness – Effect of variation of thermal Conductivity – Extended Surfaces – Unsteady state. Free convection in atmosphere free convection on a vertical flat plate – Empirical relation in free convection – Forced convection – Laminar and turbulent convective heat transfer analysis in flows between parallel plates, over a flat plate and in a circular pipe. Radiation properties – Radiation shape factors – black bodies – Radiation shields. Apply heat transfer principles to design and to evaluate performance of thermal systems, Calculate the performance of heat exchangers, calculate radiation heat transfer between objects with simple geometries
Prerequisite: Physics1

MME 254 Diffusion and Phase Transformations	Lecture	Tut/Lab	Total
	2	2	4

Fundamentals of diffusion, Introduction and definition, Importance of diffusion study, Diffusion mechanisms, Vacancy diffusion, Interstitial diffusion, Diffusion types, Atomic vibrations, Flux of diffusion atoms, Fick's diffusion laws: Fick's first law- Steady state diffusion, Fick's second law - Non steady state diffusion, Diffusion temperature dependents, Equation governing diffusion, Error function, Diffusion thermal activated process, Kerkirdal effect, Darkens equations, DIGM (diffusion induced grain boundary migration), Factors that influence diffusion
Theory of solidification of metals and alloys: Liquid to solid transformation, homogenous and heterogeneous nucleation and growth, Diffusional transformations, Precipitation hardening, Diffusion less transformations. Deformed state, Recovery, Recrystallization and Grain growth.
Prerequisite: Phase Diagrams

MME 351 Non-Destructive Materials Testing	Lecture	Tut/Lab	Total
	2	2	4

Introduction to non-destructive testing, Casting and welding discontinuities, Visual inspection, Magnetic particle testing, Liquid penetration testing, Radiographic testing (X-rays and Gamma rays). Image analysis. Ultrasonic testing, Eddy current testing.
Prerequisite: Introduction to Materials Science and Engineering

MME 352 Heat Treatment Technology	Lecture	Tut/Lab	Total
	3	2	5
Technological Principles: General principles of Heat Treatment, Heat treatment furnaces, Heat treatment of steel, Heat treatment cast iron, Heat treatment of non-ferrous alloys. Thermo-mechanical treatment of ferrous and non-ferrous alloys, Thermo-chemical heat treatment, Surface hardening. Prerequisite: Diffusion and Phase Transformations			

MME 353 Thermodynamics and Kinetics of Metallurgical process	Lecture	Tut/Lab	Total
	2	2	4
First and second laws of thermodynamics, Equilibrium between phases Clauses – Clapeyrom, Thermodynamics of solution, Composition and properties of gaseous phase, Theory of formation and dissociation of oxides and carbonates, Theory of reduction of metals oxides, Structure and properties of material melts, Structure and properties of oxides (slag), Fundamentals of interaction between metals and slag, Metals/gas reaction, Kinetics of metallurgical processes. Prerequisite: Physical Chemistry , Thermodynamics			

MME 354 Corrosion Engineering and Protection	Lecture	Tut/Lab	Total
	3	2	5
Introduction, Importance of corrosion, Electro chemical series of metals, Galvanic series of metals, Electrode potential–current density curves, General corrosion, Local corrosion, Some important types of corrosion cells, Pourbaix diagrams, Cyclic voltammetry diagrams, Different methods of metal protection, Electrochemical principles of cathodic protection, Corrosion tests and monitoring, corrosion at high temperature Prerequisite: Electrochemistry in Metallurgy			

MME 355 Metallurgical Furnaces and Refractories	Lecture	Tut/Lab	Total
	2	2	4
Different metallurgical furnaces, Principles of furnace design. Types of refractories – properties – selection for different processes. Furnace's Fuels: Ignition, classification of fuels, burners and production. The principles of heat transfer in metallurgical furnaces: application (forced convection, radiation, conduction). Heat recovery systems (regenerators and recuperators). Applications: Iron-making furnaces, Steel making furnaces, ladle furnaces, ferroalloy production furnaces, Heat treatment furnaces, Induction and electrical furnaces. Prerequisite: Heat Transfer in Metallurgy			

MME 356 Destructive materials testing	Lecture	Tut/Lab	Total
	2	2	4
Introduction to destructive tests - Tension test – Compression test – Hardness test – Impact test– Creep test – Fatigue test – Torsion test – Bending test - Formability tests.			

The following points will be covered in the above mention tests: How to carry out the test? Standard test method and test specimen, testing machines, test precaution. Parameters measured by the test, calculation and evaluation of the test results.
Prerequisite: Introduction to Materials Science and Engineering

MME 357 Welding Metallurgy and Technology	Lecture	Tut/Lab	Total
	3	2	5

Welding joints, Fillet and Groove joints, Oxy-fuel welding, SMAW, GMAW, GTAW, FCAW, SAW, Beam welding, Friction stir welding, spot welding, Plasma welding, Phase transformations during cooling of the weld metal, Transformation in carbon-, low alloy- and stainless-steels welds, the heat affected zone (Recrystallization and grain growth), Dissimilar welding. Residual welding stresses and distortion, Brazing and soldering, Safety.
Prerequisite: Diffusion and Phase Transformations

MME 358 Ceramic Materials	Lecture	Tut/Lab	Total
	2	1	3

Introduction to Ceramics, Ceramic raw materials, Traditional and Advanced Ceramics, The Structure of Crystalline Ceramics, The Structure of Crystalline Silicates, Imperfections in Crystalline Ceramic Structures, Processing and Applications of Clay Products, Processing and applications of Advanced Ceramics, Physical and Mechanical Properties of Ceramics, Glass, Nature of Glass, Types and Properties of Glass, Glass Ceramics, Processing and applications of Glass Ceramics, The Use of Glass-ceramics in Dentistry, Refractories (Classifications, Chemical compositions and Applications), Ceramic Businesses.
Prerequisite: Introduction to Materials Science and Engineering

MME 451 Ferrous Extractive Metallurgy	Lecture	Tut/Lab	Total
	3	2	5

The metallurgy of pig iron: Preliminary treatment of iron ores, Description of a modern blast furnace, Blast furnace charge and fuel, Blast furnace reactions, Blast furnace products and efficiency, Alternative methods for iron production, Direct reduction iron, Hot briquetted iron. The metallurgy of steel making: principles of steel making, The oxygen converter, The electric processes, ladle treatment, scrap handling, Ferroalloys. Safety.
Prerequisite: Thermodynamics and Kinetics of Metallurgical Processes

MME 452 Composite Materials	Lecture	Tut/Lab	Total
	2	1	3

Introduction to composite materials, Classification and characteristics of composites, Dispersion composite, Particulate composites, Fiber–reinforced composites, Fibers types and properties, Laminar composite materials, Network composite materials, Nano composites, Production techniques of composite materials, bonding, and reactivity, Rule of mixture, Physical and mechanical properties of composites, Applications of composites.

Prerequisite: Introduction to Materials Science and Engineering

MME 453 Casting Engineering	Lecture	Tut/Lab	Total
	2	2	4

Introduction to casting engineering, casting design considerations, Pattern and core making technologies, Mold technology, Sand casting processes, Special sand casting processes and other non-sand casting processes, Continuous casting, cast alloys, casting defects, Casting cleaning and fettling, Inspection and repair, Foundry pollution and safety, Foundry modernization.
Prerequisite: Diffusion and Phase Transformations

MME 454 Modeling and Simulation in Materials Engineering	Lecture	Tut/Lab	Total
	2	2	4

Introduction to modeling and simulation, Physical modeling. Mathematical modeling, Computer modeling. Numerical solution methods, Model idealization, Materials data for simulation, Solution techniques (implicit& explicit), Discretization and meshing, Boundary conditions and loading, Results visualization, results extraction and interpretation. Examples on simulation applications in in field of metallurgy and materials
Prerequisite: Introduction to Materials Science and Engineering and Computer Programing 2

MME 455 Materials Forming	Lecture	Tut/Lab	Total
	3	2	5

Effect of deformation parameters (temperature, strain rate and friction) on flow behavior of materials, Methods of solution to determine the deformation load (Slab method, finite element method, etc.). Materials forming processes: - Rolling, Forging, Extrusion, Wire and tube drawing, Sheet metal forming & deep drawing. Industrial materials machining processes (Cutting method, Surface finishing, etc.).
Prerequisite: Mechanical Behavior of Materials

MME 456 Non – Ferrous Extractive Metallurgy	Lecture	Tut/Lab	Total
	3	2	5

Main categories of extractive metallurgy, Economic classification of non-ferrous metals, Extractive metallurgy of primary metals: Copper, Zinc and Lead, Extractive metallurgy of light metals: Aluminum and Titanium, Extractive metallurgy of precious metals: Gold and Silver, Industrial safety during extraction of non-ferrous metals.
Prerequisite: Electrochemistry in Metallurgy

MME 457 Principals of Alloys Design	Lecture	Tut/Lab	Total
	3	2	5
Application of material science principals to understand the structure-properties – performance relationships. Description of how alloy design relates to component design. Interrelationship between processing, composition and properties. Illustration of alloy development to optimizing and properties. Modern concepts in alloy design and design practice under various conditions. Prerequisite: Mechanical Behavior of Materials			

MME 458 Project	Lecture	Tut/Lab	Total
		8	8
The objective of this course is to prepare students for engineering practice to work in teams, and to prepare for implementing a design project based on the knowledge and skills acquired in their earlier course work. Students learn how to brainstorm ideas for projects and plan for implementation, and write a technical report and defend their work.			

II- Syllabuses of Elective Courses

MME 359A1 Nuclear Metallurgy	Lecture	Tut/Lab	Total
	2	2	4

Introduction, Nuclear engineering; atomic and nuclear physics; interaction of radiation with matter; neutron diffusion and moderation; nuclear reactors and nuclear power; Nuclear reactor theory; the time-dependent reactor; heat removal from nuclear reactors; radiation protection; radiation shielding; reactor licensing, Material in power reaction, Radiation damage safety, and the environment.
Prerequisite: Introduction to Materials Science and Engineering

MME 359A2 Powder Metallurgy	Lecture	Tut/Lab	Total
	2	2	4

Introduction to Powder Metallurgy (PM), Advantages and limitations of PM technique, Powder fabrication methods, Properties of powders and characterization techniques; Powder mixing, Powder shaping and compacting; Compaction techniques, Cold compaction, Hot pressing, Sintering fundamental and theory, Liquid phase sintering, Full density processing; Properties and Applications of produced materials, Economy and safety of PM.
Prerequisite: Phase Diagrams

MME 359A3 Steel and Cast Irons Processing	Lecture	Tut/Lab	Total
	2	2	4

The metallurgical fundamental of high strength low alloy (HSLA) steel, Precipitation strengthened high strength steels, Dual Phase (DP) Steels, Bake-hard enable (BH) steels, Transformation strengthened steels, Complex Phase (CP) Steels, High strength fully bainitic and ferrite-bainite steels, High strength martensitic steels, Austenitic stainless steels, Super austenitic stainless steels, Ferritic stainless steels, Duplex stainless steels. Cast irons development, TWIP steel.
Prerequisite: Diffusion and Phase Transformations

MME 359B1 Hydrometallurgy	Lecture	Tut/Lab	Total
	2	2	4

Hydrometallurgy vs pyro metallurgy and other branches of extractive metallurgy, Leaching agents and leaching techniques, Kinetics of leaching, Electrochemical Mechanism in Leaching, Solution concentration and purification by Precipitation, Cementation, Solvent Extraction and Ion Exchange, Gaseous Reduction of Metals from Aqueous Solution, Metal Recovery by Electrolysis of aqueous solutions and Molten Salts, voltage requirements in electrolysis, biotechnology in metallurgy, Industrial applications of hydrometallurgy, Safety in hydrometallurgy.
Prerequisite: Electrochemistry in Metallurgy and Unit Operation in Metallurgy

MME 359B2 Polymer Materials	Lecture	Tut/Lab	Total
	2	2	4

Definitions, advantages of polymers, Chemistry of polymer synthesis, kinetics of polymerization, relation between molecular structure and physical and mechanical properties of polymers, polymer types, thermosetting resins, thermoplastics, electrical and optical properties of polymers, metal-polymer composites. Polymers and Microelectromechanical systems (MEMS).
Prerequisite: Introduction to Materials Science and Engineering

MME 359B3 Smart Materials	Lecture	Tut/Lab	Total
	2	2	4

Introduction, Piezoelectric materials, shape memory alloys, self-healing materials, advanced functional materials, magnetostrictive materials, photomechanical materials
Prerequisite: Introduction to Materials Science and Engineering

MME 459A1 Failure Analysis	Lecture	Tut/Lab	Total
	2	2	4

Introduction and statistics of failure cases, Standard investigation methods and techniques applied in failure analysis, Fractography, Fatigue failures, Creep and creep/fatigue failures, Tribological failure, Failure under thermal loading, High temperature failure, Corrosion Failure, Failure of welded structures, Reporting of failure.
Prerequisite: Introduction to Materials Science and Engineering

MME 459A2 Surface Engineering	Lecture	Tut/Lab	Total
	2	2	4

Wear and friction of metals, Surface modification: diffusion metallizing, anodizing, chemical conversion coating, ion implantation, laser re-melting. Overlay coating: Thin film (physical vapor deposition PVD, chemical vapor deposition CVD, electroplating of electronic devices), Thick film (electroplating, electroless plating, thermal spray coating, hot dipping, cladding, laser cladding). Non-metallic coating: ceramic coating, polymer coating, enamel coating, painting.
Prerequisite: Corrosion Engineering and Protection and Heat Treatment Technology

MME 459A3 Biomaterials	Lecture	Tut/Lab	Total
	2	2	4

Properties of biomaterials, Cell biology underlying the design of medical implants, Artificial organs, Biocompatibility, Surface characterization and analysis of protein adsorption on biomaterials, Biodegradation of implant materials, Standard specifications of implant materials, Metallic Biomaterials; Ceramic Biomaterials; Polymeric Biomaterials; Composite Biomaterials; Biodegradable Polymeric Biomaterials; Biologic Biomaterials: Tissue-Derived Biomaterials (Collagen); Soft Tissue Replacements; Hard Tissue Replacements, Preservation Techniques for Biomaterials; Joint Prosthesis Fixation: Problems and Possible Solutions. Case study for materials implantation.

Prerequisite: Diffusion and Phase Transformation

MME 459A4 Corrosion Testing and Monitoring	Lecture	Tut/Lab	Total
	2	2	4
Laboratory tests (electrochemical, cabinet, immersion, high temperature and high pressure testing), Surface analysis, testing for corrosion types (main standard tests), Field and service tests, Exposure tests, Testing of coats, Corrosion maintenance through inspection and modeling. Nondestructive evaluation, Modeling and life prediction. Prerequisite: Corrosion Engineering and Protection			

MME 459A5 Welding Engineering	Lecture	Tut/Lab	Total
	2	2	4
Welding physics: energy sources in welding processes - electrical arc properties - material transfer - melting rates - physical properties of metals and protection gases. Thermal transfer. Welding joint design: welding geometries for steel and aluminum alloys. Determining the cost of the welding process and how to control it. Quality of welds: the most important defects of welding (reasons and how to cure). The main disadvantages of welding mortar. Corrosion in welds and joints welded with mortar **Prerequisite**: Introduction to Materials Science and Engineering			

MME 459B1 Materials Selection and Standards	Lecture	Tut/Lab	Total
	2	2	4
Factors Influencing Materials Selection, Cost based selection, Materials Selection criteria for Mechanical Properties (static strength-toughness-stiffness- fatigue Resistance-Creep and temperature resistance), Selection for Surface Durability (corrosion Resistance-Wear-resistant), Materials selection charts, Standardization of Materials databases and knowledge bases. Non-ferrous alloys: Al-, Mg-, Cu-, Zn-, Ti- alloys. Cases studies. Prerequisite: Welding Metallurgy and Technology			

MME 459B2 Nanomaterials	Lecture	Tut/Lab	Total
	2	2	4
Definition of nanomaterials, Introduction to nanoscience, nanotechnology, and history of nanomaterials, applications nanomaterials, Classification of nanomaterials, impact of nanotechnology, production methods of nanomaterials, Safety in nanomaterials industry. Prerequisite: Introduction to Materials Science and Engineering			

MME 459B3 High temperature Oxidation and Hot Corrosion	Lecture	Tut/Lab	Total
	2	2	4
High temperature corrosive media, Thermodynamics of high temperature corrosion in gases, Mechanisms and kinetics of corrosion in gases, Oxidation of pure metals, Oxidation of alloys (internal oxidation, multiphase scales), Reaction of metals in mixed environments, Practical High-Temperature Corrosion Problems (oxidation, sulfidation, carburization, decarburization, metal dusting, nitration, gaseous halogen corrosion, fuel ash and salt deposits, corrosion by molten salts , corrosion in liquid metals, compilation			

and use of corrosion data), Methods of investigation of oxidation process, Atmospheres control for the protection of metals, Materials selection for high temperature corrosive media.
Prerequisite: Corrosion Engineering and Protection

MME 459B4 Codes of Design and Fabrication of Metallic Constructions	Lecture	Tut/Lab	Total
	2	2	4

General concepts. Rules for construction of metallic bridges. Rules for construction of power boilers pressure vessels. Rules for construction of nuclear facility components. Rules for construction of heating boilers. Rules for the care and operation of heating boilers. Guidelines for the care of Power boilers. Fiber-reinforced plastic pressure vessels. Rules for construction and continued service of transport tanks.
Prerequisite: Mechanical Behavior of Materials

MME 459B5 Casting Design	Lecture	Tut/Lab	Total
	2	2	4

Casting design considerations, Mould design, Pattern design, Fabrication of pattern prototypes, Design of Core and Core boxes, Design of pouring systems, Risering design.
Prerequisite: Casting Engineering

MME 459B6 Design and Applications of Cathodic Protection Systems	Lecture	Tut/Lab	Total
	2	2	4

Basic theory of cathodic protection (CP), Criteria for CP, Soil resistivity survey, impressed current CP, CP with galvanic anodes, Elimination of stray current interference, Ground bed design and installation, Test point installation and construction, Instrumentation, Design formulae, CP systems installations (pipelines, tanks, marine structures, ships, vessels and tubes, heat exchangers), Maintenance and control (current measurement, potential survey).
Prerequisite: Corrosion Engineering and Protection

MME 459B7 Production of Ferroalloys	Lecture	Tut/Lab	Total
	2	2	4

Utilization of ferroalloys, Classifications of Fe–x, Physico–chemical bases of oxides reduction, Metal recovery in ferroalloy production processes, deoxidation power of Fe–x, Calculations of Fe–x required for deoxidation and alloying, Production of Fe–Si alloys and Si–Ca alloys, Production of Fe–Mn (medium and low C-Fe-Mn), Production of Fe–Cr alloys (C–Fe–Cr, medium, low and free C–Fe–Cr), Production of Fe–Ti alloys, Production of Fe–V alloys.
Prerequisite: Thermodynamics and Kinetics of Metallurgical Processes

MME 459B8 Eco materials	Lecture	Tut/Lab	Total
	2	2	4
The concept of 'Eco materials', the importance of materials to human society, Materials science in the developing world: Challenges and perspectives for Egypt, Materials role, Material flows through society, materials for engineering, Materials for reducing environmental impact, The future of materials science and Materials engineering, Social responsibilities of materials engineer, Classification of materials. Prerequisite: Introduction to Materials Science and Engineering			

Mining Engineering Department (ME)

Syllabuses of Courses

I- Syllabuses of Mandatory Courses

ME 161 Introduction to Mining Engineering	Lecture	Tut/Lab	Total
	2	1	3

Prospection, Terminology in quarry & mine, opening up of deposits, Mine opening driving, Shaft sinking, Stages of Mining.
Laboratory: Mining Lab.
Prerequisite: None

ME 261 Rock Mechanics 1	Lecture	Tut/Lab	Total
	2	1	3

Stress analysis, strain analysis, stress - strain relations, some important problems in rock mechanics. Rock mass structures, physical rock properties, mechanical rock properties, technological rock properties. Rock behavior and loads, theories of rock failures, effect of discontinuities on rock properties, Laboratory tests and rock properties determination.
Laboratory: Rock Mechanics Lab.
Prerequisite: Mathematics 4 , Introduction to Materials Science and Engineering

ME 262 Plane Survey & Topography (For Petroleum, Mining , Geological and Geophysical Engineering Departs)	Lecture	Tut/Lab	Total
	2	1	3

Introduction and definitions of plane surveying, linear measurement, Angular measurements, Leveling, Plane table, Contours and contouring, Areas calculations, Volume calculations, Theodolite and practical surveying.
Prerequisite: Mathematics 4

ME 263 Geodetic Survey and astronomy (For Mining, Geological and Geophysical Engineering Departs).	Lecture	Tut/Lab	Total
	2	2	4

Tachometric measurements, Curves, Triangulation and measurements of lengths, Electro- Optical distance meter, Adjustments of triangulation and levelling networks, Eccentricity and reduction to center, Geodetic levelling, Strength of figures, Triangulation and levelling network adjustment, Figuration of the earth, Laplace equation, Convergence of meridian and theory of errors.
Prerequisite: Plane Survey and Topography

GGE 274 Applied Geophysics	Lecture	Tut/Lab	Total
	2	2	4

Fundamental Principles, Application Fields, Possibilities and Limits of Applied Geophysics. Geophysical Prospecting Methods: Gravimetric, Magnetic, Electrical, Electromagnetic, Seismic, and Radioactive. Well Logging. Other Special Methods (Chemical, Thermal). Instruments for Geophysical Measurements. Geophysical Surveying Techniques. Processing, Representation, and Interpretation of Geophysical Data. Computers in Geophysical Exploration. Field Examples. Economic and Statistical Data in Geophysical Exploration.
Prerequisite: Earth and Engineering Sciences, Structure Geology

ME 361 Underground Mining Methods	Lecture	Tut/Lab	Total
	2	2	4
Classification of underground mining methods, Field of use, Mine development and Way of working as well as Advantages and disadvantages of open or naturally supported stops - Artificially supported stops - Caved stops, Underground mining methods selection, Some novel mining methods. Laboratory: Mining Lab Prerequisite: Introduction to Mining Engineering, Rock Mechanics 1			
ME 362 Mineral Processing 1	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction, general aspects of comminution, comminution laws, crushers, grinding mills, liberation, particle size analysis (screening and sub-sieve analysis), analysis and presentation of particle size data, size reduction (crushing and grinding), industrial screening, size reduction – screening circuits. Laboratory: Mineral Processing Lab Prerequisite: Mineralogy and Crystallography, Petrology			
ME 363 Technology of Surface Mines	**Lecture**	**Tut/Lab**	**Total**
	3	**2**	**5**
Introduction to surface mining technology of coal, ores, building and construction materials and placer mining deposits, choice of a method for opencast work, determining the depth and production capacity of an open pit, major operations in opencast mining, development of surface mine fields, surface mining methods and equipment. Laboratory: Mining Lab Prerequisite: Introduction to Mining Engineering, Rock Mechanics 1			
MME 3510 Extractive Metallurgy	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
An introduction to extractive metallurgy. The metallurgy of iron: Blast furnace charge and fuel, Blast furnace reactions, Blast furnace products. Alternative methods for iron production, direct reduction iron. Steel making. Pyro metallurgy of primary metals: Copper, Zinc and Lead. Pyro metallurgy and light metals: Aluminum and Titanium. Laboratory: Hydrometallurgical Lab. Prerequisite: Analytical Chemistry, Mineral Processing 1			
ME 365 Mineral Processing 2	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction, movements of solids in fluids, classification, hydraulic classifiers, mechanical classifiers, hydro-cyclones, gravity concentration process, heavy media separation, pneumatic concentration (tables and jigs), magnetic separation, electrostatic and high-tension separation, concentration circuits, quantifying of concentration processes. Laboratory: Mineral Processing Lab			

Prerequisite: Mineral Processing 1			
ME 366 Processing of Non-metallic Raw Materials	**Lecture**	**Tut/Lab**	**Total**
	3	**1**	**4**
Coke making, ceramic industries, Portland cements, calcium and magnesium compounds, glass industries, salt and miscellaneous sodium compounds, color-alkali industries, electrolytic industries, electro thermal industries, phosphorus industries, potassium industries, Sulphur and sulfuric acid, pottery and bricks industries. Prerequisite: Mineral Processing 2			
ME 367 Strata Control	**Lecture**	**Tut/Lab**	**Total**
	3	**2**	**5**
Rock properties and behavior, Design of underground opening and pillars, Surface subsidence, Support of mine workings (timbering, bolting and self-advancing support), stowing (significance and methods). Laboratory: Mining Lab Prerequisite: Introduction to Mining Engineering, Rock Mechanics 1			
ME 368 Underground Surveying	**Lecture**	**Tut/Lab**	**Total**
	3	**1**	**4**
Introduction, Underground traverse, underground orientation (geometrical and physical methods), R. level transferring, stops surveying, mine surveying layout and open cast mining. Laboratory: Surveying Lab Prerequisite: Geodetic Survey and Astronomy			
ME 461 Survey Project	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
It is an integrated work project. In that, work the student applies all surveying science on the ground. The student should be discussed at the end of the project period, and provide a copy of the work and maps to the department. Laboratory: Surveying Lab Prerequisite: Plane Survey & Topography, Geodetic Survey and Astronomy, Underground Survey			
ME 462 Mineral Processing 3	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction, Physical Chemistry of surfaces, Solid-liquid-gas interaction, Solid-water system interaction, Flotation theory, Chemistry of flotation, flotation reagents, Flotation machines, Flotation of sulfide minerals, Flotation of non-sulfide minerals, Flotation circuits, Flocculation, Dispersion, Dewatering, Miscellaneous processes. Laboratory: Mineral Processing Lab Prerequisite: Mineral Processing 2			

ME 463 Mine Ventilation and Air Conditioning	Lecture	Tut/Lab	Total
	2	2	4

Requirements of proper ventilation to achieve quality and temperature- humidity control of ambient air in mine openings to insure suitable environment for ideal human work performance. Laws of mechanically induced air flow in airways of some simple, permanent ventilation networks and ventilation ducts of auxiliary ventilation systems. Construction and performance characteristics of mine fans, systems and equipment for air-cooling, and refrigeration plants. Heat transfer to ventilating airflow in mine airways.
Prerequisite: Underground Mining Methods, Strata Control

ME 464 Mining Geology	Lecture	Tut/Lab	Total
	3	1	4

History of mining geology, Genesis of mineral deposits, forms of mineral deposits, secondary sulphide enrichment with reference to Egyptian ores, study of coal, iron and petroleum deposits as strategic ores all over the world with special reference to the Egyptian ores.
Prerequisite: Petrology

ME 466 Project	Lecture	Tut/Lab	Total
	-	8	8

The objective of this course is to prepare students for engineering practice to work in teams, and to prepare for implementing a design project based on the knowledge and skills acquired in their earlier course work. Students learn how to brainstorm ideas for projects and plan for implementation, and write a technical report and defend their work.

ME 467 Computer Applications in Mining Engineering	Lecture	Tut/Lab	Total
	2	3	5

Introduction, Computer-based analysis of Geoscience data, Mine development planning to satisfy ventilation and transportation requirements.
Prerequisite: Computer Programming 2.

ME 468 Mine Plant design	Lecture	Tut/Lab	Total
	3	2	5

Classification of mining operations to demonstrate peculiarities of usage and constructive features of the required machinery, Evaluation of compressed air requirements of mechanical drilling equipment, Design of compressed air station to suit certain requirements, Operation and selection of heading and extraction machines, Haulage and Drum hoisting systems.
Prerequisite: Underground Mining Methods, Strata Control

ME 469 Rock drilling & Blasting Engineering	Lecture	Tut/Lab	Total
	3	2	5

Drilling: Principle of drilling, surface and underground drilling machines, selection of drilling methods and equipment, drilling theory, equipment and surface drilling, equipment and underground drilling, bench and crater blasting in open-pit and quarries, blasting in coal mining, blasting in tunneling, blasting in trenching, road construction and foundations, blasting in civil fields, under water blast.
Laboratory: Rock Mechanics Lab
Prerequisite: Introduction to Mining Engineering, Petrology, Rock Mechanics 1

II- Syllabuses of Elective Courses

ME 364A1 Mineral Analysis and Evaluation	Lecture	Tut/Lab	Total
	2	2	4
Sampling, Ore analysis by gravimetric and volumetric methods, Chemical reactions involved in the analytical methods, Analysis of ore minerals and coals, Differential thermal analysis, X-ray diffraction, X-ray fluorescence, Infra-red, Atomic absorption, and Spectrophotometry methods. Prerequisite: Mineralogy and Crystallography, Petrology			
ME 364A2 Rock Blasting Engineering	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Explosives: Classifications of explosives, composition and properties of different explosives, blasting accessories, use of explosives and accessories, alternatives to explosives, blasting: Principles of blasting, underground and surface blasting (bench and trench blasting), ground and air vibration from blasting. Laboratory: Mining Lab Prerequisite: Introduction to Mining Engineering, Rock Mechanics 1, Rock Mechanics 1			
ME 364A3 Photogrammetry and its Applications	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Kinds of photogrammetry, Terrestrial photogrammetry, stereo metric camera, orientation, horizontal and vertical angles, azimuth of line from photographic measurements, determining elevation of camera station and parallax equation. Aerial photogrammetry, classification of aerial photographs, scale of vertical photographs, overlap and orientation of the stereoscope pair, relief displacement, elevation by parallax difference, scale of a tilted photograph, Ground CO-ordinates from measurements on a vertical and tilted photographs. Stereoscopic viewing by the stereoscope, parallax bar of height determination, stereoscopic plotters, rectification, aerial triangulation, sources of errors in photogrammetry and remote sensing. Laboratory: Surveying Lab Prerequisite: Geodetic Survey and Astronomy			
ME 364A4 Drainage of Water in Underground Structures	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Ground water and aquifers, physical properties of aquifers. Darcy's law and hydraulic conductivity, ground water exploration, flow-systems analysis, surface – subsurface water relations, subsidence and lateral movement of the land surface due to ground water pumping, weather and hydrology. Prerequisite: Fluid Mechanics			

ME 364A5 Map Projection	Lecture	Tut/Lab	Total
	2	2	4
Introduction, The spheroid, coordinate system and map scale, Cartography past and present, Map projection and plane coordinates. The classification of map projection. Laboratory: Surveying Lab Prerequisite: Geodetic Survey and Astronomy			
ME 364B1 Road planning and design	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
History of road design and planning, Elements of road design, Theory of geometric design elements, Horizontal and vertical alignment, Considerations for urban road design, CAD design. Prerequisite: None			
ME 364B2 Materials Handling	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction. Classification of materials handling systems. Mining systems. Equipment selection criteria. Earthmoving fundamentals. Loading and haulage equipment. Belt conveyors. Rail haulage. Mine hoisting systems. Slurry transport. Technical and economic considerations. Prerequisite: None			
ME 364B3 Rock Mechanics 2	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Study the effects of rock properties and ground stresses on problems of mine design, Application of the principles of strength of materials to the analysis of problems of ground control. Laboratory: Rock Mechanics Lab Prerequisite: Rock Mechanics 1			
ME 364B4 Unit Operation in Mineral Processing	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Flocculation, dispersion, filtration, drying, mixing and blending, ore storage, mill product transport, slurry transport, pelletizing, miscellaneous operations. Prerequisite: Analytical Chemistry, Mineral Processing 1			
ME 364B5 Modern Surveying Equipment	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction (Digital levels, Salient features of digital levels, Components of digital levels, Various capabilities with digital levels, Example specifications for levels, Leica, Topcon, Trimble), Electronic Distance Measuring Instrument EDMI (Introduction to EDMI, Principle of EDMI, Classification of EDMI), Electronic Theodolite and Total Station, GNSS, Laser scanner surveying. Laboratory: Surveying Lab Prerequisite: Geodetic Survey and Astronomy			

ME 465A1 Novel Mining Methods	Lecture	Tut/Lab	Total
	2	2	4
Rapid Excavation, Hydraulic or solution mining, In- situ Gasification and Combustion of Coal, Underground Retorting, Marine Mining, Other Methods. Laboratory: Rock Mechanics Lab Prerequisite: Rock Mechanics 1			
ME 465A2 Industrial Ventilation	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
The behavior of air and chemical contaminants in the air, Industrial process exhaust system design (including ACGIH® calculation methods), Make-up and supply air ventilation systems, Dilution ventilation systems, Selection and design of exhaust hoods, ducts, and fittings. Fans and air cleaners (including Fan Laws), Troubleshooting and testing of existing systems, Hands-on testing and measurements Prerequisite: Thermodynamics			
ME 465A3 Geographic information system GIS	**Lecture**	**Tut/Lab**	**Total (hrs...)**
	2	**2**	**4**
What is GIS, Integration of logic component of GIS, History of development – GIS techniques technology, subsystems of GIS components, Raster data structures, and Vector data structures, Representation of features, Capabilities/functionalities of GIS, Application of GIS, and Sources of errors in GIS? Prerequisite: Computer Programming 2			
ME 465 A4 Planning and Design of Open Cast Mining	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Design of drilling and blasting of open pit mines and quarries, Design of final depth of quarries and quarry boundaries, Design and planning of machines complex in production process, Choice of kinds of machines in production, Planning and design of dumping process, Reclamation of mined out areas. Prerequisite: Technology of Surface Mines			
ME 465A5 Solid Fuel Engineering	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction to fuel engineering, classification and analysis of fuels, chemical and physical properties of coals and other solid fuels, cleaning possibilities of fuels, processing of fuels (carbonization, liquefaction, gasification and combustion of solid fuels), oil shale's and its processing methods and tar sands. Prerequisite: Thermodynamics, Mineral Processing 2			
ME 465B1 Tunneling and underground construction Engineering	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Site investigation, economic study, tunneling in soft ground, tunneling in mixed ground. Tunneling in rocks, tunneling support, tunneling by cut and covers methods.			

Laboratory: Rock Mechanics Lab Prerequisite: Rock Mechanics 1			
ME 465B2 Mine Ventilation Networks Design	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Basic mine ventilation circuits with single and multiple fan systems, Ventilation network theory, analysis of complex networks with natural and controlled splitting, Procedure in design of metal and coal mines ventilation systems, Economics of airflow. Prerequisite: Mine Ventilation and Air Conditioning			
ME 465B3 Mine Waste Management	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction to Mining activities and Mine Wastes, Environmental management methodology, Sulfide Mine Wastes, Mine Water, Tailings, Cyanidation Wastes of Gold-Silver Ores, Radioactive Wastes of Uranium Ores, Wastes of Phosphate and Potash Ores. Prerequisite: Risk Management and Environmental Eng.			
ME 465 B4 Global Positioning System	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Basic GPS, Positioning using Satellites, GPS Principles, GPS receivers, More on GPS principles, GPS Errors and Accuracy, Error sources in GPS observations, Satellite geometry and Accuracy measures, GPS Measurements Techniques, GPS Algorithms/Navigational Solutions, Other Satellite navigation Systems and GPS Modernization. Laboratory: Surveying Lab Prerequisite: Geodetic Survey and Astronomy			
ME 465B5 Industrial Minerals and Dimension Stone Technology	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Definition of industrial minerals and dimension stones; Classification and properties of industrial minerals and dimension stones; Aspects of quarrying and underground mining in dimension stone; industrial minerals productions; Examination of structural geology related to block yielding characteristics; On-site cutting processes for dimension stones; Processing of thick blocks of stones; aspects of sawing tiling and polishing; machinery and methods involved; Dimension stone reserves in Egypt and in the world; Synthetic dimension stone industry; Industrial raw materials and their production methods; Evaluation of industrial raw material and dimension stone markets in Egypt and in the world at present and in the future. Prerequisite: None			
ME 465B6 Chemical Processing of ore minerals	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Introduction. Leaching Chemistry. Leaching systems: Chemical; pressure; and biological. Leaching technology: In-situ; heap; vat column and agitation. Separation and			

concentration or purification of pregnant liquor: ion exchange; solvent extraction; and activated carbon adsorption. Recovery of metallic values from leach liquor: evaporation; distillation; precipitation; cementation; electrolysis; etc.
Laboratory: Mineral Processing Lab
Prerequisite: Analytical Chemistry, Mineral Processing 1

Geological and Geophysical Engineering Department (GGE)

Syllabuses of Courses

I- Syllabuses of Mandatory Courses

GGE 171 Introduction to Geological and Geophysical Engineering	Lecture	Tut/Lab	Total
	2	2	4

Geological Engineering Definition – Geological Engineering applications in the fields of Mining Engineering, Groundwater and Oil. The role of Geological Engineering in filling gaps between Geologist Engineer and Civil Engineer, between the Geologist and Mining Engineer as well as the Geologist and Petroleum Engineer. The role of Geological Engineering in Exploration of oil, gas and ore minerals.
Prerequisite: General Chemistry

GGE 172 Physical Properties of Rocks	Lecture	Tut/Lab	Total
	2	2	4

Introduction – definition of petrophysics – grain size analysis – rock fabric and packing – fluid tortuosity and skewedness .petro physical analysis – porosity types and determination – permeability types and determination – capillary pressure and fluid heights – Mohens potential and water cover – rock compaction and formation density – transit time and seismic velocity – specific conductivity and heat flow – petrophysics and petrography – petrophysics and well logging – petro physical modelling and basin modelling .
Prerequisite: Introduction to Geological Engineering , Physics 2

GGE 271 Theory of structures	Lecture	Tut/Lab	Total
	2	2	4

Forces – Acting Loads – Stress – Strain – Normal Forces – Sheer forces – Bending Moment – Torsion – Beams – Slabs – stress Distribution – Stress Analysis – Concrete Beams – steel beam.
Prerequisite: Physics 3, Introduction to Materials Science and Engineering

GGE 371 Geo-statistics and Information Systems	Lecture	Tut/Lab	Total
	3	2	5

Basic concepts - random variables - different distributions - random samples - important tests (chi - t - f) - confidence intervals - smaller squares - kriging Engineering - variables and semi variograms - regression techniques and correlation between geotechnical parameters - practical application in geological engineering fields - Data - Contrast techniques and automatic correlation - Applied mathematical models - Geographical information - Data modeling - Practical training and exercises based on advanced computer packages in geographic information systems such as ARC INFO.
Prerequisite: Introduction to Geological and Geophysical Engineering ,Math 5

GGE 372 Geology of Egypt	Lecture	Tut/Lab	Total
	3	2	5

Brief idea about the Geography of Egypt – Introduction to Geology of Egypt – Geological Structure and formations in Egypt – Sanctuary - Geology of Nile Valley – Geology of Delta Nile – Geology of Western Desert – Geology of Eastern desert – Geology of Red Sea – Geology of Sinai – Occurrence of Ore Minerals – Occurrence oil and Gas – Occurrence of Groundwater
Prerequisite: Earth Sciences and Engineering , Sedimentology, Paleontology, and Stratigraphy

GGE 373 Soil Mechanics	Lecture	Tut/Lab	Total
	3	2	5

Principles of soil mechanics – definitions and relationships – soil components and properties – soil classification – soil compaction – soil permeability – hydraulic properties of soil – flow net – seepage and drainage – stress distributions in soils – theory of consolidation – shear strength in soils – soil settlement – earth pressure and retaining structures – application of stability of slopes in soils.
Prerequisite: None

GGE 375 Introduction to Concrete Structure	Lecture	Tut/Lab	Total
	2	2	4

A description study of the engineering properties of various construction materials (steel – timber – soil and rocks – concrete materials – and other composite material – preliminary work for constructions – application of theory of structure – foundations – design of walls, columns, stairs, roofs and steel frames.
Prerequisite: Introduction to Materials Science and Engineering, Theory of Structures

ME 461 Survey Project	Lecture	Tut/Lab	Total
	2	2	4

It is an integrated work project. In that, work the student applies all surveying science on the ground. The student should be discussed at the end of the project period, and provide a copy of the work and maps to the department.
Laboratory: Surveying Lab
Prerequisite: Plane Survey & Topography, Geodetic Survey and Astronomy

GGE 376 Introduction to Steel Structure	Lecture	Tut/Lab	Total
	2	1	3

A description study of the engineering properties of various steel as construction materials - Steel sections – Steel Types – Reinforcement Bars – Rail Road's – Beams and Columns – Trusses – Frame – Gable – covering.
Prerequisite: Introduction to Materials Science and Engineering ,Theory of Structures

GGE 377 Instrumentation in Geological and Geophysical Engineering	Lecture	Tut/Lab	Total
	2	1	3

Geophysical instrumentation, data acquisition and analysis, and geologic interpretation of geophysical data, a knowledge and skills of modern geophysical methods relevant to their disciplines, Geodetic monitoring provides a means to measure the magnitude and rate of horizontal and vertical ground movements. Methods are well established and are often entirely adequate for performance monitoring (crackmeters, jointmeters, strainmeters, crack gauges, distometers, convergence gauges, siding micrometers), surface deformation monitoring – radar, subsurface monitoring – Inclinometers.
Prerequisite: None

GGE 378 Geophysics 1	Lecture	Tut/Lab	Total
	2	2	4

Physical principles of gravity methods; gravity field of the earth, gravity anomalies, and rock densities. Gravity observations and data reduction. Magnetic prospection, earth magnetic field, magnetic properties of rocks and their determination, Elastic waves in layered media, Earthquake mechanism.
Prerequisite: Physics1 , Introduction to Geological and Geophysical Engineering

GGE 379 Underground Structures	Lecture	Tut/Lab	Total
	2	1	3

General approach for tunneling and underground chambers. Rock and soil engineering consideration. Exaction methods and structural design of tunnels in soil and rock. Methods of support, reinforcement and monitoring structural detailing of lining. Benefit of underground chambers and caverns design, construction and support. Application of design and construction procedure for fuel and nuclear storage facility, underground power house. Shafts and raise design and construction
Prerequisite: Earth Sciences and Engineering, Introduction to Geological and Geophysical Engineering.

GGE 471 Rock Engineering	Lecture	Tut/Lab	Total
	2	1	3

Introduction to rock mechanics and its application in controlling rock mass instability and reinforcing rock mass by design appropriate support system in mining and tunneling. The syllabus consists of two components, i.e. mining aeromechanics and ground control systems. The mining geomechanics part covers rock mechanics in mining; field and laboratory procedures for determining rock material properties; rock mass classification system; intact rock and rock mass failure criteria; stress analysis for mine design; stability analysis of surface and underground mine excavations; application of soil mechanics to mine backfill and tailings management; risk assessment processes; and legislative requirements for geomechanics in mining
Prerequisite: Mathematics 4 , Introduction to Materials Science and Engineering

GGE 472 Geophysics 2	Lecture	Tut/Lab	Total
	2	2	4

Physical principles of seismic prospection: seismic instruments, methods, data processing and interpretation. Physical principles of electric methods of prospection, Potential methods, resistivity methods, electromagnetic methods, profiling and sounding. Geothermal methods of prospecting, Principle of seismic reflection as an engineering tool- Instrumentation, data acquisition reduction, processing and interpretation mechanism.
Prerequisite: Physics 2 , Introduction to Geological and Geophysical Engineering , Geophysics 1

GGE 473 Foundation Engineering	Lecture	Tut/Lab	Total
	2	1	3

Soil exploration (excavation and boring methods – subsurface sounding and geophysical methods – ground water observation – exploration report) – types of foundations and

foundation problems – types of failure – bearing capacity – settlement and allowable bearing pressure – shallow foundations (design of P.C. and R.C. wall footings – R.C. column footings- combined footings – cantilever footings – raft foundation) – deep foundations (types of piles – bearing capacity of pile groups – well and caisson foundation) – machine foundations.
Prerequisite: Soil Mechanics

GGE 474 Hydrogeology	Lecture	Tut/Lab	Total
	2	1	3

Groundwater Exploration and exploitation - aridity index, empirical formula, climatic extremes, arid region of the world. Ground water in arid region, characteristics of aquifers. Stream channel deposition. Ground water recharge in arid regions and runoff. Ground water circulation in closed desert basin. Water quality effects of occasional heavy rains and floods, buried saline deposits, salinity problems in arid regions. Rain fall harvesting. interbasin ground water movement, geologic, hydraulic and hydraulic evaluations. groundwater exploration in arid region – groundwater desalination.
Prerequisite: Structural Geology , Introduction to Geological and Geophysical Engineering

GGE 475 Project	Lecture	Tut/Lab	Total
	-	8	8

The objective of this course is to prepare students for engineering practice to work in teams, and to prepare for implementing a design project based on the knowledge and skills acquired in their earlier course work. Students learn how to brainstorm ideas for projects and plan for implementation, and write a technical report and defend their work.

GGE 477 Drilling Engineering	Lecture	Tut/Lab	Total
	2	1	3

This course builds a firm foundation of the principles and practices of well drilling engineering. It offers a comprehensive overview of past and actual well drilling concepts, supported through schematics and animations, as well as a complete overview of drilling rigs and their classification, various hardware options and drilling fluids selections. You will be taken on a journey from drilling process at the well bottom to well construction and equipment, altogether leading you to understand how and why you need to drill a well
Prerequisite: None

GGE 478 Landslides and Slope Stability	Lecture	Tut/Lab	Total
	2	2	4

Introduction and definitions of landslides, classification and causes of slope movements, characteristic types of slope movements, landslides investigation. Method of preventing and correcting landslides. The concept of limit equilibrium. Finite slopes. Stability of soil slopes (slice, friction circle and wedge methods). Mechanics of rock slopes and types of failure. Stability analysis rock falls. Stereographic projection technique. Effect of structural features. Methods of support, reinforcement and monitoring.

Prerequisite: Introduction to Geological and Geophysical Engineering, Soil Mechanics, Foundation Engineering.			
GE 479 Earthquake Engineering	**Lecture**	**Tut/Lab**	**Total**
	3	**2**	**5**
Intensity and magnitude of earthquakes. Globule seismically patterns. Influence of ground conditions on earthquakes ground motion. Basic concepts in earthquake resistant design of structures of structures. Earthquake safety coefficient. Prerequisite: Introduction to Geological Geophysical Engineering, Soil Mechanics , Civil Engineering , Geophysics 2			
GGE 4710 Soil and Rock Dynamics	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**
Fundamentals of applied dynamics – behavior of dynamically loaded soils and rocks – elastic and inelastic waves – strain energy – basic principles of seismic action – consideration for design procedures for dynamically loaded foundations, slopes, underground opening, and embankment dams with emphasis on earthquake actions. Prerequisite: Introduction to Geological and Geophysical Engineering , Soil Mechanics , Rock Engineering			

II- Syllabuses of Elective Courses

GGE 374A1 Ore Minerals	Lecture	Tut/Lab	Total
	2	2	4

Presentation of (magmatic – sedimentary and hydrothermal ore deposits – petrologic – structural and sedimentological processes that contribute to ore formation – description of class deposit types) – review of exploration sequences – laboratory studies of hand specimens – fire assay – gravimetric and volumetric methods of ore analysis – chemical reaction and reagents – coal analysis – modern physico - chemical methods (X-ray , atomic absorption , ultraviolet , infrared spectroscopy , PH and selective ion meters).
Prerequisite: Introduction to Geological and Geophysical Engineering

GGE 374A2 Rock Blasting Engineering	Lecture	Tut/Lab	Total
	2	2	4

Definition for explosives and rock blasting – Explosives and their types in Engineering Fields – use of explosive in demolition – Explosive and blasting in quarries – roads excavation – tunneling excavation – Feasibility study – Safety precautions during blasting limitations.
Prerequisite: Introduction to Geological and Geophysical Engineering.

GGE 374A3 Remote Sensing	Lecture	Tut/Lab	Total
	2	2	4

Basics of remote sensing, characteristics of remote sensors, and remote sensing applications in academic disciplines and professional industries. Emphasis is placed on image acquisition and data collection in the electromagnetic spectrum and data set manipulation (÷imagery analysis, define and describe basics of electromagnetic spectrum and interactions with various types of media, describe sensors and image acquisition methods, analyze and explain remote sensing purposes, advantages, and limitations, describe basic characteristics of remote sensing imagery, describe industry-specific image sources
Prerequisite: None

GGE 374B1 Near Surface Engineering Geophysics	Lecture	Tut/Lab	Total
	2	2	4

Near-surface geophysics and its applications, which include mapping and monitoring of groundwater resources, engineering applications, mapping of structure and stratigraphy, and archeological and forensic work. Physical properties and geophysical responses; advantages and limitations of geophysical surveying; survey design.
Prerequisite: None

GGE 374B2 Geochemistry Exploration	Lecture	Tut/Lab	Total
	2	2	4

Principles of different prospecting stages – geological principles of ore search and ore appraisal – regional guide to ores - stratigraphic – structural and lithological guides – photo interpretation – geochemical principles – the use of geochemistry in the exploration for natural resources – primary and secondary environments – anomalies – deposition

patterns – organization of field exploration – examples – statistical processing of data – case histories.
Prerequisite: Earth Sciences and Engineering , Introduction to Geological and Geophysical Engineering

GGE 374B3 Bitumen and Roads Pavement	Lecture	Tut/Lab	Total
	2	2	4

Lecture Tut/Lab Total (hrs..) 2 2 4 Introduction to pavement for roads and yards – Pavement materials – Bitumen – Asphalt layers – Flexible Pavement – Rigid Pavement – Roads pavement – Pavement for airports – Pavement onshore and ports – Interlocking Paving Blocks
Prerequisite: Introduction to Geological and Geophysical Engineering

GGE 374B4 Rock Magnetism	Lecture	Tut/Lab	Total
	2	2	4

Introduction – the physics of magnetism (the magnetic pole and dipole, the magnetization and the magnetic field inside the material)- the magnetic properties of materials (diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, and ferrimagnetism) - magnetic anisotropy – rock magnetism (magnetic properties of rocks, the ternary system of magnetic minerals, identification of ferrimagnetic minerals grain size dependence of ferrimagnetic properties, permanent magnetizations in rocks) – paleo magnetism (methods of paleo magnetism, paleo magnetic and and its tectonics applications).
Prerequisite: Physics 2

GGE 476A1 Seismic Stratigraphy	Lecture	Tut/Lab	Total
	2	2	4

Introduction, geologic significance of seismic reflections, seismic reflection and time stratigraphy, seismic stratigraphic approach, recognition of depositional sequences, boundaries of depositional sequences, seismic fancies types, seismic reflection characteristics, terminations and configurations. Internal forms of mono layers, external forms of seismic sequences, depositional system tracks, seismic sequences analysis, interpreted depositional environments, seismic sedimentation models.
Prerequisite: Introduction to Geological and Geophysical Engineering , Geophysics 2

GGE 476A2 Petroleum Related Rock Mechanics	Lecture	Tut/Lab	Total
	2	2	4

Rock mechanics is a basic technology course of petroleum engineering. It mainly introduces the basic concepts and theory of rock mechanics. For example, the rock properties, the testing methods of the rock mechanical properties, failure criteria, elastic theory, in-situ stress and some problems in petroleum-related rock mechanics such as borehole stability, hydraulic fracturing, solids production and so on.
Prerequisite: None

GGE 476A3 Reservoir Geomechanics	Lecture	Tut/Lab	Total
	2	2	4

This interdisciplinary course encompasses the fields of rock mechanics, structural geology, earthquake seismology and petroleum engineering to address a wide range of geotechnical problems that arise during the exploitation of oil and gas reservoirs. The course considers key practical issues such as prediction of pore pressure, estimation of hydrocarbon column heights and fault seal potential, determination of optimally stable well trajectories, casing set points and mud weights, changes in reservoir performance during depletion, and production-induced faulting and subsidence.
Prerequisite: None

GGE 476A4 Well Logging	Lecture	Tut/Lab	Total
	2	2	4

Introduction to well logging methods, electric resistivity of rocks, measurements zones and environments, open hole logging; spontaneous potential log, gamma ray logs, resistivity logs; conventional electric tools, focused current and induction devices, acoustic properties of rocks; sonic log, density logs, neutron logs, cased hole logging, Interpretation techniques.
Prerequisite: Physical Properties of Rocks , Geophysics 2

GGE 476A5 Reservoir Geology	Lecture	Tut/Lab	Total
	2	2	4

The course covers mechanical and chemical compaction, cap rocks (shales and salt) – overpressure, fluid flow in porous media, petrophysics (well logs and cores), stress conditions in reservoirs, reservoir models, production geology, sandstone reservoirs, carbonate reservoirs and several case studies.
Prerequisite: None

GGE 476B1 Engineering of Oil Reservoir and Groundwater Aquifers	Lecture	Tut/Lab	Total
	2	2	4

Groundwater aquifers – Oil reservoirs – quantity of water in aquifers - Haze behavior concepts (single, binary, and multi-component system), Properties of gases (gas deviation factor, ideal & perfect gas, gas viscosity, gas solubility, gas compressibility, gas formation volume factor), Properties of oil (oil viscosity, oil compressibility, oil formation volume factor, total volume factor), Properties of water (water viscosity, water compressibility, water formation volume factor, electrical resistivity of water), PVT laboratory analysis of oil.
Prerequisite: Introduction to Geological and Geophysical Engineering , Geophysics 2

GGE 476B2 Geological Engineering	Lecture	Tut/Lab	Total
	2	2	4

Scope of geological engineering– the engineering classification of rock masses – geological engineering practices – site investigations – rock mass structures – collection and presentation of structural data – strata pressures and support loads – retaining walls – trench supports – application of engineering geology for evaluation of construction problems relating to dams reservoirs – bridges – pavements water ways – tunnels – canals – high ways and shore lines – erosion process (grouting – stabilization – drainage – anchorage .etc.) – Geotechnical mapping.

Prerequisite: Introduction to Geological and Geophysical Engineering, Soil Mechanics.

GGE 476B3 Site Geology and investigation	Lecture	Tut/Lab	Total
	2	2	4
Lab and field works on geological surveys – different field methods of geotechnical observations and interpretations - geotechnical discretions of soil and rocks – instrumentations – stratigraphic and structural features mapping – aerial photo – trial pits - boring and heading as exploratory techniques – sampling tools, procedures handling, labeling, examination and testing of sample – methods and devices for measuring loads, pores and earth pressures – data processing – drawing of engineering geological maps. Prerequisite: Introduction to Geological and Geophysical Engineering , Soil Mechanics , Foundation Engineering			

GGE 476B4 Soil and Rock Improvement	Lecture	Tut/Lab	Total
	2	2	4
Excavation Supports – Excavation Works in different Projects - Construction materials and methods. Anticipated geotechnical behavior filter design. Sliding stability conditions. Stress and strain within the embankment. Compaction - Design of retaining walls. Effect of wall deformation and soil creep on stress distribution, effect of surcharge loading. Seepage effects and pore water pressure. Stability of retaining walls. Backfilling. Special types of retaining walls. Ling - Grouting Prerequisite: Introduction to Geological and Geophysical Engineering , Soil Mechanics, Foundation Engineering			

GGE 476B5 Tunneling Engineering	Lecture	Tut/Lab	Total
	2	2	4
Design of underground opening in competent and jointed rocks – stress analysis – modern tunneling techniques – emphases of evaluation of ground conditions – rock pressure determination – soft ground tunneling - rock tunnels – shield method – cut and cover method – design of tunnel sections – equipment – estimation of support requirement – lining – tunnel safety - lighting – drainage – traffic tunnel – ventilation and power supply. Prerequisite: Civil Engineering , Soil Mechanics , Rock Engineering			

Basic Sciences and Engineering Mathematics (BSM)

Syllabuses of Courses

Basic Science Courses

BSM 011 Physics1 (Properties of Matter & Heat and Thermodynamics)	Lecture	Tut/Lab	Total
	3	2	5

Properties of Matter:
International system of units, **dimensional analysis**, matter classification, elastic properties of materials, mechanical waves, sound waves, Doppler effect, shock waves, non-viscous fluids, Pascal's principle, continuity equation, Bernoulli's Equation, viscous fluids, Poiseuille's Law, turbulence, liquids cohesive forces.
Heat and Thermodynamics:
Temperature, and types of thermometers, thermal expansion, heat, internal energy, heat capacity, changing phases, latent heat, first law of thermodynamics, transfer of heat, elementary kinetic theory of gases, second law of thermodynamics, heat engine, Carnot cycle, entropy.
Laboratory:
Fine measurements, determination of gravity acceleration by many tools. Verification of Hook's law, Stokes law, and Boyle's law. Determination of density of some metals and liquids by many tools. Determination of speed of sound. Determination of thermal conductivity for some metals by Sears's method. Determination of mechanical heat equivalent, Lee's experiments. Experiments to determine the thermal expansion, specific heat and melting points of some solids.
Prerequisite: None

BSM 012 Mathematics1 (Differential Calculus+ Algebra)	Lecture	Tut/Lab	Total
	3	2	5

Differential Calculus:
Types of Functions: Algebraic and Transcendental, Limits, Continuity, Differentiation, Fundamental Rules for Differentiation, Higher order derivatives, n^{th} derivative, Rules of Differentiation, Applications of Differentiation: L`Hopital's Rule, Taylor series, Curvature, extreme points of a function, Asymptotes. Functions of Several Variables, Partial Derivatives.
Algebra:
Binomial theorem, Partial fractions, Theory of equations, Sequences, Series, Matrices, System of linear equations.
Prerequisite: None

BSM 013 Mechanics1 (Statics)	Lecture	Tut/Lab	Total
	2	2	4

Vectors: Vector algebra and vector calculus. Applications on vectors: Addition of a system of concurrent forces in two - and three – dimensions, equilibrium of a particle. Moments and couples: Moment of a force and moment of a couple, reduction of system of forces and couples to a single force. Supports and their reactions: Reaction forces due to the different supports. Equilibrium of a rigid body: Conditions of the static equilibrium, free

body diagram construction. Applications: Equilibrium of a rigid body subjected to a system of plane and space forces and couples. Friction: Laws of dry friction and its applications. Center of mass: Center of mass and centroid for a system of particles, for a single body and for composite bodies. Introduction of moments of inertia.
Prerequisite: None

BSM 014 General Chemistry	**Lecture**	**Tut/Lab**	**Total**
	3	**2**	**5**

Ideal gases laws: (Boyle's, Charles's, Avogadro's Laws), general gas equation. Kinetic–molecular theory of gases, effusion of gases. Dalton's Law, Real gases and deviation from ideality, van der Waals equation. Solution, Binary solutions, classification, dissolution of solids in liquids, liquids in liquids (Miscibility), gases in liquids. Hennery's Law, effect of pressure on solubility, molality, molarity and mole fraction. Deviations from ideal behavior, phase diagram of water, carbon dioxide. Heat changes and Thermo-chemistry: definitions, thermochemical equations, standard states and standard enthalpy changes, standard molar Enthalpies. Hess's law thermochemical calculations with some applications, combining thermochemical equation. Chemical Equilibrium, Reaction in aqueous solution, Ionic equilibrium, Le-Chatelier principle, solubility Product constants, Common-ion effect, Precipitation reaction. Electrochemistry, Electrical conduction, Electrochemical galvanic and electrolytic cells, Standard electrode Potentials, Primary and Secondary Voltaic Cells (Examples), Nernst's equation, concentration cells. Corrosion, Effects of corrosion, causes of corrosion, theories of corrosion, Factors influencing corrosion, Corrosion control.
Laboratory :
Identification of acid and basic radicals, separation of mixtures.
Prerequisite: None

BSM 015 Physics 2 **(Electricity , Magnetism and Optics)**	**Lecture**	**Tut/Lab**	**Total**
	3	**2**	**5**

Electricity and Magnetism
Charge and matter, the electric field. Gauss law, electric Potential, capacitors and dielectric, current, resistance and electromotive force, the magnetic field, Ampere's law, Biot – Savart law, Faraday's law of induction, inductance, magnetic properties of matter Maxwell equations.
Optics
Electromagnetic waves, geometrical optics, optical instruments, diffraction, interference, polarization, Optical fibers.
Laboratory
Some Mechanics experiments as: freely falling motion on inclined surfaces and projectile motion. Determination of refractive index of a lens. Verification of Malus's law of polarization. Experiments of the Specific rotation, Fresnel's Biprism, Diffraction on a single and double slit and on the diffraction grating, Determination of speed of light, Fiber optics experiments. Ohm's law and verification of parallel and series connection laws.

Charge and discharge of a condenser, dielectric constant of a capacitor. Simple A.C. capacitive, and inductive circuits. Determination of a resistance of a conductor by many tools.
Prerequisite: Physics 1

BSM 016 Mathematics 2 **(Integral Calculus and Analytical Geometry)**	**Lecture**	**Tut/Lab**	**Total**
	3	**2**	**5**

Integral Calculus:
Indefinite integrals, Fundamental Integration Rules, Methods of Integration. Definite Integrals, Properties of Definite integrals, The Fundamental Theorem of Calculus, Improper Integrals. Applications of Definite Integrations: Area Between Curves, Arc Length, Volume of Solid of Revolution.
Analytical Geometry:
Analytic Geometry in the space: The plane, the straight line, the sphere, cone, cylindrical, and quadratic surfaces. Analytic Geometry in the plane: The circle, conic sections, General equation of second degree.
Prerequisite: Mathematics1

BSM 017 Mechanics 2 **(Dynamics)**	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**

Kinematics of a Particle: Translational motion of a particle in different coordinates. Applications: motion of projectiles, absolute dependent motion, and relative motion analysis of two particles. Kinetics of a Particle: Newton's laws of motion, equation of motion of a body in different coordinates. Work, Energy, and Power: Principle of work and energy, principle of energy conservation. Impulse and Momentum: Principle of linear momentum conservation, linear impulse, principle of impulse and momentum, impact, angular momentum, principle of angular momentum conservation. Kinematics of rigid-body: Translation, rotation, and general plane motion, Kinetics of rigid-body: moment of inertia, and equations of motion. Work Power and Energy: principles of work and energy conservation. Impulse and Momentum: Principle of linear momentum conservation, principle of impulse and momentum, impact, principle of angular momentum conservation. Mechanical Vibrations: Undammed free vibration, simple harmonic motion, energy method analysis. Applications.
Prerequisite: Mechanics 1

BSM 111 Mathematics 3 **(Differential Equations and Multivariable)**	**Lecture**	**Tut/Lab**	**Total**
	3	**2**	**5**

Differential Equations:
Classifications of differential equations, Ordinary Differential Equations, First order Differential Equations, Initial Value Problems, and Applications of first order Differential Equations. Second Order Differential Equations, Applications of Second Order Differential Equations. Linear differential equations. Systems of ordinary differential equations. Laplace Transformations. Partial Differential equations, Classifications,

Analytical Methods of Solution, Method of Separation of Variables, Basic P.D.E of Engineering Application.
Multivariable Calculus:
Functions of Several Variables, Limits, Continuity, Partial Derivatives. Multiple Integrals: Double Integrals, Triple Integrals. Surface and Line Integrals. Applications of Multiple Integrals. Integration Theorems. Local differential geometry, Tangent plane and normal vector, Curvature.
Prerequisite: Mathematics 2

BSM 112 Physical Chemistry **(For all departments except Geological and Geophysical Engineering department)**	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**

Surface phenomenon and surface tension of liquids, adsorption, types of adsorption, Adsorption of gases and solutes by solids, applications of the adsorption: Chromatography, heterogeneous catalytic reactions/ Solutions, Colligative properties of dilute solutions, vapor pressure lowering, elevation of boiling point, depression of freezing point. Osmosis and osmotic pressure. Colloidal state, types of colloids, preparation of colloidal solution, properties of colloidal solution, application Chemical kinetics, the reaction rate and order reactions, effect of temperature on reaction rate, energy of activation. Catalysis, general characteristic and types of catalysis, theories of catalysis, catalytic poisoning and auto catalysis. Phase rule, determination of degrees of freedom, and deduction of phase rule. Application of phase rule.
Laboratory
Determination of equivalent weight, dissociation constant, chemical equilibrium, solubility, density viscosity of some inorganic compounds. Determination of boiling points elevation and freezing point depression. Determination of rate constants and half-life time
Prerequisite: General Chemistry

BSM 113 Earth Sciences and Engineering **(For Petroleum, Mining , Geological and Geophysical Engineering Departs).**	**Lecture**	**Tut/Lab**	**Total**
	2	**1**	**3**

Introduction, the relation between Engineering and Geology, theory of Big Bang, geologic column and time scale, earth profile, earth materials (different types of **rocks** and **soil**) and their physical and mechanical properties**, r**ock cycle (the relation between the different rock types), weathering process and its impact on the different rocks, primary structure (In sedimentary and Igneous rock) and secondary structure (In sedimentary rocks), ground water; classification, Movement, pollution,
Laboratory:
Topographic and Geologic maps
Prerequisite: None

BSM 115 Physics 3 (Introduction to Modern and Nuclear physics)	Lecture	Tut/Lab	Total
	3	2	5

Modern physics:
The special theory of relativity, Particle properties of light, black body radiation, photoelectric effect, Compton effect, X-Ray production, duality of light, principles of quantum mechanics, atomic radiation, atomic spectroscopy, Laser, electrical conductivity, band theory, semiconductors, superconductors, X-Ray diffraction, neutron diffraction, electron diffraction, crystal structure.
Nuclear Physics:
Nuclei and particles: Nuclear masses, radioactivity, nuclear reactions, nuclear fission, nuclear fusion, particles and antiparticles, hadrons: the strongly interacting particles, leptons and quarks, standard model, resonance particles, forces in nature.
Laboratory:
Plotting a Geiger Plateau. Determination of the dead time of Geiger. Absorption of gamma and beta rays. Determination of e/m of the electron. Verifications of the fourth power of radiation and the inverse square law. Hall effect. Photo cell and determination of Planck's constant
Prerequisite: Physics 2

BSM 116 Mathematics 4 (Numerical Analysis)	Lecture	Tut/Lab	Total
	2	2	4

Errors, Numerical solution of equations and systems of equations. Interpolation. Curve fitting. Numerical Differentiation. Numerical Integration. Numerical solution of Ordinary Differential Equations. Approximation theory. Numerical solution of Partial Differential Equations.
Prerequisite: Mathematics 3

BSM 114 Mineralogy and Crystallography (For Mining Engineering Department)	Lecture	Tut/Lab	Total
	2	2	4

Definition of Mineral, Physical Properties of Minerals: Optical properties, Cohesive properties, electrical and magnetic properties, Specific gravity, Thermal properties, Other properties (Full - Taste - Odor - Radioactivity). Crystal Chemistry of Minerals: Atomic structure of minerals, Coordination number, Chemical bonds Isomorphism, Polymorphism, Pseudo-morphism, Non-crystalline minerals. Origin of Minerals: From magma, From solutions, From Gases, By metamorphism Weathering of minerals. Occurrence of Minerals. Description of some common minerals and its economic values.
Laboratory:
Identification of: the seven Crystal system, and the most common mineral and their properties.
Prerequisite: Earth Sciences and Engineering

BSM 117 Structure Geology (For Mining Departments(.	Lecture	Tut/Lab	Total
	2	2	4

Mechanical Principles, Stress - Strain Diagrams, Factors is controlling behavior of materials. Structures produced by non - dystrophic deformation. Description of folds: Parts of a fold, Different attitudes of beds towards folding, Mechanics and Causes of folding: Types of folding Dynamics of folding, Joints; Genetic classification of joints. Description and Classification of faults, Nature of movement along fault plane, Minor structures associated with faults, Stereographic Projection.
Laboratory: Structural Geologic maps.
Prerequisite: Earth Sciences and Engineering

BSM 118 Organic Chemistry (For Petroleum and Petroleum Refining and Petrochemical Engineering Departments.)	Lecture	Tut/Lab	Total
	2	2	4

General principles of organic chemistry and its practical importance. The chemical structure of organic compounds, and classification of organic chemistry, Hydrocarbons; Alkenes; Alkynes, Alkynes, Structural isomerism, physical and chemical properties and applications. Aromatic hydrocarbons; Benzene Structures, physical and chemical properties and applications, Orientation in electrophilic Substitution in benzene nucleus, Compounds Containing oxygen: Alcohol's aldehydes, Ketones and Carboxylic acids, Nitrogen compounds Amines, Diazonium compounds, Petroleum Refining and application.
Laboratory:
Physical properties of organic compounds, classes of organic compounds according to function groups, identification of organic salts and unknown according to the different function group using a series of chemical reactions.
Prerequisite: General Chemistry

BSM 119 Analytical Chemistry (For Geological and Geophysical Engineering)	Lecture	Tut/Lab	Total
	2	2	4

Quantitative analysis, methods of quantitative analysis, volumetric analysis, the fundamentals of volumetric analysis, volumetric analysis requirements, methods used in volumetric analysis, the fundamentals of the indicators, titration curves, titration of strong acids with strong bases, titration of weak acids with strong bases (and vice versa) titration of weak acids with weak bases. Redox titration, redox potential difference, calculating Redox equilibrium constants, titration curves for redox reactions, indicators used in the redox, titration solution of potassium permanganate and potassium dichromate. Precipitation reactions, titration curves and calculation of equivalence point titration.
Laboratory:
Neutralization reaction titrations and its applications, Redox titrations.
Prerequisite: General Chemistry

BSM 211 Mathematics 5 (Applied Statistics)	Lecture	Tut/Lab	Total
	2	2	4

Statistics:
Statistical methods, Frequency distribution, Measures of Central Tendency, Measures of Variability, Correlation analysis, Regression analysis, Statistical Hypotheses, Analysis of Variance, Numeric Representation of Correlation, Spearman Rank Order Correlation, Proper Statistical Test, Statistical Tests Involving Correlation.
Theory of Probability:
Probability theory, Discrete probability distributions, Continuous probability distributions, Conditional Probability, Bye's Law, Random Sampling, Geometric Density Function, Poisson density Function, Uniform Density Function, Binomial Distribution, Multinomial Distribution, Discrete and Continuous Joint Distributions, Functions of Random Variables, Gamma Distribution, Expected Value, Multivariate Densities, Variance, Standard deviation, Variance and Regression, Moment Generating Function , Chebyshev`s Inequality.
Prerequisite: Mathematics 4

BSM 212 Analytical Chemistry (For Petroleum Refining and Petrochemical Engineering Department)	Lecture	Tut/Lab	Total
	2	2	4

Quantitative analysis, methods of quantitative analysis, the fundamentals of volumetric analysis, methods used in volumetric analysis, preparation of standard solutions, titer, molar, calculate the equivalent weight, preparation of solutions, Theory of the indicators, titration curves, calibration, titration of strong acids with strong bases, titration of weak acids with strong bases, titration of weak acids with weak bases, titration of polyfunctional acids and bases. Redox titration, redox potential difference, calculating Redox equilibrium constants, titration curves for redox reactions, indicators used in the redox, titration solution of potassium permanganate and potassium dichromate. Precipitation reactions, titration curves and calculation of equivalence point titration. Complexation reactions, titration curves and calculation of equivalence point titration by the EDTA. Weight analysis, analysis using voltage devices, analyzes using electrical conductivity. Use of nanotechnology technique in refining engineering applications and the creation of some of the refining and petrochemical industries problems.
Laboratory: Neutralization reaction titrations and its applications, Redox titrations.
Prerequisite: General Chemistry

BSM 213 Analytical Chemistry (For Metallurgical and Materials Engineering Department)	Lecture	Tut/Lab	Total
	2	2	4

The principles of quantitative analysis, volumetric, preparation of primary and secondary standard solutions, solution concentrations units. Principles of neutralization, titration of strong acids with strong bases, titration of weak acids with strong bases (and vice versa). Titration of weak acids with weak bases, titration of polyfunctional acids and bases, theory

of neutralization indicators. Redox titration, redox potential difference, calculating Redox equilibrium constants, titration curves for redox reactions, indicators used in the redox, titration solution of potassium permanganate and potassium dichromate. Precipitation reactions, Instrumentation analyses, analyses using electric conductive devices. Analysis of the various elements within the Ferro-alloys and non-ferrous alloy. Glass, ceramic analyses, and polymers using various instrumentation analyses. Various analytical instruments used in raw materials and raw materials intensive analysis. Slag analyses of various minerals and calcium alumina content analysis.

Laboratory:

Neutralization reaction titrations and its applications, Redox titrations, instrumental analysis of raw materials.

Prerequisite: General Chemistry

BSM 214 Analytical Chemistry (For Mining Engineering Department)	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**

The principles of quantitative analysis, volumetric, preparation of primary and secondary standard solutions, solution concentrations units. Principles of neutralization, titration of strong acids with strong bases, titration of weak acids with strong bases (and vice versa). Titration of weak acids with weak bases, titration of polyfunctional acids and bases, theory of neutralization indicators. Redox titration, redox potential difference, calculating Redox equilibrium constants, titration curves for redox reactions, indicators used in the redox, titration solution of potassium permanganate and potassium dichromate. Precipitation reactions, Instrumentation analyses, analyses using electric conductive devices. Analysis of the various elements within the Ferro-alloys and non-ferrous alloy. Glass, ceramic analyses, and polymers using various instrumentation analyses. Various analytical instruments used in raw materials and raw materials intensive analysis. Slag analyses of various minerals and calcium alumina content analysis.

Laboratory:

Neutralization reaction titrations and its applications, Redox titrations, instrumental analysis of raw materials.

Prerequisite: General Chemistry

BSM 215 Sedimentology, Paleontology, and Stratigraphy (For Petroleum, and Geological and Geophysical Eng. Depts.)	**Lecture**	**Tut/Lab**	**Total**
	2	**1**	**3**

Sedimentary Rocks; Definitions and Economic Value of sedimentary Rocks, Fabric Composition and Classification, The texture of sediments, Environmental analysis: Introduction, Environmental parameters, Classifications of environments, Diagnoses definitions, Aspects of diagnoses. Geological History; The important geologic events through the history of the earth. Stratigraphic Classification, Stratification and Facies, Environment of deposition, Geologic time Geologic time scale, Geologic sequence. Types of correlation. Study of Animal Kingdom.

Laboratory: Description of sedimentary rocks and fossils and Sieve analysis of sediments.
Prerequisite: Earth Sciences and Engineering

BSM 216 Petrology (**For Mining Engineering Department**)	**Lecture**	**Tut/Lab**	**Total**
	1	**1**	**2**

Introduction to Petrology; an overview of igneous, sedimentary and metamorphic rocks - and their origin - mineral and rock classification using hand specimens and thin sections, processes and environments of rock formation, and geological significance of rock assemblages - the utility of petrology, the laboratory exercises focus on identification of rocks - Optical microscopy and thin sections. Recognition and classification of rocks. Physical and chemical environments of rock formation. Relationships among rock assemblage – composition of rocks – industrial importance of rocks.
Laboratory:
Focus on identification of rocks - Optical microscopy and thin sections. Recognition and classification of rocks.
Prerequisite: Earth Science and Engineering

BSM 217 Structure Geology **(For Petroleum Engineering, and Geological and Geophysical Engineering Depts.)**	**Lecture**	**Tut/Lab**	**Total**
	2	**2**	**4**

Mechanical Principles: Stress - Strain Diagrams, Factors is controlling behavior of materials. Structures produced by non - dystrophic deformation. Description of folds: Parts of a fold, Different attitudes of beds towards folding, Mechanics and Causes of folding: Types of folding Dynamics of folding. Joints, genetic classification of joints. Description and Classification of faults, Nature of movement along fault plane, Minor structures associated with faults, Stereographic Projection.
Laboratory: Different Geologic maps.
Prerequisite: Earth Science and Engineering

Basic Engineering Science Courses

Basic Engineering Science Courses

MDP 021 Engineering Drawing and Projection 1	Lecture	Tut/Lab	Total
	2	2	4

Engineering drawing techniques and skills - Conventional lettering and dimensioning – Geometric construction theories of view derivation. Orthographic projection of engineering bodies. Projection of Points, lines, surfaces and bodies. Derivation of views from isometric drawings and vice versa.
Prerequisite: None

MDP 022 Engineering Drawing and Projection 2	Lecture	Tut/Lab	Total
	2	4	6

Derivation of views and sections from given views. Intersection of bodies and surfaces. Steel construction, symbols of electrical circuits, fasteners, Computer aided drafting.
Prerequisite: Engineering Drawing and Projection 1

MDP 023 Production Technology	Lecture	Tut/Lab	Total
	2	1	3

Sand casting – Forming processes (Forging - Rolling - Drawing - Extrusion) - Joining processes (Riveting - Welding - Adhesive bonding) - Manual operations - Machining processes (Turning - Shaping - Drilling - Milling –Grinding) - Measuring tools (Venire caliber - Micrometer).
Prerequisite: None

MDP 121 Mechanical Drawing	Lecture	Tut/Lab	Total
	2	3	5

Tolerances and Fits - Surface Roughness and Machinability - Bolts and Pins Connections - Weld Symbols -Working Drawing - Principles of Assembly Drawing - Assembly of Different Parts [Couplings- Joints- Valves- Clamps…]. Computer aided mechanical drawing.
Prerequisite: Engineering Drawing and Projection 2

MDP 122 Introduction to Materials Science and Engineering	Lecture	Tut/Lab	Total
	2	2	4

Classification of Engineering materials, Iron and steel making, Fundamentals of material structure, Energy and bonding in metals and alloys, Crystallography and crystalline imperfection, Solidification of metals and alloys, Phase diagrams (Binary), Iron-Carbon diagram, Heat treatment, Ferrous alloys, Material testing, Materials forming, Corrosion and protection,.
Materials classification, composites
Prerequisite: Physics1,Mechanics1

ECE 123 Computer Programing 1	Lecture	Tut/Lab	Total
	2	2	4
Computer system – brief history – Computer devices and elements – input and output devices – central processor unit – additional units – software programs – operating system programs – programming languages application – program flowcharts – problems solving and programs – software algorithms – Boolean algebra – principles of spreadsheet and database – application program development. Prerequisite: None			

MDP 124 Properties and Strength of Materials	Lecture	Tut/Lab	Total
	2	1	3
Engineering materials – Loading types – Mechanics of Material deformations - Concepts of Stress and Strain - Types of Normal Stresses – Torsion Stress and Strain – Beams - Flexure Stress and Strain – Beam Deflection – Combined Stresses – Buckling of Columns – Destructive Materials tests – Non-Destructive Material tests. Prerequisite: Introduction to Materials Science and Engineering			

MPE 125 Fluid Mechanics	Lecture	Tut/Lab	Total
	3	2	5
Properties of fluids- Fluid statics, Hydrostatic forces on submerged Surfaces-Fluid in Motion -Integral Forms of the Fundamental Laws, Conservation of Mass, Energy equation Momentum equation, Dimensional analysis and Similitude- Internal Flow, developed flow, Laminar flow in pipes, Turbulent flow in pipes, Losses in developed pipe flow, Engineering applications. Prerequisite: Physics 1			

MDP 221 Mechanical Design	Lecture	Tut/Lab	Total
	2	3	5
Mechanical Power Transmission Elements, Shaft and key design, Coupling Design, Clutch design, Belt design. Anti-friction Bearings – Sliding bearings – Design of Gears – Construction working drawings. Pressure vessels, pipes and pipe fitting. Prerequisite: Engineering Drawing and Projection , Properties and Strength of Materials , Mechanical Drawing			

ECE 223 Computer Programing 2	Lecture	Tut/Lab	Total
	2	2	4
Matlab Basics. Simulation analysis using Matlab (SIMULINK). Control Systems using Matlab Optimization analysis using matlab. Image Processing using matlab. Partial Differential equations using matlab. Robust Control using matlab. Artificial Neural Network Applications. Prerequisite: Computer Programing 1			

MPE 223 Thermodynamics	Lecture	Tut/Lab	Total
	3	2	5

Basic concepts of thermodynamics, Work and heat - Properties of pure substances - First and second laws of thermodynamics – Entropy - Ideal gases - Gas and power cycles - Steam cycles and steam tables. Carnot cycles

Prerequisite: Physics 1

MDP 224 Quality Control	Lecture	Tut/Lab	Total
	2	2	4

Introduction - Quality improvement tools- Quality control charts - Capability indices- Acceptance sampling plans - Reliability analysis.

Prerequisite: None

ECE 224 Electrical Engineering and Electronics	Lecture	Tut/Lab	Total
	2	2	4

Electric circuits elements and general parameters definitions. Analysis of resistive circuits by simplifications with DC current. Circuits and network theorems. Analysis of circuits with AC excitation in the time domain. Analysis AC circuits in the frequency domain. Analysis AC circuits using circuit theorems; Loop (Mesh), Node, Superposition, Thevenin and Norton. Electronics Circuits basics. Magnetically coupled circuits. Electric Transformers basics. Electrical Machines basics. Renewable Energy Sources. Smart Power Grids Introductory.

Prerequisite: Physics 2

MDP 321 Measurement Instruments and Automatic Control	Lecture	Tut/Lab	Total
	2	2	4

Open & Closed-Loop Control System- Advantages of Automatic Control in Industry. Basic Elements of Closed-Loop Feed Back Control Systems - Function of each unit, and Role of measuring instrument. Measuring concepts - Measuring Systems - Measuring Errors & its Sources- Accuracy, Precision, and Calibration of measuring instrument. Mathematical using Differential Equations, and Laplace Transform. Linear & Nonlinear systems, Linearization concept, and linearization Errors. Transfer function concept, Block-Diagram Reduction, Signal Flow Diagram, and Mason's theorem. Control system stability, Routh-Hurwitz Stability Criterion. Bode Plots, Gain & Phase margins, and Frequency Stability analysis. Modeling using State-Space Variables, Transformations between system models, Computer evaluation of time-response Using MATLAB & applicability of each modeling technique.

Prerequisite: Mathematics Differential Equations, Computer Programing 2

Syllabuses of University Core Courses

I- Syllabuses of Mandatory Courses

HUM 083 Technical English 1	Lecture	Tut/Lab	Total
	2	-	2

Writing clear topic sentences, well-developed supporting sentences, and concluding sentences. Editing paragraphs for punctuation & writing errors. Extracting the meaning of words from reading texts. Making logical inferences from texts. Discussing opinions and thoughts about daily life topics. Planning, implementing and delivering group presentations. Skimming through and scanning text for details. Developing critical thinking skills.
Prerequisite: None

HUM 281 Risk Management and Environmental Eng.	Lecture	Tut/Lab	Total
	2	-	2

Environmental impact and management. Impact of oil and gas industry in marine Environment. Oïl hydrocarbons in marine Environment. Chemical disposal of offshore industry and environmental management. Dispersion models and atmospheric pollution. Dispersion models continued. Hazard assessment.
Prerequisite: None

HUM 282 Preparation and Presentation of Reports	Lecture	Tut/Lab	Total
	2	-	2

Discovering and outlining ideas. Organizing outlines. Ways to begin the three parts of Technical Writing. Writing abstracts, summaries, and conclusions of long reports. The thesis statement. Forms: letters, memos, reports, scientific articles, job description, CV, references and footnotes. Selection of key words, titles, and subtitles. Editing, revising and proof - reading techniques. word processing and technical writing, vocabulary building, and basic types and patterns of argument.
Prerequisite: Technical English 1

HUM 283 Risk Analysis	Lecture	Tut/Lab	Total
	2	-	2

Industrial Safety, Hygiene & Occupational Health: Introduction to Industrial Safety, Risk Assessment & Hazard Identification, Industrial Hygiene, Occupational Health. Control of Workplace Hazards: Control of Physical Hazards, Control of Chemical Hazards, Control of Electrical Hazards, Control of Fire Hazards. Safety Legislation & Management: Industrial Safety Legislations, Industrial Safety Management. Safety Awareness & Training. Plant design & housekeeping
Prerequisite: None

Hum 481 Communication Skills	Lecture	Tut/Lab	Total
	2	-	2

Analyzing the audience, Selecting presentation topics and objectives, Recognizing different types of speeches and presentations, Overcoming nervousness and developing confidence while addressing an audience, Researching and generating information for informative presentations,Chucking presentation content, Designing effective visual aids using explicit and effective transitions throughout a presentation, Creating benefit statements for persuasive presentations. Using persuasive devices such as pathos and logos in speech lanning and delivering informative, persuasive, entertaining and inspiring presentations. Handling question and answer sessions effectively.
Prerequisite: Preparation and Presentation of Reports

HUM 482 Engineering Economics and Project Management	Lecture	Tut/Lab	Total
	2	-	2

Establishing Economic Equivalence (Interest: The Cost of Money -The Elements of Transactions Involving Interest - Equivalence Calculations – Interest Formulas - Nominal and Effective Interest Rates). Measures of Project Worth (Project Cash Flows - Present Worth Analysis - Annual Equivalent Method - Rate of Return Analysis - Accept/Reject Decision Rules - Mutually Exclusive Alternatives). Cash Flow Projections (Operating Profit — Net Income - Accounting Depreciation - Corporate Income Taxes - Tax Treatment of Gains or Losses for Depreciable Assets - After-Tax Cash Flow Analysis - Effects of Inflation on Project Cash Flows). Sensitivity and Risk Analysis (Project Risk - Sensitivity Analysis - Scenario Analysis – Risk Analysis - Procedure for Developing an NPW Distribution - Expected Value and Variance - Decision Rule). Design Economics (Capital Costs vs. Operating Costs - Minimum-Cost Function). Project Management (Engineers, Projects, and Project Management – Project Planning - Project Scheduling - Staffing and Organizing – Team Building - Project Control - Estimating and Contracting). Tips on economic factors in computer spreadsheet analysis, Ethics in economic analyses
Prerequisite: None

HUM 483 Human Rights & Labor Law	Lecture	Tut/Lab	Total
	2	-	2

Importance of human rights, Growing Historical Human Rights, The historical origins of the philosophical human rights, Legal schools to consolidate human rights, International conventions on human rights, Agencies, international organizations and global and regional based on the protection of human rights, The position of the Egyptian constitution of human rights, The legal protection of human rights national and international level, Human rights in Islamic law, Sources of international human rights, Show of some human rights. Labor Law: Definitions and general provisions, Employment of workers children and women, Employment contracts, records and wages, Working hours and leaves, Workers' safety, protection, health and social care, Disciplinary rules, Termination and severance pay, Compensation for occupational injuries, Collective labor disputes, Labor inspection, Penalties
Prerequisite: None

II- Syllabuses of Elective Courses

HUM 082A1 Selections of Life-Long Skills	Lecture	Tut/Lab	Total
	2	-	2

Communicating Clearly – Managing Time and Resources – Making Decisions – Delegating Successfully – Motivating People – Managing Teams – Negotiating Successfully – Minimizing Stress – Getting Organized – Managing Changes – Interviewing People – Managing Your Career – Balancing Work and Life – Thinking Creativity and Innovation – Influencing People – Systems Thinking – Interpersonal Management Skills – Entrepreneurial Skills.
Prerequisite: None

HUM 082A2 Ergonomics and Human Factor	Lecture	Tut/Lab	Total
	2	-	2

Evaluation of the relationship between employee and the equipment - Human performance - Visual gages and handling and interphases - Automated systems monitoring and follow-up – Bio-Mechanical structure for bones, spine cage and muscle - Dynamic muscle and bone systems compatibility models - The pressure of work and a better mental work in the industry pressure mechanisms – shifting work - Modeling the relationship between worker and machine
Prerequisite: None

HUM 082A3 History of Engineering	Lecture	Tut/Lab	Total
	2	-	2

Definitions: art, science, technology, and engineering - Civilizations and their relationship with natural and human sciences - History of different technology and engineering specialization's - Historical relations between science and technology - Relation between developments in engineering and development of engineering activities (research - design - manage - mint,).
Prerequisite: None

HUM 381B1 Human Resource Management	Lecture	Tut/Lab	Total
	2	-	2

Introduction to HRM, ·HRM activities and roles, ·Professionalism in a HRM context, Objectives and metrics of HRM, ·HR across management structures, and orientations, Development of HR through history, The Union-Management Framework, Philosophy of Unionism, ·Functions of Unions, Collective Agreements, The Collective Bargaining Process, Union as organizations
Prerequisite: None

HUM 381B2 Service Management	Lecture	Tut/Lab	Total
	2	-	2

Role of services in the economy, The nature of services, Service quality, Service Strategy , Developing new services, The role of technology in supporting service delivery, Design of Services, Capacity planning and managing queues, Quantitative methods for services managem
Prerequisite: None

HUM 381B3 Ethics and Legislation	Lecture	Tut/Lab	Total
	2	-	2

The Engineering profession: Ethical issues in Engineering practice. Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologis .Codes of professional ethics.
The legal rule: Mandatory and complementary.
Formal sources: Statutory Law, Custom, the Principlesof natural Law and rules of justice.
Informal sources: Jurisprudence, Doctrine. Application of Law. Holders of right; Natural Persons, Juristic persons. Theory of Obligation; definition, forms. Sources of Obligations. The contract; Parties, Formation, Validity, Effect, and compensation of Damage. Introduction to Engineering Contracts. Contracting Contract.
Prerequisite: None

HUM 381B4 Marketing	Lecture	Tut/Lab	Total
	2	-	2

Introduction. The Field of Sales; Strategic Sales Force Management. The Personal Selling Process and Sales Force Organization. Profiling and Recruiting Salespeople; Selecting and Hiring Applicants, Developing the Sales Program, Sales Force Motivation, Sales Force Compensation, Expenses and Transportation; Leadership of a Sales Force, Forecasting Sales and Developing Budgets; Sales Territories, Analysis of Sales Volume, Marketing Cost & Profitability Analysis, Performance Evaluation; Ethical and Legal Responsibilities tender writing.
Prerequisite: None

HUM 382C1 Humanities and Engineering	Lecture	Tut/Lab	Total
	2	-	2

History of Technology: Engineering and technology in a cultural, social, and historical context. Development of technology as a key to history of civilization in a comparative perspective. Exploring the Humanities: Introduction to modes of thought found within humanities and social sciences. Humanities for Engineers: Humanities themes of increased complexity. Different work methodologies. Critical analysis of information and choice of argumentation. Work methodologies and pedagogical interest.
Prerequisites: None

HUM 382C2 Accounting	Lecture	Tut/Lab	Total
	2	-	2
Basic accounting concepts: Accounting Terms and Assumptions, Accounting Methodology: balance sheet, income statement, and cash flow statement. Income Determination: Cash Effects, Basis of Accounting. Accounting ratio – measuring the performance – cost concepts – cost accumulation – cost allocation – cost/volume/profit analysis – budgets – forecasting. Cost Accounting Prerequisites: None			
HUM 382C3 Control and Quality Standard	**Lecture**	**Tut/Lab**	**Total**
	2	**-**	**2**
Introduction to lab safety culture, precautionary labels, Material Safety Data Sheets, using personal protective equipment, handling lab equipment safely, handling, storing and disposing of chemicals safely, using emergency equipment as well as safety planning Prerequisite: None			
HUM 382C4 Monitoring and Quality Control	**Lecture**	**Tut/Lab**	**Total**
	2	**-**	**2**
Introduction: history of quality, the dimensions of quality. Quality Control Concepts: quality assurance, total quality management. Control systems: objectives of control systems, quality systems, top management communicating. Hazard Analysis: high - quality recommendations, commitment monitoring, follow up Systems, the base line of hazard analysis critical point (HACCP). Sampling and Inspection: Sample size, sampling error, sampling designs and inspection, acceptance sampling plans. Quality Control Tools and Techniques: tools for creating new concepts, tools for organization and analysis of data, tools for determine and solving problems (Control Charts for Variables - Control Charts for Attributes - PRE - control - analysis - flow charts). International Standards Accreditation: Accreditation meaning, ISO requirements and recommendations, Audit program, Certification body. Analyzing Process Capability: Process capability indices, process performance indices. Prerequisite: None			

CHAPTER 7

Statistical Tables

Check on Suez Petroleum 2016 Regulations According to New Framework

1- Petroleum Engineering Department

Table (1A)

Per Week									Per 15 week
Semester #		Lectures	Labs / Tutorials	Total Contact Hours	US Credits	TSWL (Hrs.)	Direct-SWL (hrs.)	Indirect-SWL (hrs.)	ECTS Units
1		15	10	25	18	917	25	892	37
2		15	10	25	18	917	25	892	37
3		13	12	25	17	850	25	825	34
4		14	11	25	18	883	25	858	35
5		15	10	25	18	917	25	892	37
6		15	10	25	18	917	25	892	37
7		15	10	25	18	917	25	892	37
8		14	12	26	18	900	26	874	36
9		13	14	27	18	883	27	856	35
10		14	12	26	18	900	26	874	36
Sum per degree		143	111	254	180	9000	254	8746	360

2- Petroleum Refining and Petrochemical Eng. Department

Table (1B)

Per Week									Per 15 week
Semester #		Lectures	Labs / Tutorials	Total Contact Hours	US Credits	TSWL (Hrs.)	Direct-SWL (hrs.)	Indirect-SWL (hrs.)	ECTS Units
1		15	10	25	18	917	25	892	37
2		15	10	25	18	917	25	892	37
3		13	13	26	17	867	26	841	35
4		14	11	25	18	883	25	858	35
5		14	13	27	18	917	27	890	37
6		15	10	25	18	917	25	892	37
7		16	9	25	19	950	25	925	38
8		14	11	25	18	883	25	858	35
9		14	13	27	18	917	27	890	37
10		13	12	25	17	850	25	825	34
Sum per degree		143	112	255	180	9017	255	8762	361

3- Metallurgical and Materials Eng. Department

Table (1C)

Per Week									Per 15 week
Semester #		Lectures	Labs / Tutorials	Total Contact Hours	US Credits	TSWL (Hrs.)	Direct-SWL (hrs.)	Indirect-SWL (hrs.)	ECTS Units
1		15	10	25	18	917	25	892	37
2		15	10	25	18	917	25	892	37
3		13	12	25	17	850	25	825	34
4		14	11	25	18	883	25	858	35
5		14	13	27	18	917	27	890	37
6		15	10	25	18	917	25	892	37
7		15	10	25	18	917	25	892	37
8		14	11	25	18	883	25	858	35
9		13	13	26	17	867	26	841	35
10		15	12	27	19	950	27	923	38
Sum per degree		143	112	255	180	9017	255	8762	361

4- Mining Engineering Eng. Department

Table (1D)

Per Week									Per 15 week
Semester #		Lectures	Labs / Tutorials	Total Contact Hours	US Credits	TSWL (Hrs.)	Direct-SWL (hrs.)	Indirect-SWL (hrs.)	ECTS Units
1		15	10	25	18	917	25	892	37
2		15	10	25	18	917	25	892	37
3		13	12	25	17	850	25	825	34
4		14	11	25	18	883	25	858	35
5		15	12	27	19	950	27	923	38
6		15	10	25	18	917	25	892	37
7		15	10	25	18	917	25	892	37
8		15	10	25	18	917	25	892	37
9		12	14	26	17	833	26	807	33
10		14	13	27	18	917	27	890	37
Sum per degree		142	113	255	180	8983	255	8728	359

5- Geological and Geophysical Engineering

6- Table (1E)

Per Week									Per 15 week
Semester #		Lectures	Labs / Tutorials	Total Contact Hours	US Credits	TSWL (Hrs.)	Direct-SWL (hrs.)	Indirect-SWL (hrs.)	ECTS Units
1		15	10	25	18	917	25	892	37
2		15	10	25	18	917	25	892	37
3		13	12	25	17	850	25	825	34
4		14	11	25	18	883	25	858	35
5		14	11	25	18	883	25	858	35
6		15	10	25	18	917	25	892	37
7		17	10	27	20	1017	27	990	41
8		14	11	25	18	883	25	858	35
9		14	12	26	18	900	26	874	36
10		13	12	25	17	850	25	825	34
Sum per degree		144	109	253	180	9017	253	8764	361
Average		14	11	25	18	902	25	876	36
Maximum				28	18				
% Difference				-10%	0%	#####			#DIV/0!

Table (2A) Overall Data of All Bachelor Programs Faculty of Petroleum and Mining Engineering – Suez University Academic Regulation for Bachelor of Engineering Programs – Issue 2018														
No.	Program Title	Total Number of courses	Weakly Contact Hours			Credits ,ECTS and TSWL Per degree			Compliance with SCU Framework 2016 (in Credit Hours)					
			Lectures	Labs / Tutorials	Total Contact Hours	Credits (Chars.)	ECTS	TSWL	علوم اجتماعية وإنسانية	إدارة أعمال	ثقافة هندسية	رياضيات و علوم اساسية هندسية	علوم هندسية أساسية	تطبيقات هندسية وتصميم
1	Petroleum Engineering	63	143	111	254	180	360	9000	12	4	4	66	50	44
2	Petroleum Refining and Petrochemical Engineering	65	143	112	255	180	361	9017	12	4	4	66	50	44
3	Metallurgical and Materials Engineering	65	143	112	255	180	361	9017	12	4	4	66	50	44
4	Mining Engineering	64	142	113	255	180	359	8728	12	4	4	66	50	44
5	Geological and Geophysical Engineering	65	144	109	253	180	361	8764	12	4	4	66	50	44

Table (2B) Overall Data of All Bachelor Programs Faculty of Petroleum and Mining Engineering – Suez University Academic Regulation for Bachelor of Engineering Programs – Issue 2018											
No.	Program Title	Total Number of courses	Weakly Contact Hours			Credits ,ECTS and TSWL Per degree			Compliance with SCU Framework 2016 (in Credit Hours)		
			Lectures	Labs / Tutorials	Total Contact Hours	Credits (Chars.)	ECTS	TSWL	متطلبات جامعة	متطلبات كلية	تخصص علم
1	Petroleum Engineering	63	143	111	254	180	360	9000	20	66	94
2	Petroleum Refining and Petrochemical Engineering	65	143	112	255	180	361	9017	20	66	94
3	Metallurgical and Materials Engineering	65	143	112	255	180	361	9017	20	66	94
4	Mining Engineering	64	142	113	255	180	359	8728	20	66	94
5	Geological and Geophysical Engineering	65	143	111	253	180	360	9000	20	66	94

Table (2C) List of Common Courses Between All Programs
Faculty of Petroleum and Mining Engineering – Suez University
Academic Regulation for Bachelor of Engineering Programs – Issue 2018

No.	Code	Course Title	Lectures	Labs / Tutorials	Total Contact Hours	Credits (Chars.)	ECTS	Course Classification	
								U Core	C Core
1	BSM 011	Physics 1 (Properties of Matter and Thermodynamics)	3	2	5	3	6		√
2	BSM 012	Mathematics 1 (Differential Calculus and Algebra)	3	2	5	3	6		√
3	BSM 013	Mechanics 1 (statics)	2	2	4	3	6		√
4	BSM 014	General Chemistry	3	2	5	3	6		√
5	MDP 021	Engineering Drawing and Projection 1	2	2	4	3	6		√
6	HUM 082A	Elective Humanities 1	2	-	2	2	4	√	
7	BSM 015	Physics 2 (Electricity , Magnetism and Optics)	3	2	5	3	6		√
8	BSM 016	Mathematics 2 (Integral Calculus and Analytical Geom.)	3	2	5	3	6		√
9	BSM 017	Mechanics 2 (dynamics)	2	2	4	3	6		√
10	MDP 022	Engineering Drawing and Projection 2	2	4	6	3	6		√
11	MDP 022	Production Technology	2	1	3	2	4		√
12	HUM 083	Technical English 1	2	-	2	2	4	√	
		Total (Level Zero)	29	21	50	33	66		
14	BSM 111	Mathematics 3 (Differential Equations and Multi variable Calculus)	3	2	5	3	6		√
15	MDP 121	Mechanical Drawing	2	3	5	3	6		√
16	BSM 115	Physics 3 (Introduction to Modern and Nuclear physics)	3	2	5	3	6		√
17	BSM 116	Mathematics 4 (Numerical Analysis)	2	2	4	3	6		√
18	ECE 123	Computers Programming 1	2	2	4	3	6		√
19	MPE 125	Fluid Mechanics	3	2	5	3	6		√
		Total (Level 1)	15	13	28	18	36		
20	BSM 211	Mathematics 5 (Applied Statistics)	2	2	4	2	4		√
21	MDP 221	Mechanical Design	2	3	5	3	6		√
22	ECE 223	Computer Programming 2	2	2	4	3	6		√
23	HUM 281	Risk Management and Environmental Eng.	2	0	2	2	4	√	

24	MPE 223	Thermodynamics	3	2	5	3	6		√
25	MDP 224	Quality Control	2	2	4	3	6		√
26	ECE 224	Electrical Engineering and Electronic	2	2	4	3	6		√
27	HUM 282	Preparation and Presentation of Reports	2	0	2	2	4	√	
28	HUM 283	Risk Analysis	2	0	2	2	4	√	
Total (Level 2)			19	13	32	23	46		
29	MDP 321	Measurement Instruments and Automatic Control	2	2	4	2	4		√
30	HUM 381B	Elective Humanities 2	2	0	2	2	4	√	√
31	HUM 382C	Elective Humanities 3	2	0	2	2	4	√	√
Total (Third Level)			6	2	8	6	12		
32	Hum 481	Communication Skills	2	0	2	2	4	√	
33	Hum 482	Engineering Economics and Project Management	2	0	2	2	4	√	
34	Hum 483	Human Rights & Labor Law							
Total (Fourth Level)			6	-	6	6	12		
Basic Sciences and Engineering Mathematics			29	22	51	32 17.7%	64		
Basic Engineering Sciences			26	27	53	34 18.8%	68		
University Core			20	-	20	20 11.1%	40		
Total			75	49	124	86	172		

1- University Core (HUM)

Bachelor Program Based on Contact Hours System

Table (3A)

Level no.	Term	Code	Name	Contact hours			Prerequisites
				Lectures	Tut/Lab.	Total C.R.	
0	1	HUM 082A	Elective Humanities 1	2	-	2	None
	2	HUM 083	Technical English 1	2	-	2	None
				6	-	6	
2	5	HUM 281	Risk Management and Environmental Eng.	2	-	2	None
	6	HUM 282	Preparation and Presentation of Reports	2	-	2	Technical English 1
		HUM 283	Risk Analysis	2	-	2	None
				6	-	6	
3	7	HUM 381B	Elective Humanities 2	2	-	2	None
		HUM 382C	Elective Humanities 2	2	-	2	None
				4	-	4	
4	9	HUM 481	Communication Skills	2	-	2	Preparation and Presentation of Reports
	10	HUM 482	Engineering Economics and Project Management	2	-	2	None
		Hum 483	Human Rights & Labor Law	2	-	2	none
				6	-	6	
Total University Core Contact Hours				20	-	20	
EQ. CREDIT HOURS				20 Chars. Unit			

2- College Core

A- Basic Sciences and Engineering Mathematics (BSM)

Bachelor Program Based on Contact Hours System

Table (3B)

Level no.	Term	Code	Name	Contact hours			Prerequisites
				Lectures	Tut/Lab.	Total	
0		BSM 011	Physics 1 (Properties of Matter , and Heat and Thermodynamics)	3	2	5	None
		BSM 012	Mathematics 1 (Differential Calculus, and Algebra)	3	2	5	None
		BSM 013	Mechanics1 (Statics)	2	2	4	None
		BSM 014	General Chemistry	3	2	5	None
		BSM 015	Physics 2 (Electricity , Magnetism, and Optics)	3	2	5	Physics 1
		BSM 016	Mathematics 2 (Integral Calculus and Analytical Geom.)	3	2	5	Mathematics 1
		BSM 017	Mechanics 2 (Dynamics)	2	2	4	Mechanics 1
				19	14	33	
1		BSM 111	Mathematics 3 (Differential Equations and Multi variable Calculus)	3	2	5	Mathematics 2
		BSM 115	Physics3 (Modern Physics and Nuclear Physics)	3	2	5	Physics 2
		BSM 116	Mathematics 4 (Numerical Analysis)	2	2	4	Mathematics 3
				8	6	14	
2		BSM 211	Mathematics 5 (Applied Statistics)	2	2	4	Mathematics 4
				2	2	4	
Total Contact Hours				29	22	51	
EQ. CREDIT HOURS				32 Chars. Unit			

B- Basic Engineering Sciences Courses

Bachelor Program Based on Contact Hours System

Table (3C)

Level no.	Term	Code	Name	Contact hours			Prerequisites
				Lecturer	Tut/Lab.	Total	
0	1	MDP 021	Engineering Drawing and Projection 1	2	2	4	None
	2	MDP 022	Engineering Drawing and Projection 2	2	4	6	Engineering Drawing and Projection 1
		MDP 023	Production Technology	2	1	3	None
				6	7	13	
1	3	MDP 121	Mechanical Drawing	2	3	5	Engineering Drawing and Projection 2
	4	ECE 123	Computer Programming 1	2	2	4	None
		MPE 125	Fluid Mechanics	3	2	5	Physics1
				7	7	14	
2	5	MDP 221	Mechanical Design	2	3	5	Engineering Drawing and Projection 2, Properties and Strength of Materials, Mechanical Drawing
		ECE 223	Computer Programming 2	2	2	4	Computer Programing 1
	6	MDE 223	Thermodynamics	3	2	5	Physics 1
		MDP 224	Quality Control	2	2	4	None
		ECE 224	Electrical Engineering and Electronic	2	2	4	Physics 2
				11	11	22	
3	7	MDP 321	Measurement Instruments and Automatic Control	2	2	4	Mathematics 3, Computer Programing 2
				2	2	4	
Total Contact Hours				26	27	53	
EQ. CREDIT HOURS				34 CR. Unit			

Department Cores

1- Petroleum Engineering Department (PE)

Bachelor Program Based on Contact Hours System

Table (4A)

Code	Course Name	Contact hours			Prerequisites
		Lecture	Tut / Lab.	Total	
BSM 112	Physical Chemistry	2	2	4	General Chemistry
BSM 113	Earth Sciences and Engineering	2	1	3	None
MDP 122	Introduction to Materials Science and Engineering	2	2	4	Mechanics 1, Physics 1
PE 131	Introduction to Petroleum Engineering	2	2	4	None
BSM 118	Organic Chemistry	2	2	4	General Chemistry
MDP 124	Properties and Strength of Materials	2	1	3	Introduction to Materials Science and Engineering
Contact Hours of Level (1)		12	10	22	
BSM 215	Sedimentology , Paleontology, and Stratigraphy	2	1	3	Earth Sciences and Engineering
PE 231	Oil Well Drilling Engineering 1	3	1	4	Introduction to Petroleum Engineering
ME 265	Plane Survey & Topography	2	1	3	Mathematics 4
BSM 217	Structural Geology	2	2	4	Earth Sciences and Engineering
PE 232	Reservoir Fluid Properties	2	2	4	Introduction to Petroleum Engineering
Contact Hours of Level (2)		11	7	18	
PE 331	Reservoir Rock Properties	2	2	4	Introduction to Petroleum Engineering,
PE 332	Petroleum Geology	3	2	5	Structure Geology, Sedimentology and Paleontology and Stratigraphy, Earth and Engineering Sciences
PE 333	Production Equipment and Machinery	2	2	4	Introduction to Petroleum Engineering
PE 334 A	Elective Course 1	2	2	4	As shown in Table (4B)
PE 335	Computer Applications in Petroleum Engineering	2	2	4	Mathematics 3, Computer Programming 1, and concurrent with Applied Reservoir Engineering
PE 336	Applied Reservoir Engineering	3	2	5	Reservoir Fluid Properties

PE 334 B	Elective course 2	2	2	4	As shown in Table (4B)
GGE 371	Applied Geophysics	3	2	5	Earth and Engineering Sciences, Structure Geology.
PE 337	Petroleum Production Engineering 1	2	2	4	Introduction to Petroleum Engineering
PE 338	Drilling Equipment and Machinery	2	2	4	Oil Well Drilling Engineering 1
Contact Hours of Level (3)		23	20	43	
PE 431	Petroleum Production Engineering 2	3	2	5	Petroleum Production Engineering 1
PE 432	Oil Well Drilling Engineering 2	2	2	2	Oil Well Drilling Engineering 1 , Drilling Equipment's and Machinery
PE 434 A	Elective Course 3	2	2	4	As shown in Table (4B)
PE 435	Project	-	4	4	
PE 436	Well Logging	2	2	4	Reservoir Rock Properties, Petroleum Geology, Applied Geophysics.
PE 437	Well Testing	2	2	4	Reservoir Rock Properties, and Concurrent with Petroleum Production Engineering 2 and Applied Reservoir Engineering.
PE 438	Natural Gas Engineering	3	2	5	Reservoir Fluid Properties, Petroleum Production Engineering 1
PE 434 B	Elective Course 4	2	2	4	As shown in Table (4B)
PE 439	Well Completion and Workover	3	2	5	Petroleum Production Engineering 1, Petroleum Production Equipment and Machinery
PE 43 10	Enhanced Oil Recovery	2	2	4	Reservoir Fluid Properties, Applied Reservoir Engineering.
PE 435	Project	-	4	4	
Contact Hours of Level (4)		21	26	47	
Total Contact Hours		67	63	130	

Petroleum Engineering Department (PE)

Elective Courses Groups

Table (4B)

Group	Code	Course Name	Contact hours			Contact hours
			Lecture	Tut / Lab.	Total	
1	PE 334 A1	Evaluation of Crude Oil	2	2	4	Organic Chemistry
	PE 334 A2	Rocks Mechanics	2	2	4	Structure Geology
	PE 334 A3	Corrosion in Petroleum Industry	2	2	4	Physical Chemistry
2	PE 334 B1	Petroleum Development Geology	2	2	4	Petroleum Geology
	PE 334 B2	Petroleum Refining Engineering	2	2	4	None
3	PE 434 A1	Formation Stimulation	2	2	4	Petroleum Production Engineering 1
	PE 434 A2	Horizontal Oil Well Drilling Technology	2	2	4	Oil Well Drilling Engineering 1
	PE 434 A3	Natural Gas Well Technology and Development	2	2	4	Reservoir Fluid Properties
	PE 434 A4	Formation Evaluation	2	2	4	Oil Well Drilling Engineering 1, Concurrent with Well Testing, and Well Logging
	PE 434 A5	Transportation and Storage of Petroleum	2	2	4	Fluid Mechanics, Production Equipment and Machinery
4	PE 434 B1	Petroleum Production Technology	2	2	4	Petroleum Production Engineering 2
	PE 434 B2	Water and Gas Shutoff Techniques	2	2	4	Enhanced Oil Recovery
	PE 434 B3	Natural Gas Processing Operations	2	2	4	Natural Gas Engineering
	PE 434 B4	Well Production Logging	2	2	4	Petroleum Production Engineering 2, Well Logging
	PE 434 B5	Reservoir Simulation	2	2	4	Applied Reservoir Engineering, and concurrent with Enhanced Oil Recovery
Four elective courses each of 4 contact hours will be selected from among four groups of courses.						

2- Petroleum Refining and Petrochemical Engineering Department (PRE)

Bachelor Program Based on Contact Hours System

Table (5A)

Code	Course Name	Contact hours			Prerequisites
		Lecture	Tut / Lab.	Total	
BSM 112	Physical Chemistry	2	2	4	General Chemistry
MDP 122	Introduction to Materials Science and Engineering	2	2	4	Mechanics 1, Physics 1
PRE 141	Introduction to Refinery and Petrochemical Engineering	2	2	4	General Chemistry
PRE 142	Principles of Chemical Engineering	2	2	4	General Chemistry
BSM 118	Organic Chemistry	2	2	4	General Chemistry
MDP 124	Properties and Strength of Materials	2	1	3	Introduction to Materials Science and Engineering
Contact Hours of Level (1)		12	11	23	
BSM 212	Analytical Chemistry	2	2	4	General Chemistry
PRE 241	Evaluation of Crude Oil	2	2	4	Introduction to Petroleum Refining, Organic Chemistry
PRE 242	Petroleum Refining Engineering 1	2	2	4	Introduction to Petroleum Refining
PRE 243	Unit Operation 1	2	2	4	Principles of Chemical Engineering
PRE 244	Industrial Water Treatment	2	2	4	Organic Chemistry
Contact Hours of Level (2)		10	10	20	
PRE 341	Petrochemical Industries 1	2	1	3	Organic Chemistry
PRE 342	Unit Operation 2	2	2	4	Principles of Chemical Engineering, Introduction to Petroleum Refining 1
PRE 343	Chemical Reactions Engineering	2	1	3	General Chemistry
PRE 344	Corrosion in Petroleum Industries	2	1	3	Physical Chemistry, Properties and Strength of Materials
PRE 345 A	Elective Course 1	2	2	4	As shown in Table (5B)
PRE 346	Heat Transfer in Chemical Operations	2	2	4	Physics 1 and Thermodynamics
PRE 347	Petroleum Product Testing	2	2	4	Evaluation of Crude oil, Organic Chemistry

PRE 348	Computer Application in Chemical and Electrochemical industries	2	2	4	Computer Programming 2, Unit Operation 2 , Math.3
PRE 349	Unit Processes	3	2	5	Organic Chemistry
PRE 3410	Transportation and Storage of Crude Oil Petroleum	3	1	4	Fluid Mechanics
PRE 345B	Elective Course 2	2	2	4	As shown in Table (5B)
Contact Hours of Level (3)		24	18	42	
PRE 441	Plant Design	2	1	3	Petroleum Refining 1
PRE 442	Pollution Control	2	1	3	Organic Chemistry
PRE 443	Design of Refining Equipment's	2	1	3	Unit Operation 2 , Petroleum Refining 1
PRE 444 A	Elective Course 3	2	2	4	As shown in Table (5B)
PRE 445	Project	-	4	4	None
PRE 446	Automatic Control in Chemical Operations	2	2	4	Petroleum Refining 1, Measurement Instruments and Automatic Control
PRE 447	Petroleum Refining 2	2	2	4	Petroleum Refining 1
PRE 448	Petrochemical Industries 2	3	2	5	Petrochemical Industry 1
PRE 449	Petroleum Gases Engineering	2	2	4	Petroleum Refining 1, General Chemistry
PRE 4410	Optimization of Chemical Engineering	2	2	4	Unit Operation 2, Computer Programming 2
PRE 444B	Elective Course 4	2	2	4	As shown in Table (5B)
PRE 445	Project	-	4	4	None
Contact Hours of Level (4)		21	25	46	
Total Contact Hours		67	64	131	

Petroleum Refining and Petrochemical Engineering Department (PRE)

Elective Courses Groups

Table (5B)

Group	Code	Course Name	Contact hours			Prerequisites
			Lecture	Tut / Lab.	Total	
1	PRE 345 A1	Rheological Properties of Petroleum Products	2	2	4	Fluid Mechanics
	PRE 345 A2	Introduction to Petroleum Engineering	2	2	4	None
	PRE 345 A3	Chemical Industries	2	2	4	Organic Chemistry
2	PRE 345 B1	Enhance Oil and Gas Recovery	2	2	4	None
	PRE 345 B2	Energy Conservation	2	2	4	Thermodynamics
	PRE 345 B3	Organic and Inorganic Fertilizers	2	2	4	Petrochemical Industries 1
	PRE 345 B4	Hysys Application in Refinery Plants	2	2	4	Unit Operation 2, Computer Programming 2, Physics 3
3	PRE 444 A1	Sustainable Energy	2	2	4	Thermodynamics
	PRE 444 A2	Chemistry and Technology of Polymers	2	2	4	Organic Chemistry, Petrochemical Industries 1
	PRE 444 A3	Catalysis in Chemical Engineering	2	2	4	Physical Chemistry, Physics 3
	PRE 444 A4	Operation Research in Chemical Engineering	2	2	4	Principles of Chemical Engineering, Math.5
	PRE 444 B1	Synthetic Rubber and Plastic	2	2	4	Petrochemical Industries 1
	PRE 444 B2	Furnace and Heat Exchanger Design	2	2	4	Thermodynamics
	PRE 444 B3	Nano Technology and its Applications in Chemical Engineering	2	2	4	Physics 3

Four elective courses each of 4 contact hours will be selected from among four groups of courses.

3- Metallurgical and Materials Engineering Department (MME)

Bachelor Program Based on Contact Hours System

Table (6A)

Code	Course Name	Contact hours			Prerequisites
		Lecture	Tut / Lab.	Total	
BSM 112	Physical Chemistry	2	2	4	General Chemistry
MDP 122	Introduction to Materials Science and Engineering	2	2	4	Mechanics 1, Physics 1
MME 151	Unit Operations in Metallurgy	2	2	4	None
MME 152	Materials Characterization Techniques	2	1	3	None
MME 153	Phase Diagrams	2	2	4	Introduction to Materials Science and Engineering
MDP 124	Properties and Strength of Materials	2	1	3	Introduction to Materials Science and Engineering
Contact Hours of Level (1)		12	10	22	
BSM 213	Analytical Chemistry	2	2	4	General Chemistry
MME 251	Mechanical Behavior of Materials	2	2	4	Phase Diagrams
MME 252	Electrochemistry in Metallurgy	2	2	4	Physical Chemistry
MME 253	Heat Transfer in Metallurgy	2	2	4	Physics 1
MME 254	Diffusion and Phase Transformations	2	2	4	Phase Diagrams
Contact Hours of Level (2)		10	10	20	
MME 351	Non-Destructive Materials Testing	2	2	4	Introduction to Materials Science and Engineering
MME 352	Heat Treatment Technology	3	2	5	Diffusion and Phase Transformations
MME 353	Thermodynamics and Kinetics of Metallurgical Processes	2	2	4	Physical Chemistry, Thermodynamics
MME 359A	Elective Course 1	2	2	4	As shown in Table (6B)
MME 354	Corrosion Engineering & Protection	3	2	5	Electrochemistry in Metallurgy
MME 355	Metallurgical Furnaces and Refractories	2	2	4	Heat Transfer in Metallurgy
MME 356	Destructive Materials Testing	2	2	4	Introduction to Materials Science and Engineering
MME 357	Welding Metallurgy and Technology	3	2	5	Diffusion and Phase Transformations

MME 358	Ceramics Materials	2	1	3	Introduction to Materials Science and Engineering
MME 359 B	Elective Course 2	2	2	4	As shown in Table (6B)
Contact Hours of Level (3)		23	19	42	
MME 451	Ferrous Extractive Metallurgy	3	2	5	Thermodynamics and Kinetics of Metallurgical Processes
MME 452	Composite Materials	2	1	3	Introduction to Materials Science and Engineering
MME 453	Casting Engineering	2	2	4	Diffusion and Phase Transformations
MME 454	Modeling and Simulation in Materials Engineering	2	2	4	Introduction to Materials Science and Engineering, Computer Programing 2
MME 459A	Elective Course 3	2	2	4	As shown in Table (6B)
MME 458	Project	-	4	4	None
MME 455	Materials Forming	3	2	5	Mechanical Behavior of Materials
MME 456	Non Ferrous Extractive Metallurgy	3	2	5	Electrochemistry in Metallurgy
MME 457	Principals of Alloys Design	3	2	5	Mechanical Behavior of Materials
MME 459B	Elective Course 4	2	2	4	As shown in Table (6B)
MME 458	Project	-	4	4	None
Contact Hours of Level (4)		22	25	47	
Total Contact Hours		67	64	131	

Metallurgical and Materials Engineering Department (MME)

Elective Courses Groups

Table (6B)

Group	Code	Course Name	Contact hours			Prerequisites
			Lecture	Tut / Lab.	Total	
1	MME 359A1	Nuclear Metallurgy	2	2	4	Introduction to Materials Science and Engineering
	MME 359A2	Powder Metallurgy	2	2	4	Phase Diagrams
	MME 359A3	Steel and Cast Irons Processing	2	2	4	Diffusion and Phase Transformations
2	MME 359B1	Hydrometallurgy	2	2	4	Electrochemistry in Metallurgy , Unit Operation in Metallurgy
	MME 359B2	Polymer Materials	2	2	4	Introduction to Materials Science and Engineering
	MME 359B3	Smart Materials	2	2	4	Introduction to Materials Science and Engineering
3	MME 459A1	Failure Analysis	2	2	4	Introduction to Materials Science and Engineering
	MME 459A2	Surface Engineering	2	2	4	Corrosion Engineering and Protection and Heat treatment Technology
	MME 459A3	Biomaterials	2	2	4	Diffusion and Phase Transformation
	MME 459A4	Corrosion Testing and Monitoring	2	2	4	Corrosion Engineering and Protection
	MME 459A5	Welding Engineering	2	2	4	Introduction to Materials Science and Engineering
4	MME 459B1	Materials Selection and Standards	2	2	4	Welding metallurgy and Technology
	MME 459B2	Nanomaterials	2	2	4	Introduction to Materials Science and Engineering
	MME 459B3	High Temperature Oxidation and Hot Corrosion	2	2	4	Corrosion Engineering and Protection
	MME 459B4	Codes of Design and Fabrication of Metallic Constructions	2	2	4	Mechanical Behavior of Materials
	MME 459B5	Casting Design	2	2	4	Casting Engineering
	MME 459B6	Design and Applications of Cathodic Protection Systems	2	2	4	Corrosion Engineering and Protection
	MME 459B7	Production of Ferroalloys	2	2	4	Thermodynamics and Kinetics of Metallurgical Processes
	MME 459B8	Eco materials	2	2	4	Introduction to Materials Science and Engineering

Four elective courses each of 4 contact hours will be selected from among four groups of Courses.

Mining Engineering Department

Bachelor Program Based on Contact Hours System

Table (7A)

Code	Course Name	Contact hours			Prerequisites
		Lecture	Tut / Lab.	Total	
BSM 112	Physical Chemistry	2	2	4	General Chemistry
BSM 113	Earth Sciences and Engineering	2	1	3	None
BSM 114	Mineralogy and Crystallography	2	2	4	None
MDP 122	Introduction to Materials Science and Engineering	2	2	4	Mechanics 1, Physic 1
ME 161	Introduction to Mining Engineering	2	1	3	None
BSM 117	Structure Geology	2	2	4	Earth Sciences and Engineering
Contact Hours of Level (1)		**12**	**10**	**22**	
BSM 214	Analytical Chemistry	2	2	4	General Chemistry
BSM 216	Petrology	1	1	2	Earth Sciences and Engineering
ME 261	Rock Mechanics 1	2	1	3	Mathematics 4 , Introduction to Materials Science and Engineering
ME 262	Plane Survey & Topography	2	1	3	Mathematics 4
ME 263	Geodetic Survey and Astronomy	2	2	4	Plane Survey & Topography
GGE 274	Applied Geophysics	2	2	4	Earth and Engineering Sciences, Structure Geology
Contact Hours of Level (2)		**11**	**9**	**20**	
ME 361	Underground Mining Methods	2	2	4	Introduction to Mining Engineering, Rock Mechanics 1
ME 362	Mineral Processing 1	2	2	4	Mineralogy and Crystallography, Petrology
ME 363	Technology of Surface Mines	3	2	5	Introduction to Mining Engineering, Rock Mechanics 1
ME 364A	Elective Course 1	2	2	4	As shown in Table (7B)
MME35 10	Extractive Metallurgy	2	2	4	Analytical Chemistry, Mineral Processing 1
ME 365	Mineral Processing 2	2	2	4	Mineral Processing 1
ME 366	Processing of Non Metallic Raw Materials	2	1	3	Mineral Processing 2
ME 367	Strata Control	3	2	5	Introduction to Mining Engineering, Rock Mechanics 1

ME 368	Underground Surveying	3	2	5	Geodetic Survey and Astronomy
ME 364B	Elective Course 2	2	2	4	As shown in Table (7B)
Contact Hours of Level (3)		23	19	42	
ME 461	Survey Project	2	2	4	Geodetic Survey and Astronomy, Underground Survey
ME 462	Mineral Processing 3	2	2	4	Mineral Processing 2
ME 463	Mine Ventilation and Air Conditioning	2	2	4	Underground Mining Methods, Strata Control
ME 464	Mining Geology	2	2	4	Petrology
ME 465A	Elective Course 3	2	2	4	As shown in Table (7B)
ME 466	Project	-	4	4	
ME 467	Computer Applications in Mining and Survey	2	3	5	Computer Programming 2
ME 468	Mine Plant Design	3	2	5	Underground Mining Methods, Strata Control
ME 469	Rock Drilling & Blasting Engineering	3	2	5	Introduction to Mining Engineering, Rock Mechanics 1
ME 465B	Elective Course 4	2	2	4	As shown in Table (7B)
ME 466	Project	-	4	4	
Contact Hours of Level (4)		20	27	47	
Total Contact Hours		66	65	131	

Mining Engineering Department

Elective Courses Groups

Table (7B)

Group	Code	Course Name	Contact hours			Prerequisites
			Lecture	Tut / Lab.	Total	
1	ME 364A1	Mineral Analysis and Evaluation	2	2	4	Mineralogy and Crystallography, Petrology
	ME 364A2	Rock Drilling and Blasting Eng.	2	2	4	Rock Mechanics 1
	ME 364A3	Photogrammetry and its Applications	2	2	4	Geodetic Survey and Astronomy
	ME 364A4	Drainage of Water in Underground Structures	2	2	4	Fluid Mechanics
	ME 364A5	Map Projection	2	2	4	Geodetic Survey and Astronomy
2	ME 364B1	Road Planning and Design	2	2	4	None
	ME 364B2	Material Handling	2	2	4	None
	ME 364B3	Rock Mechanics 2	2	2	4	Rock Mechanics 1
	ME 364B4	Unit Operation in Mineral Processing	2	2	4	Analytical Chemistry, Mineral Processing 1
	ME 364B5	Modern Surveying Equipment	2	2	4	Geodetic Survey and Astronomy
3	ME 465A1	Novel Mining Methods	2	2	4	Rock Mechanics 1
	ME 465A2	Industrial Ventilation	2	2	4	None
	ME 465A3	Geographic Information System GIS	2	2	4	Computer Programming 2
	ME 465A4	Planning and Design of Open Cast Mining	2	2	4	Technology of Surface Mines
	ME 465A5	Solid Fuel Engineering	2	2	4	Thermodynamics Mineral Processing 2
4	ME 465B1	Tunneling and Underground Construction Engineering	2	2	4	Rock Mechanics 1
	ME 465B2	Mine Ventilation Networks Design	2	2	4	Mine Ventilation and Air Conditioning
	ME 465B3	Mine Waste Management	2	2	4	Risk Management and Environmental Eng.
	ME 465B4	Global Positioning System	2	2	4	Geodetic Survey and Astronomy
	ME 465B5	Industrial Minerals and Dimension Stone Technology	2	2	4	None
	ME 465B6	Chemical Processing of ore minerals	2	2	4	Analytical Chemistry, Mineral Processing 1
Four elective courses, each of 4 contact hours will be selected from among four groups of courses.						

Geological and Geophysical Engineering Department (GGE)

Bachelor Program Based on Contact Hours System

Table (8A)

Code	Course Name	Contact hours			Prerequisites
		Lecture	Tut / Lab.	Total	
BSM 113	Earth Sciences and Engineering	2	1	3	None
GGE 171	Introduction to Geological and Geophysical Engineering	2	2	4	General Chemistry
BSM 119	Analytical Chemistry	2	2	4	General Chemistry
MDP 122	Introduction to Materials Science and Engineering	2	2	4	Mechanics 1, Physics 1
GGE 172	Physical Properties of Rocks	2	2	4	Introduction to Geological and Geophysical Engineering, Physics 2
MDP 124	Properties and Strength of Materials	2	1	3	Introduction to Materials Science and Engineering
Contact Hours of Level (1)		12	10	22	
BSM 215	Sedimentology , Paleontology, and Stratigraphy	2	1	3	Earth Sciences and Engineering
GGE 271	Theory of Structure	2	2	4	Physics 3, Introduction to Materials Science and Engineering
ME 262	Plane Survey & Topography	2	1	3	Mathematics 4
ME 263	Geodetic Survey and Astronomy	2	2	4	Plane Survey & Topography
BSM 217	Structure Geology	2	2	4	Earth Sciences and Engineering
Contact Hours of Level (2)		10	8	18	
GGE 371	Geostatistics and Information System	3	2	5	Introduction to Geological and Geophysical Engineering, Math.5
GGE 372	Geology of Egypt	3	2	5	Earth Sciences and Engineering , Introduction to Geological and Geophysical Engineering , Sedimentology, Paleontology, and Stratigraphy
GGE 373	Soil Mechanics	3	2	5	None
GGE 374A	Elective Course 1	2	2	4	As shown in Table (8B)
GGE 375	Introduction to Concrete Structure	2	2	4	Introduction to Materials Science and Engineering, Theory of Structures

GGE 376	Introduction to Steel Structure	2	1	3	Introduction to Materials Science and Engineering, Theory of Structures
GGE 377	Instrumentation in Geological and Geophysical Engineering	2	1	3	None
GGE 378	Geophysics 1	2	2	4	Physics 1, Introduction to Geological and Geophysical Engineering
GGE 379	Underground Structures	2	1	3	Earth Sciences and Engineering, Introduction to Geological and Geophysical Engineering
ME 366	Survey Project	2	2	4	Geodetic Survey and Astronomy
GGE 374B	Elective Course 2	2	2	4	As shown in Table (8B)
Contact Hours of Level (3)		25	19	44	
GGE 471	Rock Engineering	2	1	3	Mathematics 4, and Introduction to Materials Science and Engineering
GGE 472	Geophysics 2	2	2	4	Physics 2 , Introduction to Geological and Geophysical Engineering, Geophysics 1
GGE 473	Foundation Engineering	2	1	3	Soil Mechanics
GGE474	Hydrogeology	2	1	3	Structural Geology, Introduction to Geological and Geophysical Engineering
GGE475	Project	-	4	4	
GGE476 A	Elective Course 3	2	2	4	As shown in Table (8B)
GGE 477	Drilling Engineering	2	1	3	None
GGE 478	Landslides and Slope Stability	2	2	4	Introduction to Geological and Geophysical Engineering, Soil Mechanics, Foundation Engineering
GGE 479	Earthquake Engineering	3	2	5	Introduction to Geological and Geophysical Engineering, Soil Mechanics, Civil Engineering, Geophysics 2
GGE 4710	Soil and Rock Dynamics	2	2	4	Introduction to Geological and Geophysical Engineering , Soil Mechanics , Rock Engineering
GGE476 B	Elective Course 4	2	2	4	As showing in Table (8B)
GGE475	Project	-	4	4	
Contact Hours of Level (4)		21	24	45	
Total Contact Hours		68	61	129	

Geological and Geophysical Engineering Department (GGE)

Elective Courses Groups

Table (8B)

Group	Code	Course Name	Contact hours			Prerequisites
			Lecture	Tut / Lab.	Total	
1	GGE 374A1	Ore Minerals	2	2	4	Introduction to Geological and Geophysical Engineering,
	GGE 374A2	Rock Blasting Engineering	2	2	4	Introduction to Geological and Geophysical Engineering,
	GGE 374A3	Remote Sensing	2	2	4	None
	GGE 374B1	Near Surface Engineering Geophysics	2	2	4	None
	GGE 374B2	Geochemistry Exploration	2	2	4	Earth Sciences and Engineering, Introduction to Geological and Geophysical Engineering
	GGE 374B3	Bitumen and Roads Pavement	2	2	4	Introduction to Geological Engineering
	GGE 374B4	Rock Magnetism				Physics 2
3	GGE 476A1	Seismic Stratigraphy	2	2	4	Introduction to Geological and Geophysical Engineering, Geophysics 2
	GGE 476A2	Petroleum Related Rock Mechanics	2	2	4	None
	GGE 476 A3	Reservoir Geomechanics	2	2	4	None
	GGE 476A4	Well Logging	2	2	4	Physical Properties of Rocks, Geophysics 2
	GGE 476A5	Reservoir geology	2	2	4	None
4	GGE 476B1	Engineering of Oil Reservoir and Groundwater Aquifers	2	2	4	Introduction to Geological and Geophysical Engineering, Geophysics 2
	GGE 476B2	Geological Engineering	2	2	4	Introduction to Geological and Geophysical Engineering, Soil Mechanics
	GGE 476B3	Site Geology and Investigation	2	2	4	Introduction to Geological and Geophysical Engineering, Soil Mechanics, Foundation Engineering
	GGE 476B4	Soil and Rock Improvement	2	2	4	Introduction to Geological and Geophysical Engineering, Soil Mechanics, Foundation Engineering
	GGE 476B5	Tunneling Engineering	2	2	4	Civil Engineering, Soil Mechanics , Rock Engineering

Four elective courses each of 4 contact hours will be selected from among four groups of courses.